THE ROLE OF METEOROLOGY IN FIRE CONTROL IN B.C.¹

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In 1964, after representations from the Industry, the position of forest meteorologist in the B.C. Weather Office in Vancouver was established, and his work was to be:

1. To determine what the protection agencies in B.C. required in the way of weather information and forecasts, and how to provide this in timely and usable form.
2. To set up and operate a pilot forecast service which would test different procedures and content so that a most useful service could be decided upon. Subsidiary duties which have evolved include:
 1. Advising the Industry as to how to collect weather information on their operations so that it will be representative, accurate and economical.
 2. Assisting them in using this information to integrate the effect of past and present weather on forest fuels in order to arrive at an index of fire danger.
 3. Interpreting the forecast of future weather so as to enable protection officers to adjust fire fighting forces as fire danger circumstances may indicate.
 4. Assisting in the interpretation of past present and future weather as applied to problems of slash disposal.
 5. Assisting in the training of field personnel charged with using weather information in their fire protection duties.
 6. Investigating forest fire problems which were caused or aggravated by unusual weather or by weather which produced an unexpected effect. This is a sort of post mortem activity which results in a report being written up and distributed in a way calculated to reduce the chance of error due to similar conditions which might occur in the future.

THE COLLECTION OF FIRE WEATHER INFORMATION

For fire weather purposes, co-operating agencies in B.C. are as follows:

1. The Department of Transport.
2. The B.C. Forest Service.
3. The Industry.

The Meteorological Service of Canada, a Branch of the Transport Department, is the most active and important of these agencies. However, although the information supplied by the MSC is basic to practically any form of weather forecast, supplementary information for fire weather purposes is needed.

The reason for this is not only that the coverage of the Province by MSC stations is quite sparse, but that the altitude of most of them is not at a level where most forest operations are carried on and where the danger from forest fire is most acute.

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To supplement the network of MSC stations (most of which report every hour) we have 63 stations operated by the Forest Service and 18 operated by Industry. Many other stations are maintained by the Industry to provide information for their own use, and this is available on occasion when required.

The Forest Service stations are operated by lookout men or, at the Ranger Stations, by the radio dispatcher on duty. Fortunately the altitude of the lookouts on the Coast varies from 1,100 to 4,200 feet, which is in the range of altitude at which most logging operations are carried on. In the Interior things are not so happy. Lookouts there are generally too high, and the ranger stations too low. Estimates of conditions in between have to be made by interpolation.

The transmission of these reports to Vancouver is accomplished by radio, telephone, teletype and Telex; sometimes in a round-about and awkward fashion.

The provision of supplementary weather information by Industry has proven to be a rather spotty undertaking. The attitude of the Industry towards the value of weather observations and forecasts varies widely, with the result that some parts of the province are sampled in detail at a good level of accuracy, whereas in others there is nothing available for great distances.

One reason for this is the lack of convenient communications. Some of the larger companies have their own bush teletype circuits, and these are used to good advantage. Smaller companies may report by telephone with resultant delays due to poor lines or busy circuits, followed by discouragement and finally by failure of the reporting program, although observations may continue.

Another problem is that of station location. The larger companies, particularly those operating under tree farm licences, will locate their stations carefully at altitudes representative of logging areas. Smaller companies feel that it is not economical to have their weather stations removed from their camp because of the cost involved in having someone travel to and fro to take readings. However, observations taken at the camp site frequently serve only to prove that they are not being taken at the right place.

This is particularly true at the head of the mainland inlets, where the camps are located at tide-water while the operating areas are on mountain sides fifteen miles inland at an altitude of 1,500 to 3,000 feet. Some sort of inexpensive radio telemetering device connected to an automatic weather station appears to be the way to collect representative information in these locations. At present prices the Industry cannot afford them.

The matter of automatic stations will have to receive more attention in the near future because of the trend to use airplane spotters rather than lookout men in locating new fires. Automatic stations without radio transmitter are now available at about \$7,500 and it is hoped that experimentation with a woods station of this type can commence soon.

WHAT USE IS MADE OF THIS INFORMATION?

These supplementary reports are used first for forecast verification, second for the calculation of drought index and fire danger index, and third for determination of fire weather climatology of the area.

About half of them cannot be used directly in the preparation of forecasts because the data is too old. As presently constituted most reports consist of:

1. The maximum temperature on the previous day.

2. The maximum relative humidity overnight.
3. The minimum relative humidity on the previous day.
4. The minimum fuel stick moisture on the previous day.
5. 24-hour rainfall to 8 a.m.
6. The wind direction and speed at noon and 4 p.m. on the previous day, and at 8 a.m. on the current day.

Some stations calculate and report the drought and danger index for either the previous or the current day.

One of the most valuable uses of the supplementary reports is in the delineation of drought index (1) With such mountainous terrain, rainfall varies widely over short distances, and an accurate idea of the amount of available moisture in each section of the forest is highly desirable. A drought index chart is prepared daily. (Fig. 1).

FORECAST FORM AND CONTENT

Two types of forecast are prepared. One is a general forecast issued by the duty forecaster in the public weather office at 5 a.m., intended for planning purposes and including an outlook for an extended period whenever information is available which appears likely to verify.

The second type of forecast is prepared in the fire weather office about noon daily. Each Forest District is served by a separate forecast, containing first a general statement with particular note of humidity, wind, fire danger and lightning.

Spot forecasts follow the general statement. These consist of a forecast of the maximum temperature the next day, the minimum relative humidity, the maximum hour of wind, and the percentage chance of rain. Special spot forecasts are supplied for going fires. About thirty are prepared for regular distribution.

A word as to the reason for the choice of the elements above as components of the forecast. Temperature has to be forecast as part of the procedure of arriving at a minimum relative humidity. Although it may not have as much effect on fire danger as some of the other elements, nevertheless it is a valuable indicator of the kind of day to be expected, and it is a forecast which users like to have.

A forecast of minimum relative humidity requires no justification. It is the weather factor most closely related to fuel moisture.

The maximum hour of wind was chosen by the forecaster doing prescribed burning in the southern interior in 1964 and 1965 as the most significant value of wind for his purposes. Higher winds for shorter times are mentioned sometimes if they will appreciably affect the fire problem.

However, there is a major difficulty involved in using this means of forecasting wind. It is not readily apparent how the maximum hour of wind at the 'spot' location will be reflected in the wind which may blow at another point in the same area. This is particularly true in B.C. where the terrain is so rough. Some education of the user in the way to make best use of a spot forecast of wind is required, but how and by whom this is to be done is not an easy question to answer.

FIGURE 1. Drought Index chart for September 26, 1966.

Finally we come to the percentage chance of rain. Frankly, this is an admission that the forecaster knows that his prediction may not verify, and it gives the user a means of gauging the degree of confidence that the forecaster has in his forecast. This is not good enough, and we must finally devise a way of forecasting the amount of rainfall which will fall at a given spot on the following day. However, our present tools do not provide means to prepare a forecast of this type with sufficient accuracy, and for the time being we must be satisfied with this admitted makeshift.

Spot forecasting of lightning is not a part of the routine. Perhaps it should be, but the accuracy with which this can be done is not very high. Consequently, lightning forecasts are made only when there is reasonable confidence in verification; and for rather large areas.

The forecasting of fire danger is not done on a routine basis either. Six different measures of fire danger are in use in B.C. To me this means that forest managers do not have real confidence that any of them measure fire danger accurately. Until an index is produced which has the approval of a large majority of operators I am reluctant to make forecasts of fire danger itself.

At times of prescribed burning special advice on the weather is prepared, stressing those factors most important in the successful carrying on of this worrisome activity. It is at this time that most contact is made with operators, usually by telephone. Special warnings of high winds or imminent rains are issued from time to time when it is deemed to be advisable. Most of the distribution of the warnings is done by the Forest Service.

A LOOK INTO THE FUTURE

How can the meteorologist best serve the forester in the years to come?

For one thing, he can improve his general forecasts. The new tools at his disposal, satellite and computer, will help. But a satellite is only a new type of observing platform; albeit a very useful and powerful one; and computer product is only as good as its input and programming. Improved technology is surely an advantage, but we need the best brains we can get to develop and make use of this technology. With many other fields open to the physical scientist today, it is not going to be easy to recruit able new men.

The meteorologist can also improve his specialized forecasts. To do this he must have more foresters interested in weather, willing to take time to co-operate in producing a weather observing and forecasting program that will make best use of the present state of the science and at the same time suggest the most fruitful and valuable areas for research and improvement.

Weather has a tremendous influence on the growth and safety of one of our most valuable natural resources. I would be pleased to see more foresters devoting time and interest to this rather neglected side of the science of forestry.

REFERENCE

- MACTAVISH, S. S. 1965. Forest Fire Danger Tables, Canada Department of Forestry Publication No. 1099, Table 3.