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This magazine is a staff publication, and is not in any sense a medium for the expression of Governmental policy.

The object of its publication is to promote discussion, foster exchange of ideas, disseminate news of "family" interest and, through the encouragement of individual initiative, to strengthen the spirit of co-operative effort.

P R O G R A M M E

DISTRICT FORESTERS' CONFERENCE

	Hour	Subject	Presented by	Discussed by
Monday, Feb. 25.	9:30 A.M.	Stumpage Appraisal Cruising Methods.	Gibson	Bonney, Parlow, Andrews.
	11:00 A.M.	Selective Logging	MacDonald	Moore; Prowd, Bonney.
	2:30 P.M.	A Forest Reserve Policy	Parlow	Andrews, MacDonald, Haddon.
	4:00 P.M.	Relation of Slash Dis- posal to Reproduction and Forest Protection	Alexander (Coast) Prowd (Interior)	Andrews, Moore, Gibson.
Tuesday, Feb. 26.	9:00 A.M.	Standard Rates of Pay	MacDonald	Bonney, Parlow.
	11:00 A.M.	Effectiveness of Organ- ization Charts on Fire Control.	Stuart	Gibson, Moore.
	2:30 P.M.	Forest Protection Propaganda Methods.	Bonney	Parlow, Haddon.
Wednesday Feb. 27.	9:00 A.M.	Range Improvements	Haddon	Parlow, MacDonald, Moore.
Adjourn for meeting of Resolution Committee.				
Thursday Feb. 28	9:00 A.M.	Meeting to consider Resolutions.		
	2:30 P.M.	" " "	"	(continued, if necessary.)

Conference with Head Office Officials,
as per schedule supplied at Meeting.

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Monday, Feb. 25, 1924.

Proceedings opened at 9:30 a.m., when Chief Forester P. Z. Caverhill made a few opening remarks and invited the Hon. T. D. Pattullo, Minister of Lands, to formally inaugurate the Conference.

Since our last Meeting, said Mr. PATTULLO, another year has vanished into the vista of the past, and while that year had been one of the most active in the history of the Industry, there was every indication that the coming year would be equally good.

During the year we had had two rather notable events - the British Empire Forestry Conference, and the Conference at Ottawa, - and a great amount of benefit undoubtedly had accrued from both. Unquestionably, the Ottawa Conference should be productive of much closer co-operation between the Dominion and the Provinces.

In the deliberations of these Conferences, one point was outstanding - a point which was strongly emphasised by the Chief Forester of British Columbia at Ottawa - namely, that in the final analysis, in all our field work and work in the interests of Forest Protection, we come down inevitably to the great need for the general education of the public. That is essential if we are to make any material progress, and it is essential not only for the general public but also for the operator. We must make every effort to lead the operator a little further along, and always a little further along, in the interests of Forestry.

"I feel sure," said Mr. PATTULLO, in concluding his remarks, "that the work you will do this year will also be productive of much good, and I bid you heartily welcome."

The Chairman then called upon J. M. GIBSON, District Forester, Prince George, for his paper on -

STUMPAGE APPRAISALS AND CRUISING METHODS

It is doubtful if two years ago a paper on Cruising Methods would have had allied with it the subject Stumpage Appraisals. Conditions change and being progressive, the Branch, seeing the necessity of trying to arrive at correct stumpage values, introduced it to the staff and since its introduction district staffs and field staffs have been digging deeper after knowledge in order to base stumpage valued on an appraisal basis.

It might be well before dealing with appraisals which might be termed the result to discuss cruising which provides the substance for the appraisal.

The first step in any appraisal is to have a reliable inventory of the stock to be appraised. This in our case is furnished by the cruise, and in this connection it might first be well to discuss briefly the history of cruising in connection with the Forest Branch. My information in this respect has been gained largely from the older members of the service, and if incorrect I will appreciate your criticisms and corrections.

During the years 1912 and 1913, the cruising by members of the branch was largely confined to extensive reconnaissances of timbered areas. No special method of examination was used, each examiner doing the field work and making the report on his own system. More general cruising by the field staff commenced with the cruising of timber sales in 1914 resulting in the awarding of seventy-one sales. The growth of this particular work has been enormous, six hundred and seventy-one sales being awarded in 1922, and if the increase in other districts is similar to that in the Fort George District, 1923 will show a large increase over the previous year.

Until the advent of Circular A33, "Instructions for Timber Cruising", the method adopted in making the cruise depended largely on the field man's knowledge and previous experience. No uniform system was in vogue. Cruises were frequently turned in by rangers based on a visual and very often visionary estimate obtained by walking through the chance, the accuracy varying with the judgment of the individual. I know of one ranger who based his cruises largely on the cut per acre of adjoining areas. Fortunately in his district many of the stands were fairly uniform and no great inaccuracy resulted.

Following the instructions of this circular and further instructions from Junior Foresters, Assistant District Foresters, and District Foresters, cruising methods became much more uniform. These instructions were further augmented by the correspondence course in cruising and surveying conducted by the Branch during the winter of 1921-22.

The publication in September 1921 of "Instructions for Intensive Reconnaissance" although published I believe primarily for large field parties, proved of much benefit to all field men, and the methods outlined in it are now used I believe by all the interior field staff.

Systemizing the method of Forest Branch cruising has led to far greater accuracy and to much clearer reports. The accuracy come through using a method based on averages and eliminating guess work and the clearness in reports shows in improved sketches and detailed estimate by forties.

A more detailed discussion on cruising methods will be dealt with later and your attention is now requested for the consideration of the results obtained from stumpage appraisals.

The present system of stumpage appraisals was commenced in this service during the fall of 1922. I believe it was at first more or less regarded by the field men as rather asking for too much, and they were a little apprehensive of its application. When the idea was however thoroughly grasped the field staff became very much interested as it placed the reason why on stumpage charges.

Considerable improvements have been made in appraisals submitted by the field men, and I thoroughly believe this improvement will continue. Although the editor may think that discussions over the appraisals published in "Root and Branch" are not filling his basket, I can assure him that these same appraisals are keenly looked over and criticised by our field men.

Sometimes it may seem to the Victoria Office that our appraisals are inconsistent, but quite often changed values are the result of more complete information and when it is considered that at best many factors in an appraisal must be estimated, and that the idea has only been in effect about a year, I would consider that the appraisal work as far as it has come to my notices is very good.

In connection with field work since appraisals were introduced, field men have paid much closer attention to sizing up logging chances. When making a cruise points are noted which will effect the cost, the amount, type and location of roads is kept in mind, measurements of roads are made to check the cost of timber moved over them, and cost enquiries are always being made. One example of this might be noted; the number of skidways needed in logging a certain area is arrived at by dividing the amount decked in an average skidway of a similar operation by the estimate.

A big fund of information is being gathered by each ranger in his operations, which although often only of local use is of a definite value in subsequent appraisals of similar chances.

It is I believe largely the fact that this information is necessary in making up the appraisals which acts as an incentive to the field men in sizing up the chance.

In the effect of appraisals on stumpage price it might be interesting to quote the trend of Timber Sale prices from 1915 to 1922:-

Year	All Species	Fir	Cedar	Spruce	W. Pine	Y.P.
1915	80	95	1.05	71	77	
1916	96	1.00	1.16	72	1.69	1.74
1917	99	1.12	1.24	96	1.24	1.51
1918	1.18	1.32	1.36	1.02	1.04	1.45
1919	1.38	1.48	1.54	1.56	1.63	1.50
1920	1.84	2.04	2.23	2.05	2.06	1.37
1921	1.46	1.65	1.57	1.60	1.55	1.82
1922	1.39	1.43	1.66	1.46	1.93	1.47

In this statement only the main species are quoted, although the average is based on all species.

You will note the upward trend of prices with the boom year of 1920 with its abnormal stumpage prices at the time of abnormal selling prices and with the resulting depression only however bringing prices to the normal point in their upward trend.

Prior to appraisals being made on our interior sales I feel that the largest criterion of stumpage value was the distance from transportation. In some appraisals this still shows itself a determining factor, but appraisals have brought out points of comparison in chances which I feel sure ~~we were prone to overlook~~ before.

One large factor especially in small sales is the valuation of the necessary improvements. In tie sales this will vary from a cent to five and six cents per tie.

Another factor which seems to vary greatly is skidding and swamping costs on different operations, due usually to the density of the stand and the resulting heavy or light brush, and to the amount of down timber in the stand. As you will realize my basises or comparisons are based solely on horse logging interior operations.

One of the biggest factors in logging is transportation and the necessity of rehandling the logs. This will vary as much as three dollars when an operation skidding logs into a drivable stream a few miles above the mill boom is compared to an operation with a sleigh haul to a lake, booming and loading charges and a rail haul to the mill. Such a mill is not the economical one to handle the timber when there is available mills on the same lake to handle this timber. In cases such as this we have not been allowing the cost of rail hauling the logs in the appraisal. In logging costs efficient transportation is a bigger item than just plain distance, the old criterion.

The biggest step in appraisals I believe is in determining relative values. Our costs are an estimate, most costs before a job is done are, and we allow a factor of safety in our margin in the percentage for profit and risk. Our estimate in our appraisal is I believe much fairer both to the operator and to the Branch in determining stumpage values than the system of immediately jumping stumpage with increase in selling price.

One big safeguard in appraisals is the fact that all costs and values are relatively over the same period for there is but a small margin of time elapses between a boom in price and a boom in costs.

It seems to me that appraisals have lent stability to stumpage prices. They assist in preventing sales over areas on

which because of operating conditions, no margin for stumpage would be left, for if such a case now occurs the Branch is I believe justified in withholding the sale of the timber. Appraisals have also justified high stumpage prices for cream chances which I believe all operators will contend is correct.

As I mentioned in the beginning of this paper, appraisals are a comparatively new field in our work. When the idea was first given birth and the text received, I must confess that I read the text through three times before I even got more than a general idea of what it was about. Since then I have listened with much interest to discussions on the subject and still find that there is a whole of a lot to learn about it. The ranger is in the same position, the keener minds have grasped the idea most readily, and as far as my own staff go all are interested in it, and although some can make much better appraisals than others, they are all out to learn any new points in that work. One of our operators has offered to hire any of our men at four times their present salary if they can tell him what his logs are going to cost. This particular operator has run into unexpected weather conditions, necessitating extra handling of logs, and finds that his logs are costing far more than he estimated. This is cited as a case when a man of wide experience in logging finds unfavorable conditions greatly increasing costs and substantiates the contention that our appraisals based on costs of similar operations may fall down in particular cases but will fill the bill under average conditions. With field men example is often better than precept, and it would be most instructive and appreciated by the ranger staff if more sample appraisals were published for their information.

On sales large enough to be cruised by the ranger the appraisal should I believe be made by him. In other words I think that the appraisal should be made by the man examining the sale. If the appraisal is to be made by any one else, they should spend enough time on the area to be familiar with the conditions.

Appraisals take time, time to gather cost data, work it up, utilize it, the time taken in gathering information on sales of saw log timber for making the appraisal being far greater than the time spent in preparing a cruise report after the field examination is finished on the same area, and the limitation of size of sales below which no appraisal is required should I believe be seriously considered. In our district the staff have been submitting appraisals on very small tie sales. As this was based on the overturn method and they had the information at their fingersends, it did not require very much time, but in some cases I consider was entirely unnecessary.

On sales of less than 500 M. feet of saw logs or 10,000 ties, the price could I believe be fixed on comparison prices in the vicinity without an appraisal, but I believe an appraisal should be made on all large sales.

To again return to the cruising part of this paper I will first discuss methods used in the Fort George District for the cruising of our products. The methods in use although similar I believe to those in use in all Interior Districts are open to argument, and improvements in method will be welcomed. On all timber sale cruises of sawlogs and ties a ten per cent strip cruise is carried out. Operators buying this timber are charged for this cruising and are I believe entitled to as accurate a cruise as possible. In the field saw timber is tallied in two inch diameter classes and the cruiser estimates on each forty the log length class that each diameter class would fall in and uses this log length and diameter class in computing his volumes. There is no great variation of log lengths for the same diameter in the same stand, although it varies in different parts of the district.

In the cruising of tie timber, diameters by inch or two inch classes are again tallied, the cruiser checking with his eye to determine the number of log lengths in each diameter class. These log lengths and diameters are checked with the C.P.R. volume tables for ties to determine the number of ties of different grades. These tables are however a little conservative and it is the practice of the cruisers to check the grades of ties obtained in similar stands of similar diameter to determine the grades from their cruise. The cruise by grades has been found to check fairly well, and is a big factor in determining the stumpage price. A flat cull per cent is usually made on ties to allow for red rot based on the cutting on adjoining areas. The spruce is reasonably sound and free from hidden defect, the cull usually for churn butt being allowed by taking the diameter above the swelling. Balsam has been found to be very defective and a cull factor as high as 50% is used in some stands. The cull factor is based on information gained in the cutting of somewhat similar stands.

The cruising of poles in our Cedar in the Prince George District is almost a pure guess. The cedar is exceptionally defective and cull factors up to 75% are used. Many sound butted trees with green tops are found to contain centre rot and ring rot at seven and eight inch diameters rendering them useless as poles.

For field notes in connection with the cruising of our stands loose leaf forms 109 and 110 are very satisfactory, although I believe it would be a slight improvement if form 109A were divided into inch groups up to 14 inches to be used in tallying tie timber. The limited number of tie size diameters makes a more accurate diameter class tally necessary.

The Biltmore stick is used almost exclusively for measuring diameters which are tallied by two inch classes. I believe a certain amount of discussion has arisen over the feasibility of having volumes printed directly on the Biltmore scale. To do this would I believe first make necessary a Universal Volume Table for all species or a Biltmore stick with a much greater surface than the one at present in use. In interior timber with smaller trees,

but a larger number to tally on each strip, it would necessitate tallying the contents of from 100 to 200 trees on each forty which would require much more time on a cruisers part than putting down a dot in the proper column.

The adding of these volumes would also require more time than computing the volume of so many trees of a certain volume. It would have an advantage in making cull deductions but would be a very cumbersome method of cruising Interior Timber.

In cruising interior timber I consider that for accuracy and economy two men are essential. We should all strive to make cruises as accurate as possible. It is generally admitted that the 10% strip system for our particular district gives more effective results than any other. There are of course numerous errors to be guarded against, (1) The error in width of strip, (2) The error in estimate of diameters. (3) The error of misapplication of volume tables, (4) The error in unsurveyed country in strip distance. All these errors will crop up in either strip or circular plot systems, but with two men a quarter section or two miles or better of strip cruise can be covered daily and the errors liable to arise closely watched. With one man double that time is necessary, and the personal factor through working alone leads to greater liability of error. It has been found in our district that a compassman can be readily picked up to assist a ranger in a cruise, and I would suggest that every district allotment carry a small vote to be used for employing extra assistance for cruising. The sale lessee is charged with the cruising costs, so it should be our aim to give him the best value possible for his money.

... ..

This paper opened a wide field for discussion, remarked the Chairman on its conclusion. There could be no doubt that better results would accrue from the adoption of some kind of a system, even with all the imperfections which must necessarily be present than from the hit-and-miss methods which had previously been in use. He then called upon P. S. BONNEY, District Forester, Prince Rupert, to open the discussion.

Many interesting points had been raised by Mr. GIBSON'S paper, said Mr. BONNEY, and to his mind one of them was the question of two-man cruising, and the degree of accuracy which we should endeavour to attain in handling our Timber Sale examinations.

Conditions were totally different in the Interior and on the Coast, and they differed widely again in different Districts. In Fort George, for instance, it was established rule that cruises are uniformly based on a 10% cruise by two men, the result being that we secure data which is dependable and enable a more accurate appraisal to be made. On the Coast, as we all know, the cruising standard varies from an ocular one-man cruise made from a launch

for a Hand-logger Timber Sale up to a two or three-man party where conditions justify it. We have been following the practice in the Prince Rupert district, wherever possible, of getting from the applicant a compassman to assist, so that we have two-man cruises **except** in the small Interior Tie Sales where one man is sufficient.

As for the Cruising Stick against the "dot and dash" method of tallying, that question he thought divided itself into two parts, and must be determined by the conditions under which work was being done. On the Coast, the volume stick and direct cruising by direct figuring is more desirable, whereas in the Interior the volume stick would not be practicable.

Mr. Gibson mentioned an instance where an operator had offered to employ a Ranger at four times the salary the Service was offering if the Ranger could guarantee to tell him what the operation would cost. Of course, we all admit that we cannot appraise with absolute accuracy, but we do claim that our system of appraisal is a means of approaching within a very fair degree of accuracy.

One of the problems that we are up against on the North Coast is that there is no true local market, we have no basis on which to compare the value of the logs as there is a non-competitive market. What we are up against in Prince Rupert is the question - What is our true log value? If we take the Vancouver prices and correct that by deducting the cost of towing we still do not get a true value. It is plain that on the North Coast there is a purely local value, it not being considered as a competitor with the Vancouver market. At the same time, there is no local competition and the prices depend on a number of factors, one being how badly the logger needs the money. Prices vary from \$9 to \$17. for Spruce and from \$9 to \$13 for Hemlock.

The system we follow, is to take the value which is considered in relation to existing Vancouver values as a fair basis, quite irrespective of present values as obtained in the open log market.

We consider that the limited amount of valuable Crown stumpage has a future value which should be recognized in present appraisals.

The Chairman commented briefly on Mr. BONNEY'S remarks. Mr. Bonney's last point, he thought, would be found to be general throughout all the Interior districts and could no doubt be worked out by them in much the same way.

He then called upon A. E. PARLOW, District Forester, Vernon, to continue the discussion.

I quite agree with Mr. Gibson, said Mr. Parlow, that the appraisal begins in the field, and for this I am looking forward to receiving our revised Cruising Form. This should be of great

assistance in the initial examination, and it will give the Ranger the data that is wanted. The standard method, I believe, is the Ten per cent strip, and I favour two men except for very small sales; they will do the work in less than half the time and with greater accuracy.

We do not guarantee our cruises, but we must remember that the purchaser pays for the cruise, and is entitled to value for his money; that is to say, he has a right to expect reasonable accuracy. It should at least be a good enough cruise for the man to base his plans upon it.

Mr. Gibson says the appraisal system was at first more or less regarded by field men as asking too much, and I am afraid that I was myself one of the sceptics. Of course, the system was new and unfamiliar both to Rangers and Field Officers.

For instance, one of the first appraisals the Ranger at MERRITT was called upon to make was for four and a half million feet of Yellow Pine forming part of a large stand estimated at from three to four hundred million under various ownerships, but practically all one logging chance. The nearest mill was twenty-four miles away and the Ranger was faced with two alternatives (1) to base his figures on a small mill to be set up in the area with a truck haul to the nearest Railway point. This brought up the alternative question of the size of the mill and its life, and as the surrounding timber was on a plateau and could all be taken to the mill, the quantity would depend entirely on the mill owner's ability to negotiate the purchase. The other alternative was to make an appraisal on a Railway logging operation, which is probably the most efficient way to handle the timber. This would cover not only the four and a half million in this particular sale, but the four hundred million or so on the plateau. The General Manager of the Nicola Pine Mills employed engineers to estimate the cost of this railroad, paid a large fee for the work, got an estimate of sixty odd thousand for a part of the Railway and gave up the scheme for the present. The point I wish to make in this, that an appraisal of this sort is too much to ask of a Ranger. A technically trained engineer is necessary. We would, however, be justified in making a rough appraisal based on the data available, and putting an arbitrary price - say, \$2.00 or \$2.50 on the timber, or as I recommended in this case, seeing that the project was not definitely under way, the sale might be put off until there was a Railroad or a local mill in sight, when we would have more definite figures to work on.

The sending out of sample appraisals with "ROOT AND BRANCH" was a sound idea. They are read and discussed in the field with a great deal of interest. The use of the Manual has undoubtedly resulted in a more clean cut and detailed setting out and consideration of the various items that make up the logging and milling costs and arriving at the spread as a basis for determining stumpage value. The enormous amount of discussion and argument

over appraisals, resulting from the issuing of the Manual has in itself led to better and more intelligent work.

As for Stumpage, the increase should be conservative, that is to say, on a flatter curve lagging more behind the curve of current price of lumber, which in the nature of things fluctuates widely. Mr. Gibson says "all costs and values are relatively over the same period for there is but a small margin of time elapses between a boom in price and a boom in costs." Men go broke or make money. The average selling price is a weak point, and there is a tendency to use the current price, aided by the general impression as to whether it is high or low.

Mr. Barclay and Mr. Pidcock, I believe, have accumulated a wealth of data in connection with Royalty. Similar figures on Stumpage might be obtained from which to plot a curve covering a period of months or years, for a district in which similar conditions exist - e.g., the Yellow pine area in the southern Interior. This would give a sounder average selling price than the present method, and as even in a two or three year sale, prices of lumber are certain to vary greatly, the curve would be produced a short way into the future, aided by a study of its present direction, the causes known to be responsible for it and possible reactions in the near future.

There was another point raised by Mr. Gibson, namely, that for small sales where there are a number of similar chances; individual appraisals should not be required. It certainly seems a waste of time to make appraisals on each one. The Ranger is a field man and should not be overloaded with office work.

After all, the Stumpage Appraisal is not a method of ascertaining the actual value of the timber, but is based on the estimated spread between the market price of lumber and the cost of conversion, with present methods and present economic conditions. It does not take into account a replacement value. It is pointed out that the best estimates of cost may be very much out. Twenty per cent Profit and Risk is an insurance. I might cite the case which came under my notice last week where a small Timber Sale operator left 200,000 ft. of logs all ready decked in the woods, the Chinook having taken off all the snow, and a sleigh haul is necessary.

Sometimes even, a careful appraisal brings results which we know to be wrong, e.g. a cordwood sale shows a loss, but the material can be sold for .50¢ a cord. But unquestionably it assists to a very great extent in strengthening one's judgment.

The Chairman, in reference to the remarks of the previous speakers, said that we at Head Office are quite imbued with the idea of decentralization of control as much as possible. Of course the idea of Stumpage Appraisal is a new one, and while it is new the more checks we have on it the better. For instance, went on

the Chairman, the other day a stumpage appraisal came before him in which the field man had added the log over-run instead of deducting it, which materially affected his costs. That appraisal had gone through the District office, and through the Management Office, and had actually reached him before the error was detected.

By and by, no doubt, we will arrive at the time when we will not require these close checks, but for the present decentralization is hardly practicable.

The discussion was resumed by L. R. ANDREWS, District Forester, Vancouver.

In Vancouver, he said, they made a large number of small sales every year. In fact, the bulk of their cruising was the cruising of small sales, and most of these sales were sales of fractions and included large timber.

The question of the method of cruising has brought out in the Vancouver district the use of the volume stick - that is to say, of volume tables on a Biltmore stick. That has resulted from the nature of the work, which is mostly one-man cruising on small areas in big timber. The instructions contained in the Manual, of course, are necessarily based on the law of averages, a uniform method of tallying and a standard method of cruising. The law of averages, however, must have a basis to work upon. The Rangers in the Vancouver district have devoted considerable time to the development of the use of volume tables on the ground.

The Volume Stick, as a matter of fact, was mainly the work of District Forester MacDonald when in the Vancouver district, but other Rangers (particularly those who think about their work) have taken it up, and some of them have improved upon it, and the Volume Stick is what they use as a general rule.

Of course, there are a number of factors in that connection that are mainly of interest to the Vancouver and Prince Rupert districts. The system was tried out at Thurston Bay, where they took a forty-acre tract which the Rangers were required to tally both by the dot and dash method and by the volume stick method, and to total them up, to do the one in the field and the other in the office, to compare the results and draw their own conclusions; at any rate to get them thinking about it.

If it were possible to hold one of these schools every year, and actually cruise an area, discuss the methods, discuss the question of allowance for defect, etc., we would undoubtedly improve the quality of the cruising tremendously, and much more effectively than in any other way.

The few days spent at Thurston Bay did more good, he believed, than one could readily calculate.

They were particularly interested in the question of suitable volume tables to be put on the Biltmore stick.

With regard to appraisals, in the Vancouver district and on the Coast, the investment method is practically the only method they use; they had had only one experience of the over-turn method. They are trying now to evolve some method of taking time studies; heretofore they have been endeavoring to get their data from the operators.

Of course, we all know that any logger or any contractor in the logging business must go in on green timber to start with, and the appraisal he makes is based on judgment gained by experience. Unless our Rangers are prepared to go in with the cost of logging clearly in mind, their appraisals will be purely mechanical and worth little. I believe a good many of our rangers today are well qualified for the job, because of the years of experience they have behind them.

Time studies are impossible unless we put on special crews, but the Rangers instead of studying all the woods costs at once are concentrating on one item at a time, mastering that and then passing on to the next. By and by in this way we will have some fairly sound figures.

There is the question of equipment in the investment method. We use the plan of taking the cost of new equipment on all our sales, and charging a proportion of the investment during the life of the sale. This seems to be the only way. Second-hand equipment could be used, of course, or the man might have all his equipment on hand; but we are bound to ignore that possibility and base on new plant.

What troubles us to a large extent is the difficulty of apportioning an equitable allowance for the small fractions of timber as compared with the whole operation over which the whole of the equipment would have been charged.

In the matter of selling price, the Loggers Association in Vancouver publish weekly the actual sale prices of logs. It is not absolutely accurate, possibly, as when prices are good every one readily reports their sales but when they are weak they do not always report, which of course affects the average selling price and makes it come out somewhat high. Rangers soon get to know what timber sells most readily - that is to say, from what areas - and he uses that knowledge in his appraisals.

Mr. Mulholland sends out a bulletin on the average selling price, of each species for the month and for the preceding twelve months.

Reverting to the meeting at Thurston Bay, more was done there in the few days than could have been done with the men in a

year by any other method. They cruised their forty acres and visualised it afterwards as a 500 acre tract, and discussed it from all its angles on that basis, and the results were wonderful, good.

The Chairman interpolated a few remarks, in reference to those made by the last speaker. There could be no doubt, he said, that Ranger meetings tended to clarify the air. They were a fine thing and must be continued.

Hon. T. D. PATTULLO rose to remark that decentralization of control was impossible until we had attained to a greater degree of uniformity. In the North, appraisals were altogether too high as compared with the South. Representations had been made to him where distinct hardship was the result, and while he was not disposed to favor transactions in timber of a speculative nature, at the same time he did feel that where a man wanted a piece of timber for immediate cutting, the Northern operators should not have their appraisals based on the prices current in the South.

He regretted his inability to remain longer with the meeting,

R. C. St CLAIR raised the point as to how far we should go in the matter of guaranteeing our cruises. Indifferent cruising he pointed out might cause the operator to put up a considerably larger deposit than was necessary. The margin for Profit and Risk seemed to be the greatest difficulty whereas it should really be the least. Probably this arose from efforts to go too closely into it; \$2.00, \$3.00 or \$4.00 per M., as circumstances might dictate, was close enough.

The average costs, he thought, were not taken over a long enough period. They should be got over a term of years, so that we could build up our own figures from year to year. Apparently on small sales, we might be able eventually to set a uniform price. In such cases, he thought extensive appraisals were unnecessary.

Cruising by the volume stick did not appeal to him greatly, he went on, although undoubtedly it had its advantages.

F. D. MULHOLLAND claimed that the volume stick method showed the defect better than the dot and dash method. Mr. St Clair possibly attached too little importance to the value of judgment in cruising; personally he attached a great importance to it.

As for guaranteeing our cruises, he doubted if it would be possible to proceed that far without a good deal more expense than we were willing to incur at present.

In regard to the estimated selling price away from the Vancouver market, the question is affected by whether we wish to

centralize the industry or whether it is to be encouraged and developed generally throughout the Province. On the P.G.E., to apply the Vancouver price minus the cost of freight would bring them into the same class as much easier shows.

E. B. PROWD contended that cruising in Cedar Poles must still be regarded to some extent as guesswork, as we have not yet had the experience to reduce it to any degree of exactness. Local conditions had a good deal to do with the situation, of course, For instance, in Nelson they had a younger stand and their poles were less liable to top rot, and as a matter of fact the pole maker himself did not know whether he was going to get a pole or not until he had actually cut it. On that basis, a guaranteed cruise was obviously out of the question.

N. MOORE thought that Management had shown a tendency in the past to stick too rigidly to the Manual.

There were many factors to be considered, amount of over-run for instance entered very largely into appraisals. He knew of mills which had never been able to ship out their mill tally. He quoted some decidedly interesting figures in that connection, which figures had been given him in confidence and were not for publication.

As for guaranteeing cruises, the most careful cruises gave but little indication of defect, yet the defect might occasion a loss as high as 20%.

We cannot standardize on an amount for Profit and Risk. The measure of loss and risk depends entirely on the district. Climatic conditions vary too much, and we are bound to make allowance for that.

In each district, he thought there should be a minimum price set for certain classes of timber which at some time may show a loss. Hemlock and Larch, unless for ties, must show a loss, and each district should have a minimum stumpage for material of that class. They had done that in the Cranbrook district, and very often they were able to take up that loss with other material, such as Pine and Spruce.

G. P. MELROSE remarked that variations could be made from the procedure laid down in the Manual, if circumstances seemed to warrant it, and within reason. The Manual was simply a plan of campaign, and was not to be regarded as being a rigidly laid-down ruling, from which no departure would be permitted. But at the outset, we should adhere to it until everyone became more familiar with it.

The Cruising Form was in process of revision still, but would be ready shortly, he hoped.

Allotments for Compassmen to assist in Cruising had been available for each District during the past year, and would be available again.

The Stumpage Appraisals sent out with "ROOT AND BRANCH" were sent out solely that they might be criticised; that was the whole idea.

E. C. MANNING on the subject of two-man cruises; thought the general feeling was that we should aim at better cruising, but "Guarantee" he thought was hardly the word. We were hardly prepared to go that far.

Some men disliked the idea of going out single handed on a cruise; that had been his experience in the Interior. They preferred the two-man cruise. Of course, where the cruising was easier, the Ranger should be able to cruise small isolated patches, especially of tie timber.

He asked for some further data on cruising with the Biltmore stick, which was furnished by F. A. MacDONALD, who was the originator of the system. He had found that it was very much quicker to collect the information on the spot than afterwards, and the stick figures left on record a very clear idea of the size of each individual tree - a much clearer picture, really, than was possible by the dot and dash method, he thought.

In reply to a query, C. D. ORCHARD estimated that the actual work of compiling the data gathered by a party occupied about four per cent of the time.

Other desultory remarks followed.

P. Z. CAVERHILL in summing up, thought that the question of lower appraisals on small timber sales might be worked out later.

Vancouver were fortunate in having a log market from which to obtain current figures. Elsewhere, he thought the product itself must be the basis.

Mr. Parlow had complained that we were requiring our Rangers to assume the responsibilities of Technical Engineers. That was true - in fact, they must be more than that if they were to perform adequately the many functions of a Ranger. The Ranger must shoulder his responsibilities, and if we cannot get them all up to the same standard of efficiency in that respect we can at least work along that line.

To his mind, Cruising whether by the Volume Stick or by the dot and dash method should not be regarded as anything more than an approximation. Probably the stick was more accurate on the question of defect, but there was the visible and the invisible

defect both to be taken into account. Then there was the question of breakages - those, of course must be estimated.

It was questionable, he thought, whether estimates made on the spot or those made afterwards in the office were the more accurate. Of course, the Biltmore stick method ~~might force the men to~~ take a more careful view of the stand. It largely resolved itself into a question of the amount of time to be spent on the work as to which was the better method.

Mr. St. Clair's point of guaranteeing cruises was possibly misunderstood. It was not intended by Mr. St Clair that we should positively guarantee our cruises, but only that we should endeavour to make them reasonably accurate. For instance, were we justified in extracting the ten per cent deposit from the operator when it was found that our cruise showed much over the actual result.

Scaling was practically a similar proposition, and in Scaling we had fixed the margin of error at three per cent. In the case of a rescale being demanded, if it was found that the error did not exceed three per cent the rescale had to be paid for.

Mr MOORE had made two points which seemed to be diametrically opposed. In dealing with the Manual as a guide we must set a limit to the departure which would be allowed. The other point of minimum stumpage meant that if we fixed a minimum stumpage we tied ourselves down - was that desirable?

At this point Mr R. C. St CLAIR put forward the suggestion that, in order to accomplish the work which the Conference had before it, night sessions might be advisable, and Mr. MOORE favoured the idea.

There were many points to be discussed, went on Mr. CAVERHILL, for instance a The Standardizing of Cruising, Disciplinary Action - in which connection Mr St Clair had proposed a system of merit and demerit marks similar to that in force among the Railroad Companies. Then there was the question of Uniforms, of Standardization within the Branch. Uniformity was essential, if only for the compilation of the Annual Report. It was distinctly disconcerting to have data rendered by different Districts in different ways. Then there was the Standard of work to be done by the Field Officer. Logging Inspection Reports was another item.

C. S. COWAN suggested that Rangers should exercise greater care in the certifying of payrolls. We could not detect errors with the same facility here in Victoria as could the man on the spot and that was a responsibility, in any case, which devolved on him.

Loss of tools was becoming a serious matter. He thought something should be done to minimise this, even to the extent of charging the fire fighter with his equipment, and deducting from his paycheque for the value of tools carelessly lost, or not turned in.

Mr St CLAIR suggested that all this was beyond the scope of any one Committee to handle, and thought it should be spread over several Committees selected from those who were most immediately interested in the matters in hand.

Mr. ST CLAIR then assumed the Chair and proceeded to the appointment of the Committees.

On Cruising, Standardization within the Branch and Standard of Work.

Chairman : E. C. Manning.
Messrs Mulholland, Parlow and Gibson.

On Discipline, and Uniforms.
Chairman : A. E. Parlow.
Messrs Andrews, Moore and Wilkinson.

And on Forest Protection and matters relating thereto -
Chairman : C. S. Cowan,
Messrs Stuart, MacDonald and Haddon.

Other matters of Procedure were suspended to enable F. A. MacDONALD to deliver his paper on

SELECTIVE LOGGING

In presenting this question for discussion actual conditions as affecting the semi-wet belt of the interior will be delineated and the several problems therein laid before you for consideration. The position taken in this paper is influenced by close association with the local phases of the logging industry, as the district forester occupies a position midway between the idealist and the materialist; between the forester, whose aim is the scientific management of forests, and the logger whose object is profit, or, at least, a livelihood from the forest without thought for the future crop.

At the present time, in West Kootenay, White Pine and Cedar Poles of the medium to large sizes are in active demand and command fairly high prices. Sawlogs, other than White Pine, are being cut in decreasing quantities from year to year, largely on account of the falling off of the Western Canadian Market.

The forest type in the accessible portions of this district generally consists of Cedar, Hemlock, Fir, White Pine and Larch, the occurrence of the several species being in the order named;- Cedar being the most abundant.

As late as 1916 logging of the several species was practically parallel with their occurrence in the general stand but in 1923 the cutting, following the demand, had changed so that the order in volume scaled was Cedar, White Pine, Fir, Hemlock and Larch. Although Fir occurs twice as frequently in the stand, White Pine cutting exceeds the Fir by 20%. Cedar is five times as common as Pine yet the Cedar cut, including poles is thirty-three (33%) per cent greater than the cut of Pine.

Hemlock is three times as prevalent as Pine yet the cut of this species is only half as much as Pine.

Apart from actual figures it is well known that logging has followed the vagaries of the market and those products have been freely cut that found a ready market, while there has been a general falling off in the cutting where markets are not readily available or lacking altogether.

The districts where logging is most active have not materially shifted during recent years so that it may be stated that the figures for 1923 as to the origin of cut material will apply to that period covering the transition from clean logging to selective logging as now practiced.

In 1923 - 78% of the cut came from Crown Grants and Timber Licences; 22% from Timber Sales and Pre-emptions.

It is assumed that, insofar as Crown Grants and Timber Licences are concerned, the operators may choose what method and extent of cutting they wish and little or no control may be exercised by the Forest Branch. The cutting on Timber Sales however is controllable and may be regulated or denied altogether. It appears, therefore, that selective logging may be carried on at the owners pleasure on three quarters of the areas being logged.

The cutting of white Pine and Cedar poles from an area where these products constitute considerably less than half the stand will undoubtedly result in degradation of the next crop. This will be particularly true where hemlock and balsam occur frequently in the stand, as the shade from these trees would surely militate against any considerable reproduction of White Pine.

On 43 Timber Sales recently cruised White Pine shows only 28% of the entire stand of sawlog material. It will be understood that these areas comprise the most attractive sites for logging of marketable species, and the percentage of White Pine is away above the general average for the district. But even these tracts show that White Pine only occupies about one quarter of the forest cover and any logging which removes only the pine would leave conditions unfavourable for a subsequent restocking with White Pine reproduction.

The appraisals on these sales show a stumpage value for Pine as high as \$8.00 per M. and usually a minus value for the other species.

The practice has been to fix a minimum stumpage of \$1.00 for the inferior species and reduce the stumpage on Pine to take care of the loss, and this has resulted in Pine being sold at from \$2.00 to \$4.00 per M. If there were no other consideration than the net returns, I should consider that the Pine should be sold for selective logging at its indicated stumpage and the balance of the stand held for a rise in value, which is bound to come. Fir, Larch and Cedar are long lived species and twenty years hence, if the trend of prices in other timbered areas may be taken as a criterion, these species should bring a plus value on their own merits.

Another argument in favour of selling Pine from our stands is to be found in the prevalence of bark beetles and the imminent destruction of the species from blister rust.

At the same time it would not be forgotten that the White Pine in West Kootenay probably amounts to 500,000,000 feet of accessible timber. At the present rate of cutting this will last for thirty years. It is probable that in ten years all the Pine in this district will be affected by blister rust. If the whole stand could be salvaged before this occurs it would mean that the market would be over-supplied and the price, of course, would fall.

If the eventually predicted by the Blister men materializes there would seem to be no need to worry about another crop of White Pine, and any material salvaged will be so much to the good. If, however, blister and beetle can be successfully controlled, there is every reason to give much thought to the perpetuation of White Pine as being our most valuable forest product today and probably as long as it can be grown. The reproduction of White Pine depends upon an equal chance with other species in access to light, and mineral soil for the prolific germination of the seed. If given an equal start with other seedlings we have ample proof that it will hold its own or even outgrow the others on favourable sites. I recently examined an area of some 200 acres where the whole stand consisted of White Pine and Hemlock. The Pine had reached a D.B.H. of 18 to 22 inches in 114 years. The maximum diameter for the hemlock was 10 inches at the same age. There were however about five hemlock trees to one of white pine. Cutting on this area is, of course, confined to Pine. No provision has been made in the sale contract for disposal of the remaining hemlock, so that, in all probability, this tract will be given over to a pure stand of hemlock and, although a favourable site, will cease to produce pine.

This is a case where selective cutting is the only cutting possible, so far as merchantable timber is concerned.

It might be suggested that a broadcast burn over this area would eliminate the hemlock and put the site into condition for another stand in which a fair percentage of pine could be expected. The present revenue from this area will not exceed \$15.00 per acre so that no extensive preparation for slash disposal could be undertaken unless the Department were prepared to re-invest practically the whole income from the area in a more or less uncertain attempt to restock the site with pine.

From the silvicultural point of view, it is apparent that the selective logging of White Pine on the average site will result in the debasement of the stand and preclude the probability of any further restocking with pine.

Consideration must also be given to the effect upon the fire hazard. It is undoubtedly true that fires become more difficult to control and more liable to develop into serious conflagration as the quantity of inflammable material on the ground is increased and the stand opened to sun and wind.

It may be possible to pile and burn pine slash as created on an area, and it is desirable to do so where beetles exist, but in the present state of the industry the general opinion of the logger seems to be that piling and burning is not economically feasible.

The economic side of the question however injects further complications into the problem.

Throughout the pine district we have a population which is largely depended on the forest resources for their livelihood. The three main pursuits are mining, lumbering and farming. The mines are mostly spasmodic in operation and uncertain of revenue; the farms are mostly small and their produce is rarely sufficient to support the occupants. The result is that both farmers and miners must have their income supplemented by some revenue from the forest.

There are a large number of people who operate in a small independent way and produce poles, ties, cordwood or saw-logs, each item amounting to a large gross total. These people depend upon, for, and consider it their right to have access to Crown Timber. They operate without capital and expect a fair return for their labour. If, however, they are compelled to log an area clean, and produce stuff which is not saleable, their profit is locked up in that part of their output which is not marketable. The end to which they worked is therefore defeated.

If the population is to be supported, it appears necessary that conditions favourable for profitable employment must be afforded to them, for, after all, the forests are public property and, in the final analysis, the public will demand, and get, such administration of its own affairs as it considers to be advisable and necessary.

Whether the Forest Branch wishes or not, the time is fast approaching when Crown Granted timber lands and licences, which have been logged off, will revert to the Crown with all the silvicultural problems which can be conferred by an endless variety of logging and slash disposal methods.

The problems for solution then appear to be:-

1. How can the district be supported by the forests when only White Pine and Cedar poles are marketable, without selective logging?
2. How can selective logging for pine be carried on without degrading the quality of the stand?
3. How can the large footage of pine be conserved against the attacks of beetles and blister rust without some method of cutting along with adequate brush disposal?
4. If beetle and rust cannot be controlled, why should we not salvage as much pine as possible without any consideration of the silvicultural results?

Another and quite a different problem has arisen in the cutting of cedar poles.

The definition of merchantable cedar poles has up to the present time included any cedar tree which would make a 5 inch 20 foot pole. In fact our timber sale contracts call for utilization of tops to a minimum diameter of 5 inches. It is apparent that this minimum diameter was set because this was, until recently, the smallest size that was marketable, or, merchantable. In other words marketability was the measure for setting the standard of merchantability. If this were so, is there any good reason for denying revision of the standard, either up or down, as market conditions make major variations of a semi-permanent or permanent nature?

Over a period of three years now the market for 5 and 6 inch poles has weakened until the recession has reached the point where it may be said that such poles are absolutely unmerchantable. Large numbers of these poles are piled up in the various yards and are deteriorating rapidly. They were manufactured or bought at a cost far above the price that is being received for the small quantities that are occasionally sold.

The chief market for small poles has been the Prairie Provinces of Canada. Up to 1920 heavy purchases were made by the Governments of these provinces and deliveries were completed in 1921. Apparently the quantities bought were far in excess of their requirements as it is estimated that there are still half a million poles in their yards. The fact that this stock of poles is in the hand of the chief consumers would in itself indicate

that there will be no great demand from those districts for some years. Furthermore, I have been advised, there is being established at Calgary a plant for treating poles for prairies and eastern points, and it is proposed, through this plant, to furnish that market with Jack Pine poles in competition with the Cedar poles from Eastern B.C. Persons, who are qualified to judge, have asserted that, for short lengths, treated Jack Pine poles are at least equal to Cedar poles for strength and durability and can be landed at their ultimate destination at a price below the minimum price at which it would be possible to deliver poles from B. C.

It is well known that extensive areas of Jack Pine of pole size exist on the eastern slopes of the Rockies and tributary to Calgary. These areas carry a larger number of poles per acre than the very best Cedar stands in B. C. This factor enters largely into the costs of producing poles.

It is anticipated that there will be no market at all for small poles now. The United States market which has absorbed large numbers of 7"-30' and larger poles cannot use any of the small poles.

The local yards are heavily stocked at present with short poles left on their hands when the market collapsed. The method of disposing of these now presents a serious problem and, in any event, will entail heavy losses.

Under such conditions, which apparently will prevail for some considerable time, it seems that a change of standard of merchantability is imperative. It is therefore recommended that the top diameter specified in Timber Sales shall be raised to 7 inches for Cedar Poles, and the cutting of trees smaller than this shall be prohibited or discouraged. It is also recommended that operators on private lands be encouraged to leave all the small poles.

This question has been treated from the operator's side only. It is now purposed to show that the policy of leaving these trees for a short period of years is a good investment both for the operator and the Government.

A study has been made of areas where cutting was done seven and nine years ago.

Site No. 1 carried about 6 M. to the acre of sawlog size and consisted of a dense stand of Cedar 70%; White Pine 10%; Hemlock 5% and Fir and Tamarac 15%. The crown cover must have been complete. During the winter of 1916 75% of the saw timber and all poles down to 25' were removed, reducing the crown cover to half its former density.

The area is now being cut over again for poles.

The following is observed of the poles now being cut:

Average diameter growth at stump in seven years since thinning - 2.1 inches.

Average diameter growth in 5 years preceding thinning - .9 inches.

Average diameter growth in 10 years preceding thinning - 1.7 inches.

The increment during seven years after thinning is seen to be one and one quarter times the growth in the previous ten years.

2	poles	cut	7"	30'	would	only	have	been	5"25'	seven	years	ago.
1	"	"	7"	30'	"	"	"	"	5"20'	"	"	"
3	"	"	7"	35'	"	"	"	"	6"30'	"	"	"
8	"	"	7"	35'	"	"	"	"	6"25'	"	"	"
1	"	"	7"	35'	"	"	"	"	5"25'	"	"	"
3	"	"	7"	40'	"	"	"	"	6"30'	"	"	"
2	"	"	7"	40'	"	"	"	"	6"25'	"	"	"
1	"	"	8"	40'	"	"	"	"	7"30'	"	"	"
5	"	"	8"	40'	"	"	"	"	6"30'	"	"	"

The maximum increase in value was in 2 - 7" 40's where the difference is \$4.75.

The pole showing the least increase in value was cut into a 7" 30' worth \$1.75 more than the 5" 25' which could have been cut seven years ago.

The average increase in value of all poles examined is \$3.38 each, or 48 cents per pole per year.

Site No. 2 carried a stand of mature Spruce and Cottonwood up to 30" D.B.H. and small cedar. In 1912 the Spruce only was logged. 30 trees per acre were removed, and everything down to 14" D.B.H. cut.

Nine years later a pole operation removed 50 trees per acre of 35 and 40 foot poles.

There is now on the area 200 trees per acre :- Cedar 40% 3" to 8" D.B.H.; Spruce 30% 6" to 12"; White Pine 10% 6" to 12" D.B.H.; Balance Cottonwood. No windthrow from thinning.

An inspection of the stumps left in the 1921 operation showed the following:-

Average	diameter	growth	in	9	years	since	thinning	2.4	inches
"	"	"	"	5	"	previous	to	1.0	"
"	"	"	"	10	"	"	"	1.6	"

From this it appears that the growth in 9 years subsequent to the opening of the stand was one and one half times the growth during the ten years previous to the thinning.. Unfortunately the poles cut in this operation were removed and could not be examined for top diameter increase. It may safely be assumed however that, the site being more favourable than Site No. 1, equal, or greater increases incurred in this instance.

In looking into the question of income to the Province from pole stumpage it is to be noted that a fair percentage of the outstanding stumpage and Royalty accounts cover charges against stocks of small poles which cannot be disposed of either by the owner or by the Forest Branch where seizure has been made, and, consequently, cannot be considered as valuable security for the payment of the account.

Any policy of timber sale which would add to this condition would apparently be bad business. This is doubly true when it is considered that three quarters of a cent per foot is the **average stumpage on poles below 7" 30**, and is from $1\frac{1}{2}$ to 4 cents on the larger poles. In the case of the poles previously studied the increase in stumpage receipts for individual poles at $\frac{3}{4}$ and $1\frac{1}{2}$ cents respectively, over the seven year period would show the following;

Stumpage of pole if cut 7 years ago at 6" 25 - $18\frac{3}{4}$ cents.
" " " actually cut from this same tree 7" 40' 60 cents.

The price paid for 8"-40's averages around $2\frac{1}{4}$ cents. In this case where a 6" 30' would bring in only $22\frac{1}{2}$ cents seven years ago this tree when left to grow until the present time would bring in stumpage 90 cents.

This looks to me away beyond the returns given by any ordinary safe investment.

From the silvicultural point of view there is no apparent objection to the thinning of a stand of cedar poles. Cedar trees seed frequently, germination usually occurs in the autumn in which the seed is shed, and the seedlings establish themselves readily on practically any type of forest floor and in even the densest shade. The growth of the reproduction continues and the tree will mature under heavy shade. It would appear, therefore, that a continuous crop of cedar may be confidently expected from an area once stocked with this species. so long as there remains a cover of seed trees.

Once the area is logged clear the chance of getting a second crop would not seem so favourable as Cedar seeds do not retain their vitality for any great time. I am definitely in favour of selective logging for cedar poles from any desired stand, with the cutting of any pole smaller than 7" 30 prohibited.

Still another problem exists in the cutting of hewn ties. In this district the railways accept only Fir and Larch ties. Fir and Larch of the tie size are at that period in their life when the most rapid increment is made. Trees over tie size in a tie chance are usually scattered and are generally left. This will ordinarily insure that there will be a further crop of similar type. Slash resulting from tie making is considerable but fortunately Larch and Fir reproduction follow readily after a broadcast burn which is a satisfactory method of disposal after this type of operation. So long, however, as hewn ties may be cut from immature stands, just so long will our large areas of mature larch remain untouched. These stands, often nearly pure larch, are very extensive, and apparently larch is of little value as building lumber, but it is eminently satisfactory for sawn ties. The timber on these Larch areas is mature or nearly so and there is probably very little annual increment. In fact, it may be assumed that when the stand is mature, deterioration from decay and diseases common to mature timber, are already offsetting increment and will continue to do so until the stand is removed. This cutting of immature timber to ties when large areas of suitable mature timber are available will tend to bring about a condition where the mature timber will be lost through some one of the various hazards or become valueless through being overmature and at the same time we will have large areas with young growth of an indifferent quality where the most thrifty trees have been removed for tie timber.

It is therefore proposed that wherever possible, immature, rapid growing timber of tie size should be retained to gain full advantage from the increase in volume and operators should be encouraged to install small mills on those areas of mature larch which are most suitable for manufacturing into ties.

This completes the major problems in selective logging as they are seen in this district.

... ..

Opening the discussion on Selective Logging, Mr. St. CLAIR remarked that it was a very important problem in the wet belt of the interior. It was a problem that we should have a good deal to say on; it was at once a silvicultural problem, an economical problem and a protection problem. He called upon Mr. MOORE.

The conditions which obtained in Nelson, remarked Mr. MOORE, did not exactly parallel those of Cranbrook. He furnished further statistics, also of a confidential nature and not for publication, and passed on to a general discussion. They were overstocked in Cranbrook area with Fir and Larch. The operator desired only to cut the Pine and Spruce which were easily disposed

of. However, they had been insisting on the operators include the other species, and the result was that the operator was finding it difficult to make a profit, with a general depression in stumpage as a consequence. Fir and Larch was actually being sold at a loss.

On the other hand, if we would permit the cutting of the more desirable species, he did not think there would be any marked depreciation in the value of remaining stands.

Fashions changed in timber. Formerly Fir and Larch were in demand, but now they were finding it difficult to meet the demand for Spruce. Operators could not see far enough ahead to foresee what timber would be most in demand in the future.

During 1915, and 1916, when the market was good, one Mill cut White Pine exclusively, and it had been found that on those Licences the reproduction has not been effective. There was a strong growth of Yellow Pine coming up but very little White Pine. But where there has been clean cutting of Yellow Pine, an almost pure stand of Larch and Fir has resulted.

We should be very careful to cut to a diameter limit.

We find at the present time that there are other products cutting into the Cedar market, notably Long Leaf Pine. Jackpine is replacing the short Cedar Poles, and Jackpine in 25-ft poles gives 30% more strength and 5% longer life, so that shipments of Cedar poles are falling off.

In the Cranbrook district, he estimated the waste from tie chips alone might amount to twenty-four million feet. Personally he could see no need for hewn ties, the sawn tie is much cheaper, sells better, and leaves a bye-product. Axe ties, too, cut out the younger timber while the maturer stuff was left, which meant the depreciation of the stand and the creation of a fire hazard. Tie chips constituted a fire hazard for at least ten years.

The smaller operators would be affected, of course, but the smaller operators will have to go out of business anyhow in a few years as the timber becomes more inaccessible.

R. C. St CLAIR thought that possibly our returns might be increased by growing only axe tie timber, as the axe tie timber became marketable much faster than timber suitable for sawn ties.

E. B. PROWD remarked that conditions were very similar in Kamloops to conditions in Nelson unless for White Pine. Most of their products were minor products such as Ties and Poles. But a policy should be formulated in view of the Forest land which will ultimately bear future crops; of course, we had no control

over the alienated lands.

Mr MacDonald had recommended the holding of cedar for cedar pole production. In the Nelson district the cedar was what might be termed a middle-aged stand, say from 80 to 100 years old. In Kamloops, however, a great deal of it was in older stands, too old even for poles, and ruined by defect. In his own paper, he would go further into this question, and also into the slash problem.

He was glad to hear that the Jackpine was coming into its own as pole timber. Kamloops had a lot of it and it presented rather a problem. If the Jackpine market was opening up, the young Cedar stands would benefit.

In Kamloops they had no Larch but lots of Jackpine, and selective cutting he thought would be good business in the Jackpine stands, as the stands are over-crowded as a rule. And why hold the tie size trees when we were getting a good return from ties?

The diameter limit had been practiced a good deal in the Maritime Province but it did not seem to be a solution. Economic conditions did not permit of its working well.

C. S. COWAN expressed surprise that tie chips should constitute a hazard. He had not heard of that phase of the problem before, and was greatly interested in the possibilities it presented

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P. S. Bonney drew attention to the variety of operations from hand logging show to steam logging outfit and pointed out that all were more or less of the selective type. He was of the same opinion as Mr. MacDonald that the minimum top diameter to which we require cutting in the case of cedar poles should be increased from five to seven inches. He pointed out that tie operations on the line of the C.N.R. resulted in great waste and believed that selection cutting in this class of operation would result in better utilization if we can secure proper slash disposal, which we are not getting at the present time. He stated that he believed lopping and scattering would be sufficient disposal but that as now handled it is impossible to get the tie hacks to handle the brush. He suggested an additional charge of one cent per tie to be paid the tie hack for the disposal work and thinks this would solve the difficulty. In addition provision to be made in the contract for the collection of one cent per tie over and above stumpage to be refunded to the operator if slash disposal clauses are properly carried out. At present non compliance with slash disposal clauses means loss of the ten per cent deposit; but in small sales the sum involved is not sufficient to have much weight with the operators.

G. P. Melrose stated that on coast sales he had been told that taking out poles prior to further logging created too big a hazard and had been discontinued.

L. R. Andrews in reply to Melrose stated that the taking out of a few poles selected prior to further logging operations did not really create a great hazard. At some points on the P.G.E especially, the system was highly desirable. No market existed for the remaining stand along this line and a selective cutting of the merchantable products was the only class of operation possible.

F. D. Mulholland confirmed L. R. Andrews' statements as above.

R. C. St. Clair stated that he believed that selective cutting for poles ahead of further logging operations on coast operations was desirable. He agreed that, if the hazard could be controlled, the culling for large poles in the interior, leaving the smaller ones would be advisable. He stated further that he did not think we could decide the White Pine question on the basis of today's money return. White pine has always been one of our most valuable species throughout Canada and there was reason to think it would always be so. Therefore efforts should be made to perpetuate the species in B. C. Latest information regarding Blister Rust was that it could probably be controlled at a cost of one dollar per acre not oftener than once in five years. He also indicated some of the silvicultural problems a consideration of which must enter into any decision. Areas for cutting must be very carefully chosen, possibly as a result of a ten per cent cruise or better. Possibly only those areas carrying 40% or more of White Pine should be offered for sale reserving other areas until such time as species now showing a loss in manufacture will show a profit.

A FOREST RESERVE POLICY

Section 29 of the British Columbia 'Forest Act' 1923 provides that the Minister shall cause an examination of Crown Land to be made for the purpose of delimitating the areas of such lands which it is desirable to reserve for the perpetual growing of timber, and further - that the Lieutenant-Governor-in-Council may by Proclamation constitute any such area a permanent Forest Reserve withdrawn from the provisions of the "Land Act", and administered under "such conditions as the Lieutenant-Governor-in-Council may impose".

1. Definition. The purpose of Forest Reserves may be stated as - the fullest, rational use, for the present, as well as for the future, of lands unsuited for the production of field crops. The name "Forest Reserve" is in my opinion unfortunate. 'Reserve' conveys to most minds the idea of fencing off, or reserving from

use. A more suitable name suggested would be "Provincial Forest" which would avoid this misconception. The reason for which such forests should be set aside are roughly as follows:

- (a) Timber production.
- (b) Protection of Watersheds for irrigation, power, town, water supplies, prevention of erosion.
- (c) Grazing - such lands carry a great deal of valuable forage for stock. The grazing thereon is intimately connected with fire-prevention, silvicultural methods, etc., and as grazing on Crown Lands is administered by the Forest Branch, grazing lands, even where not at present bearing timber should logically be included in the forests.
- (d) Recreational uses - Camping, picnicking, etc., including the establishment and administration of Summer resorts, fishing lodges, etc. in suitable places.
- (e) Control of miscellaneous uses such as trapping, prospecting, hunting, etc.

2. Extent of Forests and rapidity with which they should be established. Areas should first be blocked out where pressing need exists for instance, -

- (a) For the protection of watersheds where communities are dependent on the run-off of water as in the Interior Dry Belt. This was the primary reason for the establishment of Forest Reserves in the Okanagan Valley; or to preserve town water supplies, e.g. the Aberdeen Mountain Forest Reserve covers the watershed from which the towns of Armstrong and Vernon draw their supply.
- (b) For a supply of tie material for Railways, as along the Canadian National and Grand Trunk lines. A constant fairly normal demand for Railway ties will always exist along these lines, and suitable areas of forest soil should be set aside to supply this demand.
- (c) To supply mine timbers. A large and increasing demand for this material exists, for instance at Princeton, Coalmont, Merritt and other mining centres. The material required is usually of small diameter, and lends itself to a system of forest management on a sustained yield basis with a short rotation. Coal mining is in its infancy yet in this Province, with large ore bodies roughly located but not yet being developed. The industry is certain to grow enormously, and as man has found no way yet, of taking out coal without putting timber under ground, provision should be made for taking care of not only the existing demand for mine timber, but of the larger demands certain to be made in the future.

The Provincial Forests should ultimately be extended to cover all Crown Lands in the Province that are non-agricultural.

It has been suggested, that as large areas in this Province lie above the upper limit of tree growth, or are rock or barren, Forest Reserves - or Forests should be confined to soils suitable for the production of trees. This would entail the fixing of a lower boundary, between the Forest and agricultural or alienated lands, and an upper boundary at the limit of tree growth. The objection to this is, that the upper limit of tree growth is irregular and variable, frequently the South and Westerly exposures will be bare of trees while the North and Easterly exposures are timbered at the same elevation. Many areas are now bare of trees that formerly were timbered, and may bear trees again in the future. The upper line would at best be a tortuous ill-defined boundary which could scarcely be fixed by a satisfactory legal description, and the surveying or marking of which would not be practicable even if it were desirable. Further, as there should be nothing in the Forest Regulations to interfere in any way, with the freest development of water-powers, extraction of minerals or any other use of the land, there would appear to be no valid reason for eliminating such areas of rock or barren from the Forest. In many cases these areas will provide good forage, and as mentioned above, Grazing being administered by the Forest Branch, their inclusion would be an advantage.

There is no need to embark on a policy of too rapidly classifying and reserving all the non-agricultural lands of the Province. The work should not be too far ahead of Public Opinion. The support of the people is essential for any such policy in a democratic country. An example of the danger of overlooking this, is the experience of the Dominion Forestry Branch in the Railway Belt in British Columbia. The dry-belt between the Fraser River on the West and Sicamous on the East, an area where agriculture is almost entirely dependent upon irrigation, was chosen for a beginning, and nine Forest Reserves were established. These Reserves were in existence two or three years before the great majority of people in the district were aware of the policy. Considerable friction and hostility to the Forest Reserve policy arose, principally through objection on the part of certain cattle-owners to the policy of protecting young timber growth at the expense of grass-lands, and culminated in numerous public meetings of protest, the setting of a great number of incendiary fires on the Forest Reserves whereby much valuable timber was destroyed, and in demands being sent to Ottawa for the removal of forest officials and the entire dis-establishment of all Forest Reserves in the Railway Belt.

Full publicity should be given to the policy of establishing Forests throughout the Province, the reasons for such Reserves made plain, and public sympathy and support enlisted. Much has been done in the way of arousing public sentiment for the protection of Forests from fire; this campaign of public education should be carried further to include the full scope of the Forest Branch's activities and rouse public opinion in support of a rational use of the Forests we are protecting.

3. Methods of delineating areas. Generally speaking there is enough data already available for the mapping out of Forest areas, without putting survey parties into the field. Existing maps show all alienations, and natural boundaries such as lakes, rivers, etc., and in many districts good topographic maps exist. Land classification reports on most areas that might be on the border line are on file, and this information together with that in "brain files" of field-officers of the Branch should define the Forest boundaries. These boundaries will not be fixed and immovable but may be altered from time to time by Proclamation of the Lieutenant-Governor-in-Council, any small areas required for agriculture or other uses being eliminated, and rocky and unprofitable areas, Crown Granted during 'boom days', being included in the reserve as they revert to the Crown. The present field staff should be able to handle all the work of determining Forest boundaries except in special cases, where it may be necessary to report on large areas of possible agricultural land.

4. Objectives of Forest Reserve Policy might be briefly summed up as:-

- (a) Timber - provision for national use of the present timber crop and the ensuring of future crops.
- (b) Protection Forests, - the maintenance and improvement of forest cover, for protection of watersheds, etc.
- (c) Recreational and other miscellaneous uses including game preservation, etc.

5. Rights already existing on Forest Areas. Certain rights and privileges now existing, must affect the Regulations under which Forest areas are to be administered, such as -

(a) Timber Sale Contracts, - these are all short term agreements, and all now existing will expire within the next two or three years. Any clauses considered necessary for the proper utilization of the present crop, or for the production of future crops, can be inserted in these contracts when they are drawn up. This class of rights should therefore not offer any obstacle to forest management, except the general limitations imposed by present day economic conditions. Contract requirements covering close utilization or silvicultural methods must be limited by the extra cost that the operator can carry and still produce lumber at a profit, or else the timber must be withheld from sale until altered conditions do make it possible to so operate at a profit.

(b) Free Use Permits. This right is already firmly established in certain districts, and appears to be spreading. The history of other Countries shows that once established, it is difficult or impossible to withdraw this right. The issuance of Free Use Permits is however at the discretion of the Minister, and any necessary conditions of utilization or silviculture may be made an

essential part of the Permit. I would suggest that an office fee of \$1.00 be charged for each Free Permit issued which would partly cover the cost of administration, and would tend to reduce unnecessary work by checking frivolous applications.

(c) Timber Leases or Licences vest in the holder thereof "all rights of property whatsoever in all trees timber and lumber" on the limit during the term thereof, but are held subject to such terms, conditions and Regulations as are in force at the time of the issue or renewal or at any time thereafter. Section 140 of the Forest Act gives authority for the framing of Regulations governing the standards of utilization, methods of logging, reservation of seed trees etc. "on any timber lease - hold or timber limit". The timber-holder is therefore in the position of having signed a blank cheque, it is necessary however, both from ordinary business honesty and also to ensure the cheques being honoured, that care be exercised in filling in the amount. Where the 'limits' are on land suitable for agriculture, the only steps necessary, are, to require the most complete utilization of the timber possible, and such treatment of the logging debris, as will best prevent fire loss after the operation. Where the land under the timber is 'absolute forest soil' special provision is necessary to ensure future forest crops.

This Province is fortunate above the other Provinces and States of this Continent in that, given a reasonable opportunity, logged-over areas tend to come back to commercial species instead of producing what Dr. Fernow used to call 'weed trees'. On many areas good volunteer reproduction exists in advance of logging, enough of which will survive the operation, to restock the area. Even on these areas however, sufficient seed-trees should be required to be left, to ensure a fair re-seeding in case the volunteer growth is destroyed by fire. Large, limby veterans, often with splintered or defective trunks may be chosen, these from their height and large branching crowns will throw a maximum quantity of seed, and being limby or of poor form, would produce mostly low grade lumber if cut, also in interior Districts, are expensive to log, from their size and difficult to handle in small mills. At the same time, it must be recognized, that the 'limit holder' owns this stumpage, and if he is required to leave seed trees, provision must be made to compensate him at a reasonable rate. The actual machinery for doing this would probably be the marking and tallying of all such trees on a licence or group of licenses, the fixing of a fair stumpage for the total so marked, by means of a careful appraisal by Forest Officers and provision for a refund from forest revenue, or a rebate of this amount from Royalty payable on the current operation. Authority for this should be provided in the Regulations.

(d) Mining Rights. Section 29 of the Forest Act provides that all lands within the Forest boundaries, with respect to the Mineral Act, the Placer Mining Act, etc. shall be subject to Regulations under this Act. As the true definition of a Forest

Policy should contemplate the fullest possible use of all lands within the Forest, there should be nothing in the Regulations to hinder, or in any way prevent, the taking out of minerals, or the necessary and proper use of timber materials for such a purpose. A regulation might be made requiring the holder of a Free Miners license to register before entering a Forest area, the name and address of each member of his party, region in which he proposes to work and probable period of trip.

(e) Grazing rights on certain Forest areas have been established through long use. Regulations should provide that where such use clashes with silvicultural policy, careful investigation into all the circumstances be made, to determine whether the area in question is better suited, or is more valuable, as range for stock, or for the growing of timber, in the general interests of the community, and the land allotted to the use so determined.

6. Indian rights or claims are for the most part clearly defined. Special cases will necessarily be settled by agreement with the Department of Indian Affairs, and could not be covered by Regulations under this Act.

7. Industrial operations will come under the general Regulations regarding standards of utilization, logging methods, reservation of seed trees, disposal of debris, etc. Special cases, such as smelter fumes damaging the forest might be prohibited.

8. Forest Investigation. The British Columbia Forest Branch must develop and improve its own silvicultural system, or rather, systems, applicable to the different conditions, tree species and economic conditions found in different parts of this Province.

Every Forest Officer in the field is constantly observing the results of present methods of logging, disposal of debris, etc. and consciously or unconsciously forming opinions about the problems that confront us. Most of this is however inarticulate, being retained on the before mentioned individual "brain file", and is at best not clearly defined or conclusive, and little or no experimenting and keeping of accurate methods has been done. I understand that good work has been done this past season by specially detailed men under Mr. Alexander. I would recommend that this phase of forest work be placed in the hands of a permanent organization, such as the Forest School at the Provincial University, with a qualified staff under direction of and paid by the Forest Branch, or else that a Forest Experiment Station or Stations be established such as those maintained by the United States Forest Service. The proper harvesting of our present timber crop, and the best methods of providing for future crops constitute our real problem - we are apt to lose sight of it in the pressure of current administrative work, - and we do not know enough about it. Working plans are not needed at this stage.

The time will come when instead of a 'nomadic lumber industry', cutting out, and moving on, we will have permanent mills, with capacity based on the ability of the tributary country to supply the normal annual cut. The foresters of that day, can prepare working plans in detail. Our problem is to provide the timber, in the greatest quantity and best species and quality, for them to administer and if we fail in that no efficiency in our present administrative work and in the collection of current revenues will compensate for the loss in timber material the Public of this Province will have sustained. Who is very violently interested in the amount contributed to the Provincial Revenues from timber sources for say the year 1915. In my opinion, the immediate establishment of a proper Forest Reserve Policy is a necessary step and the first step to that end.

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P. Z. Caverhill in introducing this paper read a resolution passed unanimously at the late conference at Ottawa, regarding the naming of Reserves. He stated that the title allotted to this paper was possibly unfortunate and that the above conference had suggested that such reserves should be known as "National" or "Provincial" forests as the case might be. Resolution No. 4 Read.

L. R. Andrews took note of the different view points naturally arising from experience in different Districts. Agreed that when in the Vernon District himself he had early recognized the necessity of the reserves now established there and advocated by Mr. Parlow. Pointed out that in some districts, as in the case cited, the problem was fairly well defined, while in others, especially on the coast it was a difficult matter to decide where to make a beginning. In the Vancouver District it had been decided that the two classes of areas requiring first attention were (1) Areas over logged or very intensively logged, (2) Virgin logging units. Reconnaissance has already been made of three over logged islands and all available information gathered with a view to establishing a Provincial Forest covering them. The present intention is, having established a Provincial Forest within the district, to make special regulations relating to exploiting of timber on it. These regulations will, if possible, cover also Licences and other alienated land within the forest as well as Vacant Crown Land. These regulations will cover such points as extent of utilization, securing reproduction, fire protection, etc. Sales within the area will be awarded only when the public interest demands it. He believed that through these Forests we will get a better grasp of cut, utilization, reproduction, etc. than has been the case in the past, and pointed out that this was highly important in the Vancouver District, the yearly cut being so great that that district was faced with more imminent danger of exhausting its timber supply than was the remainder of the province. At a rough estimate he placed the present supply as sufficient for not more than eighty years. Stated that the solution of the continued

supply problem lay in part in the establishment of Provincial Forests, more careful handling of our remaining supply and better statistics on which to base decisions. He thoroughly agreed, he said, with the policy of experimental stations.

F. A. MacDonald thought the boundaries of any Provincial Forest should be very definitely defined and in view of the fact that blazed lines are apt to become obscure in a few years suggested that painted signs should be established at intervals to delineate them for the general public. He thought a reserved area should include forest land only and suggested that the boundaries might be changed from time to time to include or exclude additional territory as further information was gained as to the capabilities of such areas. He did not agree at all with the suggestion that such reserves might be put under the University for administration and in support of his stand pointed out that the University would not be in session during the very season when studies could best be undertaken and that so far as permanency of that establishment went it would have no advantage over the Forest Branch. He believed that the establishment of these Provincial Forests, segregated and managed under special regulations would have a certain moral effect on the general public which would materially assist in their protection.

C. J. Haddon agreed that establishment of Provincial Forests is necessary. Reserves should be first set aside and policy determined from information gathered during determination of areas to be set aside, but he thought that quite complete information and data should be collected relative to a suggested area before the reserve was actually made. He believed that the rangers could collect this information and suggested that special parties be allotted to the work. Those parties could collect the data required quickly and many reserves could be made at once, which he thought essential. He stated that the areas under consideration would have to receive very careful thought from every angle. He cited as an instance the Horsefly country. This area is true forest land but at some future date will probably be placer mined resulting in the complete destruction of the timber stand on areas so treated. Grazing rights, in his opinion, should have secondary consideration, also all grazing land at present vacant should be made into Reserves. He agreed with the policy of establishing Experimental Stations.

E. D. Mulholland stressed the point that we must have the public support in any system of Provincial Forest established. Also that we should encourage private and corporation holding of timber lands believing that it will stimulate public interest in scientific handling of wood lands, e.g. the watershed of a city water supply might be given to a city to be controlled by the city in co-operation with the Forest Branch. He suggested also that logged areas might be given to the University for management in co-operation with the Forest Branch. The publicity given such undertakings would tend to educate the public to the point where

they would accept regulated forests.

N. Moore did not agree with Mr. Mulholland regarding the present attitude of the general public, but stated that the general run of people are already coming to really appreciate the importance of our forests and will accept a system of Provincial Forests under strict regulation.

P. S. Bonney suggested that as a first step toward the establishment of Reserves extensive land classification should be undertaken thereby making it possible to establish and delineate definite agricultural areas for settlement.

R. C. St Clair brought up the question of disposal of land above timber line. Such areas might be useful for parks or mining and would be difficult to eliminate. Their elimination would be desirable as we could not afford to get too great an area under reserve lest we antagonize public opinion.

The Deputy Minister was of the opinion that the parks might safely be left to take care of themselves. About two thirds of the province had already been asked for for parks and it was pretty certain that park areas will be adequate.

Chief Forester stated that the problem was a very big one and admitted that it was difficult to say where to start. For this reason it was, he believed, very important that some definite start should be decided on at this conference. He asked the committee in charge of resolutions on the subject to work out something definite as a starting point even though it were not more than a matter of a comparatively small area, or areas, for the immediate present, suggesting at the same time that any policy formulated should be progressive and provide for subsequent reserves in the near future. He believed that we should confine our attention to timber land only, not bothering much about agricultural or barren areas. He also believed that as soon as the reserves had been made regulations should be formulated for their administration in order that the public would realize that these were special areas and thereby strengthen our position in protection and regulation. He did not agree with Mr. Mulholland's suggestion to give worthless logged over lands to the University. It would entail a grant for administration to an institution already handicapped by lack of funds.

F. D. Mulholland stated that he had intended that sufficient lands should be given to be self supporting, there being some small revenue from these logged over areas.

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RELATION OF SLASH DISPOSAL TO REPRODUCTION AND PROTECTION

SOUTH COAST

The topography of this region varies from level plains and benches with deep sandy loam to precipitous slopes with shallow peaty soil and numerous outcroppings of rock. Pure fir forests occupy the plains and lower slopes where the precipitation is comparatively light, merging into hemlock, cedar mixtures on the upper slopes and moister sites. The main bodies of timber have passed the peak of their production being from two hundred and fifty to three hundred years old and are often even aged over entire watersheds which indicate some great disturbance such as fire or insect infestations in the past. Every area of virgin timber examined showed evidence of previous fires and in many places remains of dense fir stands were found where Hemlock and cedar now exist. The fir stands probably followed the very hot fires which removed the crown cover, while less severe fires that did not open up the crown sufficient for the establishment of fir would probably be followed by hemlock and cedar. Under natural conditions where fires do not occur and only small openings are made the future crop will be mostly the more tolerant species. It has generally been supposed that forest growth is a good indication of agricultural possibilities but this does not always hold for fir. The soil even where the topography would permit farming is usually a red sandy loam acid in nature and lacking in phosphorous and potash which makes it unsuitable for the production of agricultural products. A large percentage of the level areas and all the upper slopes will probably be used perpetually for growing forest products and unless our manner of controlling these areas keeps them producing our system of management fails. This necessitates the establishment of another crop after logging and its protection from fire and other agencies until ready for harvesting, and in this relation of slash disposal to reproduction and protection is most important

In discussing the effect of slash disposal it is necessary to give a brief outline of the fundamentals which underly the establishment of reproduction. A great diversity of opinion even in the minds of our own organization has resulted from general observation not based on carefully collected data. A preliminary survey of the South Coast and Vancouver Island during the past summer supplied considerable general information and demonstrated the general lines which should be followed in more intensive work to discover the principles which underly proper silviculture for the various combinations which occur throughout the commercial range of Douglas fir on the Coast. In most instances the summaries showed definite trends on which conclusions could be based, and although this work is preliminary our findings checked in exceedingly well with the results of intensive experiments carried out in Oregon and Washington for similar conditions.

Starting with the source of seed we have little data on the hereditary conditions which may be transmitted from the parent tree through the seed. However, stock grown from fir seed collected at high altitude does not show as rapid growth as those from lower altitudes. The low altitude seedlings when planted at high altitudes show great damage from frost. These factors are of sufficient importance to justify the growing of both low and high altitude stock to meet the conditions where planting is being done in Oregon and Washington. This may be more important when the lower slopes are logged and any seed coming in will have to disseminate from the higher altitudes where the timber is now considered inaccessible. The heart rots which are the chief causes of defect in our virgin timber are confined to the dead wood and do not effect the normal functioning of the trees. For this reason the selection of trees attacked by these fungi for seeding purposes should not be detrimental to the future growth. However, healthy thrifty offspring cannot be expected from stunted, deformed or badly weakened trees. The effect of slash fires through damaging and weakening seed trees has not been determined.

It has been proven by Dr. Hoffman, Director of Wind River Experimental Station that there is considerable seed in the forest floor distributed as follows:-

Depth	Hemlock and Cedar	Fir
0-2"	80-85%	40-50%
2-4"	10-15%	35-40%
4-9"	0- 5%	5-15%

The seed in the forest floor represents the accumulation of many years of that which has escaped damage from insects, fungi and chemical action, and the amount of each species should vary with the composition of the virgin stands. The surface layers contain the largest quantity and the freshest seed and any damage to this will seriously effect the succeeding reproduction.

The dissemination of seed from blocks of green timber has not been definitely determined. The studies have not isolated distribution from the factors of germination and establishment. If seedlings are not found on a certain area it does not necessarily follow that seed has not been disseminated there since, for establishment they require a favorable seed bed and favorable conditions for germination and growth which may come only periodically. However the indications are that blocks of green timber have a marked influence for six chains for fir, and fourteen chains for hemlock, and within these limits there should be sufficient seed distributed from the blocks of timber to seed the areas even in the event of successive fires.

Previous studies carried out by our Branch shows a 175 foot fir to have an effective seeding radius of $4\frac{1}{2}$ chains, with 70% of the reproduction within three chains. The studies this

Summer indicated that individual fir seed trees had a marked influence for two chains with a rapid falling off at the three, beyond which little effect was noticed. This work tied in fairly well with the previous studies. Dr. Hoffman does not consider that individual fir seed trees in Oregon and Washington will have a marked effect on reproduction on account of the large fir seed being destroyed by rodents. In Oregon and Washington individual seed trees are being reserved on timber sales as an insurance of natural reproduction in the event of successive fires. In some locations we may leave individual seed trees but this is an expensive measure where defective trees are not available as only those over 30 inches D.B.H. will withstand overthrow in logging and two per acre would be desired. This would only be practical on fairly level sites with deep soil.

The seeds contain nutriment to supply the young plants until they can, through the action of their roots and leaves, gather and manufacture the complex chemical substances necessary for growth. They do not require mineral food for germination which mainly depends on temperature and moisture conditions. Very few seedlings were found on pure mineral soil where the evaporation through lack of humus cover would be excessive. The dense reproduction found on the sphagnum moss at the edge of a shallow lake near Beaver Creek indicated that moisture is one of the main factors in initial establishment. There were over a million and a half one year old seedlings per acre but no older age classes were found. These were mostly hemlock and cedar no fir seed trees being near. This area shows that seedlings which do not establish their roots in some mineral soil the first season probably die. Although only $\frac{1}{2}$ inch in height above ground the plants have roots 5" in length which indicates the depth of vegetable matter they are capable of penetrating. Very often large numbers of seedlings are found along old grades but these are usually older than the logging and established when the grades were put through the green timber which afforded protection and favorable conditions. Broadcast burning of slash which destroys the vegetable matter and exposes the mineral soil will through creating unfavorable moisture conditions usually hinder germination. In order for 50% of the seeds to germinate and reach above ground fir cannot be buried deeper than two inches, hemlock $\frac{3}{4}$ inches and cedar $\frac{1}{4}$ inches. When buried to a depth of one inch practically no hemlock or cedar will reach the surface.

A slash fire even when the duff is moist may destroy the majority of the hemlock and cedar seed in the first two inches while a large percentage of fir may remain unharmed. Douglas fir cones will stand a temperature of 900 degrees for eight minutes before the seed is injured while the smaller cedar and hemlock cones will be heated through in thirty seconds. Rodents may bury more of the fir cones than those containing smaller seed, and since 80-85% of the hemlock and cedar seed is stored in the first two inches it is apparent that those systems of slash disposal which result in the least damage the forest floor will

leave the greatest number of potential seedlings in stored seed and that broadcast burning will increase the percentage of fir but a less dense stand will result. The amount of young growth from stored seed following burning will depend on the amount of seed which escapes injury and this is largely influenced by moisture conditions of the forest floor.

An average of the number of seedlings established on unburned areas is shown by the following table which is based on percentage of the total of each age class for the first five years after logging.

SPECIES	1st year	2nd year	3rd year	4th year	5th year
Fir	38	33	21	6	2
Hemlock	26	12	25	29	8
Cedar	5	19	45	21	10
Others	69	16	5	5	5

This shows that Douglas fir establishes most rapidly. Hemlock establishes slower and cedar is slowest. The other species which include Western white pine and balsam show rapid regeneration after cutting. The more rapid establishment of fir may be due to more food being stored in the larger seed which enables it to force its rootlets more deeply into the soil in search of moisture than the smaller seeds of the other species.

This enables fir to resist drought where hemlock and cedar could not exist. The mortality among the more shallow rooted species on exposed sites is enormous the first year and these species may require the formation of a nurse crop before any large amount can survive. It has been found that Douglas fir seed germinates very well after being stored for three to four years in the ground and some remain viable for eight years; hemlock and cedar germinate after two to six years of storage. The seed in the forest floor has accumulated from several crops and since fresh seed germinates more readily than older the establishment may be extended over considerable period. Also any disturbance which destroys the surface layers will destroy the fresh seed and probably delay germination. Seeds which are buried too deeply to sprout may have the covering removed by erosion sufficient for germination. The extended germination may also be due to an inherent quality in the seed or dissemination from green timber. The studies on rate of establishment show that burning if attempted should be carried out soon after logging otherwise it will be done at great expense to young growth and detriment to the future stocking. Burning was found to delay the establishment of reproduction for about three years. This may be partly caused by the fresh surface seed being destroyed leaving only the older which is slower to germinate or by the removal of the slash and debris which affords protection to the seedlings. The work carried out also shows that the possibility of an area restocking cannot be definitely determined until several years after logging or burning.

The effect of broadcast burning on natural regeneration varies with the following factors:-

Site Conditions.
Species in virgin stand.
Supply of seed.
Condition of forest floor.
Advanced reproduction.
Amount of debris.

(1) Site conditions. On the deep soils where the pure fir type is found sufficient seed becomes mixed with the soil through logging to ensure satisfactory reproduction when broadcast burning is carried out at the proper time. Where the soil is of a shallow peaty nature characteristic of the hemlock-fir-cedar mixtures little seed can become mixed with the soil to be protected in this manner as the fires often burn to rock and make satisfactory natural regeneration very doubtful. When the forest cover is removed on steep slopes erosion is an important consideration and the only practical method of stabilizing the soil is through the development of vegetation. The slash which exists after logging aids in holding the soil until seedlings and herbaceous plants can develop and broadcast burning would be detrimental.

(2) Species in Virgin Stand. The amount of reproduction following slash fires will depend on the percentage of fir in the virgin stand. Since slash fires may destroy practically all the hemlock and cedar seed in the soil capable of germination we can scarcely expect satisfactory reproduction from this source on areas burned over where only a small percentage of fir existed in previous stand. If twenty five per cent. of the stand is Douglas fir the amount of stored seed should only be twenty five per cent. of the amount in a pure fir stand and the density of fir reproduction should be proportional. The work this year showed that satisfactory natural regeneration from stored seed in the hemlock-fir-cedar mixtures is very doubtful where the slash has been burned. In the pure fir type (80% fir) with deep soil sufficient seed will escape injury if burning is done when the ground is moist to ensure satisfactory stocking.

(3) Supply of Seed. On extensive clear cut areas where the succeeding crop of young growth must come from seed stored in the forest floor very hot fires which destroy this seed will make satisfactory natural regeneration impossible.

Where the areas are within six chains for fir and fourteen chains for hemlock the areas can be expected to restock from this source even in the event of successive fires. This suggests the encouragement of logging by alternate settings both from a protection and silvicultural aspect. This system should be enforced on our timber sales where practical and in some places the reserving of crown timber which subdivides alienated

land would be advisable particularly where it could be profitably logged at a future date. It would be advisable to have the blocks of sufficient size to justify future removal. Where individual seed trees are left they aid in stocking the area. Broadcast burn will usually kill most of the trees at present left on the cut over areas. It must be remembered, however, that often a tree may appear healthy for as long as two or three years after fire only to succumb at last to the injuries received. Even where trees are killed in the late summer or fall the seeds in the cones may mature. The leaving of individual fir seed trees as an insurance of natural regeneration is an expensive measure where defective trees are not available as only those over 30" inches D.B.H. would resist overthrow in logging and at least two per acre would be desired. This would only be practical on fairly level sites with deep soil.

(4) Condition of forest floor. The condition of the forest floor is one of the most important factors influencing the effect of broadcast burning on succeeding reproduction especially on clear cut areas such as exist under our present system of logging. Those fires which occur when the surface layers are moist will be followed by denser stands than where they are dry. In the spring the slash dries from the top down resulting in the surface layers becoming highly inflammable while the soil is still moist and the slash at this season can be destroyed with least damage to the forest floor. In the fall the slash moistens from the top down and when it is safe to burn the top layers may be less inflammable than the lower. Only under exceptional circumstances can satisfactory restocking from stored seed be expected after hot summer or fall fires. In the spring the surface layers of the slopes with shallow peaty soil dry out more rapidly than the benches where most of the debris accumulates and when the slash becomes sufficiently dry to burn on the benches the shallow peaty soil of the slopes may often be consumed to rock. However, the damage can be minimized by starting the slash fires on the upper slopes over which they will burn when less intense.

(5) Advanced Reproduction. The advanced reproduction which escapes injury in logging and the trees left near the margin of settings where the high lead system becomes ground yarding will aid in rapidly forming a crown cover. The advanced reproduction is mostly the more shade enduring hemlock and cedar and the amount usually varies with the type of virgin stand being least in the pure fir forests. This suppressed growth shows remarkable recovery when the crown cover is removed. The scattered trees and advanced reproduction represents many years of growth which will be destroyed where slash fires occur. However, the broadcast burning through the destruction of the advanced reproduction which is mostly hemlock and cedar will increase the percentage of fir in the second crop and since advanced reproduction is less numerous in the pure fir forests less will be destroyed in this type than in the fir mixtures.

(6) Amount and distribution of slash. The present systems of logging leave an enormous amount of debris which affords a certain amount of shade and shelter for seedlings but in some places covers the ground too completely for their establishment. The amount of slash varies with the degree of utilization and when it becomes economically possible for the smaller material to be removed, the problem of slash disposal will tend to solve itself. The slash in the fir mixtures is usually distributed sufficiently to allow the establishment of satisfactory reproduction and on the areas examined broadcast burning was not found to be a silvicultural benefit except in the immediate vicinity of spruce trees where a large amount of debris accumulates.

Erosion. The coast region is of comparative recent origin and in many places the accumulation of soil is very light. The forest cover has prevented erosion but its removal presents a serious problem. The usual method of controlling erosion where the expenditure is justified is to construct barriers which temporarily stabilize the soil until vegetation, which affords the permanent protection, can establish. The slash which remains after logging tends to hold the soil preventing the washing out of seedlings and this aids in their establishment. Thus on steep slopes where erosion would be a serious factor, any destruction of slash will be injurious from this viewpoint.

The area cut over on the Coast is annually increasing each year and as our activities advance we more and more upset the balance of nature which may result in very serious insect infestations. At present we have what appears to be a serious outbreak of *dendroctonus pscutosuga* in the neighborhood of Jarvis Inlet. There are also other infestations of various kinds on the Coast and in our slash disposal we must consider the entomological aspect.

It is difficult to determine from the percentage of the various species which come in soon after logging what the ultimate mixture at maturity will be. Any deductions we make must for some time be based on the principles underlying the growth and development of the various species. Although the percentage of fir in the mixture shows a decrease on unburned areas compared with burned the percentage of fir should increase as the stand becomes older due to its more rapid growth and its resistance to stagnation where crowded. On the other hand I do not consider hemlock and cedar undesirable species and the desirability of producing Douglas fir is debatable since it will be mainly used for saw material. With the rapid growth resulting in wide annual rings it must be considered that with short rotations a much inferior product will result than that which is being cut from our virgin two hundred and fifty year old stands. Concerning the yield of the various species we have no reliable data. The hemlock being suitable for pulp manufacture will probably be utilized more closely than the fir which will be used for saw

material and this factor may offset the value of any increased increment through more rapid growth.

Fire protection depends mainly on fire prevention and fire control and in discussing the subject I will consider these two main factors separately.

The object of fire protection is to prevent loss and since 84% of the damage in Vancouver District last year was caused by operation fires it is apparent that in the operations lie our most serious problem, 75% of the number of fires were due to other causes but these only accounted for ten percent of the damage. This shows that we have the fires from causes other than operations fairly well under control.

The inflammability of forest materials is the most important factor which controls the fire hazard, and great inflammability is a result of low relative humidity. Strong winds, steep slopes and intense heat from burning material are factors which will increase the rapid spread of fire after the material has reached a certain degree of inflammability but regardless of wind, slope or heat any fire will soon die down and remain in the smouldering stage or go out if the relative humidity of the air becomes high. Thus unburned slash is no more inflammable than an open area with dry grass or weeds. The moisture content of dead grass, ferns moss and fire weed varies rapidly with the moisture content of the air while twigs and larger material show a greater lag behind the changes in humidity. The hottest fires will occur when the moisture content of both the air and material is least while a rise in the moisture content of either will decrease the hazard. Since the periods of low relative humidity are usually of short duration the small debris, through more rapid response to moisture changes, may present a greater hazard than the larger material. A slash fire which removes the small material should temporarily at least reduce the fire hazard.

Most of our operations fires will originate in unburned slash irrespective of our policy of disposal. Operators usually fell considerable timber ahead of the yarding and even though the slash is burned every spring a one side show yarding a forty a month will have by July at least forty acres of slash and often considerable felled and bucked material around the donkey through which a fire must spread before reaching the area where the slash was previously burned and fires which cannot be extinguished when they are small will become so intense that control will be very doubtful under similar climatic conditions when they have spread to the areas on which the slash had previously been burned. Again if fall burning is practiced at least six months accumulation of unburned slash will exist on the operation during the months when the fire hazard is usually greatest. Thus with operation fires the policy of slash disposal except along railways will not effect fire prevention.

In the control of forest fires the amount and distribution of the slash is important. Where the slash is scattered less intense fires will develop than where the inflammable material is in close contact. The heat developed by a fire is proportioned to the amount of material consumed and the rate of spread depends to some degree on the draft created this being greatest with hot fires. Thus the control of fires on clear cut areas where the slash has been burned should be less difficult than on areas where a large amount of debris exists. The hazard can only be materially reduced by a very hot burn which consumes most of the inflammable material as areas will reburn over and over so long as there is food for the fires, the severity depending more on the moisture content, than the amount of material. This explains why a fourth fire may be hotter than the third.

An area of young growth is a smaller fire risk than the area of ferns and dead weeds. Burning delays the establishment of reproduction by about three years, and reduces the amount, and hinders the rapid establishment of a crown cover. However, a clean well stocked stand is a lower fire risk than one with a heavy accumulation of debris on the ground as a crown fire will not start unless there is sufficient fuel beneath to burn and heat the needles to the inflammable point. On areas where a large number of trees left standing are killed by slash fires the hazard will be increased through the creation of snags and the prolonged accumulation of highly inflammable material during the period of their overthrow. We have no data on disintegration through fungus to show the rate of breaking down of slash into a less inflammable mass.

To accomplish the object desired by broadcast burning to best advantage it is necessary to determine before cutting the policy of brush disposal to be pursued. If burning is to be attempted we should prepare for it at the time of felling and all trees which would be killed by the slash fires and all snags should be felled. Precaution should be taken to keep the fires from spreading into green timber either by establishing fire lines, starting fires in the uphill side or burning when the humidity is such that fires will not run in green timber. The fire must be of sufficient intensity to consume the bulk of the inflammable material in order to aid materially in fire control. In summing up the relation of slash disposal to reproduction and protection the main points are:-

1. That broadcast burning increases the percentage of fir but a less dense stand will result.
2. That broadcast burning will make satisfactory natural regeneration very doubtful in clearcut hemlock-fir-cedar Type on shallow soils.
3. That satisfactory reproduction can be expected after broadcast burns in the pure fir type on deep soils where burning takes place when the forest floor is moist.

4. That satisfactory stocking cannot be expected on clear cut areas after fires which occur in the summer or fall when the forest floor is dry.

5. That logging by alternate settings and the leaving of seed trees will ensure natural regeneration in the event of successive fires.

6. That areas where broadcast burning is to be practiced should have all standing material except selected seed trees felled before burning.

7. That the effectiveness of broadcast burning on protection depends on the condition under which it is carried out and it is very doubtful if the benefit ~~derived~~ from this method as carried out in the past has justified the cost.

RELATION OF SLASH DISPOSAL TO REPRODUCTION AND FOREST PROTECTION IN THE INTERIOR OF B. C.

The problem of efficient slash disposal is one of several calling for early solution in order to remove the menace to timber supplies and ensure continuous forest production. In discussing it we must not at any time lose sight of the ideal towards which all Forestry practice should tend, viz. sustained yield. That no progress has been made in the solution of the problem is not inferred, for the fact that a mere mention of the question usually brings out a host of remedies is in itself an evidence of progress.

This discussion will be confined to conditions and types found in the interior of the Province, coast conditions having been dealt with by a former paper. The Cranbrook, Nelson, Vernon, Kamloops, Cariboo and Fort George Districts are involved and as all these districts have something in common, so far as timber types and logging methods are concerned, it is desired to cover the whole field, even though references to local conditions obtaining in the Nelson and Kamloops Districts may be emphasized because of the writer's more intimate knowledge of these two sections.

The economic factors of market demands, logging methods local industry requirements, revenue production, etc., as indicated in Mr. MacDonald's discussion of Selective Logging, all heavily contribute to the complication of the problem of slash disposal. It is, however, generally agreed that until such time as an economic solution is made possible through close utilization and consequent elimination of the waste issue, and to a large extent that of slash disposal itself, it is imperative that all administrative bodies bend their energies to working out slash disposal methods best suited to various regional forest types. Just here

it may be encouraging to note that in Eastern Canada and the United States the consensus of opinion, based on investigative work by various agencies, already indicates a partial solution to the problem brought about by the existence of wider markets and concentrated population, particularly in the pulp and paper industry, which in turn mean cleaner logging and reduction of waste after logging. We in B. C. can therefore look ahead to the day not far distant when this province will undoubtedly be a large source of supply of raw material for the pulp mill, and with corresponding increase in population and local demands for forest products it is logical to infer that slash disposal will then be a simple matter. Any general policy of brush disposal of a lasting nature cannot therefore be worked out at the present time, but ample provision must be made to secure the safety of our timber resources from both the protection and silvicultural viewpoints, pending the time when the problem is simplified.

Agreed that slash disposal is necessary to reduce the fire hazard and to remove feeding ground for bark beetles in some cases, also to make room for reproduction, the question as to methods and costs is of paramount importance.

The three recognized methods are fire, decay and utilization. As mentioned above, utilization in the interior as it is at present exists cannot enter into the discussion. There remain then fire and decay methods. It is for us to choose the method which can most cheaply remove slash and debris as soon as possible after logging, bearing in mind the cost, which must be a direct charge on present stumpage values, in addition to such points as reduction of the fire hazard to the safety point, injury to remaining stand, interference with forest floor and seeding conditions, and elimination of breeding ground for insects. In most cases it is found that a reduction of the fire hazard to the safety point meets the silvicultural requirements. By safety point is meant that measure of slash removal permitting reasonably successful control of fires on cut-over lands during the fire season, for it is conceded that no method of slash disposal will entirely eliminate fire hazard and in addition to this a stand once cut over by any method of logging increases the hazard over that of uncut green timber though exposure to the action of the sun and wind. (See U. S. Forest Service Report on the Problem of Slash Disposal in Western White Pine stands of North Idaho - 1921.)

The decay methods, in which brush is brought into close contact with the ground, may consist of lopping only, lopping and scattering or lopping and piling. This method is the cheapest and has many advocates, but objections can be raised to it; e.g. prolongation of extreme fire hazard, limitation of application, interference with regeneration, and the invitation to bark beetles epidemics. Besides cheapness, however, there are good reasons for the practical application of this method at the present time in the interior. In those portions of the various interior districts known as the wet belt where, owing to economic conditions giving

rise to selective logging, it would seem to be the most practical scheme until such time as the method of piling and burning, if desirable, can be established. With selective cutting more or less confined to the actual needs of local industry and to small units the quantity of slash in any one place is limited. Timber holders are not as a general rule prone to dispose of only certain classes of merchantable timber from their holdings and the slash areas will therefore occur mainly on alienated lands being brought under cultivation and on small timber sale units which latter in many cases take in small parcels of Crown stumpage adjoining or nearby settled areas. The practice of lopping only as a slash disposal method on larger sale units or timber holdings is not advocated, but if used in combination with piling and burning at points of greatest hazard it should be satisfactory.

It is realized the above conditions apply mainly to the more recently settled areas such as in those parts of the interior where railroad transportation has become available within recent years. Operations involving White Pine as the species taken in sawlog size complicate the problem, but with this species comprising on an average of from 7% to 10% of the stand it would appear that lopping and piling of the tops should effectively meet the present situation.

Ultimately slash disposal methods will have to be worked out for the wet-belt when market conditions make possible a closer utilization. The question of undesirable species, such as hemlock, and particularly the question of ridding the stand of fungus ridden trees of this species, is one which will require some study in order to preserve a productive condition of the stand. U. S. Forest Service Studies of the problem in the White Pine type of Idaho and Montana would indicate that the silviculture requirements of the stand should be met at the time of removal of merchantable timber. This involves the removal of defective hemlock and white fir as well as resultant slash by one of three methods, viz:

- (1) Combination of girdling with falling and piling and burning of brush.
- (2) Falling and piling and burning brush.
- (3) Clean cutting and broadcast burning.

The last method is to be used with caution. Where there is a large percentage of hemlock and fir the areas are to be withheld from sale and the problem passed on to the future. (See Journal of Forestry Oct. 1923, for full discussion of this question.)

It is apparent that we in B. C. can with profit keep in close touch with results being obtained in the White Pine type, as conditions obtaining therein are similar to those in wide areas in the interior of this province.

In the plateau and Rocky Mountain regions located in the Cariboo, Fort George and Cranbrook Districts, also the higher portions of the Vernon district, where Lodgepole pine predominates the decay method of slash removal is indicated as the most satisfactory because of shallow soils and deficient soil moisture. Broadcast burning after clean cutting would undoubtedly bring in even-aged stands of Lodgepole but soil damage would evidently be too severe and ultimately barren lands would result. At the same time these stands are required as a continuous ground cover in the interests of water-shed protection. Lopping and piling of the brush would therefore appear best suited to these regions, but experimental work is required to arrive at a definite policy. The question of Bark beetle epidemics in Lodgepole may ultimately require the application of a fire method such as piling and burning.

Burning of slash either broadcast or after piling has been practiced for a number of years, particularly the former because of the cheapness of the method. In recent years however there has appeared a decided objection to broadcast burning east of the Cascades, even on lands suited for agriculture, because of the established fact that this method does not effectively reduce the fire hazard and from a silvicultural aspect is not generally applicable. In fact this method apparently has a limited application in a proper system of forest management in the interior of the province.

Piling and burning of slash with all the variations as to details of the operation, such as time relation to actual logging, would seem to be the most efficient method of reducing fire hazard, and at the same time meet silvicultural requirements in certain types. Expense is the most outstanding objection to this form of slash removal.

Considering interior conditions, there are three broad regions where piling and burning is indicated as an efficient method of securing a reasonable degree of safety from destructive agencies, mainly fire, and at the same time provide for continuous forest crop production. One of these is the Yellow pine type of the Vernon, Cariboo and Cranbrook Forest districts, also small sections in Kamloops and Nelson districts, where investigation of beetle damage has practically decided that slash must be piled and burned in order to keep down losses in merchantable timber from their activity. The benefits accruing from a lopping and scattering of slash with respect to regeneration are more than offset by resultant damage to remaining stand from beetle attacks. The use of range in this type assists greatly in the control of the fire hazard and were it not for beetle infestations it is possible that burning could with advantage be largely dispensed with. The other two regions are the Fraser basin and the Northern interior. In the former area we find rapidly developing industrial activity in the Spruce stands. Here it is we may expect first development of the pulp and paper industry and therefore early

attention must be given to a settled policy of slash disposal. The climax type will undoubtedly be spruce and balsam, lodgepole pine being present over the entire area as the result of fire. It is quite probable that experimental work in this region, which I believe is to be undertaken very shortly, will prove that piling and burning cannot be adopted as a settled policy. but looking at the situation as it stands at present lopping of tops alone or broadcast burning can only lead to heavy damage to standing timber when the cut-over areas have reached larger dimensions and accidental fires occur. It may also be that a system of cutting, such as the compartment method, can be adopted to minimize the fire risk and ensure future crops. From information received it appears that unsatisfactory results have been obtained on the east slope of the Rocky Mountains in Alberta where efforts have been made by the Dominion Forestry Branch to secure seeding in of Spruce after lopping with adequate slash disposal. The silvicultural requirements of our Spruce stands will therefore have to be worked out in conjunction with slash disposal.

The combination of fire and decay methods can with advantage be applied where only portions of the cut-over area are exposed to fire risk above normal, such as along railroads, public roads, and main haul roads. This means piling and burning adjacent to lines of travel and lopping over the remainder of the area. Cost is reduced by this method while the most serious hazard is reduced.

In the foregoing you will note only high lights of the problem have been touched and details of the pro and con for the various methods of slash removal have been avoided to a large extent. As foresters you are all familiar with these details and what we mostly require is data on which to work out general policies suited to interior conditions. With this in hand there remains the important item of cost, also to be obtained by actual experiment. When proper methods to fit the varying conditions are decided on and reliable costs are available the stumpage appraisal on timber sales will make due provision for cost and contract conditions provide full directions as to disposal of slash. This sounds well on paper, but when it comes to securing results on the ground difficulty arises. Eventually it would seem necessary to collect from the operator either in cash or labor the amount allowed for slash disposal and under take the work as an administrative duty, particularly on large sale units.

Before opening a discussion on the cost question there is this point worthy of thought. Many operations on timber licenses and alienated lands are taking place with little or no provision for slash disposal. Section 109 of the Forest Act provides for it, and undoubtedly action can be forced. Any policy of systematic slash disposal must therefore be extended to timber licenses and Crown granted timber land in order to secure desired results, for in the main these areas together with non-agricultural areas in the right of the Crown will form our future forest

land. Lands acquired for settlement purposes will, until such time as logging thereon is completed, also require special attention from the fire hazard viewpoint.

Cost Studies in Slash Disposal.

Since cost is the chief factor in the problem it deserves special consideration. In northern Idaho White Pine type it is calculated by the U. S. Forest Service that from a forest protection viewpoint alone expenditure for slash disposal up to \$1.00 per M is justified, to say nothing of the benefits accruing from a silvicultural aspect, which latter cannot be expressed in actual dollars and cents. Piling and burning or forced burning are the methods used, and the work is carried out by co-operative agreements in timber sale contracts. Proper supervision of disposal work is rated as important as the method used.

In order to secure cost data fitting local conditions in the Kamloops District special studies are being made this winter. In most instances the work of handling the slash is being done by the field officer working alone and actual time required is tabulated in relation to the unit output. To date the work has covered cedar poles, sawlog and tie operations with studies in lopping, piling, and piling and burning. From field notes already submitted the following averages have been worked out:

1. Lopping and scattering of brush in a sawlog operation follow-sawyers. Fir-spruce type, open stands, clean bottom, light under-brush of willow and alder and medium slope. Snow from 6 to 8" in depth, weather moderate with occasional light snow falls. Piling and hewn ties also cut to secure close utilization. Scattering of brush confined to limbs which did not fall to the ground when lopped. The main stem cut off at 4 inches diameter after clearing branches. The stand was 60% fir and 40% spruce.

A total time of 15 - 9-hour days is covered in this calculation which indicates a cost of lopping, with scattering where necessary, averaging 5.7¢ per M board feet, considering only actual time involved in slash disposal. 45¢ per hour rate used.

This operation is in the vicinity of Swift Creek and data secured should fit average conditions on the lower slopes of the Fraser basin type.

One acre has been marked off which cut out 32 M board feet where slash is to be piled after skidding and burning attempted with a Hauck torch. Reports are not in to date. Another typical quarter acre is to be piled after skidding is completed and to be burned in the spring.

2. Lopping and scattering in a cedar pole operation, 10 days to 3 weeks after poles were made. Cedar-hemlock stand near

McMurphy in the semi-wet belt. Light underbrush, Hemlock and Cedar reproduction medium density, 8° to 16° slope, N. E. exposure. Snow 6" - 12" deep on ground and 3" - 6" on brush. Most of poles skidded.

A time study of 24 hours, 23 minutes, actual work shows a cost of .075 of one-cent per lineal foot at the rate of 45¢ per hour for a 9-hour day.

In the same operation lopping and scattering immediately after making of the poles shows a cost of .07 of one-cent per lin. ft., a figure slightly lower than in the case of delayed action.

Where sawlogs were cut out of the base of the cedar trees the calculation was based on board measure scale of the whole tree and cost of lopping and scattering averaged 9.4¢ per M. board feet. Poles were partly skidded, but logs remained.

Lopping and piling of brush after makers was also tried out where both logs and poles were taken from the same tree. The bark from poles was included in the piling. The average cost per M. log scale including poles works out to 29.6 cents.

Lopping and piling, including barks but omitting log scale from the calculation, shows a cost of 42¢ per lin. ft.

The above figures are rough averages but may be taken to represent a cost close to the actual expense in pole and saw-log operations in the types studied.

Further studies are being carried on in various classes of operations and under as many different conditions as possible in order to strike a fair average cost for winter logging in this district.

Below there is given the costs of piling and burning on two sales in the Larch Hills Forest Reserve of the Dominion Forestry Branch supplied through the courtesy of this Branch. The operations consisted of hewn tie and cedar pole products, burning being done by Ranger labor and piling by the operators. On the two areas the following averages are worked out:

Piling	--	28.30¢	per	M. B.M.
Extras	--	9.75	" "	" "
Burning	--	<u>4.50¢</u>	" "	" "
TOTAL:		42.55¢	per	M. B.M.

Detailed report of this work is in my hands for anyone wishing to study it.

The Dominion Branch also conducted an experiment in

piling near Notch Hill from Dec. 14 - Dec. 29, 1923, the results of which are briefly as follows:

Douglas Fir type. Elevation 1690 ft. 10 M per acre. 16" - 40" D.B.H. utilization. Reproduction 20 - 35 years old. Logs ran 4.08 to the tree and 9.9 to the M. Brush was piled after skidding. 232 trees involved yielding 866 logs scaling 87,247 Board feet. 143½ man-hours consumed. Cost based on \$3.00 per day without board.

Cost of piling - \$53.81 or 61.7 ¢ per M. Spring burning estimated at 4¢ - 5¢ per M, making a total disposal cost of 66.6¢ per M. or 22% of swamper's wages.

These costs compare favorably with those of the U.S. Forest Service and it may therefore be concluded that piling and burning in the interior of this province can as a general rule be held to a figure well under \$1.00 per M. even in the most difficult shows.

Let us now review our present day position in regard to the problem in so far as it affects interior conditions. Only in our Yellow Pine stands have we definitely concluded that slash must be taken care of by piling and burning and this because of the probable depletion of the source of supplies through beetle damage and utilization within a few years. In the other types we feel that some form of slash disposal must take place to avoid wholesale damage, not only to existing stands but also to future crop prospects, but owing to lack of data we hesitate to institute clear cut policies and therefore apply methods which may or may not be along the best lines. Each year sees added acreage to our logged areas with increasing fire risk. This means either ever-increasing patrol cost or the diversion of a portion of the money so required to reduce the hazard. The source of the funds needed is the same in either case, i.e. the public purse. In turn the timber resource contributes heavily to the general revenue.

No matter, then, how the problem is solved, either by burning or decaying systems, the present harvest should supply the expenditure.

Out side Canada and the Pacific North-west states, the modern tendency is to decry fire as the means of removal of slash in the North American forest regions. The problem is, however, simplified by diversified industrial development and more concentrated population. In the interior of B. C. we have a more complicated problem and must view it from different angles.

In conclusion it is therefore my considered opinion of some years standing that to place the work of slash disposal on a proper footing we require well established experimental stations under independent administration to answer such questions as:

1. What systems of slash disposal are best suited to the various forest conditions to be found?

2. What will the cost be?

In addition a Departmental policy will be required to decide as to how cost is to be met and as to responsibility for carrying out the work. In the meantime we should carry on in securing such disposal as the various conditions indicate and in the interior require at least lopping of all brush, with burning after piling in cases of bark beetle infestations and where extremely hazardous situations arise.

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Discussion postponed until Tuesday.

Committees Appointed:-

Stumpage Appraisals and Cruising Methods.

Chairman :- Gibson, J.M.
Bonney, P.S.
Parlow, A.E.
Manning, E. C.
Andrews, L.R.

Selective Logging.

Chairman :- MacDonald, F.A.
Prowd, E.B.
Bonney, P.S.
Melrose, G.P.
Moore, N.

Forest Reserves.

Chairman :- Parlow, A.E.
MacDonald, F.A.
Mulholland, F.D.
Haddon, C.J.
Orchard, C.D.

... ..

Tuesday, Feb. 26, 1924.

Proceedings opened at 9.20 a.m. R. C. St CLAIR in the Chair.

J. M. GIBSON opened the discussion on "Relation of Slash Disposal to Reproduction and Forest Protection in the Interior of British Columbia."

He thought that Pulpmills were hardly likely to concern themselves very greatly with reforestation problems or indeed with anything beyond the getting out of cheap logs. He thought this had been shown on the Coast.

He favoured a fixed policy in regard to Spruce-Balsam types. This was the industrial type of the North. He had noticed a tendency to leave the Balsam, which did not tend to a reproduction of Spruce.

Some types of operations in the North, in the Jackpine country, where there were a number of settler-operators, cut everything that they could use, whereas in other cases selective cutting was practiced with beneficial results where the stands were more even.

He agreed with Mr. PROWD in regard to broadcast burning. The broadcast burning of Spruce did not tend to reproduction so far as he could see, whereas where nothing had been done in the way of slash disposal the reproduction was fairly good. Some operators were interested in the slash disposal question, either from the view of Protection or from the view of its assisting their operations. Others again did not feel that the stumpage allowed a sufficient margin for the cost of slash disposal. Then again a man might be working in an area where there was a large accumulation of slash from other operations to which the slash disposal clause did not apply; he did not feel disposed to do much in the way of getting rid of the slash from his operation in that case.

R.C. St CLAIR asked Mr. GIBSON, in reference to operations where spruce only was being cut, did he think that the time had come when some sort of regulation was in order to require them to cut the Balsam too, and to dispose of the slash in some way?

Lodge pole seemed to be bringing in Spruce in the Prince Rupert district. Did that apply also in the Prince George district?

In the Eastern Provinces, 40¢ per M. was the estimated cost of burning in the Spruce-Balsam area.

J.M. GIBSON thought that in places in the Prince George district there was a little Spruce coming up in the Jackpine. In other places the stand was mixed and it resolved itself into a question as to which would be the more economical species to perpetuate. The Spruce, of course, was more difficult.

E. C. MANNING spoke of the accumulation of slash left by the Public Works Dept. along the right of way.

C. S. COWAN pointed out that if this was so, it was very largely the fault of the Districts themselves. The PUBLIC WORKS Dept. had been approached on the point and had declared their willingness to co-operate. Reports were asked for from the Districts as to accumulations of slash, but no reports had been received until it was too late to take any action in the way of securing authority for the expenditure by the PUBLIC WORKS Dept., consequently nothing had been done. This was the fault of the District Foresters themselves, really, and certainly not of the PUBLIC WORKS Dept.

There was a growing tendency, remarked G.P. MELROSE, to deprecate the effect of slash disposal from the purely Forest Protection viewpoint. He was not himself convinced that slash disposal was an unmixed blessing.

He disagreed that the Pulp Co's would pay little attention to silviculture. The modern tendency was all the other way. Companies were beginning to look to the future. He thought that with their Technical staffs, they were more likely to develop along these very lines.

Lopping and scattering was good, as the decomposition was very rapid.

Said P. Z. CAVERHILL, After all, both Forest Protection and Silviculture were merely means to an end, namely the production of a new crop of timber. If Forest Protection required slash burning and slash burning is going to destroy the chances of a future crop, as in some places it does, then slash burning must be regarded as a wrong procedure.

C. S. COWAN pointed out that all he had contended was that slash burning did certainly decrease the hazard, not that it was the only safeguard.

L. R. ANDREWS took occasion to compliment J. L. Alexander on his paper, which he had appreciated very much. At one time there was a prejudice in favor of broadcast burning among Yellow Pine, a theory which had since been exploded.

On the Coast, slash disposal by broadcast burning had been favoured from the Silvicultural standpoint, but his experience did not tend to confirm this in toto. He had not found that controlled broadcast burning eliminated the fire hazard in all cases nor could he see that these areas reproduced any more readily.

It used to be thought that Broadcast burning tended to the reproduction of the most desirable species, but as a matter of fact natural conditions had more to do with this than the mere preparation of the seed bed.

Seed beds might prepare the soil for Fir, but if the many other conditions were not in evidence, the burning alone would have no effect.

He was inclined to think that the value of Broadcast burning was overestimated.

For instance, we might think today that Fir was the most desirable species, but may we not change our ideas as time goes on? Conditions in the future may make some other species more desirable. Hemlock today is regarded as an inferior species but it may be that in fifty or sixty years hence the principal industry on the Coast may be the Pulp mills, and in that case Hemlock may be the preferred crop.

Some people maintain that in burning slash we not only destroy the hazard but we also prepare the seed bed and release the seeds imbedded in the forest floor so that there is no need for seed trees. He could not endorse that theory, however. His experience did not indicate that such was the case. He had extracted seeds from the Forest Cover, only to find that they were mouldy. Hemlock and the like were to be found on top as a rule, and the Fir perhaps five inches down. How long would the seeds remain capable of germinating when buried to that depth in the ground?

He would be inclined to hesitate a good deal before depending on that source for a crop.

Broadcast burning has not been a successful medium of reproduction. In North Vancouver they had an area that was hard to explain. The soil had been burnt red, and still there was a fine reproduction. Where did the seeds come from? There were no seed trees and certainly there were no seeds stored in the soil. The seeds must have come from a distance. He did not question but that with satisfactory conditions seeds would travel miles. There was no one governing factor, but hundreds.

To his mind it was a debatable point. If fire was kept out of slash for say five years, he figures the hazard remained practically the same. Utilization was getting closer and closer and there was a growing tendency to take out everything.

He favoured logging in blocks, on a checkerboard pattern. That would enable burning to be done, after which seeds would be distributed from the standing timber in the untouched blocks. This would tend to the production of something tangible - young growth that one could see. That system of course would cost more but the increase in value would make it worth while. There is lots of money available today among the Loggers for Forest Protection if they can be shown how to spend it.

N. MOORE instanced investigation which had been carried out in the Cranbrook district of areas which had been burnt over.

His deductions were that where the slash had been left it acted as a protection for the young growth; areas which had been piled and burnt brought no reproduction of any kind.

Lopping, he thought, was the solution. He did not think that the burning of slash reduced the hazard, rather the reverse. As far as the intensity of the fire was concerned, he would prefer to fight a fire that had broken out in an area which had not previously been burnt.

He thought we might in our Timber Sales add the estimated cost of slash disposal to the stumpage price, and refund it to the operator when the operation was completed.

R. V. STUART suggested as an alternative to broadcast burning, better prevention. All fires started near the machines used in operations, in their District.

C. S. COWAN was disposed to favor any suggestion that would tend to make the country fire-proof.

P. Z. CAVERHILL remarked that, while he was sorry to cut short the discussion, time was pressing, and whatever else they had to suggest might well be put before the Committee.

He then called upon F. A. MacDONALD for his paper on

STANDARD RATES OF PAY

A survey of fire occurrences in recent years has been made in the Nelson District and it is apparent that, in certain well defined districts, fires of unknown or suspicious origin have occupied the whole fire season year after year. The cost of fire fighting in these districts has been uniformly heavy each year and has formed a substantial part of the gross income of the residents of the contiguous settlements. One particular district was viewed with concern by the Nelson Staff, as the yearly fires fitted in so nicely one after another, that the summer's employment was continuous, or, as nearly so as a beneficent providence would arrange for it. It is a noteworthy fact that immediately the notices or pay for fire fighting were posted in that district, those men whose names appear most frequently opposite large amounts on paysheets of 1921 and 1922 left the district in search of work more attractive and remunerative than fire-fighting promised to be. It is further to be specially noted, that although a large number of fires occurred over the district generally, no outbreak of fire occurred in that locality during 1923.

We have another well defined "hot spot" in the vicinity of a large somnolent mining town, where the recession from a prosperous city to the present condition has necessitated supple-

ments to dwindling payrolls. 1920, 1921 and 1922 saw numerous large and costly fires in the immediate vicinity and the control of one fire meant the immediate incipience of another.

In 1921, 16 cost fires occurred in this vicinity and \$7200. were spent in combating them. In 1922 the game was attractive and thirty cost fires were attended at a total cost of \$18,000. There was one fire which cost in the neighborhood of \$200.00 per acre! This may properly be termed intensive fire fighting.

We now come to 1923 - Thirteen cost fires were dealt with during the season and \$756.00 was the total expenditure. In commenting on this radical change from previous years, it is necessary to give the season its full complement of credit, but it is also necessary to state that the latter part of the season was highly hazardous and that no fires occurred during that period. A former resident of this place, and apparently a fire fighter was replying from Idaho to a letter from his chum in B. C. He says "I note in your last letter not many fires around home. That damned 25 cents no inducement," No attempt will be made to elaborate this point further, but there is no question of doubt that in previous seasons the pay for fire fighting has been sufficiently attractive to militate against the rapid extinction of fires, if not actually to induce some persons to assist the spread of fires beyond the fire guards constructed.

It is considered that the light hazard of the greater part of last season has been important factor in establishing the present reduced hourly rate to fire fighters. If we had been faced with a hazard such as the season of 1922 presented, the story of the application of the lowered rate might have been considerably different. The small number of fires required only a few men at a time and favourable conditions for fire control reduced the time they were needed to a minimum. If large numbers of men had been conscripted, it is quite possible that serious opposition would have been encountered. Fortunately they were not required and it is believed that in the coming year the present rate will be looked upon as a established custom and only slight difficulty will be experienced in collecting fire fighting crews.

There is this to be considered also, that we have had a full year to justify the established rate to those who offered any objection. It is believed that the argument showing that those who obtain a portion of their livelihood, either directly or indirectly from the forests, are under an obligation to contribute somewhat to the preservation of those forests, has had a widespread influence in bringing the public into accord with the policy of removing fire fighting from the list of remunerative employments.

It has been urged that in adopting the present wage scale, we are losing the support of the labouring men who form the greater percentage of fire crews. This appears to be somewhat of a joke,

as it is not apparent, except in a few instances, where we ever had the support of this class, or any chance of getting it.

Criticism of the rate of pay has come largely from the man who cannot see further ahead than the particular day on which the question of amount of pay vitally touches him. Commendation of the establishment of the present rate has been heard on all sides from those who have the continued prosperity of the forest regions at heart. Several logging operators have given unqualified approval of the reduction, even one who had a claim at 45 cents per hour reduced to 25 cents. A large proportion of the population in the Southern Interior are directly dependent on the forests for their income, and it is not very difficult to convince even the most radical of these that it is good business to spend a few days at reduced pay in order to insure employment for the remainder of the year.

The biggest opposition comes from the floating population. These men wish to pile up a maximum stake in a minimum of time in the intervals of their wanderings from here to there. They have no interest in any district beyond their immediate needs and they care not at what sacrifice of resources it is obtained.

There is some question as to whether there has been any important reduction below the average wage for this class of work. As nearly as can be ascertained the general pay in this district is \$3.75 for eight hour day. From this a deduction of about \$1.25 per day is made for board so that the net earning is \$2.50 per day of eight hours. It would therefore appear that the daily return in money is the same for fire fighting as for road or similar work. The difference is that it takes ten hours to earn that amount at fire fighting. The net contribution then is two hours extra work per day. It has been suggested that if the rate were changed to $37\frac{1}{2}$ ¢ per hour and a deduction made for board there would be no objection from the employed. It is a psychological fact that observation of the larger hourly rate clouds the perception of the ultimate net return per hour. There is however a decided objection to the increased hourly rate with deduction. It often happens that overtime must be worked to consolidate the position won on the fire line. In that case there is no deduction from the rate per hour after the ten hours has liquidated the board bill and the net return per hour worked has risen above the rate approved.

Confirmation of the general rate of \$3.75 per day for ordinary labour is to be had from the loggers strike at present in effect in East Kootenay. One of the conditions upon which work will be resumed is the recognition of a base rate of \$4.00 per day. Presumably therefore the rate being paid is less than \$4.00 per day. Insofar as the Southern Interior is concerned the strongest objection to the 25 cents per hour came from East Kootenay. It would appear then that any increase in the hourly rate above 25 cents would mean a greater net return in money per day than is being paid in the district at present.

Here and there a condition arises which seems to require special consideration, and possibly, extra recognition in some way beyond the pay cheque at 25 cents per hour.

This refers particularly to instances where prompt action has extinguished a fire in say two hours. There have been occasions of this sort and the practice at Nelson has been to write a letter of commendation to the man in charge. It is suggested that recognition of this kind would be more highly appreciated than the extra ten or twenty cents that would follow an increased hourly rate.

There are, however, men who, as measured by effective work, are obviously worth more per hour than their fellows, and provided the practice would not be abused or extended so far as to defeat its object, it is believed that such men should receive extra remuneration. This should be done upon definite recommendation to district officers by the Ranger or Assistant Rangers. This could be accomplished by a notation on the Time Statement or Time Sheet to the effect that special recognition should be made. The form of this reward might be either an increased rate per hour, or a lump sum bonus to be paid no matter what the duration of the fire. If this were paid from Victoria direct to the man, with a letter of appreciation, it would go a long way toward bringing home to him the fact that he had done something worth while even if no bonus could be considered, a letter, similar to the letters to Honorary Fire Wardens last season, would perhaps be equally as effective as the few extra cents on the ordinary pay cheques.

The consensus of opinion in Nelson District undoubtedly favours the reduced rate as now paid, and, except, in special cases, as noted before, no increase is desirable.

Perhaps the greatest good that has resulted from fixing the rate and proclaiming it, has been the great amount of criticism, favourable and otherwise that followed the publication of fire fighting pay last Spring. This criticism has come from all classes and "two-bits an hour" has succeeded in bringing Forest Protection more squarely before every individual in the province than any amount of advertising and propaganda has done in the past.

As to the attitude of the fire crews, it may be said that they have shown a keen desire to get their fires out and get back to better wages of their former state of idleness.

Where logging camp crews have been called out, fires have been promptly extinguished. Where only a few men were taken from camps, the foreman have invariably sent their best men to get the job over as quickly as possible. This looks to me like the condition we are aiming at, and has never before been so nearly achieved.

Between 25 cents per hour and the school campaign it is believed that much progress has been made toward making Forest Protection a public duty.

In the letter assigning this subject to me, were a number of direct questions which should be dealt with. So far points have been set out as they occurred to me, but the headings will now be listed.

1 - Is the standard rate of pay a success?

It is my opinion that the standard rate of pay has been a success in that it has reduced the cost of fire fighting, reduced the number of outbreaks in suspicious districts, and magnified the public duty to protect the Forests.

It is not apparent wherein it has been a failure. Some slight opposition has been encountered but no real obstruction has been anywhere put in the way of rapid collection of crews. Our observations have failed to detect any case where service rendered on the fire line was less effective than in previous years. In fact the reverse is generally true that fires have been attacked with more vigour and control effected more rapidly than in other seasons. I would say that so far the system has been a decided success.

2.- "Is it too low?"

If it has been a success it is not too low.

3.- "Is there any point to be gained by setting the rate below the going rate of labour?"

It is my belief that the whole success of the system lies in making fire fighting less attractive than other lines of work. Ordinarily nobody likes fighting fire, but wherever the work yields profitable returns, the incentive to end the job is certainly weakened if not entirely dissipated.

4.- "Has it resulted in quicker action on the fire line?"

This question has been pretty thoroughly answered in the affirmative already.

5.- "Has it resulted in greater care in the woods?"

This is a very difficult question to answer in any way. It is believed that a person who is careless in the woods would not be influenced at all by the fact that he might be called on to fight at a low rate a fire which resulted from his own carelessness. In so far as operators are concerned, none of these want fires at all, and it is presumed that they already exercise every precaution to avoid fire, as their personal interest is endangered

even more than the public estate.

6 - "Recommendations for 1924"

It is generally conceded in Nelson District that the rate of 25 cents per hour is reasonable recompense for fire fighters, and entirely adequate, in view of the going wage for similar work and the personal interest that most of the fire fighters have or should have in the preservation of the forests for their own use. It is believed, however, that the posted rate for foremen should be a single definite figure and not 35 to 40 as carried on the posters last year.

Quite evidently, remarked Mr. CAVERHILL, the standard rate of twenty-five cents an hour had a good friend at NELSON!

P. S. BONNEY announced himself as being heartily in favour of the statutory rate of pay for fire fighting. In fact, he was prepared to advocate a cut, and would suggest that it be reduced to 20¢ an hour with board. Mr. MacDonald's experience of the reduction in the number of fires consequent upon the reduced rate of pay was borne out by his own experience in the interior of his district. His experience had been that the men in his district who were employed in fire fighting were keen to get the fire under control and suppressed so that they might return to their more lucrative employment.

In some cases in the Prince Rupert district, in cases of what he might term legitimate fires, they had found it advisable to make up the rate of pay by allowing extra hours, in order not to work a hardship. Probably a more straightforward method would be by bonus. But it was the general opinion in the Prince Rupert district that the 25¢ rate should be established for the coming season.

He then called upon A. E. PARLOW for his paper also on

STANDARD RATES OF PAY

I agree entirely with Mr. MacDonald, that fires have been deliberately set, - or assisted to spread over fire-guards, - or allowed to spread through neglect, in order to create or prolong a well paid job, and I think that everyone with much experience in the work of fire prevention has come to the same conclusion even if he could not prove his facts in a court of law. I agree further with him, that "the two bits rate" removed this inducement. I am not so sure however, that a standard "two bits rate" is a

complete solution of the problem.

In the Vernon District, no actual trouble was met in getting men for fire crews in 1923 at this rate. We did however, turn out most of our crews with the assistance of the Police - who by the way co-operated promptly and gladly in every case. They appeared to regard it as a good joke on the men turned out. Further in every case I saw, the men so turned out delivered the goods on the fire line, partly I suppose because they felt savage, and partly to shorten the time till they could get back to their own jobs. There was no case of a man refusing to go. As Mr. MacDonald has stated, trouble might have arisen if large numbers of men had been conscripted at one time. 1923 was a very fortunate year to initiate the experiment.

I do not agree with Mr. MacDonald's next statements. "Those who obtain a portion of their livelihood from the forests are under an obligation to contribute somewhat to the preservation of those forests", granted, - but the low wage for fire-fighters hits one class only - the woods labourer, whereas the butcher, the grocer and even the jeweller in a mill-town make their living - and usually a better living - from the forest, and in practise these men are not called out to fight fire at 25¢ per hour. There are reasons for not calling them, - usually they are soft and would not pull much weight in a fire crew, often their shops are one man shows, and to take away the one man would work hardship. It has been suggested though that these men take their turn on the duty roster, and either fight fire or find a substitute and make good to him the difference between 25¢ and his normal pay.

Another objection. A man is called out, works 10 hours on a fire and turned loose. He has spoiled a pair of boots, some clothes and a suit of underwear. He is paid off with \$2.50 which will not replace the boots.

A man with a family dependent on him has a tie or pole contract and is making \$7.00 to \$12.00 per day. He is called out to fight fire and works three weeks. His contract is broken and he suffers heavy financial loss. Granted his well paying contract depends upon a green forest. Is he not being asked to contribute an unfair proportion.

The greatest objection, to my mind is that the low standard rate hits directly at the spirit of co-operation we are trying to encourage. Mr. MacDonald says "it is not apparent where we ever had the support of this class, or any chance of getting it." The camps in Midday, the Cold-water, Otter Creek and other places in the Vernon District employ the same class of woods labour as other parts of the Province. Many of them are drifters, with no stake in the country, other than their job, which they may chuck any day, but there are lots of thinking men even among this class and I would not say that co-operation from them is hopeless.

The wage scale quoted for woods labour appears to be low. Actual wages paid now in camps in the Vernon District run \$3.50 to \$4.00 per day for general woods labour less \$1.00 to \$1.20 board in the Eastern half, and \$4.50 to \$6.00 in the South West. This does not agree with the Nelson figures, and incidentally brings out the fact that different wage scales obtain at the same time in different districts.

There is something in Mr. MacDonald's suggestion that the 'standard rate' include board. 25¢ per hour plus \$1.20 board = \$3.70 for a 10 hour day (or should we work 8 hours) and the rate, while still below the average wage throughout the Province looks better to the men. The objection that a man would be paid a higher rate after the 10 hours does not appear sound. The principle of increased pay for over-time is a recognized thing.

Lastly. Can we adhere to the standard rate? The Kettle Valley Railway spotted a fire last season, not a Railway fire, well off the right-of-way, thirty miles from the nearest supply of men. An extra section gang was put on promptly and the fire was put out. I believe the men were paid their usual wage - considerably higher than 25¢ and at that, the fire cost us much less than if the Ranger had taken a crew in at 25¢, or even if the fire had run until the Ranger arrived on the scene and conscripted the Railway crew. Will we get co-operation of this sort if we insist on the "two bits" rate. Letters of appreciation undoubtedly help, but do not exactly make up for a big hole in the pay cheque to the labouring man. A 5¢ bonus plus a letter of appreciation should have good effect as incentive to good work on the fire line.

To sum up. - A rate of pay lower than the ruling rate does reduce the incentive to set fires or prolong them in order to make a job and a fixed rate is desirable. But - (1) the burden of fire-fighting at this low rate should fall as far as possible on all that part of the community directly profiting from woods revenue. (2) The rate should not be too low, so that it works undue hardship on the men conscripted. Suggested inclusion of board in the established rate would probably avoid trouble in making the plan work. (3) Provision should be made for exceptions where necessary, on the understanding that they are exceptions, and in each such case reasons should be stated.

R. V. STUART stated that they certainly approved of a standard rate on the Coast. In 1923 they had been fortunate in not having many large fires as compared with previous years. It did seem, however, that whoever was responsible for fixing the rate at 25¢ an hour had not given due consideration to the cost of living. The rate was too low to secure the support of the Loggers. He thought that a rate of 30¢ an hour would secure their co-operation to a greater extent.

They had had cases, of course, in the past where some of the more highly paid employees of the Logging outfits had received as much as \$20 a day for fire fighting, but now it seemed to him we had gone too far to the opposite extreme. The cost of living must be borne in mind.

He cited one area in the Vancouver district where their fire fighting organization had always been particularly good, and public sentiment strongly with the Service in the matter. These people resented the 25¢ an hour rate, and it would have been disastrous, he believed, if they had had a bad fire season.

N. MOORE stated frankly that he felt very strongly on the subject, he believed the standard rate of 25¢ an hour was wrong in principle and he had found that it did not work out in practice. How does a man feel about it, he asked, who is compelled to work at reduced rates of pay possibly for several days? We should not expect it unless we are willing to do it ourselves.

Incendiary fires, he believed, were rarely set for what could be got for fighting them. He had yet to discover an instance. They were frequent, undoubtedly, but not for the wages that were in them. They were "spite" fires without exception, and set in a spirit of sabotage, and innocent men were called upon to fight at 25¢ an hour.

He pointed out that very much better wages were being freely offered in the Cranbrook district, and still the employers were unable to obtain the men. The industry, for instance, was paying a very much higher rate, all of which made it extremely difficult to get fire fighters.

He referred to fires in his district where an active spirit of revolt had been displayed, and where equipment to the value of hundreds of dollars had been wantonly destroyed.

The public, in his district at least, were apt to lay the blame, not on the Department but on the members of it with whom they actually came in contact; they did not trouble to weigh the matter nor to reflect that the rate of pay at which they were complaining was universal throughout the Province. They looked at it strictly as it affected themselves; they were sore, ill-disposed, and actively hostile in many cases.

Strong opposition was experienced also from the Operators, and so far as his district was concerned it had emphatically not been a success.

P. Z. CAVERHILL called Mr. Moore's attention to a case, where an important operator in the Cranbrook district had remarked to him (Mr. Caverhill) that so long as it was made worth while to fight fires so long would there be fires to fight. When told of the proposed rate of 25¢ an hour, that operator had declared

it to be one of the wisest moves the Branch had made in some considerable time!

Mr. Moore admitted that there might be one or two operators who felt that way about it, but not the majority.

Communities, he said, did not like fire-fighting, and would certainly not set fires for the wages to be gained in fighting them. The only instances he had come across, he reiterated, were "spite" fires. Men had paid the fine, or even gone to jail, rather than fight fires at that rate of pay, and many who had formerly been friendly were now actively opposed to the Service. Their goodwill had been sacrificed.

He had enforced the rate of pay rigidly, and had insisted on men being paid only for the hours they had worked. However, we had committed ourselves to a standard rate of pay, and it would be inadvisable to turn back; what he contended was that the rate of pay was too low. If it were possible to pay different rates of pay for different grades of labor, that would be a solution, but he did not see that that was possible. A man working at the lower rate would feel hostile did he know that the man working alongside him was being paid more. Certainly we should try to pay a living wage, and the rate need not be high enough to make fire fighting positively attractive.

R. C. St CLAIR asked what did he think the rate should be in his District. Mr. MOORE said 30¢ an hour.

What was the average working day at fire fighting?
11-1/2 hours.

P. S. BONNEY stated that his experience had been exactly the reverse of Mr. MOORE's. Fire fighting was not a profession, it was a public duty, which paid annual dividends to the very persons who were being protected. The crying need in the Cranbrook district seemed to be Public Education. The whole trend of the experience in Europe indicated that when the same idea gained ground in B. C., the situation would be greatly relieved. In Vancouver there were special conditions, no doubt, which called for special treatment. Why could not such conditions be met by a small subsidy in the shape of a retaining fee?

N. MOORE asked had Mr. Bonney ever tried asking a hostile public to consider their stake in the country?

Mr. BONNEY admitted that such a public might not be very amenable to argument.

P. Z. CAVERHILL said that admittedly Mr. MOORE had put up a very strong plea. He pointed out, however, in regard to Mr. Moore's statement that we must be willing to do ourselves what we required of others, that a District Forester working twenty-four

hours a day as they generally did during the fire season, gained very little more than 25¢ an hour. Had Mr. GIBSON found any difficulty in Prince George?

J. M. GIBSON had found that on the whole it worked very well in Prince George district. He had not found it necessary to prosecute. His public were strong for forest protection, being dependent to a great extent on the industry for a livelihood.

In Cranbrook, evidently they had a type of worker who could not see Fire Fighting at any price less than he could obtain in any other line of endeavour - they would fight fire only when there was no other work to be had or fire fighting was the best paid labor.

C.S. COWAN confessed to feeling every sympathy with those cases where actual hardship was worked, but how would it have affected the situation had the Industry been slack? Would not that have made a material difference? On the whole even in Cranbrook the situation had shown a marked improvement over previous years.

"Our rainfall was well distributed," said Mr. MOORE. "Had we had a bad season we could not have handled it." "If your humidity was high your reports did not show it" replied C.S. COWAN. "Then I was misinformed," said Mr. MOORE, "but certainly my information was to that effect."

Generally speaking, resumed Mr. COWAN, the results had been all to the good, and in spite of the opposition which had been experienced and which was inevitable to every new movement, the results were good all over. After all, the main thing was to encourage the quick suppression of fire.

E.B. PROWD remarked that the Dominion Service in the Railway Belt had at first been averse to the idea, but had later adopted it, and now were strongly for it.

C. J. HADDON had found it very satisfactory in the Cariboo. In the case of Claim Fires where they paid their own standard rates, it might have had an adverse effect on the other workers who were being paid only 25¢ an hour. But certainly uniformity should be established, and established all over, he thought.

R. V. STUART would be glad to have the Committee say what they thought could be done towards securing the co-operation of the Loggers.

P. Z. CAVERHILL cited some points to be laid before the Committee for their consideration. He pointed out that after all the 25¢ an hour spread over the average working day at Fire-fighting, which it had been stated was 11½ hours in the Cranbrook

district, brought up the man's earnings for his day to pretty nearly the general average. After all, a man's earnings were what he earned in the course of the twenty-four hours, be his day long or short.

It was doubtful, maybe, if we were justified in extracting the extra hours from the Fire Fighter. Then again, would it be better if we paid him say 35¢ an hour and deducted board, or called it a day rate of \$3.00 less board, and worked him for as many hours a day as circumstances demanded?

But to pay a man for hours not actually worked was a practice that could not be counselled under any circumstances. It was, in short, equivalent to padding the payrolls.

We will now proceed to the next paper, said Mr. CAVERHILL, and called upon R. V. STUART for his paper on

EFFECTIVENESS OF ORGANIZATION CHARTS ON FIRE CONTROL

Fire control has been defined as that phase of the fire protection problem which deals with the organization of all men, equipment and facilities available in the annual protection campaign for fire detection, communication, transportation and suppression purposes. Its object is to insure that when a fire starts it will be detected and attacked by a force competent to extinguish it before it reaches uncontrollable dimensions.

When one considers the variety of operations incidental to fire control, and the numerous details to be provided, the need of some form of chart for the purpose of recording these is obvious. Not only must all available known fire fighting resources be listed, but each fire suppression job has many points of similarity to a military operation, and an accurate knowledge of the ground on which fires are likely to occur is therefore indispensable. One person, or any number, may know every item in the total available suppression resources, every physical characteristic of the territory to be protected, but this information would be of little value unless recorded in chart and map form, as it certainly could not be passed from one person to another, verbally.

The first question that presents itself to an officer faced with the responsibility of organizing a protection force is naturally what is the measure of fire danger in the district to which he is appointed, and the extent of the resource available for protection purposes.

There exists in every district certain resources which are there as a result of direct Government expenditures. These are not usually extensive, and it is not my intention to discuss organization of these. It is sufficient to state that they form

the frame on which the protection machine is constructed.

Most forest districts are large, and the logical plan of organization, the one that is usually followed, requires the division of the district into sub-division or sections. These sections are numbered and referenced on the organization plans and charts.

It will be readily appreciated that the resources of a district, and its fire risk, can be more easily ascertained this way than by endeavoring to cover the entire district without following any such preconceived plan.

When the protection resources of a district have been ascertained desirable labor for all the operations incidental to fire control enlisted, communication, transportation and equipment facilities investigated, and the use of all available arranged for in case of need, this information should not be trusted to the memories of one or any number of persons; it must be recorded in chart form if it is to be available for use when needed.

Similarly with fire risk data, it must be platted in map form, if it is going to be of any assistance to the field officer in planning fire suppression work.

If the organization plans are a true index of the work that has been done in lining up the suppression forces, and fire hazard conditions as indicated in the plan actually exist on the ground, the plans in the hands of a competent person not only facilitate the speediest possible assembling of the fire fighting crews, and assure their proper equipment and transportation to the fire location, but will also be of inestimable value as a guide to the most effective and economical method of attack.

I do not wish to infer that I consider it a simple matter to organize an efficient fire fighting organization. No doubt, in the majority of cases, so far as man-power is concerned, it will be pretty much a matter of organizing numbers, but as fires occur and men are tired out, bad and indifferent material can be weeded out or placed in second or third reserve, to be used only when all good material is in action.

In addition to weeding out poor and indifferent material, experience will show that certain men have special qualifications, for fire suppression work, some for handling men, some to operate pumps; similarly, with transportation, some conveyances are reliable and economical, some dear at any price; a knowledge of these matters will mean all the difference between a low and a high standard of suppression efficiency for the district concerned.

There are many arguments in favor of fire organization

charts, but their value is so obvious that there would seem little necessity of continuing on this point. Briefly, their effect on fire control is to insure the maximum fire fighting resources and also risk data, which can be platted in chart form, of a district being known at all times to the officer in charge. When a fire occurs, their use renders possible the speediest assembling, transportation and equipping of the most competent force available for the purposes of putting that fire out.

They facilitate, so far as man-power supplies permit, the utilization of picked, efficient fire suppression crews, as against the usual low standard of efficiency where men are taken haphazard and without any knowledge of their fire-fighting ability.

By their use needless expense is avoided bringing men unnecessary instances for fire fighting, and the possibility of overlooking good fire fighting material available nearer to the location of a fire is obviated.

The map section of the chart, if the physical characteristics and other hazard factors are accurately indicated, is an invaluable aid toward economical and effective fire suppression.

An organization chart, properly drawn up and based on real effective organizing effort, plus accurate knowledge of risk data, gives an officer taking over a district an insight into conditions in the district, and the resources available for protection purposes, in a few hours, that would take months of effort on his part to learn by any other means.

The Ranger is the man who usually directs fire protection operations in the field, and if for no other reason than this, he is the logical man to prepare the charts. There are, however, many other reasons why their preparation must devolve on him.

Under present conditions he is the only permanent field official in the organization who is concerned with fire protection. He is vitally interested in the efficiency of the protection machine in his district and its success must depend to a great extent on his personal initiative. To him must fall largely the task of augmenting the patrol force by recruiting Honorary Fire Wardens, fire fighting labour, arranging in advance of actual need for transportation of fire fighters, and for the use of any fire fighting equipment required beyond that supplied him by the Department.

His duties, other than those directly connected with protection, logging and pre-emption inspection, collection of mill returns, bring him into contact every day in the year with the people whose assistance he will require when fires occur. During these inspections he obtains, without any additional effort

on his part, information bearing on hazard conditions necessary for the map portion of the chart.

By reason of the permanency of his employment he is in a position to continually improve the fire organization in his district; for these reasons the Ranger is the logical man to prepare and maintain the fire organization chart.

Assistant Rangers and patrolmen will naturally be furnished with organization charts for the district allotted to them, and during the term of their appointments should be expected to add to and improve the charts.

The work of preparing the charts has an educational value to the officer preparing them. In his search for Honorary Fire Warden material and for fire suppression labor he becomes better acquainted with the people in his district than would be the case if he waited until a fire occurred, and then drew on his supplies from memory. Meeting more people he discusses his work and the object of forest protection to a larger extent, with the result that he gives the matter more thought himself and benefits thereby.

In preparing the fire map it is necessary for him to secure a better detailed knowledge of the topography, cover, and improvements and hazards in the district, and as a result, when fire occurs he is better informed and it is an easier matter for him to decide his plan of attack.

In the Vancouver District we have had various forms of fire organization charts in use for the past five years, and have found their value increase steadily each year. The present chart, Form B, seems to fit the requirements satisfactorily, except that it does not permit of maps being drawn to a large enough scale to plat topography and other details sufficiently plain to be of real value in actual fire suppression work. This fault is not, however, due so much to the scale of the map as to the size of the districts. I have here a copy of the Fire Legend we use, and one of the District Office fire maps, which I will pass around for inspection. The information on this map was obtained largely from Rangers fire organization charts.

The charts are prepared by the Ranger. The Supervisor keeps a copy of each in his office, and each Assistant Ranger and Patrolman receives a copy of the chart for the district to which he is appointed and is instructed to add to it. The charts are called in at the end of each season and the information contained on the maps is transferred to the District Office map.

We consider the fire organization chart of a district a fair index to the state of the organization in that district, and it always works out accordingly in actual practice. The districts with the best charts and plans have during recent years led all the others in protection achievement and, similarly, the

ones with poor charts have been the ones that have fallen down.

These charts are checked over by District Office officials from time to time. As each Ranger District is visited the chart is checked over, section by section, and the forces shown on the plan checked against the requirements as indicated by the past history of it, and the risk factors denoted on the map.

The District Officer ascertains whether all known available Honorary Fire Warden material has been recruited in each section, fire lookouts arranged, communication and transportation arrangements the best that can be secured, and the rates for the latter reasonable.

Transportation arrangements alone furnish a good indication of the value of the charts. Before a standard system of charts was instituted, we found we were paying rates varying from ten cents to forty cents per mile for use of Ford cars. The high rates were paid in districts where organization showed no advance arrangements had been made. There was also a similar spread in water transportation costs. Organization charts have been of material assistance to us in eliminating unnecessary expenditures of this nature.

Fire fighting labor supplies are checked over to see that not only are sufficient numbers enrolled, but that the organization possesses men qualified to direct fire fighting operations, mechanics for pump operations, snag fallers, etc. The checking process is not confined merely to looking over the charts and comparing the organization indicated, with the map portion of the chart. A number of Honorary Fire Wardens and men enrolled for fire fighting in each district are visited and their position in the emergency organization discussed.

We believe that this checking of the fire organization plan is one of the most effective contributions that the inspecting District Office official can make toward protection efficiency and, if carried out frequently and thoroughly, it is going to do a lot toward bringing the fire organization machine to the 100% efficiency mark.

In my earlier remarks I reviewed briefly the main benefits to the protection organization derived through the use of charts. In conclusion I want to state that we have found them absolutely indispensable to the building up of an efficient fire fighting machine. One might just as well try to run a store or a factory without a bookkeeping system, as to endeavor to maintain a fire organization without keeping records of its members, their location, qualifications, the location of transportation and equipment facilities, and without being in a position to visualize hazard conditions from the charts. In fact, without these records, the fire organization may scarcely be said to exist.

J. M. GIBSON opened the discussion. He was strongly in favor of Chart "B". He had been rather obscure at first as to just what was required, but having got the idea, and knowing now what was wanted, he was convinced of its value.

It seemed, however, to be rather a duplication of the Reference Maps in a way. Would it not be possible to use the Reference Maps themselves in conjunction with Chart "B".

C.S. COWAN explained the relationship of the Reference Map to Chart "B".

Frequent changes in personnel, went on Mr. Gibson, rather militated against the usefulness of the organization chart, which became in time rather a return of the strength available than of the actual personnel.

The weeding out of the poor fire fighters was too apt to throw the burden on the better ones to an unjust extent. We should try to keep some of the second-rate men so that they would do their share of fire fighting, having in mind the reduced rate of pay.

The Rangers should prepare the chart, he agreed, and in as much detail as possible, before the season started, and keep it up to date with the assistance of his Assistant Rangers.

J. M. Gibson asked, in regard to Vancouver's method, did the Rangers prepare the chart and make the necessary extra copies for his Assistant Rangers? R. V. STUART said Yes. The original chart was regarded as the permanent record, to which were added from time to time the additional items required to keep it up to date, which of course were supplied by the Rangers.

C.S. COWAN said the original idea was to prepare the map in the field. The map was sent to Victoria and traced, the tracing was kept as a record, and to the tracing was added from time to time the various improvements and alterations which became necessary. From the revised tracing white prints were made in sufficient number to supply the requirements of the various districts, so that they were always kept supplied with up to date maps.

J.M. GIBSON resumed, in concluding his remarks, that the practice of putting down the Rangers' knowledge on paper at the time and from time to time was correct, and must be good.

R.C. St CLAIR suggested that Chart "B" might be amended by the District Forester to suit conditions in his own district.

N. MOORE said they had not used Chart "B" in his district, but had made blueprints for their own use on which was embodied all the information called for on the Chart. He thought the greatest advantage of the Chart, used as he had used it, was that

it brought the public into line with us. And he thought we might go even further and enlist not only our own public but our visitors. He had issued his blueprints broadcast, even to the extent of posting them up in Hotel Offices, Postoffices, and Stores, so that everybody had an opportunity to see the line-up, and with them he had posted the necessary information to enable the public to get in touch by reason of the timely warning sent in from outlying points. He recommended a wider issue of Chart "B".

Chart "B" he pointed out, had been very greatly affected in his district by strikes which depleted the available personnel.

C.S. COWAN pointed out that, of course there would be changes in the personnel, that was one of the main ideas of the Chart. The chart should be altered as conditions changed.

He further thought that, where District Offices departed from the established procedure, they should at least give Head office an opportunity to pass on their ideas. He did not approve of Districts modifying or altering established forms until Head Office had been consulted, or at least advised.

R. V. STUART favoured the idea of Mr. MOORE's chart for the use of the public, but he did not see that it affected the importance of keeping our own organization up to date.

C. J. HADDON found that Chart "B" had not worked in his district, largely owing to the Rangers not having the right idea. Now they had become more familiar with its working and he was looking for better results in the future.

R. V. STUART reverting to Mr. Gibson's remarks, thought it was not feasible to do anything else but weed out the indifferent fire fighters. Efficiency in fire-fighting was that they were aiming at, so as to get fires out while they were small.

C. J. HADDON suggested that maybe it might be possible to pay the better men better wages.

Meeting opened at 3:00 p.m. for the Afternoon Session with the Minister present. Mr. St. Clair opened the meeting, the chair being taken a few minutes later by the Chief, who called upon P. S. BONNEY for his paper on

FOREST PROTECTION PROPAGANDA METHODS.

The Forest history of practically all countries, which were naturally endowed with extensive forest resources, has been very similar.

First the population regards the forest as a handicap to agriculture or a cumbersome resource of little value, and proceeds to destroy it. Then, as markets develop and expand, there are the various phases of commercialized cutting, accompanied by great waste, Improvident and profligate usage, together with deliberate and careless destruction by fire, finally reduces the country to a condition of partial or complete forest exhaustion, and the nation suffers degeneracy in direct proportion to the degree of forest destruction. Recovery is slow and very costly. Some nations never recover, and therefore remain decadent. China and Spain are notable examples of this historical fact that forestless nations are decadent nations.

The forests of this province have been reduced, by fire and cutting, to less than one-half their original dimensions, and they are still subjected to enormous destruction by fires, which are, for the most part, preventable. Obviously, the most important question in our present forest economy, is the prevention and control of fires.

In a province containing such vast areas of such widely divergent forest and climatic conditions, with numerous hazards and sparse population, it is obviously impossible to finance a fire prevention and control force sufficiently large and mobile to handle the situation, during periods of hazardous weather.

One of the outstanding lessons which recent disastrous fire seasons have taught, is that the view-point and understanding of the general public, in matters of forest protection, must be changed and improved without further delay. A well organized and properly supported campaign of Public Education must be undertaken immediately to counteract the deadly apathy, ignorance and criminal carelessness of the average person who is insidiously paralyzing and negating the efforts of forest protection forces in this province. We must have a vigorously active co-operation from the public, particularly that portion which inhabits, travels or camps in forest areas, before any great progress can be made.

There are apparently two factors which can effectively change the mental attitude and personal view-point of the general public, namely, Pinch of Necessity and Public Education. We, obviously, should not wait until the adverse economic pressure of impending forest exhaustion forces a radical change in the public view-point.

Assuming that public education is of paramount importance in our forest economy, and that the success or failure of fire prevention and control is dependent, to a large extent, upon the degree of co-operation secured from the general public, any methods of forest protection propaganda, which will tend to improve conditions are justifiable, providing they are financially feasible.

At the risk of reiterating many well known practices,

which are already familiar to you, Forest Protection Propaganda Methods may be classified in the following order, based on their effectiveness consistent with expenditure involved, and their adaptability to present B. C. conditions:-

- (1) POSTERS & SIGNS:- Appropriate posters on durable card-board with non-fading ink, designed to last one or two seasons, should be issued in greater numbers. The fire law posters should be standardized and should have the essence of the law, with penalties set out in red type. Cartoons and picture posters are effective with people who cannot or will not read. There should be special series of posters of a temporary changing type designed to appeal to and warn different sections of the public, such as campers, travellers, fishermen, logging operators, stockmen, etc.

Painted or enamelled signs on tin or zinc plate, designed for permanent posting and carrying specially chosen fire slogans, should be provided in greater numbers. An effective color scheme should be followed with a view to establishing in the public mind, that a certain combination of colors stands for fire prevention. For instance, a light green as symbolic of the green forest and bright red for the Red Enemy.

Specially erected painted signs are worth considering, in limited numbers, and at strategic points, designed to appeal to tourist and motorists along a few of the highways where traffic is sufficiently heavy.

Considering the relatively low cost of posters and signs, and the fact that the field staff of the branch is able to place them effectively, this method of propaganda should receive first consideration.

- (2) BULLETINS & CIRCULARS:- A series of bulletins and circulars should be prepared by the Forest Branch, dealing with forest protection in British Columbia, in the various forest regions of the province; namely, Lower Coast Fir Region, Southern Interior, Northern Interior and lastly, North Coast. One series, designed for popular reading, should be for distribution to the general public. A special series of bulletins should be issued for logging operators in the three important regions, emphasising methods of fire prevention and control. These bulletins and circulars should be well illustrated and should deal exclusively with British Columbia forest fire conditions.
- (3) SPEAKERS & LECTURERS:- This form of propaganda is undoubtedly most effective, but the cost involved limits the amount which can be undertaken by special lecturers. There is, however a big field which can be developed in

in this regard. If the permanent field staff were provided with prepared bulletins, containing digested forest facts, and with popularly written lectures, a great deal of effective propaganda could be accomplished. A speaker's bureau, similar to that at present operated by the Canadian Forestry Association, should be developed in British Columbia. By providing interesting fire data, and sample talks, the proposed speaker's bureau would function through boards of trade, parent teachers association, farmers' institutes, women's clubs, church organizations, trade unions, school teachers and selected citizens who are leaders in local communities. The education of employees in logging camps, particularly on the lower coast, by means of lectures by selected Rangers and Supervisors, would undoubtedly have considerable effect. The effectiveness of personal appeals through the medium of competent speakers, who can put over the startling facts of the situation, is undoubtedly greater than any other form of propaganda.

- (4) INSTRUCTION IN THE SCHOOLS: All school teachers throughout the province, especially in rural communities, should be required, by the Department of Education, to give at least two hours' instruction each week throughout the year, on Forest resources and Their Protection From Fire. A special bulletin for use by school teachers should be prepared and issued under the authority of the Minister of Education without further delay. Lectures by Forest Officers in the schools should be made the object of a special drive during April, May, and June. Propaganda through the public and high schools, of the province, will pay accumulated dividends and is a sure method of ultimately producing active public co-operation, provided the campaign is applied and maintained through a term of years.
- (5) PROSECUTIONS:- Contraventions of the Forest Fire Law, which justify prosecutions, provide excellent material for publicity and selected cases should be broadcasted through the press. The news value of a prosecution can often be made a vehicle for putting over an extended column on forest protection, particularly in the rural news papers. Prosecutions also teach fire prevention, to the violators of the laws, in a very definite manner and are very often the only methods which are effective with a certain type of individual.
- (6) ESSAY COMPETITIONS:- The unqualified success of last year's Essay Competition, among the public and high school children of the province justifies its continuance. The series of medals and silver cups which were distributed as prizes are eminently suitable and they should be made standard for future school Essay Competitions.

The feasibility of putting on Essay Competitions for people engaged in Forest Industries and for University students, warrants consideration at some future date.

- (7) PERSONAL INTERVIEWS:- The necessity of all Forest Officers talking protection at every opportune moment, is obvious. This is especially effective among people who live and work in, and adjacent to, forests, because they have common touch and personal experience with the problems under discussion. Rangers, and all field officers, should be coached and assisted by means of bulletins and sample talks, with a view to becoming efficient Protection Missionaries.
- (8) EXTENSION OF HONORARY FIRE WARDEN & FOREST FIRE PREVENTION OFFICERS' ORGANIZATION.
In addition to being active in fire control, the Honorary Fire Wardens should function as propagandists, and they should be provided with specially prepared material for this work. The Honorary Fire Warden organization, in my opinion, should be developed primarily as a means of public education, and they would, of course, function incidentally as fire reporting agencies. They should be especially selected for that purpose and should be educated to the idea of spreading the gospel of protection. Special bulletins should be distributed to them. We should build up by careful selection, an organization of at least two thousand Honorary Fire Wardens throughout the province.
- Very often a man who would be incapable of taking personal charge of a fire crew, is a very valuable propagandist, and likewise the opposite is true. The appointment of Forest Fire Prevention Officers should be limited only to the type of citizen who has had practical woods experience and is capable of taking charge of a fire crew. This type of volunteer appointee will usually function only incidentally as a propagandist.
- (9) RADIO BROADCASTING:- This method reaches a large audience which is continually expanding, and being inexpensive, is feasible for immediate development. Brief and interesting speeches, emphasizing the need for prevention, and appealing for co-operation, could be broadcasted from Vancouver.
- (10) FORMATION OF LEAGUE OF FOREST GUARDS:- This method of propaganda will pay excellent dividends and requires a relatively small expenditure of time and money to put it into operation. Public and high school boys, between the ages of 8 and 15, should be enrolled in a League of Forest Guards. An inexpensive, attractive lapel button, together with a specially prepared bulletin would

be given to each recruit at the time he is enrolled. Duplicate pledge cards, containing a few essential pledges designed to appeal to the honor and integrity of the recruit, would be signed up at time of enrollment. A league, which would be of considerable value in fire reporting, as well as for propaganda, could be developed through the schools in this manner at little cost, and it is probable that several thousand growing youths could be enrolled. Special prizes could be awarded within the league for meritorious service rendered during the fire season, and these prizes could be supplemented by special letters of commendation from the Minister of Lands or Chief Forester.

- (11) PROPAGANDA AMONG BOY & GIRL ORGANIZATIONS:- Special bulletins, dealing with forest resources and their protection from fire, prepared in accordance with established rules and regulations obtaining in various boy and girl organizations, would be productive of good results, if distributed among Boy Scouts, Tuxis Boys, Trail Rangers, Canadian Girls in Training and Girl Guides. It is a well known fact that these organizations have a large and beneficial influence among the boys and girls of the province and we should capitalize the opportunity for forest protection propaganda. A series of prizes could later be developed and awards for meritorious services rendered.
- (12) SAVE THE FOREST WEEK:- This event, which it is understood will be proclaimed on a Dominion wide bases, and will become operative during the week from April 27th, to May 3rd, should be made the occasion for a special drive in forest protection, and various methods of propaganda employed. The proposal to eliminate the confusion between this and general Fire Protection Week, by designating the above mentioned period as "Save the Forest Week," is very desirable, and the idea should be maintained until it becomes a custom of the country.
- (13) NEWS PAPER AND MAGAZINE ARTICLES AND ITEMS:- There is a great wealth of material in forest protection for reading columns and news items of general and local interest for news papers, as well as special articles for monthly magazines, and this method of propaganda is essential to an effective scheme. Arrangements could probably be made with the leading news papers and trade magazines, to take items and articles during the fire season. A special series of reading columns and items, designed to sustain a public interest in forest protection, should be prepared and issued in logical sequence throughout the fire season. Rural papers especially would accept this stuff in considerable quantities, for free publication, provided there was news value in it, and

the propaganda was properly tempered with material of local interest District Offices could deal with a limited amount of this free news paper propaganda for rural papers, but the majority of the work should be dealt with by a publicity bureau, which will be discussed later.

(14) PAID NEWS PAPER AND MAGAZINE ADVERTISING:- Advertising contracts with news papers and magazines should be made contingent upon an agreement to accept news items and articles for free publication. The results obtained by the present plan of forest protection advertising are, in my opinion, not consistent with the expenditure involved. The cut and dried generalizations regarding forest protection, which were inserted as paid advertisements, in selected news papers, during past seasons, did not attract the interest of the reading public. If the advertising contracts were issued as subsidies for acceptance of reading articles and news items containing protection propaganda, I believe better results would be secured. The general scheme of advertising in news papers should provide for the insertion of special ads, of a startling nature, at psychological times during the fire season, setting out, in no uncertain terms, an extraordinary message and appeal for more co-operation, based on the actual fire situation at the time of publication. An Advertisement of this nature would carry a news value and would have more effect with the reading public than cut and dried forest facts.

(15) CO-OPERATION WITH PUBLIC WORKS DEPARTMENT:- Slash along a heavy percentage of the public highways, is an open scandal, with which we are all familiar, and, in spite of regulations and written instructions issued to the contrary, this type of slash hazard is continually being augmented by new construction. If we could get the Public Works Department to clean up these fire traps, and dispose of new slash resulting from new construction, a marked improvement in reduction of fire hazards, as well as improved public opinion, would result. The rural public, especially, could be more successfully approached on similar problems and clean public roads would be an incentive to better slash disposal.

(16) DEVELOPMENT OF CAMP SITES:- The establishment of a series of well constructed and well maintained camp sites, along a few of the main tourist highways in the Southern Interior, on the Lower Coast, and on Vancouver Island, constitutes an important method of propaganda, as well as an effective means of fire control. They should be carefully located at strategic

points, made attractive and of practical use. The proposal to enroll as many foreign and domestic cars as possible through automobile associations, with the idea of promoting a tourist league for forest protection, is worthy of consideration. At the time of enrollment each car owner could be handed an attractive forest protection bulletin, containing a usable road and camp site map, information regarding roads, places to fish and camp, points of interest to visit, and forest protection propaganda could be worked in as the main idea. A small, mobile patrol force should be assigned to keeping the camp sites in good condition, and to prevent and control tourist fires. By making a charge of one dollar per car, at the time of enrollment, the camp site scheme would very probably be largely self-supporting.

- (17) CO-OPERATION WITH CANADIAN FORESTRY ASSOCIATION:- The Canadian Forestry Association has had a number of years' experience in forest protection propaganda, and they have developed several excellent methods which are producing results. The present tour of their Exhibition Car, which is succeeding wonderfully in the Northern part of the province, in spite of adverse weather conditions, indicates that we should endeavour to secure the car for annual tours. This association maintains an extensive speakers' bureau, and we could arrange to secure valuable assistance and information from them. Special lectures and addresses by the Secretary and his assistants, especially for larger centres of population, could be arranged co-operatively. Assistance from the Association's editorial writers is no doubt available.
- (18) CO-OPERATION WITH THE DOMINION GOVERNMENT:- In view of the interest which the Dominion Government is taking in forest protection, as evidenced by the recent conference of forest authorities held in Ottawa, it is possible that a Dominion grant could be secured to assist in the financing of a provincial scheme of public education. Ample justification for such a subsidy, exists in the return of revenue secured by the Dominion Government from the B. C. Forest Industries, as well as the broader consideration of the great importance of B.C. Forests in our National economy. It is within the bounds of possibility to assume that the Dominion Government might also authorize the carrying of forest protection literature free in the mails, which would amount to a considerable economy in any extensive campaign.
- (19) MOTION PICTURES:- On account of cost involved, the development of motion picture propaganda should be undertaken to a limited extent only, at the present time.

Films are particularly effective in rural communities, and they should be supplemented with short addresses on forest protection. As soon as funds are available, we should secure several first class films of B. C. Forest and Fire conditions. They should be true to life, somewhat spectacular, prepared by experts, and designed to appeal particularly to rural populations. Selected fire propaganda should be pushed into the rural districts early during the fire season, where the majority of movie theatres would run the films between shows and, very probably permit a local forest officer to put on a five or ten minute talk.

- (20) PROPAGANDA SLIDES FOR MOVIE SHOWS: Considering the relatively low cost and the service rendered, a series of forest protection slides is undoubtedly a good investment in propaganda.
- (21) CALENDARS: - The present issue of Forest Branch Calendars is in great demand, and we should be provided with a larger supply.
- (22) DISTRIBUTION OF USEFUL ACCESSORIES: - The distribution of small whet stones, match boxes, special cigarette receptacles for autoists, etc., carrying forest protection propaganda, provides an avenue for personal appeal which is very effective. These accessories should be durable, of good quality, useful and attractive. They should be distributed through the field staff to selected people living, working or travelling in and around forest lands. The carborundum pocket whetstones, which were issued as a medium of propaganda by the branch in 1914, proved to be an excellent investment in forest protection, and many of these stones are still in use throughout the Northern Interior.
- (23) PROCLAMATIONS: - The campaign of public education could be furthered by proclamations issued by the Lieutenant Governor or the Premier. They should be in plain language and consist mainly of a brief, dignified appeal for active co-operation in forest protection. An initial proclamation could be circulated through the press at the beginning of the fire season and a second one issued at a psychological time during the height of the fire season.
- (24) TELEGRAPHIC PROPAGANDA: - Last year, I understand, telegraphic weather forecasts, warning operators regarding impending hazardous periods of weather, were sent out in the Vancouver District to selected operators. This method is, in my opinion, adaptable only to the lower coast fir region, where rapid means of communication enable the transmission of dependable forecasts.

Night Lettergrams, containing news regarding fire disasters in other Coast operations, as well as weather warnings, would be effective in increasing vigilance, and in causing special precautions to be taken by coast operators. In view of the fact that approximately 80% of the total fire losses occurred in Vancouver District, last year, in operations, it seems to me that this method is feasible if properly applied.

- (25) FOREST PROTECTION EXHIBITS AND DISPLAYS:- Exhibits and displays afford a means of reaching the public and are feasible for agricultural fairs, tourist centres, conventions etc. Special window displays are worth while, especially during "Save the Forest Week". This method, in my opinion, is of minor importance as regards its effectiveness at the present time in this province .
- (26) CO-OPERATION WITH THE POSTAL DEPARTMENT:- The postal department frequently assists in advertising various important events, and it is believed that it could be arranged to have a forest protection slogan stamped on all mail during the fire season. This avenue of reaching the public should be taken up with the postal department.
- (27) CIRCULAR LETTERS:- A series of carefully prepared circular letters designed to apply to various local conditions obtaining in the three principle regions of the province, is an excellent method of reaching a selected portion of the public. A special series could be issued for Lower Coast operators, Interior operators, stockmen, farmers' institutes, churches and for local leaders in community activities. A dependable list of from one to two thousand selected citizens could be built up through the district offices, and circular letters prepared by the publicity bureau and sent out at appropriate intervals during the fire season. These letters should be well mimeographed signed in ink and should contain current fire news, together with urgent appeals for active co-operation.
- (28) SPECIAL LETTERS:- A special letter from the Minister of Lands or Chief Forester, or even the District Forester, commending meritorious service in reporting or suppressing fire, is very effective, especially in rural communities. This method of propaganda should be further developed.
- (29) SPECIAL FIRE WARNINGS ON PROVINCIAL LICENCES:- Licences issued to trappers, hunters, miners, car owners and fishermen, should carry in a conspicuous place upon their face, a special fire warning and an appeal for co-operation. These warnings and appeals could be

rubber stamped or printed.

- (30) DISTRIBUTION OF SPECIAL PHOTOGRAPHS:- The distribution of a series of six high class photographs showing typical forest scenes, industrial scenes and actual forest fires, with suitable explanatory statements attached, to selected schools, libraries, boards of trade, church halls, etc., would be worth the expenditure involved. These sets of photographs would be especially valuable in public schools as a means of assisting the school teacher in forest protection instruction. An initial distribution could be limited to selected rural schools where they would be most appreciated.
- (31) FIRE NOTICES ON CIGARETTE AND MATCH BOXES:- If the manufacturers of these commodities were properly approached, they would no doubt co-operate in warning the users of cigarettes and matches regarding fire hazards, and this idea, which is already functioning to a limited extent, should be further developed.
- (32) RUBBER STAMPS:- Rubber stamps, for the purpose of printing forest protection slogans on correspondence, pay cheques, etc., would be worth the expenditure involved. These rubber stamps could be supplied to a limited number of the larger mill and logging operators.
- (33) SPECIAL STICKERS:- Forest Protection stickers for Car shields, dining car menus, logging camp windows, etc., are worth considering.
- (34) PROPAGANDA AMONG INDIANS:- The Indians of the province are responsible for a large number of fires and they are apparently impervious to usual propaganda methods. In the northern Interior some beneficial results were secured by appointing the numerous Chiefs in various villages as Honorary Fire Wardens. The whitmetal badge and letter of appointment appeal to them. They will serve without pay, and they do exert influence for good over the other members of the village. Lectures and movie shows, supplemented with explanations made in the native tongue, would no doubt tend to create at least a temporary effect.
- (35) ESTABLISHMENT OF DEMONSTRATION PLANTATIONS:- A few carefully located Demonstration Plantations could first be established, in parts of the province which have already been fire swept, and local people employed in their preparation. These plantations would create a community interest in protecting them from fire, and in addition to functioning as experimental plantations, they would provide excellent material for protection propaganda. The cost involved in establishing a few small Demonstration Plantations would no doubt be a good investment.

It is generally admitted that the hope of forest protection in this province, consists of fire prevention and control of fires in their initial stages. It is further generally admitted that the huge expenditures which we have made in the past in fighting fires after they have reached a conflagration stage are eighty percent non-effective. These inefficient and uneconomical expenditures on huge fires are largely unavoidable, on account of financial impossibility of providing and equipping a forest protection staff sufficiently large and mobile to detect and control fires in their initial stages. Assuming that these premises are correct, it is obvious that the success or failure of forest protection is largely dependent upon public co-operation. Public Education is capable of producing active public co-operation and, recognizing its paramount importance, the department should consider the immediate establishment of a Forest Protection Publicity Bureau, adequately staffed, and provided with sufficient funds to enable the prosecution of an intensive campaign of public education. This Publicity Bureau could operate under the direction of the Operation Office, and its total energies should be applied exclusively to forest protection propaganda. If other lines of public relations work are attempted, by this bureau, there is a danger of partially side-tracking its main function. The bureau should be distinctly provincial in scope and purpose. The mooted plan to centralize forest protection publicity in a Dominion Publicity Department, operating under the Dominion Forest Service, will not, in my opinion, be so effective as a distinct British Columbia bureau, but we should of course avail ourselves of any co-operative assistance in this regard.

The widely divergent conditions obtaining in this province, will require specialized treatment by means of special propaganda methods adapted to fit the peculiar local conditions.

In view of the urgent necessity for public education in forest protection, it is recommended that a fund of at least \$25,000.00 be made available for the immediate establishment of a Forest Protection Publicity Bureau, to consist of an initial staff of a competent Publicity Agent and Assistant, together with two stenographers. The Publicity Agent should be a forester with abilities and capacities for publicity. He should also be an experienced lecturer and have a special penchant for advertising. His assistant should be a man of experience in journalistic and publicity work. A rough approximation of the cost of operating the proposed publicity bureau during its first year, is estimated as follows:

Salary of Publicity Agent	-	\$3000.00
Salary of Assistant	-	2400.00
Salary of two Stenographers	-	1800.00
Travelling expenses	-	2400.00
Stationary and Printing	-	4000.00
Advertising Contracts	-	4000.00
Competitive Prizes	-	2000.00

Special Films, Exhibits and Accessories.	- \$3000.00
Various Contingencies	- 2400.00
Total.....	<u>\$25000.00</u>

Our publicity campaign should be established on the basis of continuous operation over a long period of years. Results cannot be obtained immediately, but they will accrue with accumulative value as the campaign develops. To my mind, we should concentrate upon that section of the population living in or near the forest, and of course, the public schools. Propaganda in the larger cities is not nearly so effective as in rural communities, on account of the many other distracting interests which the city dweller has, as well as his ignorance of the subject.

As stated before, fire prevention, and control of small fires, is our hope for the future preservation of the forest resources of this province, and success in this important field can only be achieved by the development of an active public co-operation.

The Chief Forester introduced Mr. Napier-Dennison, of the Gonzales Meteorological Station, who had been invited to attend in connection with a paper by Mr. Cowan on Humidity in relation to Forest Fire Occurrence. Mr. Dennison stated that this question had been investigated in some detail in the United States and that there the Meteorological had co-operated with the Forest Service and he hoped that the same might be the case here. The Dominion service has a Thermohygrograph at Gonzales Hill and are procuring several Dry and Wet Bulb Thermometers for use throughout the province and the resulting data will be available to this service. He stated that high and low air pressure areas occurred alternately in this province and that the high pressure area, moving over the province, accompanied usually by high dry winds, created our worst fire hazard seasons, or days, and that the movement of these areas could, and would, be forecasted for us. Such a high pressure area hovered over the province in May 1922 instead of moving south west as was usually the case, resulting in the unusual fire situation obtaining that month. To assist in predicting the movement of these areas studies are carried on at the station of the movement of the upper layers of air by means of small balloons filled with hydrogen which may be sent up and observed 10,000, 20,000 or even 45,000 feet. Mr. Dennison brought with him a Thermohygrograph which he had sent up for this Branch and stated that it, one of several purchased, was an especially fine machine, and that it had required little or no adjustment when received. The instrument and its working were described.

Mr. Cowan stated that for a long time we had kept records and charts in an attempt to arrive at the cause of fires. Dr. Hoffman, in the States, had decided that there was a definite relation between the relative humidity of the air and the occurrence of hazardous periods and in the course of investigations had found that the worst fire hazard occurred when the temperature was high and humidity low. In the course of his studies he had selected 49 materials which he found in the forest floor and cover and careful investigation indicated that they contained the most water at about 2.00 A.M. corresponding with the period of greatest water content in the air, that they dried out with the air and that the lighter form of cover would dry sufficiently before the time of least air content of water at about 2.00 P.M. to be easily lighted by a spark, cigarette butt, or other form of ignition, even though, with a slightly greater water content they were fairly fire resistant. With relative humidity below 35% and temperature above 70 he says we may count as hazardous weather and Mr. Cowan stated that our experience had proved this to be true.

The Berkley Fire of the past season was cited as an example. On September 16th the humidity was normal. At 2.00 A.M. on the 17th it began to drop and instead of the usual rise the following night continued low until the 23rd. At 2.00 P.M. that day it was about 20%. At 12.10 P.M. someone started a grass fire outside the city and at 4.10 \$7,000,000 damage had been done. About this time the humidity began to rise and there was a marked falling off in the intensity of the fire between that and six o'clock when it was practically over. A chart was exhibited showing the humidity at Berkley during that day. This fire started at the point of lowest humidity during the year.

In this province in 1922 we had between the 24th and 26th of May 3/4 inch rainfall. Humidity fell from that date and at a period of low humidity on the 29th the fire season started, indicating that humidity can come down very fast even on the coast. The fire peak followed the course of low humidity throughout the province.

The U.S. service has already equipped its field staff with dry and wet bulb thermometers to determine relative humidity and a supply has been purchased for the use of our staff this coming season. The instrument was exhibited and its use described.

In conclusion Mr. Cowan stated that when the humidity is below 40 the situation is dangerous, even though the usual signs do not seem to indicate this fact. Below 30 there is danger of crown fires, and at less than 25, especially if the thermometer registers more than 70 the forest floor will be in a state to take fire from sparks or cigarettes.

He explained that the bigger registering machine is being supplied to each district in order that humidity throughout the 24 hours, especially at night, may be known in order.

that humidity during the night may be taken into consideration in conjunction with the thermometer readings during the day by the ranger.

E.B. Prowd stated that he had prepared no definite discussion of this paper but had been greatly interested in these studies as reported and was glad to find that the Branch proposed making a test of them. He suggested that readings taken in Kamloops might not be useful in the outlying parts of the district and asked over how great a territory they might be considered reliable?

In reply C.S. Cowan stated that Dr. Hoffman had made tests by taking readings at his Headquarters and at a fire 47 miles distant simultaneously. The readings had coincided exactly indicating that they might be considered reliable for this distance at least.

The Chief Forester asked Mr. Dennison how far ahead we might expect to get forecasts from his station.

Mr. Dennison stated that a daily bulletin could probably be arranged and that they would cover 24 hours in advance or maybe 36 hours.

C.S. Cowan asked Mr. Dennison if the records we would be getting in the several districts would be of any use to the Dominion Station.

Mr. Dennison said that these records would be of very great value to him and he would very much like to have them if they could be reported without involving too great expense,

J. A. McDonald, when asked for his experiences by the Chief Forester stated that they had become interested in this subject in the Nelson District and had prepared charts of humidity after the fire season for purposes of study. He said that these charts indicated that the most hazardous periods would have been indicated to them ahead of time had the charts been available as the season progressed.

C.S. Cowan stressed the point that temperature alone is not an indication of fire weather. Low humidity with high temperature is dangerous and often the two go together but that our worst fire period during the past season had not been during the hottest weather.

R.C. St. Clair asked, Are rangers to take readings on their thermometers at any stated periods?

The next diary sheets printed, replied C.S. Cowan, will provide for the entry of three readings daily. Readings will also be taken at each fire at time of discovery to check estimate of time of starting. This reading may also assist in determining

the cause.

P.S. Bonney asked if there was any law as yet determined relating to the rate of change in relative humidity. Given 25% how long may we expect this condition to continue?

Mr. Dennison replied that it would depend on the location. A comparison of the records for different parts of the province shows a great difference in the length of the periods of duration. It depends however mainly on air pressure and his station will keep us posted this season as to occurrence of high and low pressure so far as possible.

The Chief Forester asked for instructions for the setting up of the recording machines.

General discussion followed by Mr. Dennison, Mr. Cowan and others from which it appeared that The Dominion Stations use a standard screen for the protection of the machine which is manufactured in England and in quite general use. However the main point is that the machine should be housed well in the open in any sort of adequate covering, the object being to permit free circulation of air while protecting from the weather. If placed near a building, as for example on a ledge outside a window, radiated heat from the building is likely to affect the records. The covering should be made strong and be kept locked to prevent tampering and theft.

R. V. Stuart wished to know if the information gained and the hazard indicated would be sufficiently reliable to warrant closing down operations.

C.S. Cowan did not know that we would be justified in closing down an operation but thought that the indications would be quite reliable to warrant a warning and that protection forces on the operations might be augmented or decreased in accordance with these indications with safety. He stated that at least one operator had agreed to install one of the machines. The freedom from risk and the advance information from the readings would give and allow him to release a large part of his protection staff during periods of small hazards, thereby easily paying for the installation.

E. C. Manning asked how accurate the Wet and Dry Bulb Thermometer readings would be after using the converting tables when compared with the thermohygrograph readings.

C.S. Cowan stated that these small instruments were accurate to within a half degree.

A vote of thanks, moved by C.S. Cowan and seconded by Mr. Melrose, was tendered Mr. Dennison, who left at this time, and discussion of the paper on Forest Protection Propaganda Methods was resumed.

Contrary to views stated in the paper on the subject, A. E. Parlow thought that we had already too many posters and signs. The present need is for fewer signs and different designs, more especially signs of the metal type. He advocated large painted signs for special cases citing an example in the Vernon District where a sign of this character might be used with advantage.

He agreed that lectures are a good form of propaganda and suggested that skeleton talks should be issued to guide amateur speakers on the subject.

He suggested a manual for course of study in the schools and stated that there is a demand for a course of this nature amongst the teachers.

He agreed that prosecutions should be published and stated that he believed that in the publication lay the greatest source of good to be accomplished.

He advocated the continuance of the essay competitions and stated he thought the practice should be province wide. Same awards as 1923 with addition of a cup for District producing best results and a shield for the Ranger for best showing in Ranger District.

He stressed the desirability of "talking shop" to any who could be interested, stating that he believed our work to be intensely interesting to the general public and that as a rule they would be glad to listen. He agreed also, he said, that the idea of an organization of Junior Forest Guards is good and cited an instance of such an organization in the States.

On the whole articles for publication should be submitted to Victoria for approval but protection propaganda might be published without this formality, he thought.

He agreed with the principle of Camp Grounds as a good form of propaganda and they should be properly labeled as a Forest Branch undertaking.

He believed that co-operation with the Dominion, so far as cash grant for propaganda is concerned, is a doubtful source of help at the present time.

What he would like to see would be pictures for distribution to the movie theatres; and he believed that they could be shown free of charge by the theatres. Distribution through travelling shows would reach the back settlements where they are most needed.

He believed the Forest Branch Calenders to be one of the most effective forms of propaganda we have and would like to see

a greater supply available, and suggested that they might be profitably supplied to every school room.

Numerous enquiries had been received for the obsolete telephone directory card and it might well be re-issued, he thought.

He advocated the principle of distribution of special advertising in the form of useful small articles and especially suggested an ash and match container to be used in cars.

C.S.Cowan drew the attention of the meeting to the fact that certain propaganda advocated had been already arranged for and mentioned,-

Camp Site signs, stencils for which are about to be issued. Letter cancellation stamps have been in use since 1914.. Boy Scouts have a Forestry Course and we co-operate in their instruction.

Suggested that Root and Branch would supply excellent material for any number of short speeches on various subjects of interest.

C.S.Cowan also pointed out for general information that publicity work was necessarily but side line of the Operation Office and that until a Public Relations Official could be retained this phase of the work could not be given the time and thought that it deserved. Also that if some criticism seemed merited at times a part of the shortcomings must be ascribed to the fact that plans and estimates had to be submitted so far in advance to insure the obtaining of the money involved that slip ups must occasionally be inevitable.

C.J.Haddon suggested that we should concentrate more on the children than in the past, also that some more substantial, or rather useful awards should be made for the prize essays as for example scholarships or books, either of which would probably be more highly prized especially in the back settlements.

He proposed the publication, in circular form, of all convictions, weekly or monthly, for posting in public places.

R.V. Stuart stated that the Vancouver Office proposed addressing crews in every logging camp before the coming fire season and thought that a much greater impression could be made if a moving picture show could be given in connection with these lectures. An outfit could be used more or less continuously during the year in school lectures and public meetings of various kinds.

He believed that broadcasting was good propaganda and stated that it had already been undertaken in the Vancouver District and that the policy would be continued. This programme involved however the securing of a good phonograph as it was

necessary to give some music to secure the requisite attention before any propaganda could be undertaken.

He believed that good work can be done through the Dominion Labour Bureaus if they can be influenced to warn every woods worker passing through, their hands concerning care with fire in the woods etc.

N. Moore, taking exception to one of Mr. Bonney's views, thought that it did pay to advertise in the papers. Also stated that he thought the personal appeal was made the greatest impression. He was especially in favour of school and public gathering addresses and suggested talks to the Indians through an interpreter; he stated that this had been done in the Cranbrook District with markedly good results.

C.S.Cowan extended to all an invitation to dine with the Minister at the Empress Hotel at seven o'clock, Thursday evening.

The Chief Forester in closing the discussion charged the committee to remember that our funds for propaganda are limited and that it is important that we confine our undertakings to our means.

Committees Appointed:-

Forest Protection Propaganda Methods.

Chairman: P.S.Bonney,
A.E.Parlow
C.J.Haddon
N. Moore

Humidity

Chairman: C.S.Cowan
L.R.Andrews
E.B.Prowd.

Wednesday, February 27th, 1924.

Proceedings opened at 9:30 a.m., P.Z. CAVERHILL presiding.

The Chairman then called upon C.J.HADDON for his paper on

RANGE IMPROVEMENTS

In the interior of B.C. are to be found vast areas of Crown Land which are admirably adapted to the raising of stock, particularly the higher plateau regions of the Cariboo and Vernon Forest Districts, which consist principally of low, rolling, open bunch grass range, suitable for early Spring and late Fall grazing, and the higher timbered areas which make excellent summer range. It is only within the last four or five years that any attempt has been made to systematically control these range areas, with a view to bringing about the full development of the grazing resources of the Province.

In drawing up plans for Range Managements one of the first considerations was the necessity for Range Improvements, the purpose of which being, briefly, to bring about the full utilization of the range by opening up new ranges and protecting over-grazed areas, insure the maximum carrying capacity, provide for the economical handling of stock on the range and eliminate entirely the possibility of losses to stock by fencing in Mudholes and other dangerous places.

Range Improvements are necessarily segregated into two classes, Primary and Secondary. Primary Improvements being those dealing directly with the range, which should receive first consideration, and Secondary those directly beneficial to stock.

A brief resume of the conditions of the range at the termination of what may be called the "free grazing period" will tend to show the necessity of primary improvements.

Up to very recent times the stock ranges of the interior have been grazed year in and year out, under practically the same system as that used in the early days by the first Settlers, when bunch grass could be cut for winter feed and the number of stock on the range small as compared with the number grazed at the present time.

Under this system stock were turned out in the Spring and were allowed to range entirely on the low ranges with the result that the continued grazing of cattle on these lower ranges, particularly the open bunch grass areas, weakened them to such an extent that Intensive Range Control and the opening up of new areas on the higher ranges became imperative. Years ago it would have appeared to the casual observer that the forage supply was

practically inexhaustible, but by continued overstocking and destructive grazing of limited areas, as the inevitable result of the lack of a system of Range Management, the forage supply became reduced to its present precarious state.

At the present time there are numerous range areas, though usually limited in extent, which have been so much reduced in carrying capacity that they have been rendered practically valueless for grazing purposes and the original palatable plants have, in many localities, been succeeded by weedy species that have very little forage value.

The opening up of new higher ranges will greatly assist in restoring these over-grazed areas, and can be accomplished by means of Range Improvements, such as Stock Trails from the lower to higher elevations. Cattle can then be pushed back in the early summer, and held there the first season by means of Herders and the judicious placing of salt, until the early Fall, when they would commence to drift down the rivers and creeks to the Fall range, by which time the seeds of forage plants would have matured and been dispersed.

The Salting of the range in this instance can properly be termed "Range Improvements" and should be directly carried out by the Department until such time as the whole range is properly organized and working under a system of properly organized Stock Associations. It may also be found necessary to erect drift fences in order to get an even distribution of stock over the range as the seasons for various forage types demand. The same procedure may be necessary in order to direct the drift in the Fall, from the Summer Ranges, to various sections of the low range so that the latter will not be overcrowded or overgrazed in any one particular section.

A further Range Improvement that is very necessary in order to bring about the full utilization of the Range and the restoration of overgrazed areas is the elimination of Wild Horses. This work can be rightly termed a Range Improvement. Wild Horses, particularly in the Cariboo District are one of the most serious problems of Range Management, as they not only cause considerable havoc among the better class of Horses, but in the early Spring when the snow commences to disappear from the lower open ranges, cause considerable damage to the new grass by close cropping and trampling. It is conservatively estimated that for every 100 head of horses eliminated from the Range, from four to five thousand areas of open range would be salvaged for the use of cattle. This can be brought about in two ways; one, by putting into effect a system of organized "Round-Ups", and second, by establishing a close season during the winter months, during which time many horses found on the range are at the Owner's risk, and by means of either a Bounty system or the establishment of a salaried force, plan to eliminate all wild unbranded horses from Crown Range by an organized shoot.

The opening up of new areas of range; through constructing Stock Trails, Salting Grounds etc., erecting Drift Fences to provide for an even distribution of stock on the range, and by the establishment of definite season for use to allow for the abundant reseeding of the more luscious grasses; is very essential to attain full utilization, but of equally vital importance is the development of the water supply. The dry seasons of recent years are undoubtedly responsible for the steadily decreasing supply of water. Lakes which were good, safe watering places for stock, have become dangerous Mudholes and some Springs are drying up, while those that are still active have suffered through trampling by stock in an effort to get water.

Until the winter snowfall increases to a considerable extent and brings the Lakes back to their original state, the providing of safe drinking places for stock must receive ample consideration in all Range Improvement Plans. It is very necessary that all Springs on Crown Range be definitely located and reserved for stock purposes. Where Springs have been badly trampled or are so situated as to be of no value for stock purposes, they must be improved, with two ideas in mind; one, to conserve the water supply, and the other, safety to stock. In forming plans for improving Springs, two usages should be kept in mind, one to make provision for an evenly distributed supply of water over the whole range for general range use, and the other, an adequate supply of water along established drive ways, for use on beef drives to shipping points. As it may not be possible to immediately carry out the improvement of all Springs, a definite plan should be drawn up that will meet the foregoing requirements.

The construction of certain Range Improvements and the organization of Stockmen, provides also a medium for active Forest Protection measures. Fires on the range have been very destructive, large areas having been so badly burned over that the best types of forage have been completely destroyed, and its place taken by weeds. It has also been a common practice to endeavor to burn off the timbered ranges under the misapprehension that better open range would result. This practice, however, does not now find general favour, as the stockmen realize they do not achieve their object, and moreover, seriously interfere with and sometimes destroy altogether the sources of water supply which is so vital to the stock-raising industry. Improvements such as Stock Trails to new and higher ranges are of equal importance for Forest Protection purposes.

SECONDARY IMPROVEMENTS.

Secondary Improvements, which may in many cases be termed Primary, will greatly assist in the economical handling of cattle on the range, such as Drift Fences to prevent the too wide straying of stock, and Stock Trails to facilitate the movement of stock from one section of the range to another, as rules and seasons demand.

Salting Grounds will not only be of assistance to breaking stock in to the use of new range areas, but can be so placed as to be of value in weaning stock away from dangerous watering places, and if properly located with reference to safe watering places, will ensure, quiet evenly distributed grazing over the whole range. The advantages to be gained by the judicious use of salt on the range cannot be over-estimated and is not sufficiently made use of.

In so far as the natural characteristics of the range are concerned, one feature is very outstanding and consists of dangerous Mudholes, which are an ever present and ever increasing menace to safe grazing. These Mudholes take a very heavy toll each year of stock, and practically the only sure remedy is to completely fence them in. Owing to the number and size of these deathtraps fencing is a very expensive item, but it is evident that if we are to secure safe grazing the problem must be handled without any delay. Some Mudholes have certain places along the edges where firm footing can be found, and experiments are being carried out, by the use of salt placed advantageously along the routes followed by the stock when drifting to and from the open range to the watering place, with a view to attracting them to the safe places. Cattle are very local in their habits and it is considered once they find a safe drinking place they will invariably come back. In other cases it is absolutely necessary to fence the Mudhole completely in. Care should be taken, however, to keep well back with the fences, as most Mudholes are caused by Lakes gradually drying up, and there is every reason to believe the seasons will so change that these Lakes will gradually fill up again, which would necessitate new improvements from time to time.

This question also brings up another problem; the menace of dangerous Mudholes, etc. on unfenced, alienated land. The Range Improvement Fund can only be used for Range Improvements on Crown Land. It is of very little use fencing in a bad Mudhole on Crown Range, if within a short distance over a surveyed line, an equally bad state of affairs exists. In this respect it is recommended that action be taken to provide, that: Owners of unfenced lands, in the vicinity of Crown Range, on which dangerous Mudholes, etc. exist, be notified that such is declared a Public Menace, and be given sufficient notice to safeguard same to the satisfaction of this Department within a given period. On failure to comply, authority be given the Department to carry out the work, costs of same to be billed against the owner and in case of non-payment, constitute a Lien against the property.

As a more extensive use of Crown Range takes place our future policy governing Range Improvements will have to include the construction of Branding Corrals, also Beef Drive Corrals situated at convenient places along established driveways, for the purpose of holding stock overnight on the drive to shipping points, while Corrals, with small fenced in pastures attached, for the purpose

of holding saddle horses, will greatly facilitate the handling of stock, particularly on the outlying ranges.

The Fencing of areas at shipping points for the purpose of Holding Grounds is also a very necessary improvement and will save stockmen considerable time and expense in the handling of cattle at time of shipment, and in case a delay occurs in shipping, will eliminate considerably the possibility of shrinkage.

A new departure in Range Improvements and one that finds great favour among stockmen, is the granting and setting aside for individual or community use, areas for Breeding Pasture purposes. The cost of fencing these areas to be taken care of by the Range Improvement Fund as funds permit.

These pastures will provide for the gathering together of Breeding Stock, and by careful and scientific management it is anticipated the calf crop will be increased from an average of 40%, as at the present time, to at least 60% or 80%. As these pastures are to be used for breeding purposes only, during an established season, this protection will result in a complete restoration of the area to its original carrying capacity, and will make possible the use of these pastures for other light grazing purposes, such as holding Bulls prior to the breeding season or the finishing off of beef cattle for a short period prior to shipment.

One thing that will greatly assist in stabilizing the stock raising industry and tend to offset the present low prices, is to increase the calf crop and do away with the carrying over of dry cows year after year, at a dead loss to the stockman concerned. The putting into effect of a policy governing breeding pastures will greatly assist in bringing about this desired result.

In all matters pertaining to Range Improvements, if complete success is to be met with, the co-operation of stockmen must be secured and the one agency above all others to bring about this result is Range Improvements.

Efforts to form Stock Associations in the past, with particular reference to the Cariboo District, have not met with the success expected, principally because previous to the past year stockmen had adapted a very antagonistic attitude towards the Grazing Act, looking upon the Grazing Fee as an additional Tax with no benefits in return. During the past year an increased effort has been made to carry out Range Improvements, particularly those affecting the community rather than the individual, and it is encouraging to note the different attitude of stockmen as the result of this activity. Arrears of Grazing Fees are being paid, and letters of appreciation received for work done, with requests for additional improvements. They are beginning to realize the old methods of stock-raising are obsolete and the only cure is the

development of Intensive Stock Raising, This can only be successfully attained through the formation and co-operation of Stock Associations, and Range Improvements are paving the way to this ultimate end.

This leads to the question as to which is the better policy:- To form Stock Associations first and endeavour to carry out their wishes and needs for Range Improvements, or for the Department to first develop and improve the Range to a certain degree, and then hand over same to properly organized Associations for co-operative management and control, with a reasonable assurance of success.

I am of the opinion, that, before endeavouring to organize stockmen, we should partially develop the range by carrying out certain Primary Improvements, such as making available new ranges, setting definite seasons aside for the use of over-grazed areas and seeing established rules are carried out, improving watering places, and fence or otherwise protect dangerous Mudholes. At the present time we are in the position of a Merchant selling forage to the stockman; for a small fee it is admitted but nevertheless we are selling. We say "You can only use the forage for part of the year but there is plenty more 50 to 100 miles away which you can have at the same rate, if you go and get it. You may not be able to find good water for your stock but you must take your chance and if you lose any cattle in dangerous Mudholes on the way, we regret the loss but request you to get busy and fence these Mudholes in order that further losses will not occur. As funds permit we will pay you for these improvements out of the amount you pay us for the forage".

You cannot expect much co-operation under these conditions.

Send the stockmen to new ranges along well cut out trails tell him where he can find good safe drinking places, that he need not fear dangerous Mudholes, and in the Fall and early Spring the low ranges will be in shape to carry his stock.

A different feeling would prevail among the stockmen and the matter of organizing Associations and securing co-operation from them would be greatly simplified. Funds are of course necessary to carry out plans along these lines, and the Range Improvement Fund as made up at the present time of one-third of Grazing Fees paid, would not accomplish much.

Therefore, it is recommended that consideration be given the amending of the Grazing Act to provide for a Range Improvement Fund, similar to that of the Forest Protection Fund, in that the Government set aside an amount equal and in addition to that of one-third of the grazing fees collected. In this way a substantial sum would soon be accumulated that would be sufficient to meet the heavy demands which will undoubtedly be made for

Range Improvements within the next few years.

It is not the intention to interfere with any rights or privileges granted Stock Associations under regulations 3, 4 and 5 but the stand is taken that the Government should first of all carry out certain Primary Improvements independent of Stock Associations or individuals.

The stock-raising industry of B.C. is still in its infancy and its future prosperity depends largely on the prompt and successful carrying out of present day policies governing the improvement of Crown Range Lands, which as one writer has so ably stated; "Cannot be excelled in North Western America for the production of good beef".

A. E. Parlow, in opening the discussion, remarked that the stockmen were still apt to look upon the Range Improvement Fund as simply an additional tax.

He would divide Range Improvement work into two classes, work which was primarily the business of the Government, and work which was the concern of the Stockmen themselves.

In the first class he would place the opening up of new Range and the building of trails; the erection of drift fences for the benefit of communities; the fencing of mudholes; the improvement of waterholes; and plans for the rotation of stock on the range, and for re-seeding the range.

In the second class would come such work as salting, the building of holding coralls at shipping points, the annual round-up for the clearing of the range of scrub cattle.

In the latter connection the Government had been paying the Range-riders; he thought that was wrong. The stockmen should bear the expense of this entirely.

Stockmen, he had found, did not combine readily, and only to a very limited extent can they be induced to form themselves into Associations by offers of financial aid. It was quite possible, however, to go too far in that direction, and he felt that that had been the tendency in the past.

The District Forester, of course, was responsible only for his own district. At the same time, he felt that when the Grazing Commissioner authorized any work in any particular District, the District Forester should be advised of it, and have cognizance of it; otherwise he was apt to be left in the awkward position of not knowing what was going on or what was being done. Instances had occurred of this very thing in his own district.

The Chairman then called upon F. A. McDonald for his "Notes" on Grazing.

- G R A Z I N G -

Range Improvement.

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It has been a pleasure to listen to and read over Mr. Haddon's presentation of his ideas for Range Improvement, but all through the paper the impression has been forced upon me, that such plans for administering Crown Range are in marked contrast to the methods followed in dealing with Crown Timber.

There is no divergence of opinion on the question of the great value of Crown Range to the successful conduct of the cattle raising industry. There is no valid argument against the right of the Crown to make a reasonable charge for the use of this range. There is every reason why the management of these ranges should be controlled by the Crown in order that unobstructed use of the range be assured to those entitled to it and that all parts of the range shall be fully utilized. But it is not apparent why such an industry, which has been long established, which has made fortunes for many of the pioneers, which has been built up in part by the free use of public property, should continue to enjoy the use of that property without paying a reasonable annual charge. Nor is it apparent why we should weaken our position in establishing such a charge by any rebate of the charge in the way of constructing improvements in aid of the industry which that industry itself must have provided, at least in part, during the past years.

Shipments of cattle have been made from the grazing districts for at least sixty years. Facilities for driving, holding at shipping points and shipping have been at the expense of the industry and transportation companies. These are, like similar facilities for other lines of business, part of the cost of doing business. No suggestion that a part of the Royalty collected on timber should be returned to the operator by assisting him in constructing booms would be considered by the Department. The equity of the Government in grass or timber appear identical. The first Royalty Act imposed a Royalty of 50¢ per M. on timber and no part of it was refundable in the shape of logging roads, booming grounds or the like improvements. The cost of these is a part of the normal cost of carrying on a logging business. So in the other case, it is considered that holding grounds at shipping points, breeding pastures, branding corrals, come normally under the head of expenses borne by the cattle raising industry and certainly should not be paid for from public funds.

Actual range improvement projects such as trails giving access to the range, fencing of dangerous mudholes, and Forest Protection measures seem to be undertakings which might properly

be paid for from range income. It would mean that we were using that income to improve the source of the income and put it into condition for wider and safer use.

Over-grazing of easily accessible ranges can only be controlled if, and when, other areas are opened up so that they can be readily used. If we have something to sell on the back ranges it must be put into condition for merchandising.

Insofar as ranges in common use are concerned, it is apparent from Regulation 5, published in 1919, that those using these ranges are expected to construct at their own expense such improvements as they deem necessary and are approved by the Department.

It then appears that with the elimination of the occupied ranges and the shipping facilities, the Range Improvement Fund could be used in opening up and safeguarding the less accessible ranges. It is noted that \$10,000.00 has been allotted by the Legislature for this fund, and this amount judiciously expended yearly should go a long way toward opening and improving areas which are now barely accessible.

I am not sure if it is permitted to criticize policies laid down in departmental circulars, but attention is directed to the last paragraph of Circular E6 regarding the difficulty of organizing stock associations, and suggesting the following method for bringing noncompliant stockmen together.

The problem can be solved by using the range improvement fund as a lever to arouse interest and by arbitrarily dividing the range into divisions, each of which should eventually be under the jurisdiction of a small organization. The permittees for each unit should be listed and the improvement fund for the Grazing District apportioned in accordance with the receipts from each unit or division. Meeting dates for each unit should be arranged at central points and the range users ranging their stock within those units should be called together at their appointed meeting places. All should be notified that the purpose of the meeting is to form a Range Improvement Board for each unit and they should be requested to come prepared to discuss range improvements needed for the unit each is interested in. It should be pointed out that it is the policy of the Government to refrain from incurring range improvement expenditures in districts where the range users fail to organize so that the Government may be made aware of the collective opinion regarding all projects proposed. In a very short while the active stockbreeders associations we desire will develop for each unit.

Regulation 5, previously mentioned outlines the procedure, and allocates the cost, it being definitely stated that the range users shall make the improvements and pay for them. Whence then comes the authority for expending any departmental funds for this purpose, and particularly as an inducement to form associations.

The circular states that the stockmen should be notified that the meeting is to be for the purpose of forming a Range Improvement Board. I have failed to find mention of any such board in either the Grazing Act or the Regulations thereunder. Herein lies the variance between Timber and Grazing policy. The one case lays down charges and regulations and enforces them. In the other case a charge is made which is not supported by a conviction of its justice, and various means are propounded for amelioration of the assessment imposed.

If the rates as fixed are excessive, it is believed that it would be better practice to reduce them to equitable amounts rather than attempt to justify the present ones by promises of refund in the way of improvements which may or may not be constructed. If it is felt that the cattle industry should contribute little or nothing to the general revenue, the rates should be reduced to the point where administration and improvement costs are taken care of. If the present rates are equitable, then any surplus above expenses should be diverted to consolidated Revenue, and not used to pacify those who have only been tardily requested to pay for the private use of public property.

Perhaps the greatest improvement in range conditions can be hoped for from more intensive control of grazing to the end that over-grazed areas shall be given the requisite rest periods by insisting on the full use of areas which have been understocked in the past. The forage which is not consumed ceases to be an asset with the end of that grazing season so it is incumbent upon the stock raisers, and the grazing officers, to give the required supervision to ensure that all available ranges shall be utilized to the fullest extent possible consistent with safe-guarding the next crop.

Perhaps the greatest range improvement work underway in the Southern Interior is the construction of the Edgewood-Vernon Road. This road will connect up a virgin grazing area, the upper reaches of the Kettle River, with an ideal hay growing district, Fire Valley. The Kettle River Valley probably carries fifty or more square miles of well watered timber grass range with heavy grass cover and open timber. Fire Valley has at present about 3,000 acres of land under cultivation and particularly suited to the growing of hay and other fodder crops as well as grain. It should be readily possible, with the use of these complementary districts to carry at least 2,000 head of cattle. The range is tapped near the centre at an average distance of twenty miles from the farm lands. In addition to the range country there are at least 500 acres of meadows along the upper Fire Valley which could be used to supplement the early or late range.

The recommendation, in Mr. Haddon's paper, that the Act be amended to provide for a Range Improvement Fund made up of one third of the Fees collected supplemented by an equal amount from General Revenue is not understood. The estimate of revenue from Grazing Permits, leases, etc., for next fiscal year is \$17,000. The amount voted to the Range Improvement Fund is \$10,000. From this it would appear that the above proposal has already been practically put into effect.

Incidentally it is noted that the salaries of the Grazing Staff at Head Office exceed the balance of the Grazing Fees. In addition there are travelling expenses of that staff, and the expenses of field administration from the District Office, so that, it now appears that the expenditure for grazing administration already exceeds the estimated income by several thousand dollars.

It is the practice of the various supervisory officials of the Forest Branch to visit the Districts from time to time and consult with District Officers on the conduct of the work. This is conducive to better work and a more thorough understanding of the aims and policies of the Department which may vary somewhat from time to time.

It is also the practice of these officers to give advance information of their visits so that arrangements may be made to cover the field and take up vexations or contentions problems and endeavor to reach some working solution of the various questions.

I have been disappointed in never having met any of the Grazing Officials in Nelson District during the last 2½ years. Neither has it been brought to my notice that any independent supervision of grazing areas or problems have been undertaken by either of the grazing officials. It is felt that where these officers do not cooperate with the local officers, either through lack of time or whatever cause, the best results cannot be expected and interest in the work is apt to lag where the head officials do not make any great effort to advise with District Officers or discuss conditions on the ground.

It then appears that unless the grazing fees are substantially increased, or that the number of stock grazed is greatly augmented, the branch will continue to operate at a loss. Any policy favoring increased allotments, or even the continuation of present practice, would mean that grazing would be bonused at the expense of some other branch, when the industry seems well able to take care of itself. This seems particularly true to anyone who buys an occasional piece of beef.

N. Moore stated that, so far as the Cranbrook district was concerned, the revenue derived from Grazing was only very small.

He was opposed to the paternalism which Mr. Haddon seemed to advocate.

He thought the grazing fees should be made as low as possible, as for the past three years the raising of beef had not been profitable. As a matter of fact he knew of stockmen who had put their beef on the market at a loss of from \$10 to \$15 a head. Less stock was being raised in his district from year to year.

To his mind the solution was a closer utilization of the Range. In Cranbrook that could be brought about if the Dominion authorities would remit the duty and permit the importation of sheep; and if we could have the Taxation Act amended to permit the bringing in of stock from other provinces where the grazing fees were higher, he could bring in enough stock from outside points to easily pay the cost of administration in his district.

He thought that grazing trespass should be handled in much the same way as a trespass on timber operation, and the stock should be placed under seizure without its being necessary to invoke any complicated legal processes.

He also thought that the Act should be amended to give us more power in the matter of collections. Arrears were piling up in Cranbrook and collections were poor, yet stock was being sold upon which arrears had accumulated and they apparently had no power to interfere.

The fees should be amended. Stock from outside points should pay one and a half times the fees paid by our own stockmen, to offset our Provincial Property Tax.

Every man whose stock warranted it should, he thought, be given permission to fence off a breeding pasture.

T.P. MacKenzie dealt first with the Grazing Fee. When the Act came into force at the request of the stockmen in 1918, the fee was set at 7¢ per head for cattle, the stockmen thought that rather high and figured that 5¢ a head was enough to cover the cost of administration.

The Range Improvement Fund stood in the same relationship to the Grazing Fee, really, as to the amount allowed to an Operator for the necessary improvement work when figuring out his appraisals. We had these necessary improvements in mind in fixing the Grazing Fees.

The object of using the Fund as a lever came about in this way: Efforts had been made to organize the stockmen for their own protection and for better range management. Twenty or twenty-two Associations were formed, some of which had been active while others dwindled and died, but having the Range Improvement Fund it was thought that if we could get a line on the improvements that were generally in demand the Government could do them, and establish their good faith in the matter of Range Improvement. The Associations were to advise us as to what was considered necessary, and they were formed first for that reason. Without the Associations, we had to go out into the country ourselves from door to door practically to find out what was wanted in the way of improvement, one man demanding one thing, and one another. Often, of course, it developed that there was a pretty general demand for certain improvements, and the Government is in a position to undertake that work to much better advantage than the individual Associations.

Dealing with the question of breeding pastures, the Grazing Commissioner remarked that in his experience the Stockmen were much more receptive when market conditions were more or less adverse. Adverse conditions prevailed at present, but this was to a great extent their own fault through mismanagement of the Range. Now that the Government had taken over the administration of the Range, there was no doubt at all but that matters would improve. All these factors had their bearing on the economic situation, of course, as the heavy losses incurred through such mismanagement had to be borne by the steers which actually got to market.

By carrying on in this way, said the Grazing Commissioner, we are helping them to bring their business into a prosperous state and are cementing their friendship, which is in itself a quite sufficient justification.

N. MOORE had raised the question of remission of duty on sheep brought in. That point had been brought up several times already. Remission of the tax was taken up last year with the Surveyor of Taxes, and it was agreed that an amendment might be asked for. Unfortunately, however, it had been overlooked in his (the Grazing Commissioner's) absence in the field.

With regard to trespass of Stock, the law permitted the seizure of such stock when the trespass was on Crown Range.

The question of co-operation with District Offices was one which he had tried at all times to keep before him, but circumstances were bound to arise (such for instance as those referred to by Mr. PARLOW) where a full degree of co-operation was impossible owing to the urgency of the case. Mr. MacDONALD had rather roundly criticised the Grazing Office, but really every effort was made to keep in touch, and for that matter the District Offices themselves might aid considerably by paying more

prompt attention to their correspondence!

What was the attitude of the Grazing Branch, asked Mr. MOORE, towards the men who fenced in his own breeding pasture? Provision was made under Regulation 5, replied Mr. MacKenzie, for schemes of this nature where the man was obliged to bear the cost of the improvements himself.

E.B. PROWD instanced the case of an isolated range which could only be used by two sheepman. Was he to understand that these men should themselves open up the range at their own expense, or would it be done by the Range Improvement Fund?

The Grazing Commissioner pointed out that in the Kamloops district the Fund was already overdrawn, and in the meantime he did not feel that they were justified in putting out any more money. He suggested that they might give five years' unrestricted range to these men in consideration of their opening it up at their own expense, under Regulation 5.

A.E. PARLOW, reverting to the subject of co-operation, thought that if visiting Officers would invariably make a point of advising the District offices of what had been done, it would help very materially.

P.S. BONNEY thought that in those districts where the stock-raising industry was still in embryo, so to speak, the Administration might be shelved until the industry got upon its feet, but the Grazing Commissioner was of the opinion that the Administration should take hold from the outset. He could not agree that there was anything to be gained by delay in taking control.

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The remainder of the Session was devoted to receiving and discussing the Resolutions presented by the various Committees.

This done, the Conference was declared adjourned.

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