

ROOT AND BRANCH

BRITISH COLUMBIA
LANDS DEPARTMENT
FOREST SERVICE

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No. 3.

The surging battle line long since is still
And cenotaphs are reared, and flowers are spread
Across the meadow and behind the hill,
O'er all those hallowed gardens of the dead.

Dead! Not to us, though all the world forget
That hideous travail of a nation's birth,
Your living memory is with us yet
Despite far scattered mounds of sacred earth.

And those of us — so few — who still remain
Cherish our scars — sore guerdon of the years
And, in remembering, almost bless our pain
That tells of tribute paid in blood and tears.

* * * *

And so to you we raise this silent glass

* * * *

And pledge ourselves to keep your memory
bright,
And pray we too, when comes our time to pass,
May look with fearless eyes into the night.

— R. Ross Napier.



On Tuesday, November 3rd, at Victoria, there was unveiled the Honourable the Premier and the Honourable the Minister of Lands, a beautifully-illuminated scroll to the memory of the late Oliver G. Clark.

In a brief but solemnly impressive address, the Premier recounted the circumstances and paid a touching tribute to Clark's courage and devotion.

The Memorial, which reads as under, and a portrait of Clark have been given prominent place in the Provincial Library, "there to remain" in the words of the Premier, "so long as these buildings shall stand."

"TO THE MEMORY OF OLIVER GOSNOLD CLARK,
Ranger, B. C. Forest Service,
who lost his life in the noble discharge of his duty
on the twenty-fifth day of June, 1925, at Port Neville.

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A Fire, of which he had charge, was whipped beyond control by a sudden change of wind, leaving only a few minutes for escape. Ignoring his own danger, Clark carried the warning to his crews and saw them safely to rafts and boats in the bay. He returned to the logging camp to make sure that no one had been missed. His body was subsequently found by his comrades, his Forest Service badge tightly clasped in his lifeless hand, bearing mute testimony that under the supreme test he had magnificently conceived and nobly discharged his duty. Ranger Clark has gone, but has left with us an inspiring example of courage and devotion to duty which will persist until the last Forest Fire is conquered and completely out."

Present at the unveiling were his brother, Mr. Reg. Clark; Colonel Hodgins and Major P.J. Campbell, late of the 1st Canadian Pioneers, with which unit Clark served in France and Belgium; A.E. Munn, M.L.A.; Chas. Woodward, M.L.A.; A.D. Patterson, M.L.A.; C. Bruhn, M.L.A.; C. McRae, M.L.A.; C. McNab, Waldo; F.A. Humbird, Chemainus; T.A. Lamb, Major L.R. Andrews, and A.V. Sutherland, Vancouver; Neale Murray, Kamloops; the Deputy Minister of Lands, the Chief Forester, the Comptroller of Water

Rights and the Surveyor General; G. P. Melrose representing the staff of the Vancouver Forest District; and a large and representative gathering of the staff.

Before writing FINIS to this sad chapter in our history, we wish to call attention to an unfortunate misunderstanding, for which we ourselves have possibly but all unwittingly been partly to blame. Naturally the first reports of this distressing affair were somewhat incomplete and disjointed, and the impression seems to be current that Clark's comrades left him to his fate. Nothing could be further from the truth. Supervisor J. Thompson and Engineer Haley who were upon the Forest Branch launch, clung for hours to the skirts of that raging inferno at the imminent risk of their own lives, in the vain hope of saving Clark. Time and again their craft was actually afire, but still they stayed until all hope of rescuing Clark had fled and they were able to rescue only his body. Then, and not until then, did they leave the spot.

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FIRE PROTECTION ALONG RAILWAY LINES

By Clyde Leavitt, Chief Fire Inspector,
Board of Railway Commissioners.

For several very excellent reasons, I am glad of the opportunity to establish contact, in this way, with the readers of "Root and Branch".

In the first place, the periodical itself is a most excellent one, and well deserves support and encouragement. The new policy of conscripting authors for its service is to be commended. Any scheme is good if it works, and this one should.

In the second place, the work of the Board's Fire Inspection Department is of very special interest to the B. C. Forest Branch. For one thing, we are helping you, with the assistance of the railways, in solving the problem of forest protection along railway lines, and in this work your organization merges with ours through the ex officio appointment of some 41 members of the B. C. Forest Branch as field officers of the Board's Fire Inspection Department. Looking at it from that angle, you may be said to be helping us, but it should not be overlooked that the primary object of the work is the protection of public and private forest property, - principally the former, - the protection of which is peculiarly the business of the Forest Branch.

Another reason for your special interest in this work is the fact that the B. C. Government in 1909 made application to the Board for the issuance of fire regulations applicable to the railways. This application was based on the preliminary report of the Royal Commission of Inquiry on Timber and Forestry, which Commission was the progenitor of the present Forest Branch. M. A. Grainger, who ably won his spurs as Secretary of the Commission, later became Chief Forester, succeeding H. R. MacMillan.

In its preliminary report, the Timber Commission referred at some length to the tremendous damage wrought by forest fires resulting from railway construction and operation in British Columbia. The application to the Board for relief was later supplemented by others from the Dominion Forestry Branch, Conservation Commission, and other organizations. Hearings were held across Canada, and on May 22, 1912, the Railway Commission issued its Order No. 16,570, which had been worked over and amended from time to time. The existing railway fire regulations are embodied in General Order No. 362, dated April 19, 1922. Thus, the pedigree of these regulations goes back, in considerable part, to British Columbia, and particularly to Grainger, who wrote the report of the Timber Commission.

The general features of General Order No. 362 may be briefly summarized as follows:

1. The order applies to steam railways subject to the Board's jurisdiction, under construction as well as under operation. It does not apply to lines built and operated by a Provincial Government, or holding a Provincial Charter, as, for example, the Pacific Great Eastern. Ninety-seven per cent of the railway mileage of Canada is subject to the Board's jurisdiction.
2. Standards are set for fire-protective appliances on locomotives, and frequent inspections are required.
3. No dumping of fire, live coals or hot ashes on the right of way, unless extinguished immediately.
4. Maintenance of railway rights of way free from unnecessary combustible matter. Local officers of the Board may regulate burning operations on the right of way, by issuance or refusal of permits to burn.
5. Posting of notices in smoking cars and compartments, warning passengers against throwing burning smoking materials from trains. Verbal warnings by trainmen to the same effect.
6. Construction and maintenance of fire guards in prairie sections of the Prairie Provinces, as prescribed by the Chief Fire Inspector.
7. Maintenance of special fire patrols, by railway companies, through hazardous forest areas, as prescribed by the Chief Fire Inspector. Local officers of the Board grant relief from this requirement, so far as weather conditions will permit.
8. Section forces, agents, contractors, trainmen and other regular employees of the railway fully instructed as to the immediate reporting and extinguishing of all fires presumably due to the railway. Forest fire prevention and control are thus recognized as an essential part of railroading.

The field staff of the Board's Fire Inspection Department is made up, as already indicated, of selected officials of the several Dominion and Provincial forest services already on the ground, each within its own territory. This co-operative arrangement dates back to the early summer of 1912. The co-operative arrangement is really triangular, since it actually embraces the railways, which have made splendid progress toward handling not only their own fires but in making their entire organizations available for the control of any fires which may occur in proximity to the railway line, regardless of origin.

With the passing years, the efficiency of the railways in handling their forest fire problems has increased most creditably, and the spirit of harmonious co-operation has grown correspondingly.

COMPARATIVE COSTS IN POWER LOGGING

G. P. Melrose.

Whether or not the systems of power logging on the Coast are detrimental to the reproduction of the stand is a question that has not as yet been settled satisfactorily. However, it has been said that high lead yarding is particularly hard on reproduction and certainly an area logged by that method presents a desolate appearance. It has been proposed that regulations of some kind be made to limit yarding by high lead and that ground yarding only be allowed, but however efficacious that might be the question of the result in cost and inconvenience to the industry of the substitution must be considered, and whether or not the results will balance the cost. As a preliminary to what is hoped will be a full discussion of the subject the following descriptions of the three main power logging methods now in use is given and the chief elements affecting their cost briefly reviewed.

Power yarding is done in three ways: First with the log dragging on the ground and the haul-in or main yarding line leading along the surface of the ground from the yarding engine to the log; second with the log dragging along the ground and the main yarding line leading from the yarding engine to a large lead block suspended near the top of a spar tree standing close by and thence out to the log; third with the log riding suspended or partly suspended from an overhead cable. The first system is known as ground yarding; the second, as high-lead yarding; and the third as overhead yarding.

The chief element in determining costs is yarding output, and it is therefore of the utmost importance to the timber operator. Many factors influence it and the difficulties of estimating it are therefore great. The following are the main factors to be considered with remarks on their effect on each system.

(1) Methods. Each method may be best adapted to one set of conditions but as a practical logging question it is not always clear which method should be used. For instance one operator may be securing excellent results with the high-lead and another under similar conditions getting equally good results with the overhead. In some cases it may be out of the question to use one system because the proper equipment is not at hand and the amount of timber not sufficient to warrant scrapping the old and buying new.

(2) Yarding direction in relation to slope of ground. Level ground or ground sloping slightly toward the machine is best for yarding under any system. The drawback to yarding logs downhill with the ground system is that as soon as the log travels faster than the speed of the main line, which often happens, the tendency is for the log to run out of the choker or get behind stumps and in depressions on the side away from the machine. As a general rule the output is 30 to 50 percent higher on an uphill pull with ground yarding than with a downhill pull, assuming that the ground for the downhill pull is steep enough to cause the logs to run ahead of the

line, and that the machinery is powerful enough to handle the logs uphill with despatch. Overhead yarding methods work better downhill than uphill, and in fact are especially adapted to the former class of work.

(3) Size of timber. The output does not vary directly with the size of the logs since a certain amount of time is consumed in any case in making a yarding trip, the same amount of time being consumed in returning the line to the woods, hooking up and unhooking at the tree. Again logs of large size are less likely to hang up than small ones if the power is ample. Large timber is especially advantageous for ground yarding because it is usually not possible to handle more than one log at a time whereas more than one may be handled per trip by the other methods.

(4) Yarding distance. It is clear of course that the longer the distance that the logs have to be yarded the less the output, but the reduction of output is not proportional to the distance, on account of the fixed times taken for parts of the operation. The economic range for ground yarding seems to be from 600 to 900 feet, high-load from 600 to 800 feet while the overhead systems work to best advantage at distances ranging from 900 to 1500 feet and even up to 2000 feet. The longer distances give a greater acreage yarded per set-up and thus lower the cost per thousand for moving machines and rigging, but naturally the greater the distance, the heavier the equipment and the costlier it is to move.

(5) Size of crew. Up to a certain point the output varies with the size of the crew but a limit is soon reached. Too much can be made of this factor as in any system the bulk of the crew is fixed. All systems use about the same number of men.

(6) Condition and care of equipment. The way the equipment is used and looked after has a large bearing on the output, as well as the type and up-to-dateness of the machinery. There must be a nice balance between the type and size of equipment and the other factors influencing output and most operators that stay in business must of necessity get close to this balance.

(7) Defect in timber. The yarding output is affected in much the same way by rotten timber as by the size of the logs. It takes as much time to yard a rotten log as it does a sound one while the scale may not be half as much. Much time is lost disentangling the sound timber from the defective since the sound and unsound have to be felled by the operator to be sure that all merchantable timber is secured. There are few factors as important as this in determining the output of any yarding unit and it is thought of the least.

(8) Surface of the ground. The output with the ground yarding method is less where the ground is broken up with potholes, hummocks, small ravines and the like, than where the ground is relatively smooth. The effect of this factor on the high-load and overhead systems is not so apparent, particularly with the overhead.

OTHER FACTORS OF COST IN POWER LOGGING.

(1) Labor on the logs. The ground system often requires that logs be "sniped" or rounded at the forward end before being yarded. This is to facilitate their movement over the ground. This is a cost that is not needed for the high-load or overhead systems, while the latter are much better able to handle long logs than the former.

(2) Investment in Equipment. To be efficient the machinery used in ground yarding must be as powerful as that used in high-load, in fact considering the added friction along the ground yarding engine needs more power. However we find that the only ground yarding done at present is with old, light equipment, while the high-load and overhead outfits are using heavy, powerful, modern donkey engines and the latest designs in blocks and rigging. In many cases the investment in a single unit will be \$25,000 with a average profit-bearing investment of about \$15,000 while the ground yarding unit will represent an investment of about half the amount and half the profit-bearing investment. But in output the high-load unit will average more than twice what the ground yarder will produce with less work on the logs and fewer improvements such as landings and cleared yarding roads.

CONCLUSIONS

In coming to a conclusion on this question it is well to look at the practice of the modern loggers, and in doing so we find that invariably they have turned to either the high-load or the overhead. Even the men with the small gasoline engine or Diesel donkeys are using high-load to get the advantage of the lift to the incoming logs. To-day it is difficult indeed to find a single ground yarding system in use, which is pretty fair evidence that the other systems are more efficient and any return to ground yarding would be retrograde step in logging engineering.

As between the high-load and the overhead systems there can be little choice in many cases. Some large companies are sticking to the overhead while others are turning to the high-load. The former is undoubtedly the best for long steep slopes and for long swings, while greater speed is obtained by high-loading the shorter distances on good ground.

From the foregoing discussion of the factors entering into the cost of power logging it can be seen that a strict comparison of the costs of the three main systems is impossible since that could only be done in specific cases and not under hypothetical conditions. The weight of proof is that the ground system is much more costly than the other two and with that we shall probably have to content ourselves. The question of what is to be done to alleviate any damage to the reproduction of the stand will have to be determined for each case considered on its merits, after the question of whether or not great damage is done by the high-load or overhead systems is determined.

WAS THE RANGER CORRESPONDENCE COURSE WORTH
WHILE, AND SHOULD IT BE REVIVED?

(Wm. Holmgren.)

The Editorial Committee has asked me to write a short article on the above subject, and, while I am glad to do so, I find on closer examination that there are really two subjects, viz. "Was the Correspondence Course worth while", and, "Should it be revived". Of course, the two subjects are closely allied, as, if the Course was worth while, certainly it should be revived, but I think a clearer insight might be had, if the two subjects are treated separately.

To the first part of the question, then, the answer is YES unhesitatingly and unreservedly. Personally I enjoyed the courses very much indeed, and also am of the opinion that they have been of a great help to me, and any other ranger I have asked, agrees. An example: During the winter the courses were held, I was for a time in the Slocan Country, helping ranger Nelson to do some cruising, and I found that Hughie was taking some of the courses. Naturally we talked Correspondence Course quite a lot. As to his reasons for taking the course, the gist of Hughie's remarks were as follows: "You might be surprised at me taking the course at my time of life, especially as I have only a few years until I am due for pension, but I think it will be helpful to me while I am still in the Service, even if it is only 3 or 4 years, and the knowledge gained will be useful to me after I have left the Forest Branch". (Have I expressed your sentiments correctly, Hughie?).

This opinion of ranger Nelson's seems to me to give a complete answer to that part of the subject. When a man like he, who knew he had only a few years more in the Service, considered the courses helpful, how much more so would they not be for a young man, just starting out on his career? The success of our organization depends upon to what a degree we are able to help each other, and the more a man knows about his work the better he is off, and the better the service is off. But, at the same time, knowledge is not everything; it is how a man uses his knowledge that counts. And that brings us to the second part of our subject.

In answering the query "Should they be revived" with YES, as unreservedly and unhesitatingly as in regards to the first part, I express, I think, not only my personal opinion, but also the opinion of all those, who had the privilege of taking any of the courses. But that is not all. To answer the question fully, I must necessarily be aware how the knowledge gained by the courses was used. Now, I might think, and other rangers might think, that

our work was better afterwards, but we do not know. The District Offices and Head Office, however, are in a better position to judge, and thus it seems to me, that the answer rests in a great measure with them. There were some rangers who took the courses, and some, I expect, who did not. The question that presents itself is then: "Has the work submitted by the participants of the courses improved sufficiently, especially in comparison to that of the non-participants, to warrant reviving?", and those of the Head Office who did the correcting, might also ask: "Have the results achieved been enough to repay us our time and trouble, at least in some degree, in that it is now easier, because of the field men's better handling of their work, to cope with the business that comes in from the field?". The places where ranger's work can be compared, are the District Offices, and still more the Head Office, and therefore I can not give an adequate answer, but I think, that when the question is gone into, (which probably has been done already) it will be found, that the evidence is in favour of revival.

As to suggestions for bettering the Courses, which were also asked for, I think it would be better, if each participant were allowed to take only one subject, instead of two, as was the case, when we had them before. It takes too much time to deal with two subjects, and do it right. I well remember I used to burn the light to one or two o'clock at night, and even later, to get the work done, and I did not have nearly as much to do then, as I have now. It would be quite impossible for me to do justice to more than one subject now, and it will be the same for most rangers. And the congestion at Head Office will of course, be less when the papers come in for correction.

Then, also, the last time the course was limited to rangers and assistant rangers on duty. I wonder, could it be arranged to admit all assistant rangers and even patrolmen? I think it would be a great thing for the Service, if it could be done, but perhaps it is impossible. If it could, though, it would furnish a pretty good indication as to which ones were sufficiently interested in the work to try to better themselves, and then, since assistant rangers and patrolmen are the ones from whose ranks rangers are recruited, at least chiefly, would it not be a distinct advantage to have men, at least partly trained, ready to step in as occasion required? Perhaps, however, it is too early for that yet, but, if the courses are continued, there will come a time when there will be less rangers to take them, as in time they will all have taken part, and perhaps then some of the others could be admitted. It might be worth while, at any rate, to address a circular letter to all assistant rangers and patrolmen, and find out just how many would like to participate.

"WINGED WORDS"

Ranger Wm. Lowry.

The necessity for a quick, reliable means of communication between the fire and headquarters can be readily understood by anyone who has had experience in fire suppression.

What is wanted is word from the man on the fire. Does he need more support or more supplies? Has the number of men required been underestimated under the changing weather hazard? How is the work proceeding on the fire lines?

As a rule, messages giving information of this kind, essential to the work can only be sent out from the fire by men on foot and as most fires are off the beaten path travel takes time. Homing pigeons, however, would appear to offer a ready easily available means of communication that would be hard to beat. Pigeons, properly trained, could be made a valuable auxiliary in fire suppression work. Here is a comparatively inexpensive method for increasing the efficiency of the fire suppression work. A homing pigeon service could be inaugurated by encouraging local boys everywhere to keep pigeons for sport and these pigeons could be brought into service when occasion required. The encouragement of pigeon keeping could be combined with the interests of Forest Protection.

In fact, we are so confident in the value of pigeons for the work, as outlined, that we have gone into the pigeon keeping world ourselves and we shall be pleased to report at some future date as to the success or failure of the experiment, locally.

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COMMENTS ON "WINGED WORDS."

by W. R. Tait.

It is a well known fact that pigeons have been used as a means of communication ever since the days of the Romans. In the late war they proved that when all other means of communication had failed the pigeons could still carry on and bring messages through at the critical moment.

In Japan, where deficiencies in telephone and telegraph systems, to which may be added an unusual slowness of the mail, some more rapid and dependable means of news transmission was essential. The newspaper then turned to carrier pigeons and the system this far has proved a success that the larger newspapers, such as Osaka Mainichi, Tiji Shimpō and Hochi Shimbun of Tokio maintain a regular pigeon loft on the roof of their office buildings. The birds are distributed to correspondents in outlying towns and when the correspondent has a "copy" to send to the office he attaches it to the pigeon and turns it loose.

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The Dominion Government has a pigeon loft at Jericho Beach attached to the Air station where pigeons are used as a means of communication in case of accident to any plane. The standing orders are that no plane is allowed to take to the air unless two pigeons are with the pilot. At this air station it has been proven that without the pigeons many a pilot's life would have been lost. This means of communication has proved such a success that all Government Airdromes have to have a pigeon loft attached.

To inaugurate a pigeon service in the Forest Branch there are a great many obstacles but, I have no doubt could be overcome with the help of all ranger and field men. In the first place there are pigeons and pigeons, some would not fly home from two miles, so that gets us to the strain of the birds to be used. All birds would have to be bred from birds that have proved their homing ability. This would mean that the Forest Branch would have to establish a Headquarters loft for breeding the right type of bird, or have some means of getting birds from some of the homing pigeon clubs in British Columbia of which there are five.

There would have to be a loft in each district, but if the rangers would take it up voluntarily each one could keep a few pigeons and not only get a lot of sport but would find the pigeons would help out the fire season, also they could be used in the launches that are not equipped with wireless in case of accident. Each ranger would have to be taught the care and training of a homing pigeon as this is the most essential part and means the failure or success of the enterprise.

In the northern districts of the Forest Branch, you have the most dreaded enemy of the pigeon, the hawk, who kills more pigeons than any other bird of prey. The U. S. Signal Corps have overcome this difficulty by using a Chinese whistle. This device is put on the tail feathers and when the bird is going through the air the whistle sounds and has the effect of scaring the hawks. I do not think it would be wise to go into details of training the birds at the present time but should any of the Forest Branch want to know anything as to pigeons just shoot it at the editor and I am only too pleased to help any of them pertaining to the racing pigeon game

If Ranger Lowry is still in the pigeon world in the Spring I will give him a pair of young pigeons to try out from birds that have flown 500 and 600 miles.

(12)

THE BILTMORE STICK

C. D. Orchard.

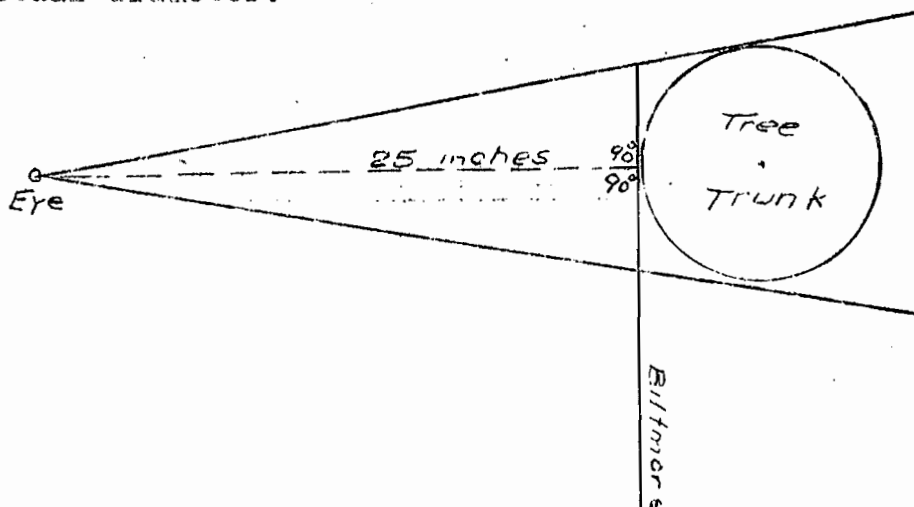
One of the common errors in cruising is the wrong estimation of tree diameters. An 18 inch four log Engelmann Spruce is shown in the standard volume table to contain 285 board feet, while a 16 inch, four log tree, contains 240 board feet, a difference of 45 feet, or more than 15%. This percentage of difference, or error if trees are tallied one diameter class wrong, holds pretty consistently throughout this table which is a fair example.

I have seen men cruising who, so far as I could find out, had never at any time actually measured the diameter of a tree; and several others who used a straight two foot rule, placing it against the tree and, with an actual measured distance before them comparing it with the apparent diameter of the tree in question, certainly a rough and ready method taking as much time and trouble as a much more accurate procedure.

Most persons can learn to judge diameters with considerable accuracy but for consistent good work trees must be measured frequently to check the judgment, and some sort of diameter measuring device should always be carried on strip line. Several such instruments have been devised, the most practical for general use probably being the Biltmore Stick.

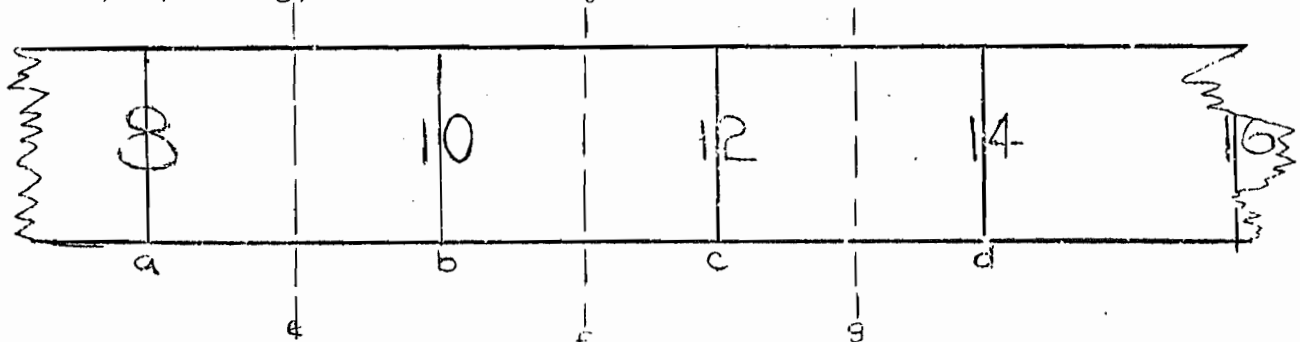
The Biltmore is a stick of any length, graduated in such a way that when held against a cylinder in a certain position and distance from the eye the graduation indicate the diameter of the cylinder with sufficient accuracy for all practical purposes. It may be made for use at any distance from the eye but the usual reach for which it is constructed is 25 inches. The method of use is as follows:

Hold the stick against the tree with the right hand. Hold it on a line with and 25 inches from the eye, and at right angles to the line of sight, as indicated below. Move the stick right or left until the left end coincides with the line of sight from the eye to the left side of the tree. The graduation cut, or nearest to, the line of sight to the right hand side of the tree is the diameter of that tree. The distance on the stick apparently coinciding with the diameter will, of course, be less than the actual diameter.

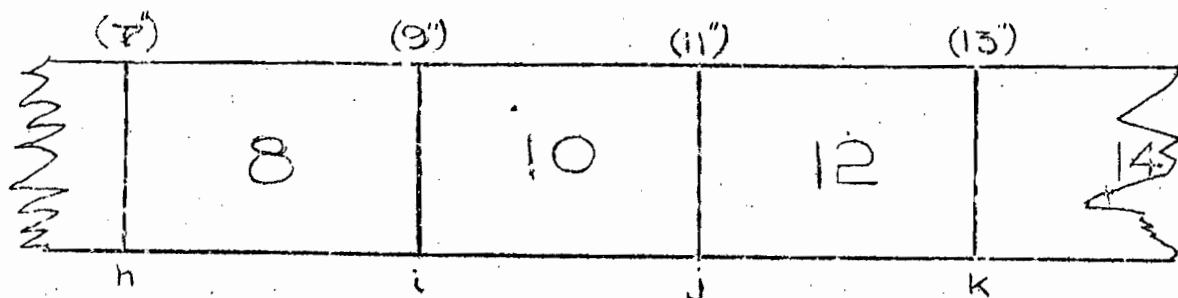


The Biltmore supplied by the manufacturers of scales and surveying instruments are usually about 36 inches long. They carry various other information in addition to the diameter scale e.g. an inch rule, a log scale and hypsometer, and are rather expensive instruments. A very practical stick may be made, however, at the cost of a few minutes effort. The measurements for the scale are given at the end of this article. For work in the interior of the province a stick 25 inches long is probably the most practical. A stick of this length will measure diameters up to 40 inches, and, being the same length as the reach for which it is constructed, is very useful in checking the distance of the eye from the tree. Cut a piece of straight dry spruce or jack pine sapling about three-quarters of an inch in diameter and 25 inches long. Face one side with knife or axe. Measure the distances as per the table below from the left hand end of the stick in two inch diameter classes, either odd or even, i.e. the distances corresponding to 8, 10, 12, 14 inches, or 7, 9, 11, 13 inches diameter. These points should be measured off with considerable care as the accuracy of the stick will depend on the accuracy with which these points are placed. Draw lines on the stick at these points and number with the even two inch diameter classes either on or between the lines according to whether the even or odd class distances have been measured off. Bore a small hole in the right hand end of the stick and tie a loop of leather shoe string or thong through it and hang on the wrist. The stick, made in about five minutes on the job, is ready for use, and will give as good results as the five dollar article providing you have measured your distances off carefully. An added advantage this class of stick has over the boughten article lies in the fact that wide experience has proved that a biltmore stick always possesses the peculiar quality of remaining on a log at the end of the last strip in the days work, probably several miles out in the bush. The loss of the improvised stick is not to be compared with the loss of one of the fancy ilk.

The use of the odd measurements is possibly a little more practical than the use of the even, as illustrated below. In the first illustration the lines, a, b, c, d, are 6.95, 8.45, 9.85, and 11.20 inches from the left hand end of the stick, respectively, and coincide with the diameter classes 8, 10, 12, and 14 inches. But a tree in the 12 inch diameter class may be anywhere between 11.1 and 13 inches in diameter. When diameters fall close to these limits one must, therefore, guess the location of the centre lines e, f, and g, which actually divide the diameter classes.

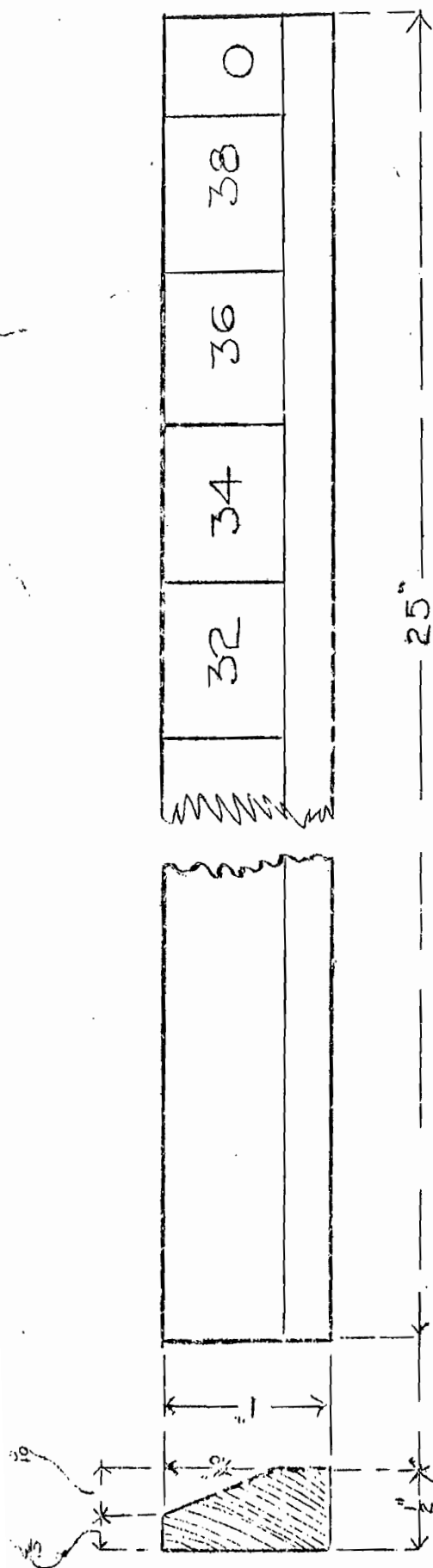


In the next illustration the lines h, i, j, k, are 6.20, 7.70, 9.15, and 10.55 inches from the left end of the stick, respectively and coincide with the diameters 7, 9, 11, and 13 inches. Everything falling between the lines j, and k, i.e. 11 and 13 inches, therefore, falls without guessing into the 12 inch diameter class. The use of the odd diameter lines eliminates guessing when trees fall close to the dividing line between two classes.



If one is less prone to leave sticks behind him than is the writer, then a very superior article can be made if a little more trouble is taken. Hard wood is, of course, more suitable for the purpose than the spruce or jack pine sapling and an old hickory double-bitted axe handle is maybe the easiest way to secure a piece of fine hard wood suitable for the purpose in this country. Take a handle which has been broken off at the eye of the axe. Plane down to shape and dimensions as per drawing below. Smooth with a piece of broken glass or fine sand paper. Make measurements from the left hand end of the stick to the odd two inch diameter classes as before. Draw lines on with a sharp pencil and a small carpenter's square if one is available. Score these lines with a sharp knife blade point. If a bold black line is desired in the finished stick, widen these scorings a little with a blunt knife point, or even cut them out a little. With a set of dies sink the appropriate numbers midway between the lines. If dies are not available the numbers will have to be drawn on and cut out with a knife. In this case cut the lines as fine as possible. Give the stick one coat of shellac. When dry rub dry lamp black into the scoring, completely filling lines and numbers. Clean the stick with a damp rag. The black will come off the surface of the stick but remain in the lines. Give one more coat of shellac, and when dry varnish. The resulting stick, if carefully made, will be as fine in workmanship and finish as the sticks manufactured by various instrument makers.

A very useful addition to the biltmore, which may be placed on the back of the stick is the hypsometer. The principle involved is the same as for the diameter scale. The scale is made for use at any distance from the tree, usually one or one and half chains. To use it, pace out one or one and a half chains from the tree, or better still, measure the distance. Face the tree and hold the stick in a perpendicular position 25 inches from the eye. Make the bottom of the stick coincide with stump height on the tree. A scale, made in accordance with the measurements given below will indicate the number of 16 foot logs in the tree. The accompanying illustration to scale shows the method of putting the scale on the back of the stick.



(15)

15' long at 1 chain																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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Merritt Hypsometer approximately to scale
25" stick, 25" reach

Biltmore Stick measurements to nearest twentieth of an inch, in inches from the end of the stick.

<u>Diameter</u>	<u>Distance from</u> <u>left end of stick</u>	<u>Diameter</u>	<u>Distance from</u> <u>left end of stick</u>
5 inches -	4.55 inches	28 inches -	19.25 inches
6 " -	5.35 "	29 " -	19.75 "
7 " -	6.20 "	30 " -	20.20 "
8 " -	6.95 "	31 " -	20.70 "
9 " -	7.70 "	32 " -	21.15 "
10 " -	8.45 "	33 " -	21.65 "
11 " -	9.15 "	34 " -	22.15 "
12 " -	9.85 "	35 " -	22.60 "
13 " -	10.55 "	36 " -	23.00 "
14 " -	11.20 "	37 " -	23.50 "
15 " -	11.85 "	38 " -	24.00 "
16 " -	12.50 "	39 " -	24.35 "
17 " -	13.10 "	40 " -	24.80 "
18 " -	13.70 "	41 " -	25.25 "
19 " -	14.30 "	42 " -	25.65 "
20 " -	14.90 "	43 " -	26.05 "
21 " -	15.50 "	44 " -	26.50 "
22 " -	16.10 "	45 " -	26.90 "
23 " -	16.60 "	46 " -	27.30 "
24 " -	17.15 "	47 " -	27.70 "
25 " -	17.70 "	48 " -	28.10 "
26 " -	18.20 "	49 " -	28.50 "
27 " -	18.70 "	50 " -	28.85 "

Merritt Hypsometer measurements to nearest twentieth of an inch in inches from the end of the stick.

<u>16 foot logs</u> <u>at 1 chain</u> <u>from tree.</u>	<u>Inches from</u> <u>end of stick.</u>	<u>16 foot logs</u> <u>at 1½ chains</u> <u>from tree</u>	<u>Inches from</u> <u>end of stick.</u>
1 Log --	6.15 inches	1 Log --	4.10 inches
2 Logs --	12.35 "	2 Logs --	8.20 "
3 " --	18.50 "	3 " --	12.35 "
4 " --	24.70 "	4 " --	16.45 "
5 " --	30.85 "	5 " --	20.55 "
		6 " --	24.70 "
		7 " --	28.80 "
		8 " --	32.90 "

TIMBER ADMINISTRATION FROM A FOREST SERVICE LAUNCH

W. Black.

The problems of Forest Administration from a Forest Service launch chiefly arise through delays and interruptions to transportation and, in this connection, it must be borne in mind that the efficient administration of a forest area accessible only by water depends primarily on the mobility and seaworthiness of the means of transportation, and that any interruptions or impairment of mobility from any cause react detrimentally on the administrative duties of the officer concerned. In this respect adverse weather conditions present perhaps the chief problem.

This is particularly true in districts covering a vast amount of territory with an extensive shore line exposed more or less to bad weather conditions, and which contain a heavy management list of widely scattered operations demanding regular supervision.

It is in these districts where interruptions caused by foul weather such as fog, wind or snowstorms are so frequently encountered, that the problem of overcoming the effect of such interruptions becomes at times more or less acute. When the distances to be traversed are considered, even during periods of normal logging activities and weather conditions, the launches (owing to their limitations in speed and seaworthiness) are at times little more than equal to the task imposed, so obviously under abnormal conditions, particularly during the winter and spring months, plans and schedules are frequently disrupted and administrative work temporarily, though unavoidably, falls in arrears.

As it is roughly estimated that it requires from ninety to one hundred and twenty hours launch travelling time per month (depending on the type of vessel used) to efficiently cover the average ranger district, it will readily be seen that during the winter and early spring months there will only be four to five and half hours of daylight available for field work and that any protracted interruptions of transportation must, to a varying extent, impair the efficiency of timber administration in launch districts.

It has often been impressed upon the operators of launches that the negotiating of rapids other than at or near slack water, night running and navigating during bad weather, are discountenanced but I surmise that most operators, particularly in the north are, through necessity, compulsory offenders and, when interruptions or delays have occurred, do metaphorically speaking, like Nelson at Copenhagen, often apply the telescope to the empty socket to overcome the handicap.

With the trend of low production northward, this problem will undoubtedly be magnified in the future and the solution will be largely a matter of economy, involving either the construction of vessels with a greater margin of speed and seaworthiness, or by increasing the personnel and reducing the area of the districts to be administered.

Office work on a launch also presents at times a problem which, on account of volume, inconvenience, and frequently the instability of the office, amounts almost to a nightmare.

It has been roughly estimated that for every two and half days spent on field work, one day is required for office work which, it must be conceded, is an entirely disproportionate ratio and, despite the commendable work of the management branch to alleviate the situation, I would point out that, with the introduction of every new policy requiring the collection of data from the field, the tendency will always be gradually, though perhaps unnoticeably, to increase the field man's burden.

Office work is not accomplished under ideal conditions, usually on the dining table with a very limited filing space available, and very often to the accompaniment of sundry bumps against wharves and boomsticks.

Interruptions here are also annoyingly frequent, whether it be from a change in the wind, interference of meal times and bed time, or the garrulous hand-logger who, under the pretext of enquiring for timber, endeavours to unload the latest local gossip. We also have to deal with the latest arrival, the radio enthusiast, who usually comes along when you are involved in a stumpage appraisal and enquires, "How's your wireless working? Do you get Los Angeles?" and it entails the exercise of great self restraint to refrain from informing this latter pest that we get a much warmer place in our business every day.

B. C. FOREST SERVICE LAUNCH THE "OLIVER CLARK"

"I christen this vessel the 'OLIVER CLARK' and may she prove as staunch and true in the Service as the valiant man whose name she bears" with those words Miss Doris Pattullo, daughter of the Minister of Lands, gracefully released from the ways of Rodd Brothers, on Saturday afternoon, the forestry launch "OLIVER CLARK" in the presence of the Hon. T. D. and Mrs. Pattullo and Officials of the Forest Service.

The vessel measures 40 ft by 9' 6" beam, and is propelled by a Vivian 16 H.P. Heavy duty engine at a speed of approximately eight knots. She is equipped with a wireless installation and provides accommodation for a crew of three. She has been built by Messrs. Rodd Brothers, and practically inaugurates their boat-building business, besides being the first vessel of the B.C. Forest Service fleet to be built in Victoria in recent years.

In addition to the "OLIVER CLARK," Messrs. Rodd Brothers are completing a boat of similar type for the B.C. Provincial Police, to be known as their "No. 1."

Rodd Brothers already employ a considerable personnel, and are believed to be contemplating a move to a more convenient location on the waterfront, where better launching facilities will be available, so that they may undertake the larger types of work and pleasure craft.

PROTECTION OF WATERSHEDS

A. E. Parlow.

The timber on irrigation watershed is primarily of importance as 'protection forest', that is, for regulation of the runoff of water to be used on irrigated lands in the valleys or for power or town water supply. In many cases, our efforts to educate the public to protect such watersheds have been only too successful, and have resulted in a militant feeling against any cutting on the areas, on the ground that cutting would lay bare portions of the protection area, and would, by creating slash and by the presence of logging crews, introduce added fire hazards.

A study of any individual watershed will usually show that the timber cover resembles an old fashioned patch-work quilt. As the result of many local fires, insect attacks, etc., large areas have been denuded of trees at various times. Nature has made valiant attempts to re-stock after each burn, and the result has been a patchwork pattern of stands of all ages, from over-mature merchantable timber to recently established small lodge-pole pine. The greater part of most of our watersheds is at present covered with stands of young growth and the mature or over-mature stands cover relatively small areas, surrounded by large tracts of younger stands, so that their removal would not appreciably affect the runoff of the watershed as a whole.

Over-mature stands of trees, no longer vigorous, are subject to attack by insects, fungus, etc., in the same way that among humans, an epidemic disease would play havoc in a colony of very old men, and the result of leaving such timber too long would be not only the loss of valuable timber which should be put to productive use, but the creation of a fire hazard through the presence of areas of dead and down material.

The Normal Forest, the Forester's ideal, with all age classes properly represented, would carry a much larger quantity of timber material, or growing stock, than is now on the watershed, and by carefully planned and supervised cuttings should produce valuable crops of wood in perpetuity. For instance, the Kelowna Watershed in the Okanagan Valley contains at present three timber types. First, and covering the largest area, are vast stands of young lodgepole pine, usually in even-aged blocks from seedlings to pole-wood size. Second, covering a smaller proportion of the area, stands of older lodgepole pine, with an understory of Spruce, and other more valuable species coming up through the lodgepole, and third, blocks of mature and over-mature Spruce, etc., that have over-topped and survived the lodgepole. A Management plan could be prepared for this watershed, whereby the latter areas could be cut through a period of years. Meantime the second class, protected from fire and insect attack, would be adding through each year's growth more timber to the growing stock on the area than the cuttings removed, and would be ready when the present mature areas

had been cut, to yield merchantable timber. In this way the forest on the entire watershed could be made to not only yield an annual wood crop, which could be used in providing packages for the fruit-crops produced in the valley below, but would be brought into a vigorous, healthy condition. Under such a plan, the amount of growing timber on the watershed would be several times as great as it is at present, and the water regulating power of the area greatly improved.

The working out of such a Management Plan presents no great technical difficulties. The amount of timber to be removed each year should be fixed, and the area or areas from which it is to be taken. Heavy cuttings on steep slopes liable to erosion should not be permitted, and care should be taken to provide for re-stocking by avoiding injury to existing advanced growth by leaving seed trees on the areas cut, or by limiting the size of any clear cutting so that it could be re-seeded from adjacent standing timber. Special conditions to minimize the fire danger should be included in the Timber Sale contract regarding disposal of slash, construction of camps, period of logging, - this would probably be done in the Winter months, and if circumstances warranted, summer logging might be prohibited. The construction of properly cleared haul and skid roads would open up the area and assist in reaching any fire promptly that might occur. The greatest obstacle in many cases will be in satisfying the interested public that properly regulated cutting can not only produce valuable returns from the forest, but can be done without endangering its use as 'protection forest', and would be actually beneficial. This could be accomplished by a frank discussion of the plan proposed, as related to existing conditions, and by visiting the area personally and discussing it on the ground with interested persons who are leaders of public opinion in the community.

RELATIVE HUMIDITY - HOW CAN IT BE APPLIED?

E. B. Prowd.

As in almost all branches of progressive modern work, the practical application of scientific data is proving to be of the utmost value in the solution of forest fire problems.

Take, for instance, the relative humidity of the atmosphere - a purely meteorological subject - and its connection with the problem of fire control.

Relative humidity means the percentage of moisture contained in the atmosphere, in relation to its total capacity.

The humidity of the atmosphere has long been recorded by the different weather bureaux, on both sides of the International line, but until very recently, no attempt has been made to apply the data secured to fire prevention and control.

For many years it has been generally believed that a high temperature, lasting over a number of days, would necessarily result in a dangerous fire situation, but we are now told that the most important factor which determines the extent of a forest fire hazard is the relative humidity. Naturally, excessive heat decreases the moisture content, but it is not until an extremely low humidity is reached that the fire danger becomes acute.

We have thus come to the knowledge that there are bad fire days rather than bad fire seasons; the reason for this I shall now try to explain fully.

... ..

Fire, as everyone knows, is the result of combustion, produced by union of oxygen of the air with carbon of the material. This combination only occurs when the latter is raised to an abnormally high temperature, which is known as its kindling point, and varies in different materials from 600 to 800 degrees fahrenheit.

Damp forest material can not be ignited, and the major part of fire heat which might be applied to it is consumed in driving off moisture in the form of vapour. When the moisture has all been dried out, however, the kindling point is rapidly reached, and the material will burn quickly, or slowly, according to the amount of oxygen that is being supplied to it. Hence, the fundamental principle in fire control is to break the heat wave, by separating burning material from new fuel.

The necessity of Oxygen is illustrated by the fact that loosely piled forest debris flames up and throws off a large

volume of heat, while tightly packed leaves, needles, etc. only smoulder, but may burst into flame and burn briskly, if the supply of oxygen is increased by strong wind. Throwing loose dirt on a fire will often put it out by cutting off the access of oxygen.

Changes in the moisture content of forest material are brought about chiefly by changes in the relative humidity of the atmosphere. The atmosphere always contains moisture, but in varying amounts, and is usually in the form of invisible vapour,

The actual amount of moisture which the atmosphere is carrying at any given time, is known as its Absolute Humidity, and is measured by weight - so many grains of moisture per cubic foot of air, the capacity of the air for holding moisture, however, varies with the temperature, warm air being able to hold much more than cold air.

Relative humidity, as previously explained, is the percentage of the actual moisture content of the air, in relation to its total capacity at the prevailing temperature, and it is the variation or fluctuation of this relative humidity (or percentage of saturation) which governs the exchange of moisture that takes place between forest litter and the air.

Evaporation is simply the absorption of moisture by the atmosphere, and the power of the air to absorb and hold moisture, varies with its percentage of saturation. The air may be compared with a sponge in its ability to absorb, hold and give up moisture. When it is fully saturated, or carrying all that it can hold, its relative humidity is 100%, and it then begins to throw off moisture in the form of fog, dew or rain. When it is only one half or one quarter saturated, its relative humidity is 50% or 25% and it acts like a dry sponge in absorbing moisture from the forest.

Variation in temperature results in changes in the relative humidity, not on account of any change in the amount of moisture held, but on account of the change in the holding capacity of the air. For instance, at a temperature of 90 degrees fahrenheit, one cubic foot of air can hold 14.8 grains of water, while at 68 degrees it can only hold half that amount, or 7.4 grains.

Apply this to forest conditions and assume that at 3 p.m. the absolute humidity is 7.4 grains, with a temperature of 90 degrees. The relative humidity is then only 50%, because at that temperature its total capacity is 14.8 grains, and evaporation from the forest material and litter would be taking place. If the temperature dropped during the night to 68 degrees, or lower, the relative humidity would in consequence rise to 100% - the atmosphere would then be fully saturated and throwing off moisture in the form of fog or dew, which, in turn, would be absorbed again by the forest litter.

This exchange of moisture is often so rapid, that it will change the forest litter from a state of low inflammability to one of extremely high inflammability, or vice versa, in the course of 4 or 5 hours.

It must not be assumed that very high temperature is necessary for low humidity conditions. Changes in the amount of moisture held in suspension are brought about chiefly by absorption and precipitation, but quite frequently by winds bringing in air from very dry or moist regions. A low relative humidity then, may often be the result of an influx of air from high arid regions; rather than of extremely high temperature. This might perhaps tend to create local, more than general conditions.

Increased temperature of material caused by sun heat is, of itself, not so important a factor in forest fire conditions as might be supposed, because, as previously pointed out, dry forest material has to be raised to a temperature of 600 to 800 degrees before it will burn. A rise then of 30 or 40 degrees, as from 60 to 100 degrees, which would be uncommon, is only about 5% of the total rise necessary to heat the material to the kindling point. The chief effect of sun heat is in lowering the relative humidity, by raising the moisture holding capacity of the atmosphere. This, of course, governs to a great extent the rate of evaporation and consequent inflammability.

In relative humidity we have a factor which gives a true indication of changes in burning conditions, and such changes should be closely watched. For this purpose, sling psychrometers or other humidity recording instruments may be used.

The first necessary step is to familiarize oneself with the approximate humidities that exist during different periods of a normal day in any particular district. It can then be determined in the early morning, whether the trend of the curve for the day is normal or otherwise, and by checking the subsequent changes with occasional readings, anticipate the action necessary, to cope with the day's fire problems. Consideration must of course be given to the other factors of wind and seasonal condition of forest material. It must also be remembered that the seriousness of the situation increases with the duration and extremity of the sub-normal period.

In order to obtain reliable data on the variation in the relative humidity, readings should be taken at the same time of day and on sites which are surrounded by similar conditions, for the reason that in dense stands of timber, northern slope, etc. lower temperature, slower circulation of air and transpiration from vegetation will result in a higher relative humidity than would be obtained in large clearings directly exposed to sun and wind.

It has been found from data already collected on this subject, that an unusually low relative humidity throughout the night or early in the morning, is indicative of extremely high inflammability conditions later in the day.

That extremely low humidities continuing for two hours or more, will normally result in a state of high inflammability, which will increase with the duration of the low period.

That extremely low humidities may bring about conditions favourable to the rapid spread of fire, particularly light debris or slashings, in less than 24 hours after a heavy rain.

That unusually low humidity conditions several days in succession, or within periods of drought, result in the most extremely dangerous conditions in all types of forest material.

As a general rule, under normal conditions, there is a high range of humidity throughout the night, with a rapid drop between 7 and 10 A.M. The range remains low through the afternoon and rises abruptly in the evening.

These natural laws explain to us very clearly why every effort should be made to control fires before the heat of day, and attack them with our strongest forces at the first break of dawn, when they are at their lowest ebb. They also explain why a fire which can hardly be approached at 3 or 4 p.m. might easily be controlled by a small number of men, just a few hours later.

For these same reasons, the evening is considered to be the best time for back-firing (except in cases of extreme emergency) and for burning the moss off trees for the control of crown fires.

It is not because the heat of the sun on the forest debris is any the less, but on account of the atmosphere becoming more heavily laden with moisture through a lowered temperature, and the consequent reduction of the heat wave.

Any accurate prediction as to the relative humidity of the atmosphere, means an accurate prediction as to the inflammability of forest litter, and the fire danger, and can only be made through an understanding of the natural laws which influence it, and the securing of data through continual research and study.

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HELPPFUL HINTS - I know the Service in general will be interested, and perhaps surprised (writes W.N. Campbell, Fort Fraser), to learn that some of the Northern Interior Indians are interested in suppressing fire in the great valleys of Northern British Columbia. Not all of them are in the habit of employing fire to drive unwelcome rivals out of their beaver country in the early Spring.

I am fortunate in having an Indian volunteer fire warden in my District, Chief Maxine, from whom I receive much co-operation and help. I have often heard him explaining to the assembled braves in council that the Great Open Spaces (beloved of Hollywood's "Strong Silent Men") are quite up to specification in their particular territory, and there is no necessity for their making them more open! His influence is considerable, and certainly I value it.

It was during the closest day of the close season last year that I received from him a suggestion for the suppression of fires and the extinguishing of the fires then burning, which I take this opportunity to pass on to "Operation Office" and to my comrades in the service. Any suggestion which makes for economy, I should imagine would be welcome, and Chief Maxine's idea has certainly the merit of economy.

Smoke was rising gently from a dozen or more fires after about three weeks without rain, when one evening my friend Chief Maxine reined his horse alongside mine on the narrow trail. "How, Rus-ty!" he greeted me. (This, I might say in passing, is a very old Indian title conferred by them on persons holding positions of great authority.) After a little discussion concerning the great open spaces that had been opened by fires up to that date, quoth the Chief "Mebbe you like rain now, eh?" "I'll say I would, even as the hart panteth for the water brooks" said I. Looking around carefully, he continued, "Me, I tell Government how to make rain. Long time I know, long time my father know, his father he tell him how to make rain, but mebbe so no can get right kind of frog in dis country. But me I look for kind of frog good for dd dis: You look too. Suppose findum, you make big rain tonight, put out all fires. You take frog jus' before supper, after make camp. Go down creek, pull willow branch down over water and fixum like dat, then tie string round frog's belly and then tie on to willow. Hang frog mebbe one inch from water in creek. He see water but no can get to it. Pretty soon it get dark and then it rain, so that frog he got covered with water because creek he rise. Bimeby he feel good and rain stop. All fire he pretty near out."

I thanked him and we parted, and I continued on my way, keeping a sharp look-out (need I say) for the right kind of frog.

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