FIRE WEATHER FORECASTING

FOR

THE MARITIME PROVINCES

(1964-70)

by

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The fire weather forecasting program involves a lot of people in the Maritime Provinces, not all of whom can be thanked individually. Therefore I would, first of all, like to thank collectively the large number of dedicated observers who manned the field stations, the dispatchers and teletype operators in the district and head offices, and the forecasters who so willingly prepared the forecasts. Without their devotion to duty, the forecasts could not have been issued.

Special words of appreciation must go to Mr. J. P. Francis of the New Brunswick Forest Service who has always been most keenly interested in this venture and who has always had good suggestions to offer. For many years, fire weather forecasting for the Maritimes had been his goal and it is gratifying to see how successfully it has been attained.

A debt of gratitude is also owed to Mr. L. A. Corkum, Supervisor of Fire, of the Nova Scotia Department of Lands and Forests. The enthusiastic way in which the Department of Lands and Forests personnel accepted suggestions for the establishment of a provincial fire weather station network and wholeheartedly embraced fire weather forecasting is due, in large measure, to Les.

Fire weather forecasting for the Maritimes would not have been possible without the full cooperation of Mr. R. H. O'Brien, officer-in-charge of the Maritimes Weather Office at Halifax International Airport, and his entire staff. All members of the staff have been friendly and enthusiastic and, consequently, fire weather personnel welcomed the return to the stimulating atmosphere of the Maritimes Weather Office at the start of the 1970 fire season.

I would especially like to take this opportunity to thank my able assistant, Mr. B. T. Goldrup, who more than anyone else, is responsible for the success of the forecasting program. Thanks to Blair, who has frequently worked long stretches without a day off, not one forecast in nearly 2100 over the 7-year period, 1964-70, has ever been missed.

There are many other people to whom I would like to express appreciation but the list is long. I am indebted to a host of people in the Canada Department of Fisheries and Forestry, most particularly in

the Forest Fire Research Institute and in Arts and Graphics. I would particularly like to single out Mr. Yvon Rozon of the Forms Management Section almost as much for his unfailing good humor in the light of my many suggested changes in the forms as for his professional drafting skill. I would like to mention Mr. Luc Pouliot and his capable forestry staff at the Montreal Weather Office. Mr. Pouliot spent some time in Fredericton in 1966 learning the Maritime fire weather forecasting procedure. He learned well and we, in turn, benefited from the many good ideas originating in the Quebec office.

Note: Since most of the work in the preparation of this report was done while the author was on the staff of the Maritimes Region, the report has been published in the Maritimes series. However, the author is now on the staff of the Forest Fire Research Institute, Canadian Forestry Service, Ottawa.

ABSTRACT

This report is largely concerned with the methods of adapting standard weather forecasts to meet the daily fire weather forecasting requirements in the Maritime Provinces. Although the program has been operational since 1964, the procedures were changed significantly in 1970 and these are described. Background information is provided on such aspects of the program as the meaning of fire danger and the fire weather station network.

The daily routine is discussed for one area in eastern New Brunswick for the 48-hour period beginning at noon on a Monday. The 24-hour forecast, issued Monday afternoon and valid for Tuesday, is described in steps 1 to 4. There is no rain associated with this forecast. The 12-hour forecast, issued Wednesday morning and valid for the same day, is illustrated in steps 5 to 7. Rain does affect this forecast.

TABLE OF CONTENTS

INTRODUCTION

Early in 1963, a group of meteorologists and foresters met in Fredericton, N. B. and recommended that the feasibility of fire weather forecasting in the Maritime Provinces be studied. Representatives of forest industry (Howie, 1963) and the Provincial Forest Services (Francis, 1963) indicated that these organizations were especially anxious to receive at least ½-day and preferably 1-day forecasts. The reasons they gave were not restricted to conditions in the Maritimes but are valid wherever the possibility of fire starting and spreading in the forest is found (Turner et al., 1961). The Forest Services and industry[1] have slightly differing viewpoints on where to place the emphasis but both are concerned with forest closure, planning the daily work of men, slash burning, and other related activities. The two groups are also vitally concerned that the travelling public be kept well informed of the potential fire danger and they are both anxious to receive special fire weather forecasts when fires break out.

The study, which was reported to delegates at the 1963 annual meeting of the Canadian Institute of Forestry and subsequently printed (Paul, 1964), showed the practicality of issuing fire weather forecasts. As a result, a full-scale program was launched in 1964 from the Maritimes Weather Office at the Halifax International Airport.[2] From May until

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[1] The Forest Service is the agency responsible for supervising the provincial forests and hence for controlling wildfire. Industry is the forestry orientated pulp and paper and/or lumber companies. The terms are not, of course, synonymous but in speaking of transmitting data to the Forest Service it is usually assumed that the messages are also sent to Industry.

[2] Henceforth the Maritimes Weather Office will be referred to as Halifax.

October, fire weather forecasts were issued twice daily, 7 days each week. The forecasts were sent directly to the New Brunswick and Nova Scotia provincial forest services and to four company offices. They were available to any forestry organization with the necessary telecommunications equipment. The general public and other forestry companies were made aware of the forecast fire danger through radio, television, and the press.

The publication referred to earlier (Paul, 1964) was intended as a "blueprint" for forecasting fire danger in the Maritimes. As the 1964 fire season progressed, changes were frequently made in the procedure and, in the years since, other modifications have been introduced.[3] The 1970 fire season saw the most extensive procedural changes since organized operational forecasting began in 1964. Completely revised forms to record fire weather data (Appendix I) were distributed and a new method of preparing the weather forecasts was used. The steps described in this paper illustrate these newly proposed techniques. Moreover, the testing of a computer program (Kourtz, 1967) showed that the computer is ideally suited for the daily fire weather forecasting and it is sure to play an increasingly important role in future years. One way in which it has already assisted fire weather personnel is seen in step 1.5.

The forecasting operation was based at the Fredericton Weather Office from 1965 through 1969 although the weather forecasts themselves still originated at Halifax. This was strictly a matter of expediency because it proved to be impractical to shift personnel from the Maritimes

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[3] The early steps in forecasting were illustrated, but not described by Paul (1966).

Regional Laboratory to Halifax for 5 to 6 months each year. It was not, however, sound policy to separate the forecaster from the fire weather staff. There are times, particularly during periods of bad fire weather, when it is necessary to discuss the daily or special forecasts directly with the forecaster. A long distance telephone conversation is not an effective substitute! It is also difficult to question a forecast that is not prepared locally and, moreover, it is almost impossible to make a last minute revision if there has been a significant weather change since the forecast was prepared. For these and other reasons, it was agreed to establish the Fire Weather Central in Halifax in 1970.

In August 1970, fire danger forecasting for Newfoundland was also undertaken on a trial basis. The fire weather forecasts were prepared by the Canadian Meteorological Service at Gander and, by recording grid numbers to mark boundary lines, a forecast 'map' was transmitted to Halifax by teletype. The success of the trial suggests that, starting in 1971, it will be feasible to handle the fire danger forecasting requirement for the entire Atlantic Provinces (including Labrador) from the Fire Weather Central at Halifax. The objection raised earlier to separating the meteorologists and fire weather personnel does not apply in this case because the Halifax forecaster is able to brief fire weather personnel regarding any unusual features of the Newfoundland forecast.

Two daily forecasts are illustrated in this report. 'Rain is neither reported nor expected with the 24-hour "afternoon" forecast of 3 June but it is an important factor in the case of the 12-hour "morning" forecast of 5 June.[4]

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[4] The forecasts discussed for 3 and 5 June were actually based on data for the 48-hour period starting at noon on June 23, 1964. The "season" was advanced 3 weeks simply to avoid having to record 20 extra days of data on the monthly forms.

Because the example data are from early in 1964 before all stations were in operation, imaginary but realistic data have been used to fill in a few gaps. The illustration is otherwise authentic. East Northumberland was chosen for a more detailed examination because it was the area with the highest fire danger in New Brunswick on 3 June (7/13). East Northumberland was also selected because it contains no fewer than five primary stations. The synoptic station at the Chatham air force base and one of the four field stations are used to indicate the method of observing weather and recording fire danger on almost all maps, messages, and forms.[5] With East Northumberland (area 12), reference is frequently made to Chatham (#120) and to Ashton Hill Tower (#128) in the accompanying text to draw attention to significant features of fire weather forecasting in the Maritime Provinces.

The proposed introduction of a new fire weather index rating system in 1971 is not likely to affect the way in which the forecast is prepared but it will call for basic changes in the calculations and presentation of the indices to the forest service.

FORECAST REGIONS, ZONES, AND AREAS

For practical fire weather forecasting purposes, Canada should be divided into a number of smaller units the size of one or more provinces (Fig. 1). It is proposed that these units be called the forecast regions and, with this in mind, it was initially planned to call Newfoundland

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[5] Forms used to record data are found in Appendix I with an explanation of their numbering system and other salient features.

(including Labrador) region 1 and the three Maritime Provinces - New Brunswick, Nova Scotia, and Prince Edward Island - region 2. Since the forecasting for the four Atlantic Provinces can be handled from one central office in Halifax, it is less confusing if the entire area is numbered region 1. This is true because the regional code number, like the "area code" used by the telephone system, is not for local transmissions. It is only needed when sending messages from one forecast center to another or for filing station weather data centrally.

The second major division is the forecast zone and there can be as many as 10 of these within a single region. All 10 numbers are used in the Atlantic Provinces with seven of them in the Maritimes (Fig. 2). Zero is an acceptable number because it can be prefixed by the regional code but it is awkward to use locally so it was assigned to Prince Edward Island where the fire severity problem is not so acute nor is its Forest Service directly linked to the Fire Weather Central.

In the case of the Maritime Provinces, it was feasible to follow the Canadian Meteorological Service practices in designating zones. For example, "Cape Breton Island" is both a public weather forecast region and a fire weather forecast zone (zone 6); "South Shore" and "Valley" are two public weather regions but only one fire weather zone (zone 4). The forecast zone number is used as a group identifier (step 4.2) but otherwise has little significance. When it is combined with a second number, the two digits comprise the basic working unit, the forecast area. Since there can be as many as 10 zones in a region, the maximum number of areas is 100. There are 55 areas in the Maritime Provinces and 22 in Newfoundland. The 77 areas in region 1 are listed in Table 1 together with the zone names.

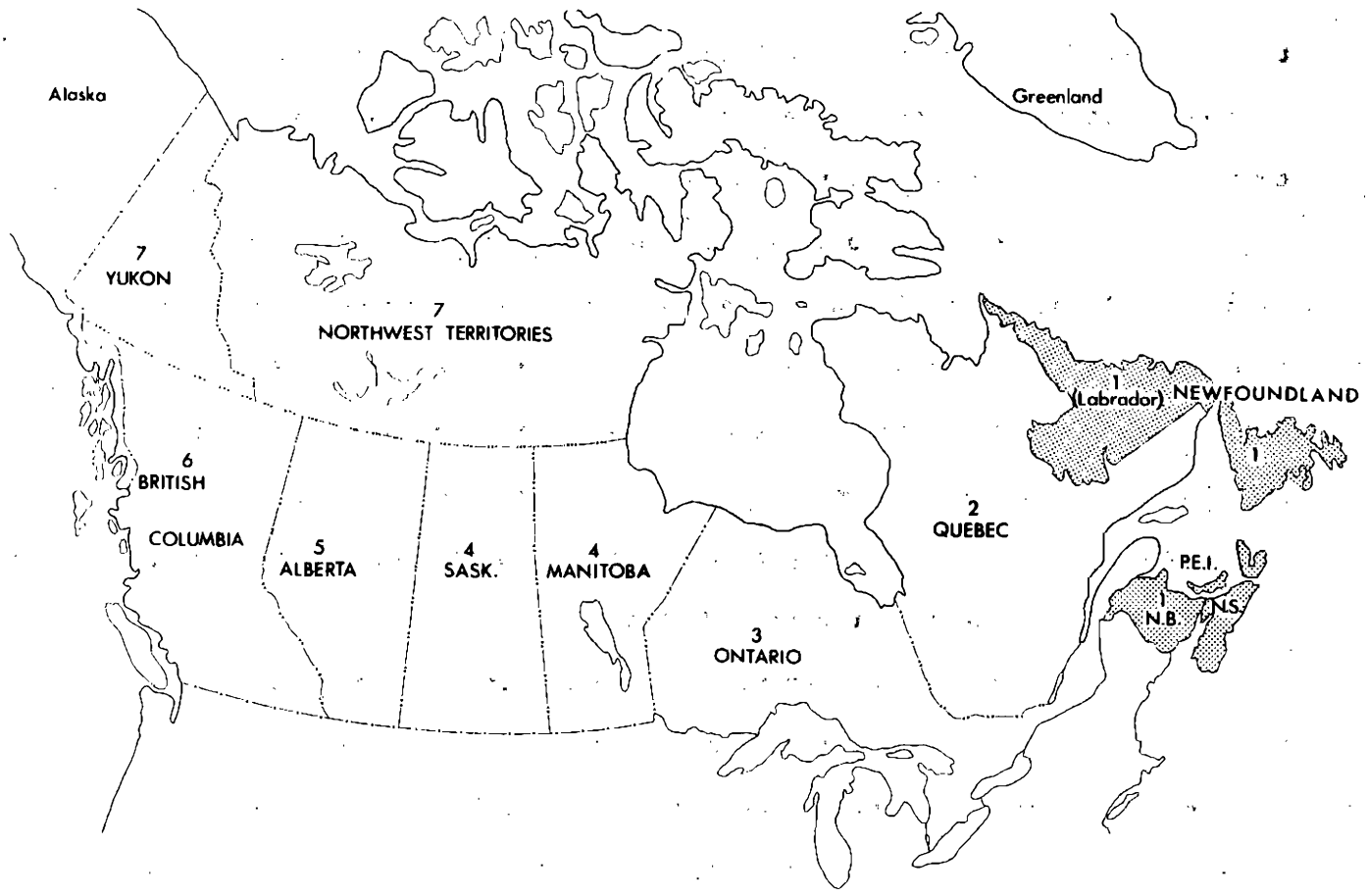

Figure 1. Proposed Fire Weather FORECAST REGIONS in Canada (Atlantic Provinces - Region 1 - shaded).

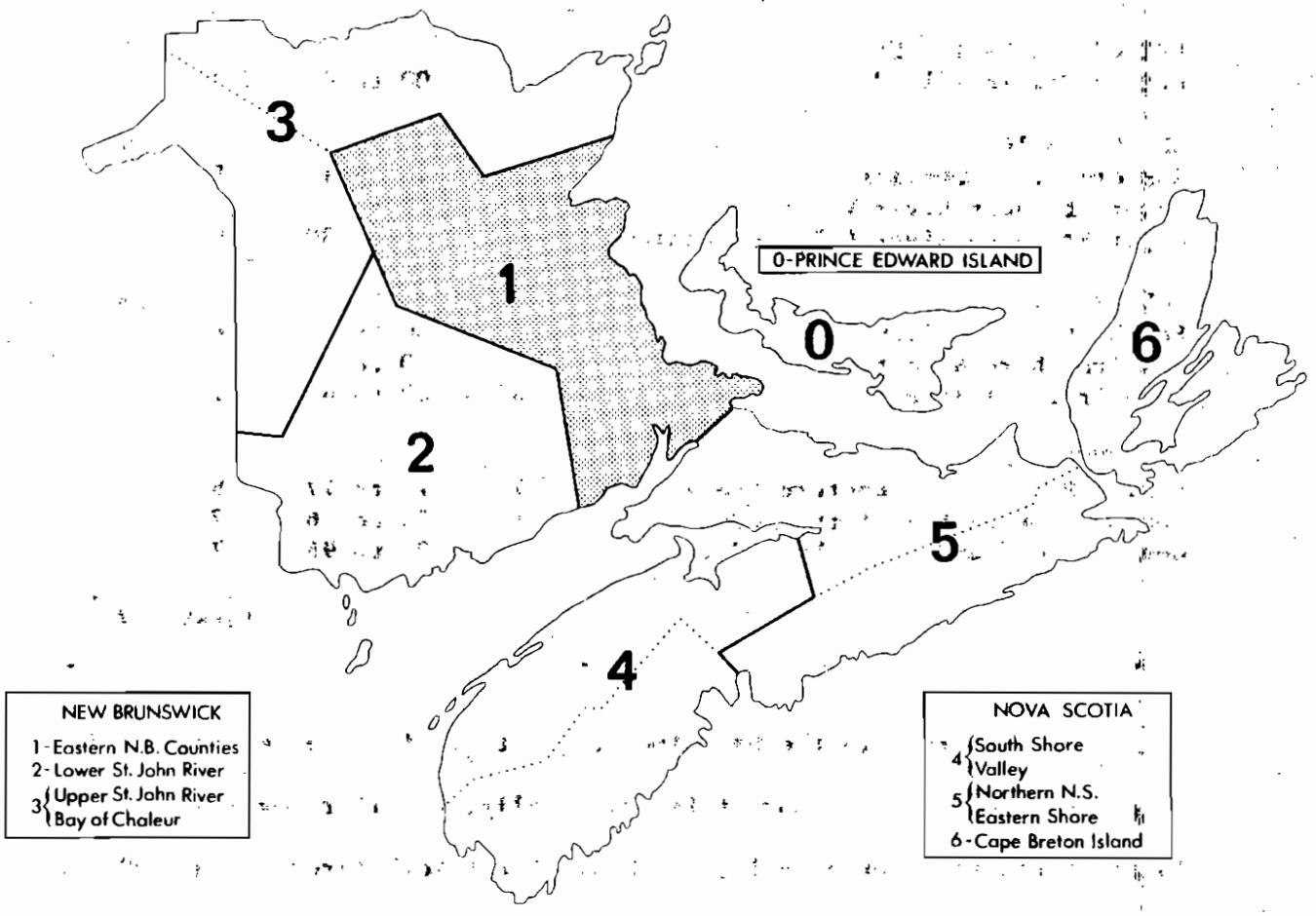

Figure 2. Fire Weather FORECAST ZONES in the Maritime Provinces (Eastern N. B. Counties - Zone 1 - shaded).

The areas that are located in the Maritimes are also shown in Fig. 3.

Table 1. Number of forecast zones and areas in the Atlantic Provinces (Region 1)

Province and zone name	Zone number	Area numbers	Number of areas	
PRINCE EDWARD ISLAND				3
Prince Edward Island	0	00 to 02	3	
NEW BRUNSWICK				27
Eastern N.B. Counties	1	10 to 17	8	
Lower St. John River Valley	2	20 to 29	10	
Upper St. John River & Bay of Chaleur	3	30 to 38	9	
NOVA SCOTIA				25
South Shore & Valley	4	40 to 47	8	
Eastern Shore & Northern N.S.	5	50 to 59	10	
Cape Breton Island	6	60 to 66	7	
NEWFOUNDLAND				22
Avalon Peninsula & Eastern Shore	7	70 to 77	8	
Southern Shore & Western Shore	8	80 to 86	7	
Central Newfoundland & Labrador	9	90 to 96	7	
			TOTAL	77

All areas in the Maritimes consist of either an entire county or parts of counties because this is, locally, a well-recognized entity. In New Brunswick, for example, North and South York (areas 28 and 29) are separated by the St. John River but Carleton County (area 30) stands by itself. Forecast areas need not be counties or sub-divisions thereof. The county is, however, the most appropriate unit in the Maritime Provinces. In Newfoundland, the "electoral district" resembles the county but, because it is subject to change from time to time, Newfoundland area boundaries were arbitrarily chosen, based in part on forestry administration divisions. Quebec is another province in which administrative

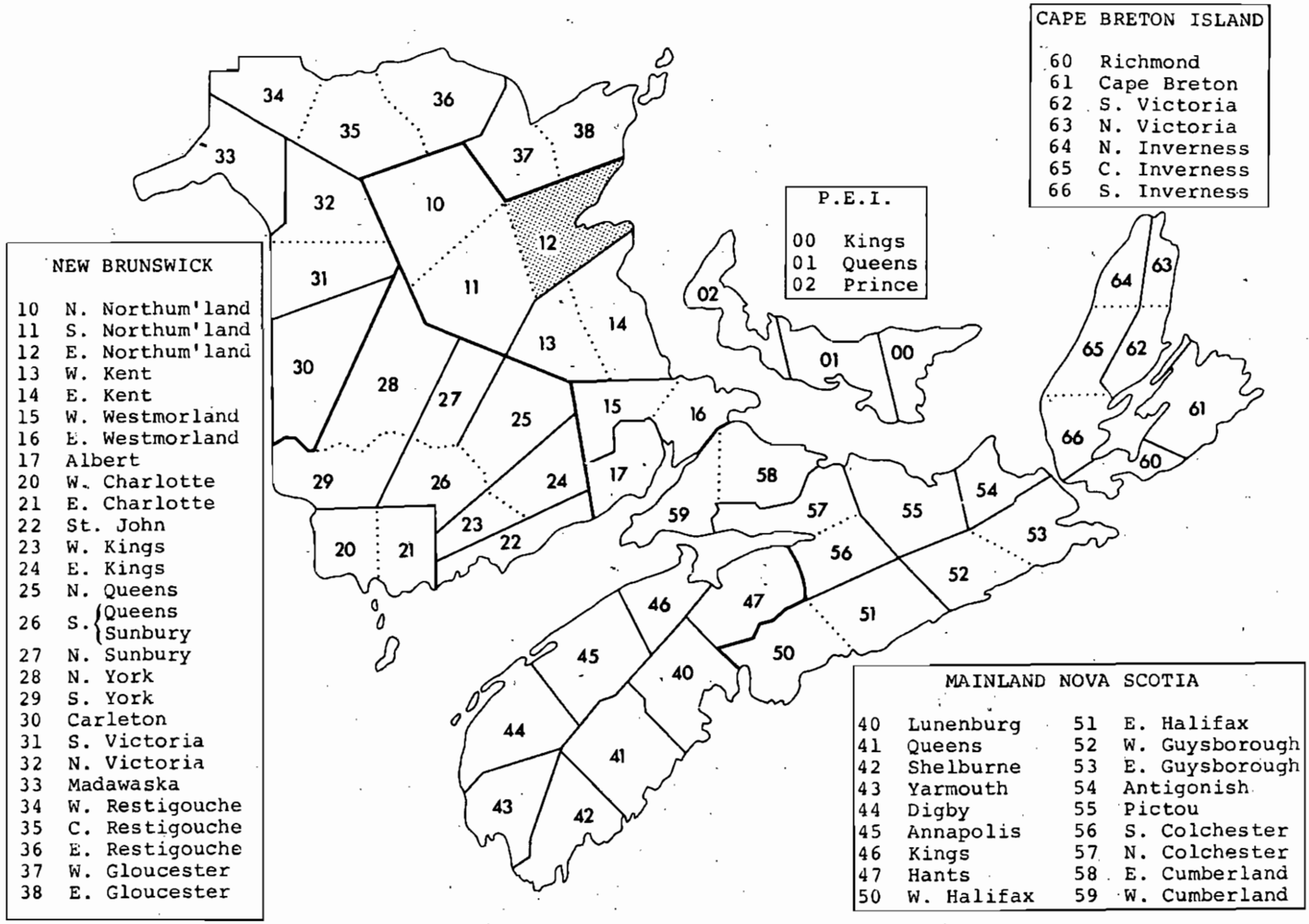

Figure 3. Fire Weather FORECAST AREAS in the Maritime Provinces (East Northumberland - Area 12- shaded).

divisions rather than counties are preferred units for forecast areas (Pouliot, 1967).

Figure 4 shows that the provincial forest districts in the Maritimes do not necessarily coincide with either forecast areas or zones. New Brunswick Forest District No. 2, for instance, includes all of area 12, most of area 11, half of areas 10 and 14, as well as small parts of other areas (Fig. 5).

FOREST FIRE DANGER RATING SYSTEM

Forecasts of fire danger and fire weather supplied by the Fire Weather Central are the information on which the Forest Services make many administrative and operational decisions. The fire danger is a numerical expression of the likelihood of fires starting, the probable rate of spread, and the difficulty of controlling those that do start. A slightly modified version of the "1956 Edition" of the Forest Fire Danger Tables (Anon., 1957) was used in forecasting in the Maritimes until the end of the 1970 fire season.[6] A new and improved fire danger rating system, the Canadian Fire Weather Index (Anon., 1970), field-tested in 1969 and operational in many parts of Canada in 1970, will be introduced into the Maritime Provinces in 1971. With more steps required to determine the index, these new Tables are more complex to use than the relatively simple "1956 Edition". However, in this report, the old system is used to illustrate the forecast system; with fewer computations, the procedure is easy to follow.

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[6] A historical sketch of the development of the fire danger rating system as it grew in Canada from the late 1920's to the present is to be found in a paper by Paul (1969). A most interesting earlier paper along these same lines has recently been reprinted (Beall, 1947).

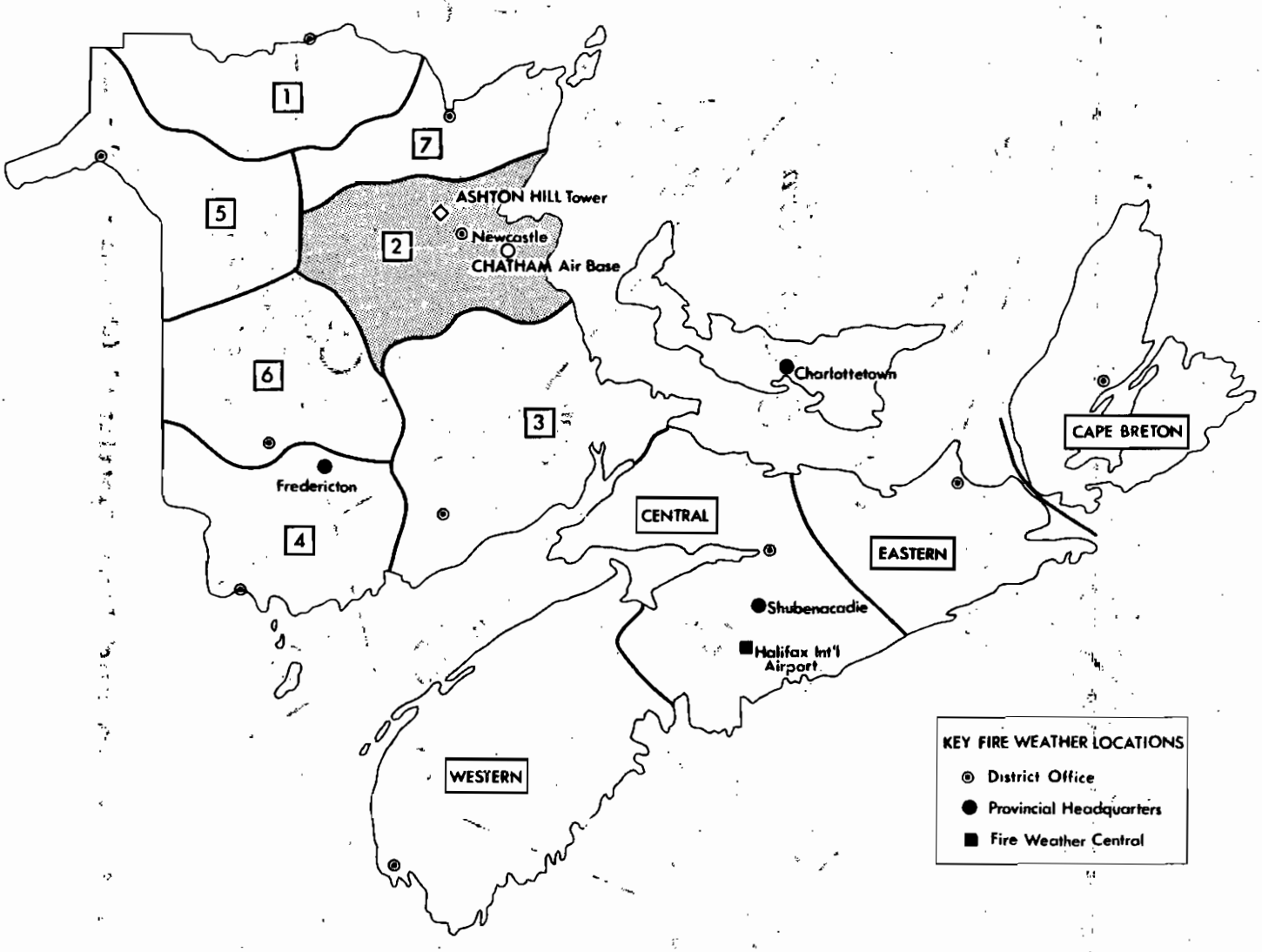

Figure 4. Provincial FOREST DISTRICTS in the Maritime Provinces (New Brunswick District #2 shaded).

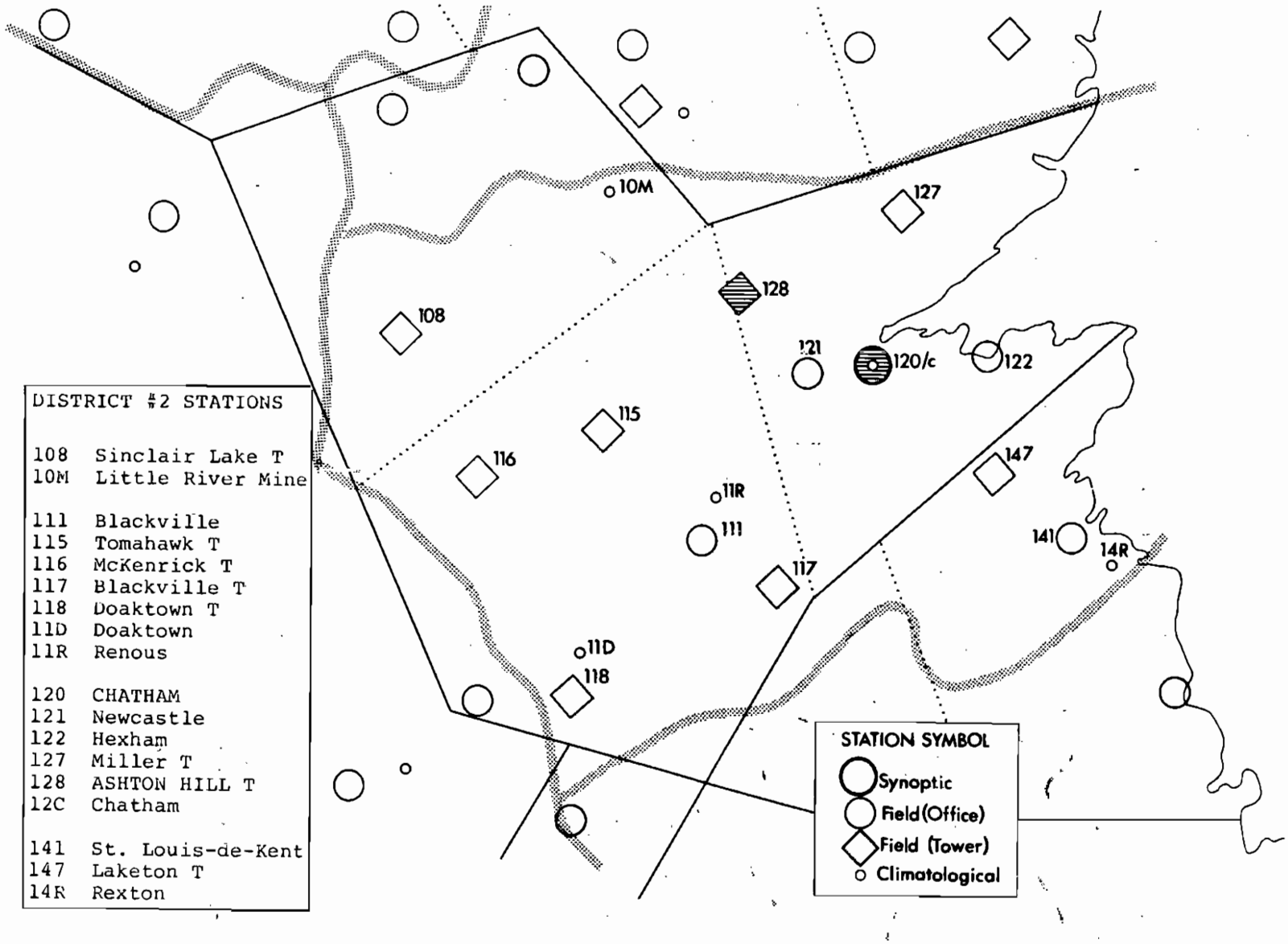

Figure 5. Fire Weather STATIONS in New Brunswick Forest District #2 (Chatham - #120 - and Ashton Hill - #128 - shaded.

The modifications to the "1956 Edition" are not in the manner of making the calculations but in the time of taking the readings and in the breakdown of the danger index classes. The modified class division is compared in Table 2 to the standard that has been used throughout Canada for many years.

Table 2. Forest fire danger index classes

Danger index	Standard version	Modified version
0	Nil	Low
1- 4	Low	Low
5- 8	Moderate	Moderate
9-10	High	High
11-12	High	Very High
13-16	Extreme	Extreme

In reporting to the general public, any number under 5 is termed low. A distinction is also made between high and very high in the message to the public. The 0-16 danger index scale is not the only criterion to be considered as far as the Forest Service is concerned. Almost as important is the drought index which may be considered as a measure of "days since rain". The drought index climbs one unit per day if the 24-hour rain is less than 0.06 inch and remains stationary if it is between 0.06 and 0.10 inch. It is theoretically possible to experience 1 week of light rain varying between 0.01 and 0.05 inch each day and still have the drought index increase by seven units. The drought index is lowered by rain but, unless more than 0.50 inch of rain falls or the drought index is fairly low to begin with, it is not usually reduced to zero.

In this report, the term fire danger is used in a special sense

to mean a combination of drought and danger. If the drought is 7 and the danger 13, as in East Northumberland on 3 June (step 2.3), the fire danger is written as 7/13. In this situation, about 1 week has ensued since wet weather was experienced in the area and the danger index is extreme. The potential seriousness of the situation is reflected in the fact that a few minutes after the above calculations were made, a fire broke out on the border of the area. It should be realized that a fire danger of, say, 9/2 is potentially more hazardous than 2/9 even though, in the first instance, the danger index is low.

Based on relative humidity, wind speed, and 24-hour rain, the fire danger is calculated every day for a primary fire weather station (steps 1.1 and 1.4). The dry- and wet-bulb temperatures are measured to determine the relative humidity and, while not needed for the calculations, supplementary parameters such as cloud cover are also recorded. The fire danger can be quickly and easily determined from the weather data and the Danger Tables.

Weather observations and calculations are made at noon and the term noon readings is a concept familiar to anyone concerned with forest fire fighting in Canada. Noon, in its original sense, meant "sun noon", the time at which the sun crosses a station's meridan. In the Maritimes, this varies from 11.55 AM just east of Sydney, N.S., to about 12.40 PM in the pan-handle west of Edmundston, N.B. It is more efficient to have all stations take their readings at the same time but, rather than settle on the mid-point of 12.15 PM, only a small degree of accuracy is sacrificed by standardizing on the noon hour itself. There are several reasons for doing so. First, with the start of fire weather forecasting, hourly

reporting meteorological stations are now integrated into the fire weather network and they take their weather readings every hour, on the hour. Second, moving the observational period forward 15 min occasionally makes the difference between meeting or missing the afternoon deadline to the news media (step 4.2). The instructions for the Danger Tables advise that in the event of rain at noon, the weather observations should be made after the rain stops. If it is still raining at 2.00 PM (standard time), the readings will be cancelled for the day and the danger considered to be nil. In forecasting, it is quite impractical to wait until the rain stops before taking the readings and consequently this requirement is ignored.

FIRE WEATHER STATION NETWORK

From the point of view of fire weather forecasting, surface weather stations are divided into two main categories. To qualify as a primary rather than as a secondary station, the criterion is that the weather parameters must be measured at noon and be detailed enough for fire danger to be calculated.

To identify the area and the type of station, all fire weather stations are designated locally by a three-digit code; a four-digit code is used nationally. This new numerical code replaces the one used until 1969 whereby the first number represented the provincial forest district and the second was a combination of the kind of station and the organization responsible for operating it (Paul, 1963). With the new code based on the forecast area, the number is independent of changes in forest district boundaries that provincial authorities might make but its main

advantage is that the station is extremely easy to locate on a map.

Some of the primary stations mentioned most frequently in the example are identified on the Forest District Map (Fig. 4). The total number of such stations in the Maritime Provinces is now close to 125. For a land area of only 50,000 square miles, the ratio of stations to number of square miles (about 1:400) is very good. File reports -- consisting of circular diagrams, photographs, and a brief description of location, elevation, and similar features -- have been prepared for primary stations.

PRIMARY FIRE WEATHER NETWORK

Synoptic Stations

The hourly reporting synoptic stations are operated by or for the Meteorological Branch of Canada or the United States Weather Bureau. The current fire danger is determined from noon weather data sent over the meteorological teletype circuit. In the Maritime Provinces, 16 such stations fit this description -- seven in Nova Scotia, five in New Brunswick, two in Prince Edward Island, and two in eastern Maine close to the New Brunswick border. The two American stations are of considerable help in evaluating the fire danger for the western New Brunswick counties. Others, such as lighthouses near the coast, are unsuitable for forestry purposes and are assigned secondary status, whereby only their rainfall data are considered. Miscou Island in area 38 is one such station.

All 16 stations are "first-order" but, even so, there are complications associated with using their weather data (step 1.4). One problem is that the wind anemometer at a synoptic station, installed at 10 m (33 feet), usually gives higher values than at a forestry station.

Another difficulty is the time of observing rain. By international agreement, surface weather observations are taken all over the world every 6 hours. In the Maritime Provinces, this is either 4 hours too early or 2 hours too late for the noon readings. The time difference is not as serious a problem as one might think as shown by a comparison between the fire danger determined at noon and at 2.00 PM. The study was made possible because the American synoptic station at Caribou, Maine (#310), recorded rain hourly in 1964 (Goldrup, 1968). Fortunately, it is only precipitation that is determined from the 2.00 PM Atlantic Standard (1800Z) time period: all other weather parameters are observed at noon (1600Z).[7] Of the 70 days in which a measurable amount of rain fell at Caribou in a 5-month period from 1 May to 21 September, 20 were days when rain between noon and 2.00 PM affected the index. Sometimes the two indices, calculated at noon and 2.00 PM, were not reconciled for 2 or more days after the rain so that the index differed on 27 of 144 days involved. This is about 1 in 5 days but on 13 of these the index varied only by ±1. Therefore the index was appreciably affected by the different time of taking measurements on just 1 in 10 days. Moreover, when there was a difference of more than one unit, it almost invariably meant that rain started between noon and 2.00 PM and thus gave a more accurate indication of the current fire danger. This is so because a short-range forecast is built into the Danger Tables so that the fire danger will apply to the peak hazard period (about mid-afternoon). Rain in the afternoon invalidates the assumption that the relative humidity will continue to decrease during the warmest part of the day.

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[7] Z is traditionally used as a substitute symbol for GMT (Greenwich Mean Time) in weather analysis and forecasting.

West Halifax (area 50) is the only forecast area in the Maritimes with two synoptic stations but this situation is more common in Newfoundland and other parts of Canada. The third digit numbers, 0 and 9, are reserved to identify this type of station.

Field Stations

The second type of primary station is largely maintained by the provincial forest services, forest industry, and by the federal government in National Parks and at research and management locations. The term field is used in place of forestry to identify such stations, because a few of them are operated by private individuals or organizations with no tangible forestry interests.

As in the case of synoptic stations, the first two numbers indicate the area. The third digit varies from 1 to 8 with offices assigned the lower numbers and towers the higher (see Fig. 5). The "tower" and the "office" designations represent the two kinds of stations recognized. The distinction between the two is maintained because a fire tower is expected to be at a higher elevation than a ranger office. This often means that the tower is located in a different local climate and, for this reason, the Forest Service is encouraged to take weather readings at towers and offices even if they are near to one another. Besides retaining the distinction for practical purposes, they are also segregated because many fire towers in New Brunswick will be dismantled in the next few years due to the widespread change to aerial fire detection. The loss of towers is certainly detrimental to fire weather forecasting which can only be as good as the data upon which it is based. It is not possible to replace all of the towers by offices because, in some of the remote parts

of the province, the only permanent person is the towerman. The eventual solution is the installation of automatic weather stations.

SECONDARY FIRE WEATHER NETWORK

Climatological Stations

Climatological stations report to the Canadian Meteorological Service at the end of each month. In most cases the observations, consisting of maximum and minimum temperatures plus the 24-hour precipitation, are taken daily (usually at 8.00 AM local standard time). The temperatures are of no use in determining fire danger but the rain measurements are worthwhile even though they do not correspond to the noon-to-noon "forecast-day". Some of the forestry field stations also record maximum and minimum temperatures for the Meteorological Service but, because they take noon readings as well, they are upgraded to primary rather than secondary status.

Discussions with climatological observers in Nova Scotia and New Brunswick have suggested that many would be willing to take noon readings but it is often impractical to do so because the communication costs are prohibitive. Supplementary rain data from these stations are always welcome even if several days elapse before they reach the Fire Weather Central. If, for instance, the average drought for an area is calculated as 12 based on only a trace of rain at one station, and later a report from a climatological station reveals a rain shower of 0.50 inch, the drought index must obviously be lowered. This situation occasionally happens in Nova Scotia.

Climatological stations are given a letter instead of a number to accompany the two digit area code because their rain data are not analyzed by a computer. Unless there are two stations in the area with a name

starting with the same letter, the first letter is normally used. Thus Miscou Island in East Gloucester is identified as #38M.

COMMUNICATION FACILITIES

Rapid communication is essential to fire weather forecasting not only because the actual weather data must be sent to the Fire Weather Central but because the finished forecast must be returned to the Forest Service in time to be of practical use. The installation of teletypewriters is a simple and relatively inexpensive solution to the communication problem. The messages can be transmitted as quickly as the most skilled stenographer can type. Teletypewriters also have a big advantage over the telephone because both the sender and the recipient have a typed copy and the incoming message is printed out even if there is no operator present. This feature is indispensable when the early morning forecast is transmitted before the forest service staffs arrive on duty. Automatic teletypewriters are recommended because using the paper tape even the most inexperienced typist can prepare an error-free and properly spaced message. There is no problem in renting such machines since there are two competing systems which, by and large, provide essentially the same service. One is operated by the Canadian Pacific-Canadian National jointly (Telex) and the other by the Bell Telephone and its affiliated provincial companies (TWX). Each has small advantages over its competitor but the overall monthly or seasonal cost is not likely to differ much between the two systems. Therefore the particular system used in any given region is governed by factors other than cost. It may depend on what most potential subscribers have installed or on servicing considerations but, whatever

the choice, it is necessary that all cooperating parties use the same type of machine because, as yet, there is no provision for switching from one to the other.

Telex or TWX solves the problem of transmitting data from the provincial fire headquarters to the Fire Weather Central and vice versa. It does not necessarily allow data to be transmitted to and from the field. To do this, a combination of radio and telephone facilities is used. The Nova Scotia fire headquarters at Shubenacadie is in direct touch with all their district and ranger offices and fire towers by radio while the province of New Brunswick has installed a direct telephone system between a number of forestry offices in Fredericton and all seven district offices. A fixed annual charge is paid for this privilege. This so-called "Green Line" telephone system is remarkably convenient because it enables an operator to be in touch instantaneously with any district office merely by pressing the correct button. While data are transmitted between the district and head office by telephone, the towers and ranger offices are usually linked to the district office by radio. Both the Nova Scotia and New Brunswick systems work extremely smoothly and normally data are in the Fire Weather Central less than 1 hour from the time they are collected in the field.

FIRE WEATHER FORECASTING PROCEDURES

It is virtually impossible to discuss the mechanics of fire weather forecasting in the abstract; a concrete example is needed to make the procedure clear. To do this, the steps required in preparing the daily forecasts in the Maritime Provinces are described. The two forecasts are the 24-hour forecast, issued in mid-afternoon and valid for

the next afternoon; and the 12-hour or updated forecast issued early in the morning and valid for the same afternoon.

The Maritime Provinces are on daylight time in the summer months so, unless otherwise specified, all times used in the example refer to daylight time and therefore neither Atlantic Daylight Time nor its abbreviation, ADT, will be inserted after the hour. In actual practice, the 24-hour clock is used on all forms and messages. Moreover, reference is occasionally made to Greenwich Mean Time, symbolized by the letter Z, which is 3 hours ahead of Atlantic Daylight Time. This means that the noon readings, taken at 1.00 PM (or 1300 by the 24-hour clock), could also be recorded as 1600Z or, more briefly, 16Z.

To simplify the following discussion, the two forecasts are described in Table 3 under seven major headings. The number of steps under each heading is also included.

Table 3. Headings and steps in preparing daily forecasts in the Maritime Provinces

Heading	Steps numbered	Number of steps
24-HOUR "AFTERNOON" FORECAST		13
Obtaining the data	1.1 - 1.5	
Plotting the fire danger	2.1 - 2.3	
Preparing the forecast	3.1 - 3.3	
Issuing the forecast	4.1 - 4.2	
12-HOUR "MORNING" FORECAST		10
Preparing the forecast	5.1 - 5.4	
Issuing the forecast	6.1 - 6.2	
Obtaining the data[a]	7.1 - 7.4	

[a] Steps 7.1 - 7.4 are essentially preliminary steps for the 24-hour "afternoon" forecast rather than the final steps for the 12-hour "morning" forecast. They are described in the order shown because of the time of day at which they are carried out and because they are important only if rain has fallen.

In some cases, it is difficult to decide just where one step ends and another begins and, in the example, not all possible steps are illustrated. They are included only if they contribute to a better understanding of the forecasting procedure. Consequently, recording field data at the provincial fire headquarters is not illustrated because the step is essentially as described for a district office (steps 1.2 and 7.2). The order in which the steps are listed is usually, but not invariably, an indication of the order in which they are actually performed. An exception is the recording of noon data for synoptic stations (step 1.4) which is normally carried out about the same time as at the field stations (step 1.1). However, it is logical, and the explanation clearer, to describe all field data procedures together.

THE 24-HOUR FORECAST

Issued

Monday Afternoon, 3 June

1. OBTAINING THE DATA

1.1 Recording at the Field Station

Every afternoon at 1.00 PM throughout the fire season, "noon readings" are taken at more than 100 field stations in the Maritime Provinces. The afternoon data for Monday, 3 June, are shown for one New Brunswick station, Ashton Hill Tower (#128). With the aid of the Quick Reference guide to the left of the form, the observer has little difficulty recording the weather in columns 4 to 12.[8]

Data for the shaded columns are determined indirectly. Relative humidity is obtained by using the Psychrometric Tables included in the Forest Fire Danger Tables. The 24-hour rain is obtained by adding the morning (col. 3) and afternoon (col. 12) sub-totals. The drought and danger indices are calculated from the Danger Tables using certain weather parameters. In this case only current humidity and the wind speed are needed since there is no rain recorded in column 11.

---

[8] More detailed instructions than those given in the quick reference guide are given on the back of form #10 (Appendix I).

MONTHLY FIRE WEATHER SUMMARY (#10)

MONTH	YEAR	STATION NAME	NO.	0900 MORNING	1300 AFTERNOON	TIME	INITIALS	REGION
JUNE	19xx	ASHTON HILL T.	128			☐ STANDARD ☑ DAYLIGHT	W.M.	1

QUICK REFERENCE

DETAILS ON REVERSE SIDE

	1	2	3		A	B	4	5	6	7	8	9	10	11	12
	MORNING				AFTERNOON										
	TEMP		RAIN		INDEX		TEMP		RH	WX	CL	WIND		RAIN	RAIN
	MAXIMUM	MINIMUM	20 HOUR	DATE	DROUGHT	DANGER	DRY BULB	WET BULB	RELATIVE HUMIDITY	WEATHER	CLOUD	DIRECTION	SPEED	24 HOUR (COL. 3 + 12)	4 HOUR
				30/31	3	9									
	79	53	.02	1	4	5	68	59	59	5	3	8	6	.03	.01
	75	49	.04	2	5	8	78	62	40	0	1	7	16	.04	x
	81	50	x	3	6	12	82	62	31	0	2	5	13	x	x
				4											
				5											
				6											
				7											
				8											
				9											
				10											
				11											
				12											
				13											
				14											
				15											
				16											
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				21											
				22											
				23											
				24											
				25											
				26											
				27											
				28											
				29											
				30											
				31											

RAIN

X – NO RAIN
T – TRACE

WEATHER

1 – HAZE
2 – RAIN*
3 – LIGHTNING
4 – FOG
5 – DRIZZLE
6 – RAIN
7 – SNOW
8 – SHOWERS
9 – TH'STORM
0 – FAIR

*(not at station)

CLOUD

0 – CLEAR
1 – SCATTERED
2 – BROKEN
3 – OVERCAST
4 – OBSCURED

DIRECTION

1 – NE
2 – EAST
3 – SE
4 – SOUTH
5 – SW
6 – WEST
7 – NW
8 – NORTH
0 – CALM

SHADED COLUMNS MUST BE CALCULATED

F-2204 (12/69)

Figure 6. Fire Weather Observations Recorded at the Ashton Hill Field Station on 3 June (Step 1.1).

1. OBTAINING THE DATA

1.2. Transmitting to the District Office

The Ashton Hill observer is 1 of 12 who transmits his readings by radio to the district office at Newcastle.[9] The data are recorded on form #20 whose columns are identical to those of the Monthly Summary (#10). The X, indicating no rain, is recorded by the observer but not by the Newcastle dispatcher.

It is advisable for the dispatcher to list the station numbers in ascending numerical sequence each morning before transmission time. By so doing, he immediately notices that St. Louis-de-Kent (#141) missed the afternoon call. The omission is eventually traced to radio transmission problems.

As soon as all the local stations have responded, the Newcastle District #2 data are relayed to the provincial headquarters in Fredericton by telephone. They are also recorded on form #20 by the headquarters dispatcher along with data from the other six provincial districts.

---

[9] In Nova Scotia, step 1.2 is omitted and the weather readings from all over the province are transmitted directly by radio to the dispatcher at the provincial fire headquarters in Shubenacadie.

DAILY FIRE WEATHER SUMMARY (#20)

MONTH	DAY	YEAR	LOCATION		INITIALS	REGION
JUNE	3	19xx	NEWCASTLE (#2)	FIELD STATIONS	AMS	1

12V	X		1	2	3		A	B	4	5	6	7	8	9	10	11	12
			MORNING				AFTERNOON										
RAIN	RAIN		TEMP		RAIN		INDEX		TEMP		RH	WX	CL	WIND		RAIN	RAIN
FROM COL. 12 YESTERDAY	24 HOUR (COL. 12V + 31)		MAXIMUM	MINIMUM	20 HOUR	STATION NO.	DROUGHT	DANGER	DRY BULB	WET BULB	RELATIVE HUMIDITY	WEATHER	CLOUD	DIRECTION	SPEED	24 HOUR (COL. 3 + 12)	4 HOUR
		1	76	53		108	4	9	74	60	44	0	0	5	7		
		2	84	49		111	5	9	82	66	43	0	1	5	8		
		3	82	52		115	6	10	79	63	41	0	0	5	8		
		4	78	56		116	6	10	76	62	45	0	1	5	5		
		5	83	50		117	6	10	81	65	42	0	2	5	12		
		6	82	46		118	4	10	81	64	39	0	1	5	9		
		7	85	46		121	8	13	83	64	34	0	1	5	12		
		8	82	44		122	7	14	82	61	28	0	1	5	5		
		9	83	46		127	5	11	90	63	38	0	2	5	10		
		10	81	50		128	6	12	82	62	31	0	2	5	13		
		11	81	45		141											
		12	82	47		147	5	9	83	64	34	0	1	5	8		
		13															
		14															
		15															
		16															
		17															
		18															
		19															
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		25															
		26															
		27															
		28															
		29															
		30															
		31															
		32															

F-2205 (12/69)

Figure 7. Field Station Observations Transmitted to the New Brunswick #2 District Office on 3 June (Step 1.2).

1. OBTAINING THE DATA

1.3 Transmitting from the Provincial Headquarters

Even before all the districts have reported to Fredericton, the headquarters dispatcher has handed over the first sheet of station data to the typist and a tape is immediately prepared for Halifax using the teletype instructions at the end of the form as a guide (see Appendix I).

The message is typed in groups of numbers partly because it is quicker and easier to do so than to space out each individual column and partly because it facilitates transmission to the computer (step 1.5). The absence of rain suggests the reason for placing the two rain columns at the end of the row and the 24-hour before the 4-hour. A different location would mean that frequently many blank spaces (costing time and money) would have to be left on the typed message.

```
FIRE WX. CENTRAL, HFX.
N.B. FOR. SERV., FTON.

.
.
.

DISTRICT #2
108  0409  7460  4400  507
111  0509  8266  4301  508
115  0610  7963  4100  508
116  0610  7662  4501  505
117  0610  8165  4202  512
118  0410  8164  3901  509
121  0813  8364  3401  512
122  0714  8261  2801  505
127  0511  8063  3802  510
128  0612  8262  3102  513
141
147  0509  8364  3401  508

DISTRICT #3
142  0306  7864  4601  406
148  0409  8061  3202  508
151  0208  8163  3601  505
158  0309  7966  5002  510
168  0406  7463  5402  404
231  0608  7865  5002  605
241  0512  8364  3401  515
242  0409  7560  4101  407
248  0611  7759  3301  510
251  0207  8064  4101  508
252  0209  8166  4502  511

.
.
.

FEDERAL
232  0610  8066  4701  514
261  0713  8364  3401  512
262  0712  8367  4301  618
263  0610  8168  5101  512
271  0209  8164  3901  509

JPL   JUNE 3, 19xx   (1405 ADT)
```

Figure 8. Field Station Observations Transmitted to the Regional Fire Weather Central on 3 June (Step 1.3).

1. OBTAINING THE DATA

1.4 Recording Synoptic Station Data

With the exception of the first and the last two columns in form #30, all the data are abstracted from the 1.00 PM (16Z) message received over the weather office teletype facilities. The Sherbrooke, Quebec, station is listed mainly because it appears on the same relay as the Maritime synoptic stations but, with Sherbrooke lying 200 miles to the west of New Brunswick, it also provides an advance fire danger warning. In addition, several American stations near the New Brunswick border are considered so much a part of the Maritime network that they are actually assigned regional fire weather numbers.

Instead of requesting a repeat from Charlo (#360) for the partially garbled message, the 2.00 PM (17Z) data were used to calculate the fire danger.

It is necessary to be constantly alert to the unusual in the event of going fires and consequently the maximum overnight humidity (col. 0) is needed. An adjustment to the danger index is normally applied in the mountainous terrain of western Canada for any station at which the night relative humidity remains low. This is not the practice in the Maritimes but the situation is watched closely if this tendency is noted at any synoptic station.

The discrepancy in height and exposure between anemometers at synoptic and at field stations means that the wind at the former must sometimes be adjusted before calculating the fire danger. This is done for those stations whose wind speed is circled.

Rain is not present on the synoptic maps so, therefore, the fire danger is immediately calculated. If rain had occurred after 9.00 AM (12Z) or was expected before 3.00 PM (18Z), it would have been necessary to wait 2 hours before completing the calculations.[10]

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[10] This is explained in greater detail in step 7.4.

DAILY FIRE WEATHER SUMMARY (= 30)

MONTH	DAY	YEAR	LOCATION	SYNOPTIC STATIONS	INITIALS	REGION
JUNE	3	AXX	HALIFAX F.W.C.		BTG	1

0		A	B	P	V		4	5	6	7	8	9	10	11	
		NOON					STANDARD TIME								
NH		INDEX		PR	VIS		TEMP		RH	WX	CL	WIND		RAIN	
MAX. NIGHT HUMIDITY	STATION NO.	DROUGHT	DANGER	SEA LEVEL PRESSURE	VISIBILITY	IDENTIFIER	DRY BULB	DEW POINT	RELATIVE HUMIDITY	PRESENT WEATHER	CLOUD	DIRECTION	SPEED + GUSTS TO	24 HOUR (AT 18Z)	REMARKS
94	500	6	9	18.7	20	HZ	78	53	42		⓪	5	14 +		
M	530	7	10	18.7	15	VW	78	45	31		①	4	06 +		
84	160	2	10	16.1	35	QM	79	51	37		①	5	14 +		
98	509	6	7	19.5	10	AW	64	56	72		①	5	11 +		
94	QUE	1	6	15.0	15	SC	82	57	42		①	5	14 + 22		
95	460	6	11	17.5	15+	ZX	85	58	40		①	6	(30) +		
89	020	7	11	16.1	15	SU	77	54	45		⑩	4	14 +		
93	260	7	13	15.7	20	FC	86	57	38		①	5	14 + 23		
93	120	7	14	13.7	15+	CH	84	48	29		⑪	5	(18) + 23		
89	360			11.5	15	CL					①		+		GARBLED
		2	9				83	57	41			6	16 +		17Z
96	220	7	11	17.9	15	SJ	75	64	48		⑩	4	(18) + 23		
100	430	6	6	20.6	10	QI	67	59	75		⓪	6	08 +		
96	010	6	9	17.4	15	YG	73	53	49		⑩	4	07 +		
98	580	4	6	18.0	15+	TQ	80	50	35		①	5	06 +		
98	610	7	12	18.6	15+	QY	77	43	30		⑩	4	08 +		
													+		
89	310	5	10	15.2	30	CAR	80	50	35		⑩	5	17 +		
90	300	6	11	16.2	20	HUL	81	49	33		⑩	5	14 + 21		
													+		
													+		
													+		
													+		
													+		

CLOUD

- ○ – CLEAR
- ⊖ – SCATTERED
- ◍ – BROKEN
- ⊕ – OVERCAST
- ⊗ – OBSCURED

VISIBILITY

REPORTED IN STATUTE MILES AND FRACTIONS

(V = VARIABLE)

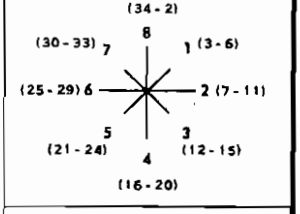
PRESENT WEATHER

A – HAIL	F – FOG	RW – RAIN SHOWERS
AP – SMALL HAIL	GF – GROUND FOG	S – SNOW
BD – BLOWING DUST	H – HAZE	SG – SNOW GRAINS
BN – BLOWING SAND	IC – ICE CRYSTALS	SP – SNOW PELLETS
BS – BLOWING SNOW	IF – ICE FOG	SW – SNOW SHOWERS
D – DUST	K – SMOKE	T – THUNDERSTORM
E – SLEET	L – DRIZZLE	ZL – FREEZING DRIZZLE
EW – SLEET SHOWERS	R – RAIN	ZR – FREEZING RAIN

PRECIPITATION INTENSITIES

– – = VERY LIGHT – = LIGHT (NO SIGN) = MODERATE + = HEAVY

WIND DIRECTION



WIND SPEED

CIRCLE IF LOWERED

F-2206 (8/69)

Figure 9. Synoptic Station Observations Recorded at the Regional Fire Weather Central on 3 June (Step 1.4).

1. OBTAINING THE DATA

1.5 Checking Field and Synoptic Data by Computer

Plans are underway to computerize most of the repetitive operations needed to prepare the routine daily forecasts but the benefit of checking station data by computer has already been demonstrated. Without the computer, there is not sufficient time in the afternoon to detect any but the most glaring errors. In 1967, the shaded columns on the Daily Summary (#30) were typed and transmitted to a centrally located computer in Ottawa. For this reason, the regional code number had to be included, but it was unnecessary to type all the field station data groups because the computer calculates the fire danger and checks the relative humidity. If rain had been reported from any of the stations, only the 24-hour amount would have been included.

Wind direction is not currently considered in calculating fire danger but, in cases where field stations are partially sheltered by trees or other obstructions, the computer may eventually be fed the necessary information to make possible applying a correction to individual stations depending on the direction from which the wind is blowing. It is also expected that lowering (or raising) the wind speed will become a systematic procedure when individual wind characteristics are thoroughly analyzed; at present, however, the synoptic stations with circled winds should have their velocities reduced before the message is typed.

When the computer program is operating efficiently it is expected that turn-around time will be in the order of 15 min. This makes it possible to advise the Forest Service almost immediately of any computational errors made by the field stations. Moreover, the continuous checking of station data will in itself help to reduce this source of errors.

```
FIRE WX. CENTRAL, OTT.
FIRE WX. CENTRAL, HFX.

.
.
.

1500  7853  514
1530  7845  406
1160  7951  514
1509  6455  511
1460  8558  615
1020  7754  414
1260  8657  514
1120  8448  515
1220  7554  415
1430  6759  608
1010  7353  407
1560  8050  506
1610  7743  408
1310  8050  517
1300  8149  514
1360  8357  616

.
.
.

1108  7460  507
1111  8266  508
1115  7963  508
1116  7662  505
1117  8165  512
1118  8164  509
1121  8364  512
1122  8261  505
1127  8063  510
1128  8262  513
1147  8374  508

IWD   JUNE 3, 19xx   (1415 ADT)
```

Figure 10. Primary Station Observations Transmitted to the National Computer Facilities on 3 June (Step 1.5).

2. PLOTTING THE FIRE DANGER

2.1 Examining Yesterday's Fire Danger

Today's fire danger is plotted on a large overlay of the region but, before doing so, it is advisable to glance back over yesterday's data.[11] Shown here are the actual fire dangers for all New Brunswick stations on Sunday, 2 June. Box B contains the 27 New Brunswick area averages determined from these data. East Northumberland's fire danger of 6/10 was determined as follows.

Table 4. Fire danger in East Northumberland, N.B. on 2 June

Station number	Station name	Drought index	Danger index	Danger class
120	Chatham	6	11	V.H.
121	Newcastle	7	12	V.H.
122	Hexham	6	11	V.H.
127	Miller Tower	4	7	Mod.
128	Ashton Hill Tower	5	8	Mod.
		TOTAL 28	49	
		AVERAGE 5.6	9.8	

In actual practice, some weight is given to the data from the surrounding areas as well as to the percentage of the area that each station might reasonably be said to represent. Anomalies would also have to be dealt with. For example, if Chatham's fire danger were reduced to 1/6 by local showers on 1 June, less weight would be given to it in working out the area average.

---

[11] The corresponding station numbers are found below the overlay. Thus Ashton Hill's fire danger of 5/8 blocks out its station number, #128. See Fig. 5 for other station names and numbers in New Brunswick Forest District #2.

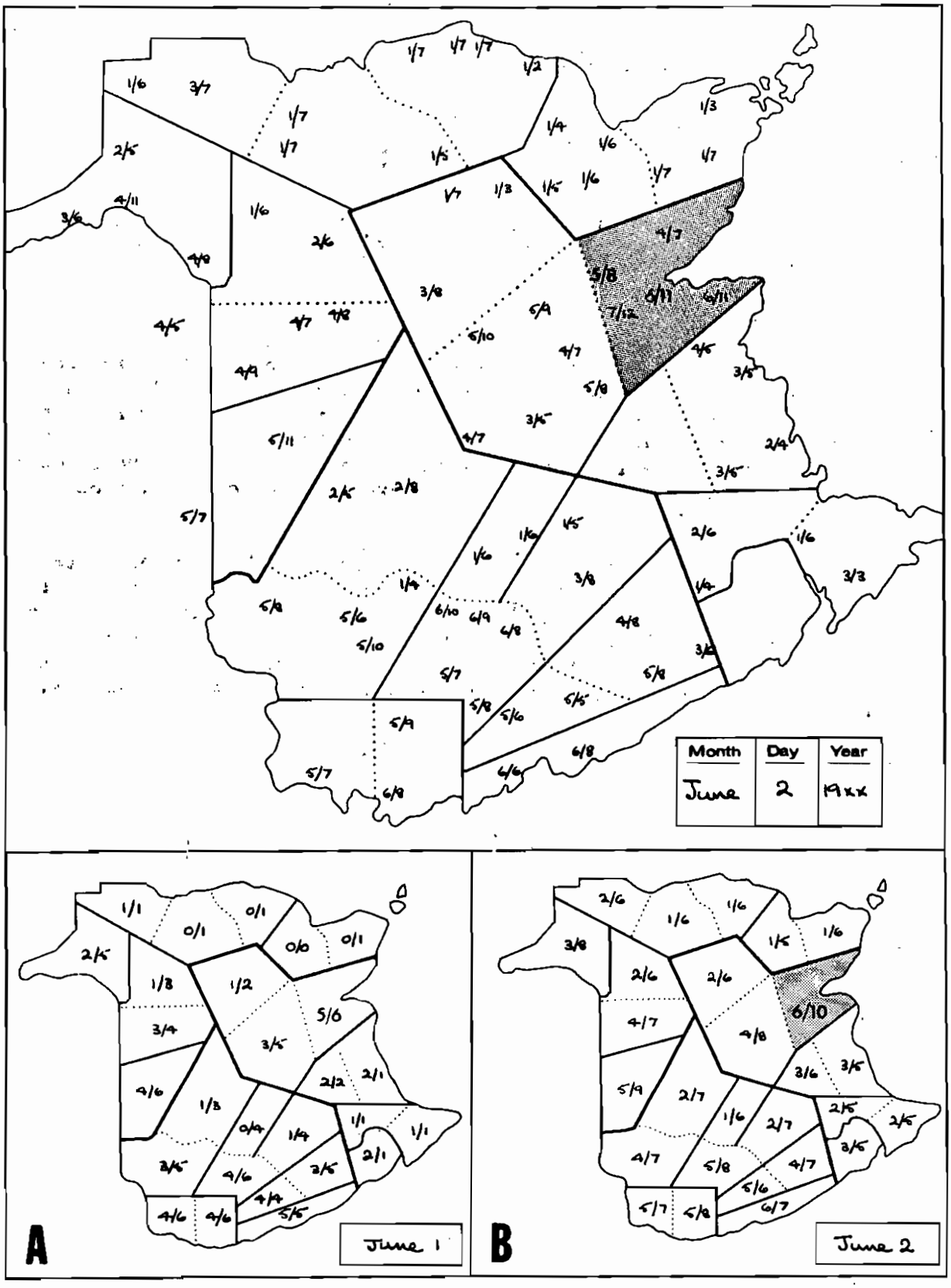


Figure 11. AREA Fire Danger for 2 June Examined at the Regional Fire Weather Central (Step 2.1).

2. PLOTTING THE FIRE DANGER

2.2 Plotting Today's Station Fire Danger

Yesterday's 2 June map is erased along with Box A containing the 1 June area averages. Box B is left intact as a reminder of how the data were averaged yesterday. The current fire danger is now plotted on the larger map and, after a close examination, the area averages will be recorded in Box A (step 2.3). Not everyone would arrive at the values obtained, but experienced personnel should seldom differ by more than one index unit.

It will be recalled that St. Louis-de-Kent (#141) was unable to report today because of transmission difficulties. Yesterday its fire danger was 3/5 and, because no rain has occurred anywhere in the province in the past 24 hours, it is reasonable to assume that today's drought index is 4. On the other hand, the danger index is left blank because the correct value cannot be determined so readily.

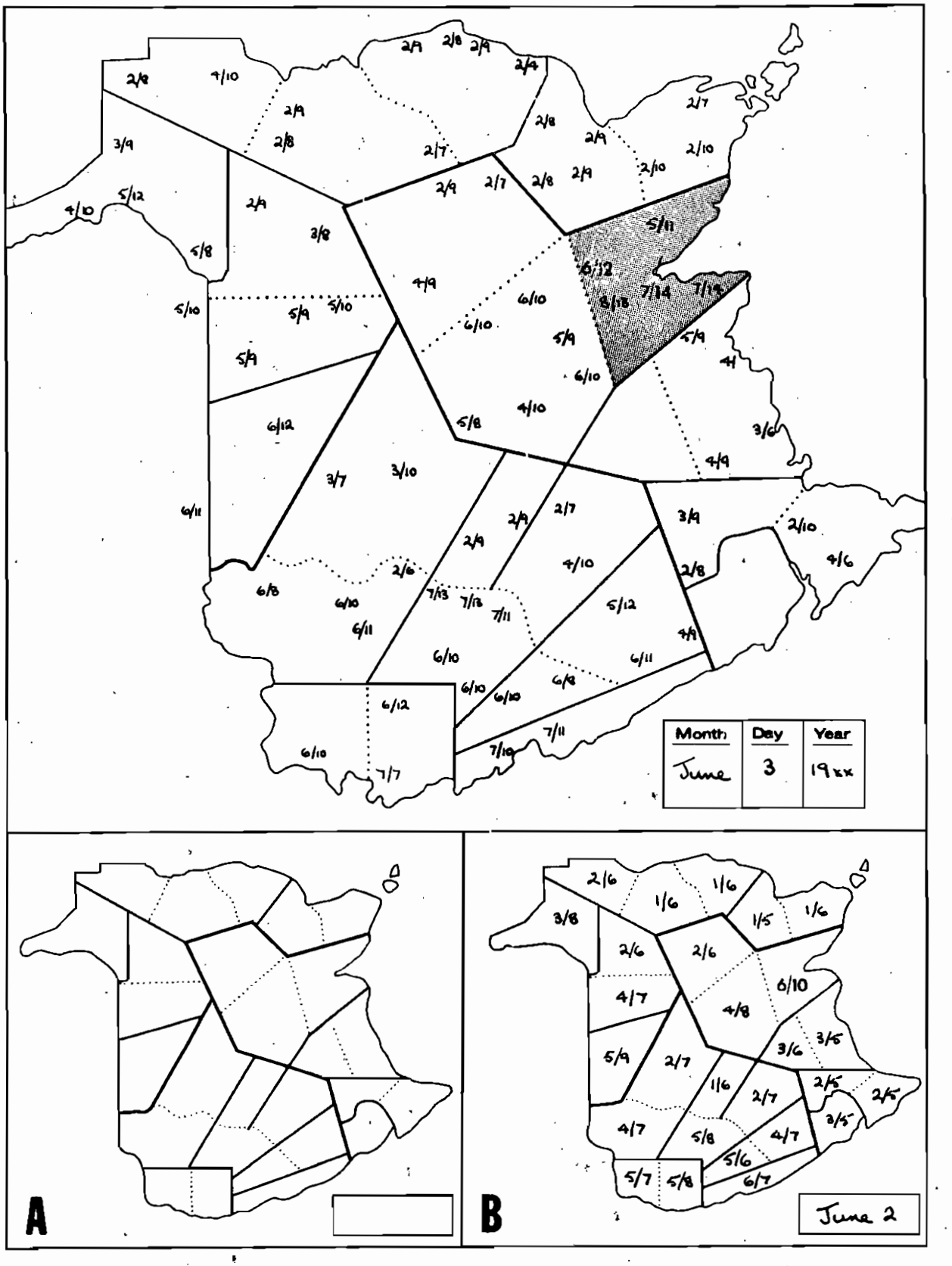


Figure 12. STATION Fire Danger for 3 June Plotted at the Regional Fire Weather Central (Step 2.2).

2. PLOTTING THE FIRE DANGER

2.3 Determining Today's Area Fire Danger

Today's area averages are shown in Box A. Tomorrow Box B will be erased along with the main map but Box A will remain and, if there is no rain by the afternoon of 4 June, one index unit will be added to the drought indices recorded in it. This step is not, of course, automatic but is subject to adjustment depending on whether additional information is forthcoming from stations whose data are missing at present.

It should be noticed that East Northumberland has the highest fire danger of any area in New Brunswick with three of the five stations reporting extreme fire danger.

Table 5. Fire danger in East Northumberland, N.B. on 3 June

Station number	Station name	Drought index	Danger index	Danger class
120	Chatham	7	14	Ext.
121	Newcastle	8	13	Ext.
122	Hexham	7	14	Ext.
127	Miller Tower	5	11	V.H.
128	Ashton Hill Tower	6	12	V.H.
		TOTAL 33	64	
		AVERAGE 6.6	12.8	

It has been suggested in step 2.1 that the area averages are not always determined by the simple procedure of adding and dividing presented above. Most situations are more complicated than shown here, and sound judgement is required to determine the fire danger. For instance, it is unusual to find such a clear demarcation as occurs between Gloucester (areas 27 and 38) and East Northumberland (area 12). Shower activity does not often follow area boundaries so closely. Interpretation from surrounding areas is necessary in West Kent (area 13) where there are no stations.

This step must on no account be hurried or done sloppily because these are the critical starting indices on which the fire danger forecast will be based (step 3.3). Consequently it often takes an hour or longer to work out the averages for the 55 areas in the Maritime Provinces.

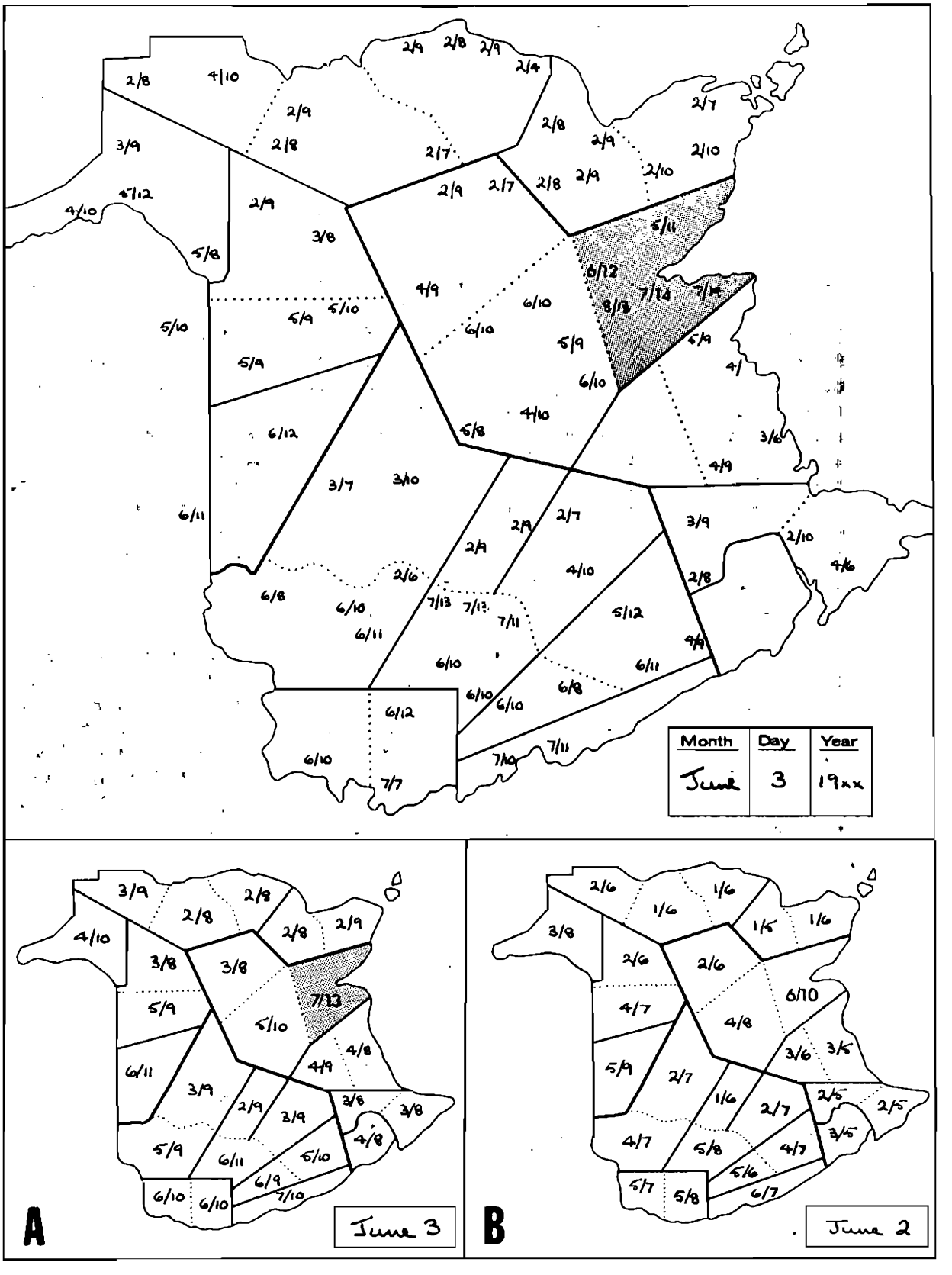


Figure 13. AREA Fire Danger for 3 June Determined at the Regional Fire Weather Central (Step 2.3).

3. PREPARING THE FORECAST

3.1 Preparing the Weather Forecast by the Forecaster

The 24-hour fire weather forecast is prepared for the Maritime Provinces at approximately 2.00 PM. The forecaster draws lines to mark the boundaries between distinct forecasts on a large topographic map.[12] The weather parameters requested of the forecaster are found in the column headings in Box A. Space for up to 20 numbers is provided in Boxes A and B but this number will rarely be reached. On the other hand, it is theoretically possible, although most unlikely in practice, that a single forecast could be issued for the entire Maritimes. It is improbable because even a 1°F difference would require a second forecast and there are almost certain to be a great many differences between coastal Nova Scotia and interior New Brunswick.

In this example, the forecaster has prepared a forecast containing 12 divisions, two of which are recorded in Box B and hence not seen. Area boundaries are completely ignored and also the last four columns are left blank because no rain is expected. The forecast is for 1.00 PM Tuesday afternoon, the time at which the "noon readings" will be taken. The temperature is not the maximum expected for the day which may be higher by 5°F or more and, if desired, can be obtained from the regular public weather forecast broadcasts.

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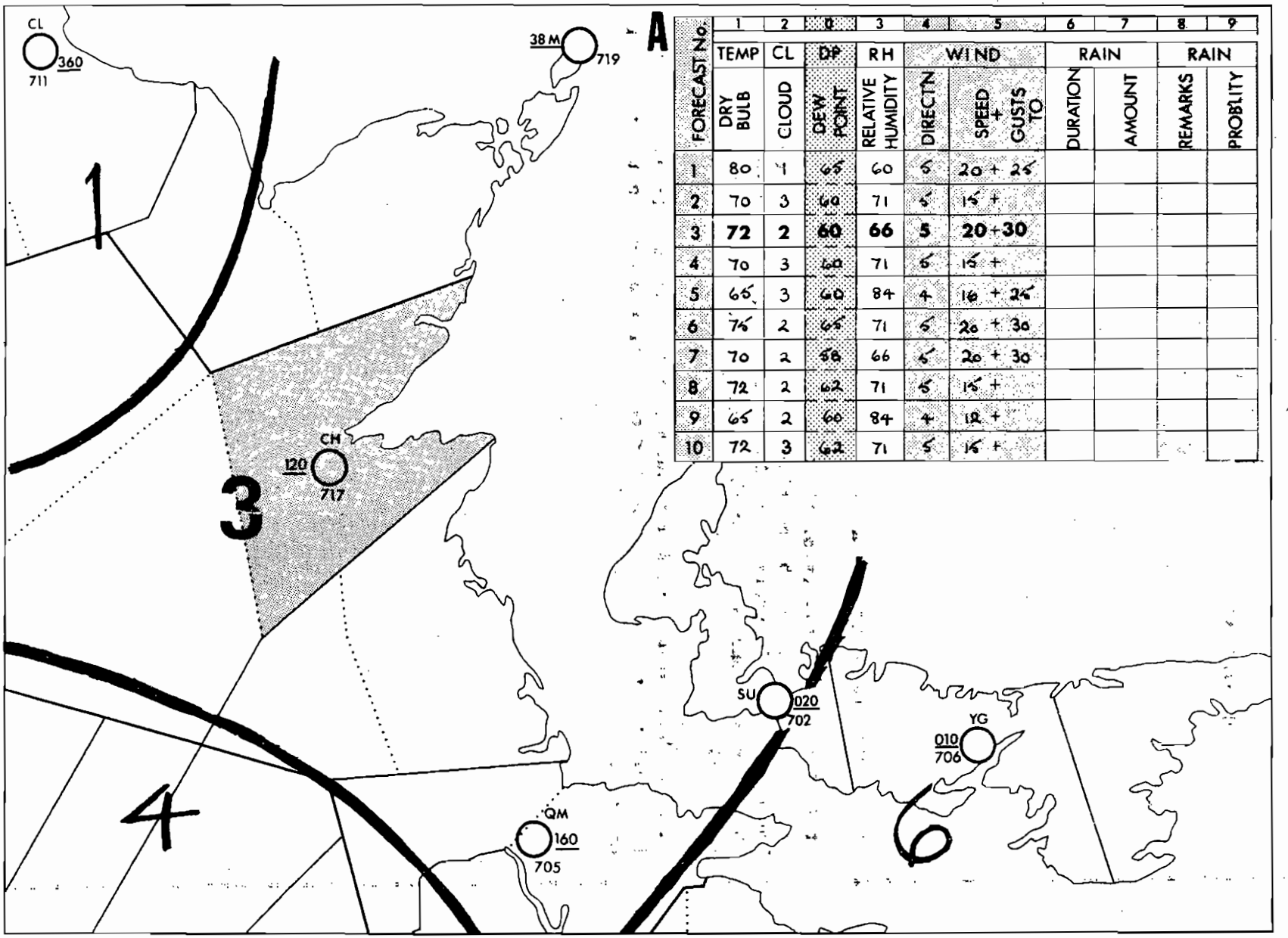
[12] Only a small portion of the map is presented here and without the topographic features shown. On the actual map, a second box of 10 forecast numbers (from 11 to 20) is also printed.



FORECAST No.	1 TEMP DRY BULB	2 CL CLOUD	3 DP DEW POINT	3 RH RELATIVE HUMIDITY	4 WIND DIRECTN	5 WIND SPEED + GUSTS TO	6 RAIN DURATION	7 RAIN AMOUNT	8 RAIN REMARKS	9 RAIN PROBLITY
1	80	1	65	60	5	20 + 25				
2	70	3	60	71	5	15 +				
3	**72**	**2**	**60**	**66**	**5**	**20+30**				
4	70	3	60	71	5	15 +				
5	65	3	60	84	4	10 + 20				
6	74	2	65	71	5	20 + 30				
7	70	2	66	66	5	20 + 30				
8	72	2	62	71	5	15 +				
9	65	2	60	84	4	10 +				
10	72	3	62	71	5	15 +				

Figure 14. Fire Weather Forecast Prepared by the Forecaster at the Regional Weather Office on 3 June (Step 3.1).

3. PREPARING THE FORECAST

3.2 Determining Forecast Boundaries

It is the responsibility of fire weather personnel, not the forecaster, to adjust the forecast boundaries to correspond to the nearest area boundaries. While there is no doubt that area 12 lies in forecast 3, there can be a choice made with respect to the area to the northwest (area 37).

Once the boundaries are drawn and numbered, they are transferred to the smaller maps to make it easier to enter the data in the vertical columns.

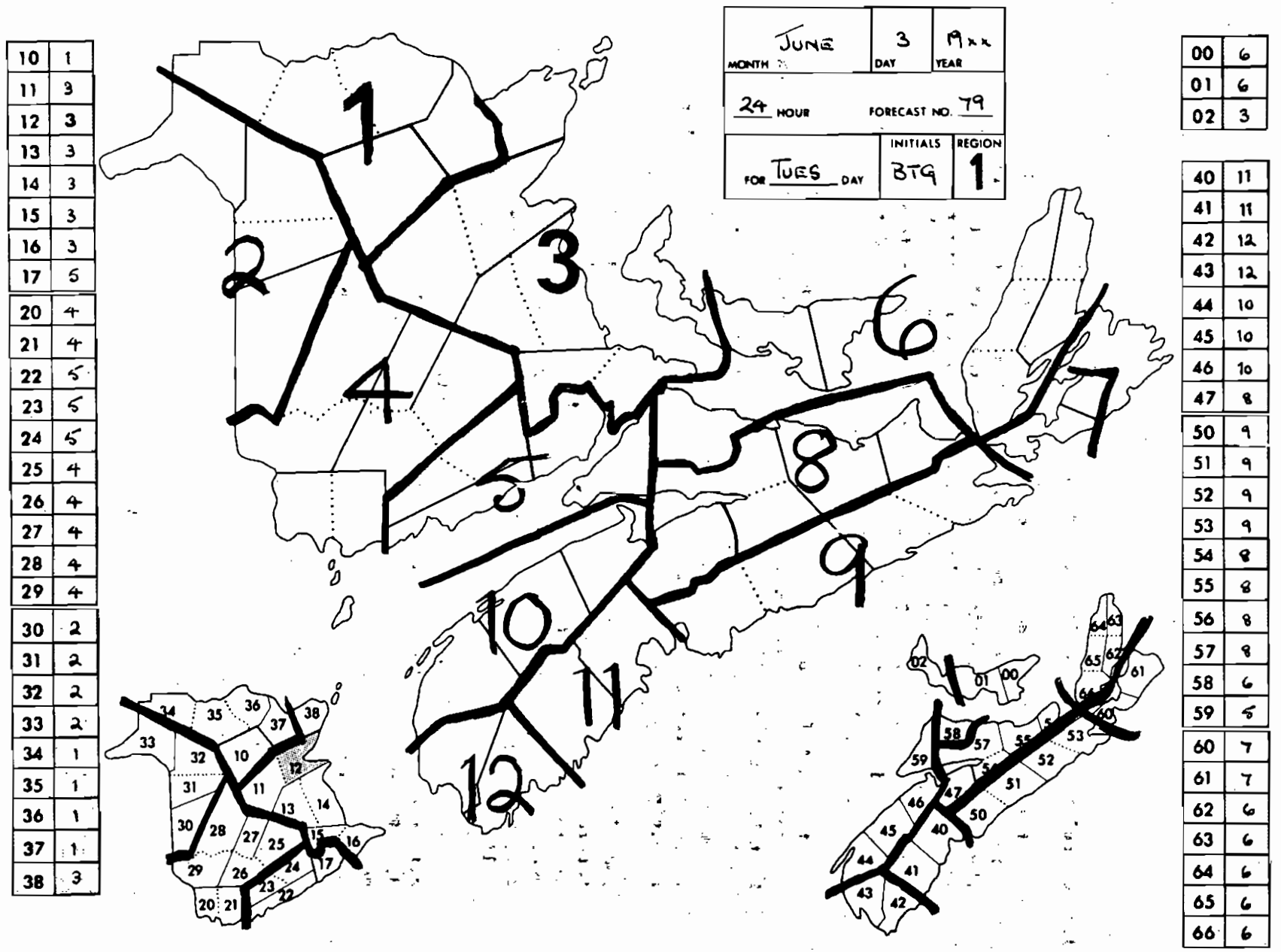


Figure 15. Forecast Boundaries Determined at the Regional Fire Weather Central on 3 June (Step 3.2).

3. PREPARING THE FORECAST

3.3 Calculating the Fire Danger Forecast

The forecast numbers determined in step 3.2 are transferred to form #41 and the corresponding forecast is entered to the right of these numbers. Dew point is not found on this form; it was only included on the forecaster's map to aid in determining relative humidity. The weather forecast is recorded only when the forecast number first appears. Thus the weather forecast for forecast number 3 is written opposite area 11 but it is assumed to apply to areas 12, 13, 14, 15, 16, and 38 as well.

The forecast fire danger is now determined from the weather parameters (step 3.1) and the area averages (step 2.3). For instance, East Northumberland's forecast fire danger of 8/12 is obtained by applying a humidity of 65% and a wind speed of 20 mph to today's calculated fire danger of 7/13. The predicted high humidity is responsible for the fire danger dropping to very high rather than remaining at extreme.

Today's area averaged danger indices (col. S) are of considerable interest because they provide the Forest Service with the overall provincial fire situation at a glance. Moreover, since these averages are based on the authentic station data plotted in step 2.2, they represent actual conditions and are not dependent on the validity of the weather forecast.

Remarks call for rain throughout the Province starting late Tuesday afternoon or early evening. If the rain had been expected before 3.00 PM, part of it would have been included in the forecast and, depending upon the amount, the danger indices would have been lowered one or more units.[13] With the rain expected to hold off till later in the day, the danger should be moderate to very high on Tuesday throughout all of New Brunswick.

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[13] See the reverse side of the Daily Forecast (#41) in Appendix I for more details.

DAILY FIRE WEATHER FORECAST (# 41)

MONTH	DAY	YEAR		PROVINCE	INITIALS	REGION
JUNE	3	19xx	24 HOUR FORECAST NO. 79	NEW BRUNSWICK	BTG	1

AREA CODE	5 TODAY'S DANGER	TUES DAY FORECAST FOR	A FORECASTED DROUGHT	B FORECASTED DANGER	C FORECASTED DANGER CLASS	FORECAST NO.	1 TEMP DRY BULB	2 CL CLOUD	3 RH RELATIVE HUMIDITY	4 WIND DIRECTION	5 WIND SPEED + GUSTS TO	6 RAIN DURATION	7 RAIN AMOUNT	8 RAIN REMARKS	9 RAIN PROB'LITY
1	EASTERN N.B. COUNTIES														
10	8	N. NORTHUM'LAND	4	10	H	1	80	1	60	S	20 + 25				
11	10	S. NORTHUM'LAND	6	10	H	3	72	2	66	S	20 + 30				
12	13	E. NORTHUM'LAND	8	12	VH	3					+				
13	9	WEST KENT	5	10	H	3					+				
14	8	EAST KENT	5	10		3					+				
15	8	W. WESTMORLAND	4	10	H	3					+				
16	8	E. WESTMORLAND	4	10		3					+				
17	8	ALBERT	5	7	M	5	65	3	84	4	16 + 25				
2	LOWER ST. JOHN RIVER VALLEY														
20	10	WEST CHARLOTTE	7	11	VH	4	70	3	71	S	15 +				
21	10	EAST CHARLOTTE	7	11		4					+				
22	10	ST. JOHN	8	8	M	5					+				
23	9	WEST KINGS	7	8	M	5					+				
24	10	EAST KINGS	6	7		5					+				
25	9	NORTH QUEENS	4	9	H	4					+				
26	11	SOUTH QUEENS SUNBURY	7	11	VH	4					+				
27	9	NORTH SUNBURY	3	8	M	4					+				
28	9	NORTH YORK	4	9	H	4					+				
29	9	SOUTH YORK	6	9		4					+				
3	UPPER ST. JOHN RIVER AND BAY OF CHALEUR														
30	11	CARLETON	7	11	VH	2	70	3	71	S	15 +				
31	9	SOUTH VICTORIA	6	9	H	2					+				
32	8	NORTH VICTORIA	4	9		2					+				
33	10	MADAWASKA	5	10	H	2					+				
34	9	WEST RESTIGOUCHE	4	10	H	1					+				
35	8	CENT. RESTIGOUCHE	3	9		1					+				
36	8	EAST RESTIGOUCHE	3	9		1					+				
37	8	WEST GLOUCESTER	3	9	H	1					+				
38	9	EAST GLOUCESTER	3	9		3					+				

GENERAL REMARKS: GENERAL RAIN EXPECTED THROUGHOUT N.B. BUT NOT UNTIL LATE TUESDAY AFTERNOON OR EARLY EVENING.

DANGER CLASS: LOW (1-4) MODERATE (5-8) HIGH (9-10) VERY HIGH (11-12) EXTREME (13-16)

F-2201 (12/69)

Figure 16. Fire Danger Forecast Calculated at the Regional Fire Weather Central on 3 June (Step 3.3).

4. ISSUING THE FORECAST

4.1 Transmitting to the Forest Service

The message from the Fire Weather Central is easy to decipher and, once received at the Fredericton provincial headquarters, it is again recorded on form #41 before being telephoned to the seven district offices. The forecast danger class (col. C) is deliberately left off the message because it can be readily determined from the code at the bottom of the form. Moreover, a zero is always placed in front of a single number if two digits are possible. For example, the forecast drought index (col. A) for East Northumberland is typed as 08 and not simply as 8.

Messages from the provincial headquarters to the forest districts are selective. This means that Fredericton only transmits the forecasts for areas 10 through 14 to the Newcastle district office.

```
N.B. FOR. SERV., FTON.
FIRE WX. CENTRAL, HFX.

24 HR. FCST. NO. 79 FOR N.B.
FOR TUESDAY, JUNE 4, 19xx.


1008  0410  01  80160  520+25
1110  0610  03  72266  520+30
1213  0812  03
1309  0510  03
1408  0510  03
1508  0410  03
1608  0410  03
1708  0507  05  65384  416+25

2010  0711  04  70371  515
2110  0711  04
2210  0808  05
2309  0708  05
2410  0607  05
2509  0409  04
2611  0711  04
2709  0308  04
2809  0409  04
2909  0609  04

3011  0711  02  70371  515
3109  0609  02
3208  0409  02
3310  0510  02
3409  0410  01
3508  0309  01
3608  0309  01
3708  0309  01
3809  0309  03

GENERAL RAIN EXPECTED THROUGHT N.B.
BUT NOT UNTIL LATE TUESDAY AFTERNOON
OR EARLY EVENING.


BTG   JUNE 3, 19xx  (1520 ADT)
```

Figure 17. Fire Weather Forecast Transmitted to the New Brunswick Provincial Headquarters on 3 June (Step 4.1).

4. ISSUING THE FORECAST

4.2 Transmitting to the News Media

The message to the news media, sent via the Canadian Press, must meet a 4.30 PM deadline. This causes no difficulty unless there is line transmission trouble or if scattered shower activity has drastically slowed down the calculating of the area averages. On a fine day with no complications, such as experienced in this example., the message is usually sent before 4.00 PM. Unlike the one to the Forest Service, this message is not coded. All areas with a given zone are grouped together in descending order of forecast fire danger. This is the reason for listing East Northumberland first under the Eastern N.B. Counties (zone 1); it is the only area with very high danger.

It is the responsibility of the Canadian Press to make certain that the message is relayed to all newspapers, and radio and television stations serving the Maritime Provinces. The Canadian Press message is sufficient for most stations although a television station in Saint John requests the Forest Service message in order to show the actual danger indices for all parts of New Brunswick and the Annapolis Valley of Nova Scotia. With the aid of flashing lights, large fires are also located on the map. The program is carried as a public service during the early dinner hour, six evenings each week. Transmitting today's danger also helps to explain the presence of fires burning today when tomorrow's forecast might be calling for rain and moderating fire danger.

CANADIAN PRESS, HFX.
FIRE WX. CENTRAL, HFX.

FOREST FIRE INDEX NO. 79.

HFX: HERE IS THE FOREST FIRE DANGER FORECAST FOR TOMORROW (TUESDAY).

NOVA SCOTIA:
SOUTH SHORE AND VALLEY
SHELBURNE, DIGBY, ANNAPOLIS AND KINGS HIGH.
ALL OTHER AREAS MODERATE.

NORTHERN N.S. AND EASTERN SHORE
E. CUMBERLAND HIGH.
ALL OTHER AREAS MODERATE.

CAPE BRETON ISLAND
RICHMOND AND CAPE BRETON VERY HIGH.
VICTORIA AND INVERNESS HIGH.

PRINCE EDWARD ISLAND:
ALL AREAS VERY HIGH.

NEW BRUNSWICK:
EASTERN N.B. COUNTIES
EAST NORTHUMBERLAND VERY HIGH.
NORTH AND SOUTH NORTHUMBERLAND, KENT AND WESTMORLAND HIGH.
ALBERT MODERATE.

LOWER ST. JOHN RIVER VALLEY
CHARLOTTE, SOUTH QUEENS AND SOUTH SUNBURY VERY HIGH.
NORTH QUEENS AND YORK HIGH.
ST. JOHN, KINGS AND NORTH SUNBURY MODERATE.

UPPER ST. JOHN RIVER AND BAY OF CHALEUR
CARLETON VERY HIGH.
ALL OTHER AREAS HIGH.

BTG JUNE 3, 19xx (1545 ADT)

Figure 18. Fire Danger Forecast Transmitted to the Canadian Press on 3 June (Step 4.2).

THE 12-HOUR FORECAST

Issued

Wednesday Morning, 5 June

5. PREPARING THE FORECAST

5.1 Recording 12-Hour Precipitation

The forecaster begins his morning forecast by 6.00 AM but, before doing so, he is provided with synoptic station precipation for the past 12 hours. It is entered on his forecast map (step 5.2) by the fire weather personnel. The two 6-hour intervals covering the period 3.00 PM (18Z) yesterday to 3.00 AM (06Z) today make up half of the 24-hour rain period for which the forecast is applicable. This represents only a small sample of the actual reporting stations but the morning data from the field and climatological stations will not be available for another 3 to 4 hours (step 7.3). There is bound to be quite a bit of variation when scattered shower activity occurs and this is reflected in the fact that Chatham (#120) received 0.12 inch while Moncton (#160), 72 miles to the south, had a heavy shower of 0.50 inch and Charlo (#360), 78 miles to the north, had only a trace of rain. Even so, synoptic rain data provide a starting point and are one reason why the 12-hour forecast is more correct, statistically, than the 24-hour forecast.

When the Chatham data are interpreted, it is seen that at 9.00 PM (00Z) Tuesday evening, only haze (05) was reported.[14] Six hours later, the message read light rain showers (80). These had been falling for 4 to 5 hours and were still continuing. This rain information is recorded on the reverse side of the Daily Summary form (#30).

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[14] These numbers are from the World Meteorological Organization code for "Present Weather" and are used because they are familiar to the forecaster.

MONTH	DAY	YEAR	PARAMETER		INITIALS	REGION
JUNE	5	19xx	PRECIPITATION	SYNOPTIC STATIONS	BTG	1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	EVENING				NIGHT			MORNING				AFTERNOON				
IDENTIFIER	PRESENT WEATHER	6 HOUR (7RR – –)	BEG./END.	24 HOUR (2 RRRR)	PRESENT WEATHER	6 HOUR (7RR – –)	BEG./END.	PRESENT WEATHER	6 HOUR (7RR – –)	BEG./END.	24 HOUR (2 RRRR)	PRESENT WEATHER	6 HOUR (7RR – –)	BEG./END.	24 HOUR (2+6+9+13)	STATION NO.
	00Z				06Z			12Z				18Z				
395	51	T	2		80	T	7									500
610				.01	80	.02	2									QUE
711	51	T	1		80	T	4									360
717	**05**				**80**	**.12**	**5**									**120**
700	80	T	2		80	.11	7									260
609	51	T	8		51	.11	8									220
705	05				25	.50	3									160
702	05				29	.31	2									020
706	05				80	.05	1									010
398	02				80	T	1									560
397	05				03	.05	2									460
603					80	.14	1									430
601	51	T	M		51	T	2									509
710		M				M										530
707					02											610
712					80	.14	5									310
HUL					80	.02	4									300
719					80	21	5									38M
604					80	.18	1									53C
602					80	.44	1									41W

TIME PRECIPITATION BEGAN/ENDED (7 – – R_t –)

1 – LESS THAN 1 HOUR AGO	4 – 3 TO 4 HOURS AGO	7 – 6 TO 12 HOURS AGO
2 – 1 TO 2 HOURS AGO	5 – 4 TO 5 HOURS AGO	8 – MORE THAN 12 HOURS AGO
3 – 2 TO 3 HOURS AGO	6 – 5 TO 6 HOURS AGO	9 – UNKNOWN

Figure 19. Synoptic Station 12-Hour Precipitation Recorded at the Regional Fire Weather Central on 5 June (Step 5.1).

5. PREPARING THE FORECAST

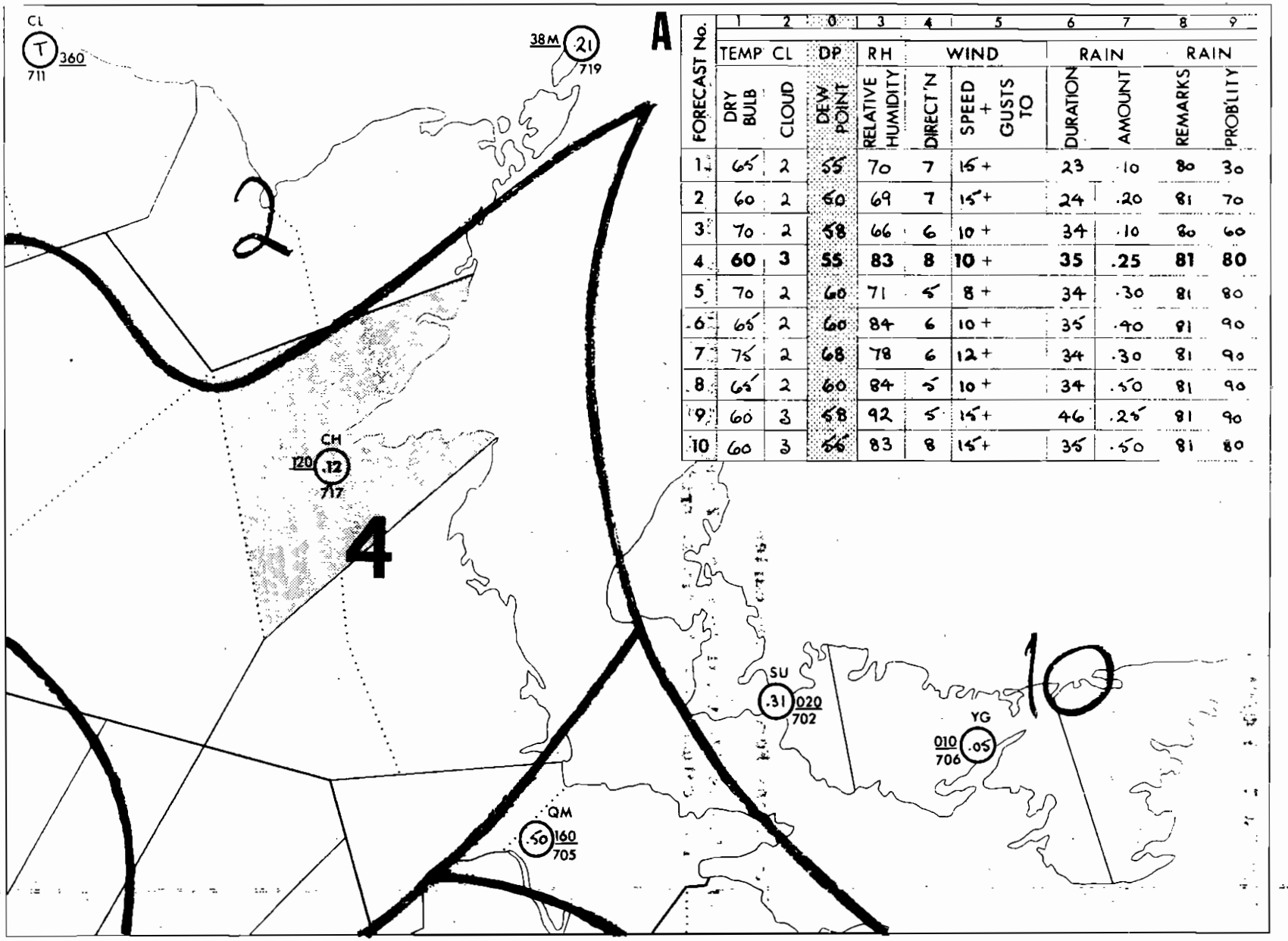
5.2 Preparing the Weather Forecast by the Forecaster

This step is the same as step 3.1 although rain was not included in the earlier forecast. The forecaster knows that rain began Tuesday evening in western New Brunswick and he forecasts that it should start Wednesday morning in Cape Breton.[15]

The 12-hour rain amounts, ending at 3.00 AM (06Z) and discussed in step 5.1, are recorded in the appropriate synoptic station circles by fire weather personnel. Besides the fire weather station number, the meteorological identifying code letters and numbers are printed on the map because only they have special significance to the forecaster.

---

[15] An explanation of rain amounts and duration is found on the back of the Daily Forecast form (#41).



FORECAST No.	1 TEMP DRY BULB	2 CL CLOUD	0 DP DEW POINT	3 RH RELATIVE HUMIDITY	4 WIND DIRECT'N	5 WIND SPEED + GUSTS TO	6 RAIN DURATION	7 RAIN AMOUNT	8 REMARKS	9 RAIN PROBLITY
1	65	2	55	70	7	15 +	23	.10	80	30
2	60	2	60	69	7	15 +	24	.20	81	70
3	70	2	58	66	6	10 +	34	.10	80	60
4	60	3	55	83	8	10 +	35	.25	81	80
5	70	2	60	71	5	8 +	34	.30	81	80
6	65	2	60	84	6	10 +	35	.90	81	90
7	75	2	68	78	6	12 +	34	.30	81	90
8	65	2	60	84	5	10 +	34	.50	81	90
9	60	3	58	92	5	15 +	46	.25	81	90
10	60	3	56	83	8	15 +	35	.50	81	80

Figure 20. Fire Weather Forecast Prepared by the Forecaster at the Regional Weather Office on 5 June (Step 5.2).

5. PREPARING THE FORECAST

5.3 Determining Forecast Boundaries

Step 5.3 is identical to step 3.2 and, once again, the numbers in the vertical columns will be transferred to form #41.

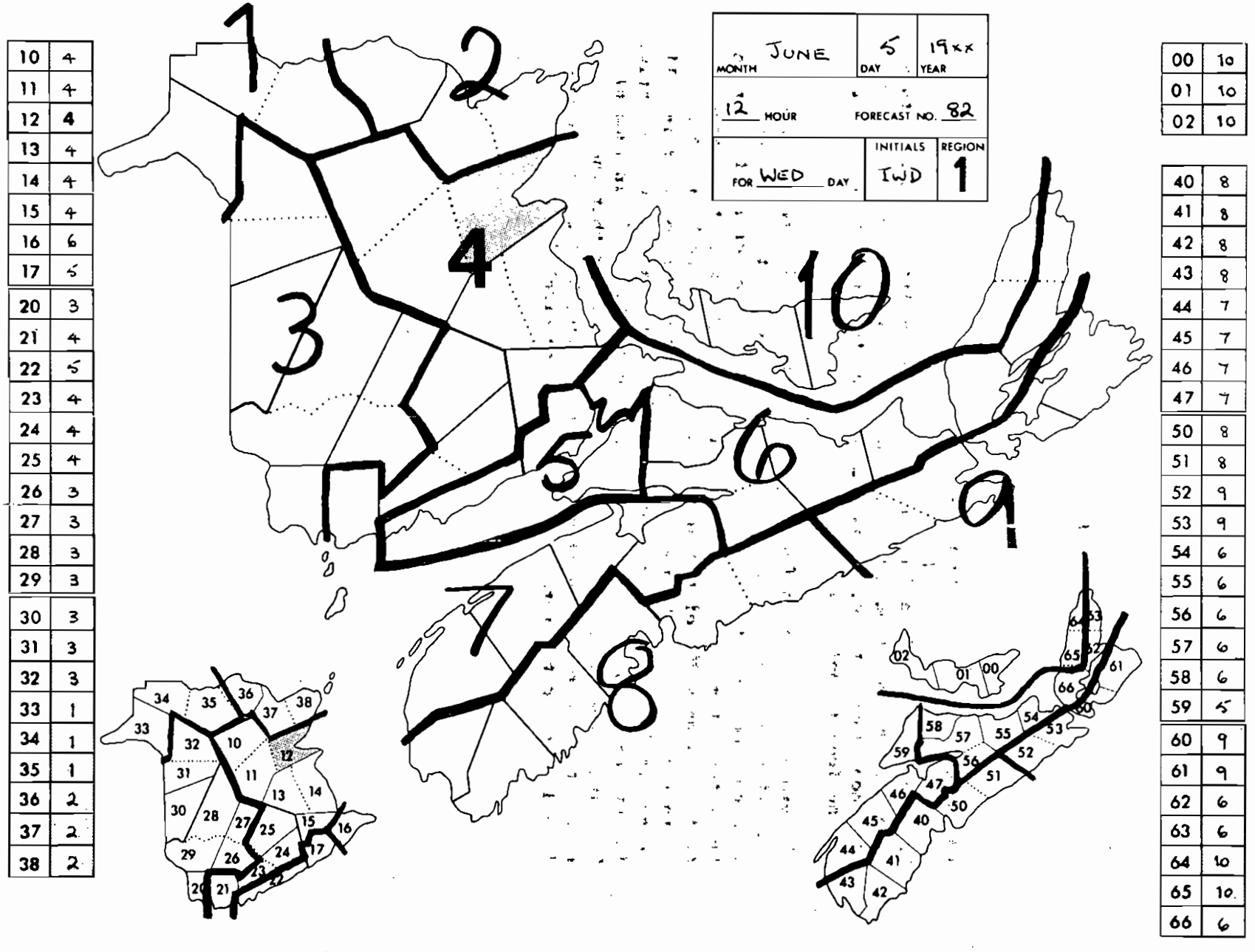


Figure 21. Forecast Boundaries Determined at the Regional Fire Weather Central on 5 June (Step 5.3).

5. PREPARING THE FORECAST

5.4 Calculating the Fire Danger Forecast

The figures for column S never appear on a morning forecast -- they have already been transmitted to the Forest Service in the Tuesday afternoon forecast and, because they refer to a past situation, they are no longer applicable.

The probability of rain for the three northwesterly areas of New Brunswick is only 30% compared to 60% or more for the other areas. This does not mean that there is only a 30% chance of receiving rain but rather it means that, although rain is forecast, it is expected to fall on only 30% of the area. This is considered by the fire weather personnel to be too small a percentage to give the rain full weight in determining the fire danger for these areas. Consequently, in this case, half the forecast rain is used (i.e. 0.05 instead of 0.10 inch) for areas 33, 34, and 35. As a reminder that the calculations were <u>not</u> based on forecast values, both the calculated fire danger and the forecast rain amount are circled.

DAILY FIRE WEATHER FORECAST (# 41)

MONTH: JUNE | DAY: 5 | YEAR: 19xx | 12 HOUR FORECAST NO. 82 | PROVINCE: NEW BRUNSWICK | INITIALS: IWD | REGION: 1

WED DAY — FORECAST FOR

AREA CODE	S TODAY'S DANGER		A FORECASTED DROUGHT	B FORECASTED DANGER	C FORECASTED DANGER CLASS	FORECAST NO.	1 TEMP DRY BULB	2 CL CLOUD	3 RH RELATIVE HUMIDITY	4 WIND DIRECTION	5 WIND SPEED + GUSTS TO	6 RAIN DURATION	7 RAIN AMOUNT	8 RAIN REMARKS	9 RAIN PROB'LITY
1	EASTERN N.B. COUNTIES														
10		N. NORTHUM'LAND	0	1	L	4	60	3	83	8	10 +	35	025	81	80
11		S. NORTHUM'LAND	0	1		4					+				
12		E. NORTHUM'LAND	1	1		4					+				
13		WEST KENT	0	1	L	4					+				
14		EAST KENT	0	1		4					+				
15		W. WESTMORLAND	0	1	L	4					+				
16		E. WESTMORLAND	0	1		6	65	2	84	6	10 +	35	040	81	90
17		ALBERT	0	1	L	5	70	2	71	5	08 +	34	030	81	80
2	LOWER ST. JOHN RIVER VALLEY														
20		WEST CHARLOTTE	7	6	M	3	70	2	66	6	10 +	34	010	80	60
21		EAST CHARLOTTE	0	1	L	4					+				
22		ST. JOHN	1	1	L	5					+				
23		WEST KINGS	0	1	L	4					+				
24		EAST KINGS	0	1		4					+				
25		NORTH QUEENS	0	1	L	4					+				
26		SOUTH QUEENS SUNBURY	7	6	M	3					+				
27		NORTH SUNBURY	3	4	L	3					+				
28		NORTH YORK	4	5	M	3					+				
29		SOUTH YORK	6	5		3					+				
3	UPPER ST. JOHN RIVER AND BAY OF CHALEUR														
30		CARLETON	7	6	M	3					+				
31		SOUTH VICTORIA	6	5	M	3					+				
32		NORTH VICTORIA	4	5		3					+				
33		MADAWASKA	(6)	(5)	M	1	65	2	70	7	15 +	23	(010)	80	30
34		WEST RESTIGOUCHE	(5)	(5)	M	1					+				
35		CENT. RESTIGOUCHE	(4)	(5)	M	1					+				
36		EAST RESTIGOUCHE	0	3	L	2	60	2	69	7	15 +	24	020	81	70
37		WEST GLOUCESTER	0	3	L	2					+				
38		EAST GLOUCESTER	0	3		2					+				

GENERAL REMARKS

DANGER CLASS: LOW (1-4) MODERATE (5-8) HIGH (9-10) VERY HIGH (11-12) EXTREME (13-16)

F-2201 (12/69)

Figure 22. Fire Danger Forecast Calculated at the Regional Fire Weather Central on 5 June (Step 5.4).

6. ISSUING THE FORECAST

6.1 Transmitting to the News Media

As soon as the fire danger has been worked out, a message is sent to the Canadian Press for relay to all regional newspapers, and television and radio stations. Of the three, radio is by far the most effective medium for disseminating the fire danger warnings in the morning. Very often there is no change from the previous afternoon's message but, even so, a new one is always prepared because radio stations do not make a practice of retaining old copy.

With low fire danger forecast for all Nova Scotia, it is unnecessary to divide the Province into its three zones and, in fact, it is even combined with Prince Edward Island in the message. Since there are two classes of predicted fire danger for New Brunswick, the three-zone distinction is maintained.

CANADIAN PRESS, HFX.
FIRE WX. CENTRAL, HFX.

FOREST FIRE INDEX NO. 82.

HFX: HERE IS THE FOREST FIRE DANGER FORECAST
FOR TODAY (WEDNESDAY).

NOVA SCOTIA AND PRINCE EDWARD ISLAND:
ALL AREAS LOW.

NEW BRUNSWICK:
EASTERN N.B. COUNTIES
ALL AREAS LOW.

LOWER ST. JOHN RIVER VALLEY
WEST CHARLOTTE, SOUTH QUEENS, SOUTH SUNBURY
AND YORK MODERATE.
ALL OTHER AREAS LOW.

UPPER ST. JOHN RIVER AND BAY OF CHALEUR
CARLETON, VICTORIA, MADAWASKA, WEST AND
CENTRAL RESTIGOUCHE MODERATE.
EAST RESTIGOUCHE AND GLOUCESTER LOW.

IWD JUNE 5, 19xx (0645 ADT)

Figure 23. Fire Danger Forecast Transmitted to the Canadian Press on 5 June (Step 6.1).

6. ISSUING THE FORECAST

6.2 Transmitting to the Forest Service

As explained in step 5.4, column S is not transmitted in the morning but otherwise the format is identical to that of the afternoon message. However, unlike the 24-hour forecast that was issued Monday afternoon, the Wednesday morning forecast contains rain.

It might be mentioned that the order in which the messages are sent to the Forest Service and Canadian Press is reversed in the morning from that of the afternoon. The objective in the afternoon is to get the message to the Forest Service as quickly as possible. In the morning, it is more urgent to reach the news media because it is hoped the message will be available for the 7.00 AM news broadcasts.

N.B. FOR. SERV., FTON.
FIRE WX. CENTRAL, HFX.

12 HR. FCST. NO. 82 FOR N.B.
FOR WEDNESDAY, JUNE 5, 19xx.

10	0001	04	60383	810	35025	8180
11	0001	04				
12	0101	04				
13	0001	04				
14	0001	04				
15	0001	04				
16	0001	06	65284	610	35040	8190
17	0001	05	70271	508	34030	8180
20	0706	03	70266	610	34010	8060
21	0001	04				
22	0101	05				
23	0001	04				
24	0001	04				
25	0001	04				
26	0706	03				
27	0304	03				
28	0405	03				
29	0605	03				
30	0706	03				
31	0605	03				
32	0405	03				
33	0605	01	65270	715	23010	8030
34	0505	01				
35	0405	01				
36	0003	02	60269	715	24020	8170
37	0003	02				
38	0003	02				

IWD JUNE 5, 19xx (0715 ADT)

Figure 24. Fire Weather Forecast Transmitted to the New Brunswick Provincial Headquarters on 5 June (Step 6.2).

7. OBTAINING THE DATA

7.1 Recording at the Field Station

Yesterday's maximum since 1.00 PM and the overnight minimum temperatures are recorded at 9.00 AM at the field stations. The morning observations are obtained chiefly for the forecaster but if rain is also included they are quite as important to fire weather personnel.

Most climatological station observers also record maximum and minimum temperatures and 24-hour rain at 9.00 AM. Normally their data are only sent to the Meteorological Branch in Toronto at the end of each month for inclusion in long-term climatological records. Where arrangements have been made with the individual observers and the Meteorological Branch, the rain data that reach the Fire Weather Central are helpful in determining the actual fire danger.

MONTHLY FIRE WEATHER SUMMARY (#10)

MONTH	YEAR	STATION NAME	NO.	0900 MORNING	1300 AFTERNOON	TIME	INITIALS	REGION
JUNE	19xx	ASHTON HILL T.	128			☐ STANDARD ☑ DAYLIGHT	WM.	1

QUICK REFERENCE

DETAILS ON REVERSE SIDE

RAIN

X – NO RAIN
T – TRACE

WEATHER

1 – HAZE
2 – RAIN*
3 – LIGHTNING
4 – FOG
5 – DRIZZLE
6 – RAIN
7 – SNOW
8 – SHOWERS
9 – TH'STORM
0 – FAIR

*(not at station)

CLOUD

0 – CLEAR
1 – SCATTERED
2 – BROKEN
3 – OVERCAST
4 – OBSCURED

DIRECTION

1 – NE
2 – EAST
3 – SE
4 – SOUTH
5 – SW
6 – WEST
7 – NW
8 – NORTH
0 – CALM

1	2	3		A	B	4	5	6	7	8	9	10	11	12
MORNING				AFTERNOON										
TEMP		RAIN		INDEX		TEMP		RH	WX	CL	WIND		RAIN	RAIN
MAXIMUM	MINIMUM	24 HOUR	DATE	DROUGHT	DANGER	DRY BULB	WET BULB	RELATIVE HUMIDITY	WEATHER	CLOUD	DIRECTION	SPEED	24 HOUR (COL. 3 + 12)	4 HOUR
			30/31	3	9									
79	53	.02	1	4	5	68	59	59	5	10	8	6	.03	.01
75	49	.04	2	5	8	78	62	40	0	2	7	16	.04	X
81	50	X	3	6	12	82	62	31	0	6	5	13	X	X
86	48	X	4	7	12	72	63	61	0	7	5	18	X	X
78	59	.19	5											
			6											
			7											
			8											
			9											
			10											
			11											
			12											
			13											
			14											
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			28											
			29											
			30											
			31											

SHADED COLUMNS MUST BE CALCULATED

F-2204 (12/69)

Figure 25. Fire Weather Observations Recorded at the Ashton Hill Field Station on 5 June (Step 7.1).

7. OBTAINING THE DATA

7.2 Transmitting to the District Office

The morning observations from the field are received initially by the seven district offices and then transmitted to the provincial headquarters in Fredericton. Only the first of these two steps is illustrated.

The 24-hour rain, ending at 9.00 AM, can be determined directly on the form if yesterday's 1.00 PM readings are transferred from column 12 to today's column 12Y. (In this example, there is no rain to transfer.) It is easier to transfer the rain values from yesterday's form if the district stations are listed in ascending numerical order.

DAILY FIRE WEATHER SUMMARY (#20)

MONTH	DAY	YEAR	LOCATION		INITIALS	REGION
JUNE	5	19xx	NEWCASTLE (#2)	FIELD STATIONS	AMS	1

12Y	X		1	2	3		A	B	4	5	6	7	8	9	10	11	12
			MORNING				AFTERNOON										
RAIN	RAIN		TEMP		RAIN		INDEX		TEMP		RH	WX	CL	WIND		RAIN	RAIN
FROM COL. 12 YESTERDAY	24 HOUR (COL. 12Y + 3)		MAXIMUM	MINIMUM	20 HOUR	STATION NO.	DROUGHT	DANGER	DRY BULB	WET BULB	RELATIVE HUMIDITY	WEATHER	CLOUD	DIRECTION	SPEED	24 HOUR (COL. 3 + 12)	4 HOUR
		1	77	58	.39	108											
		2	79	61	.09	111											
		3	76	62	.11	115											
		4	75	60	.16	116											
		5	82	56	.07	117											
		6	80	60	.05	118											
		7	82	62	.15	121											
		8	80	62	.18	122											
		9	81	64	.25	127											
		10	78	59	.19	128											
		11	80	61	.14	141											
		12	80	62	.13	147											
		13															
		14															
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		32															

F-2205 (12/69)

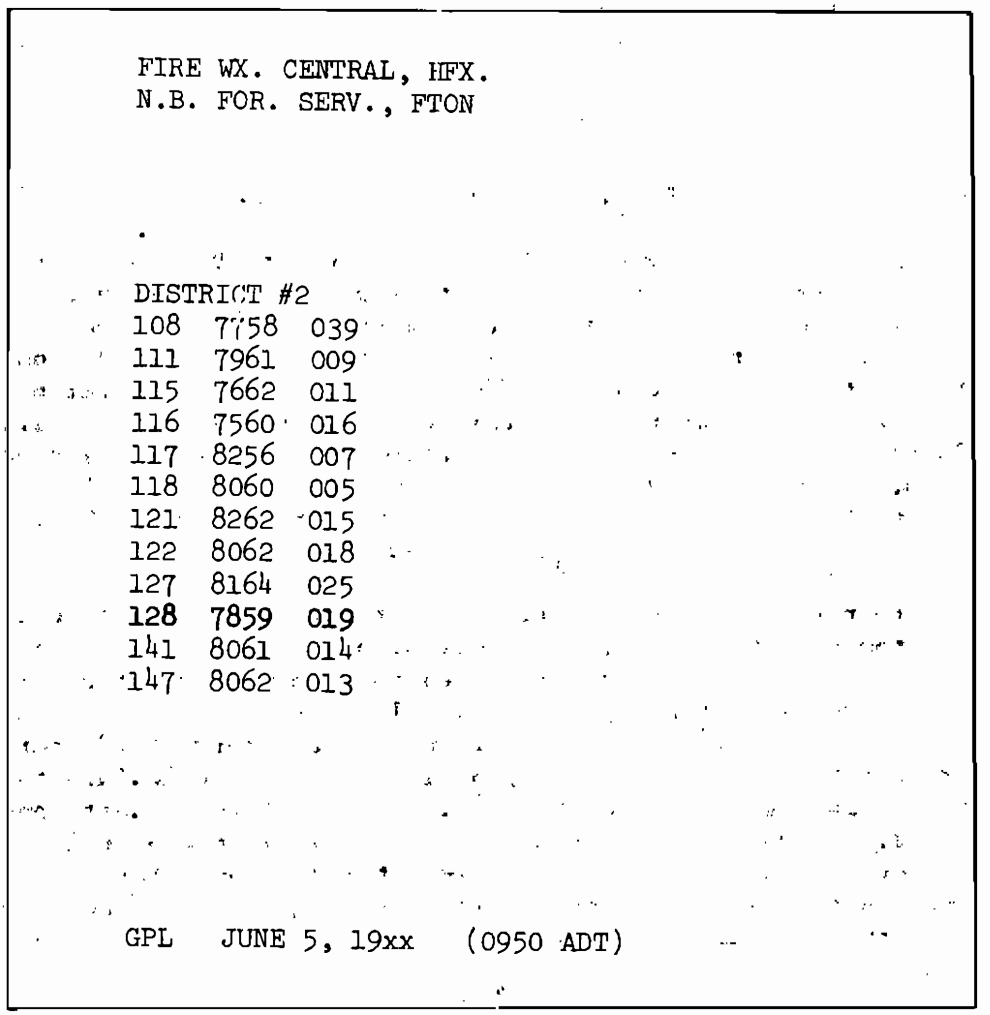
Figure 26. Field Station Observations Transmitted to the New Brunswick #2 District Office on 5 June (Step 7.2).

7. OBTAINING THE DATA

7.3 Transmitting from the Provincial Headquarters

The message from the Forest Service follows the example shown under "Teletype Instructions" at the end of the Daily Summary form (#20) (see Appendix I). For speed in typing, a zero replaces the decimal point in column 3 when the rain is under 1 inch.

These observations are usually received by the Fire Weather Central in less than 1 hour and, if there is no rain involved, handed over immediately to weather office technicians for plotting. If rain has occurred in the 4-hour interval between 9.00 AM and 1.00 PM yesterday, it must be added because the forecaster is mainly interested in the 24-hour amount.



FIRE WX. CENTRAL, HFX.
N.B. FOR. SERV., FTON

DISTRICT #2

108	7758	039
111	7961	009
115	7662	011
116	7560	016
117	8256	007
118	8060	005
121	8262	015
122	8062	018
127	8164	025
128	**7859**	**019**
141	8061	014
147	8062	013

GPL JUNE 5, 19xx (0950 ADT)

Figure 27. Field Station Observations Transmitted to the Regional Fire Weather Central on 5 June (Step 7.3).

7. OBTAINING THE DATA

7.4 Recording 18-Hour Precipitation

In the Maritime Provinces, 12Z corresponds to 9.00 AM so that the 24-hour synoptic station precipitation can be determined as well as field and climatological station rainfall. The 12-hour precipitation to 3.00 AM (06Z) has already been recorded on the form (step 5.1) so that it is now just a matter of entering the most recent 6-hour rain and related data in columns 8 to 11. Chatham (#120) is currently experiencing light fog (10) since the rain, amounting to 0.10 inch, stopped 4 to 5 hours earlier. For the past 24 hours, this makes the total precipitation 0.22 inch, all of which fell since 9.00 PM Tuesday.

In order to determine the fire danger for synoptic stations, rain for the next 6-hour interval must also be known. The four 6-hour amounts will be added and recorded in column 15 and then transferred to column 11 on the front of a similar form (step 1.4). This means waiting until mid-afternoon but in fact the current 18-hour totals are entered in column 11 in pencil and used to calculate the fire danger in conjunction with the 1.00 PM relative humidity and wind speed. If more rain occurs by 3.00 PM (18Z), the penciled values are erased and the correct totals entered. Some stations, such as Moncton (#160), would not be affected by more rain since the 0.65 inch that has already fallen is more than enough to reduce the fire danger to low.

MONTH	DAY	YEAR	PARAMETER		INITIALS	REGION
JUNE	5	19XX	PRECIPITATION	SYNOPTIC STATIONS	BTG	1

IDENTIFIER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	STATION NO.
	EVENING				NIGHT			MORNING				AFTERNOON				
	PRESENT WEATHER	6 HOUR (7RR - -)	BEG./END.	24 HOUR (2 RRRR)	PRESENT WEATHER	6 HOUR (7RR - -)	BEG./END.	PRESENT WEATHER	6 HOUR (7RR - -)	BEG./END.	24 HOUR (2 RRRR)	PRESENT WEATHER	6 HOUR (7RR - -)	BEG./END.	24 HOUR (2+6+9+13)	
	00Z				06Z			12Z				18Z				
395	51	T	2		80	T	7	45	.50	1	.50					500
610				.01	80	.02	2	51	T	2	.03					QUE
711	51	T	1		80	T	4	51	.09	2	.09					360
717	05				80	.12	5	10	.10	4	.22					120
700	80	T	2		80	.11	7	03	.03	3	.14					260
609	51	T	8		51	.11	8	51	.17	3	.28					220
705	05				25	.50	3	03	.15	2	.65					160
702	05				29	.31	2	01	.32	1	.63					020
706	05				80	.05	1	61	.36	7	.41					010
398	02				80	T	1	25	.42	1	.42					560
397	05				03	.05	2	03	.31	4	.36					460
603					80	.14	1	25	.11	1	.25					430
601	51	T	M		51	T	2	25	.36	1	.35					509
710		M				M			M		.30					530
707					02			51	.01	1	.01					610
712					80	.14	5				.14					310
HUL					80	.02	4				.02					300
719					80	.21	5	10	.25	4	.46					38M
604					80	.18	1	51	T	1	.18					53C
602					80	.44	1	25	.08	1	.52					41W

TIME PRECIPITATION BEGAN/ENDED (7 - - R_t -)

1 - LESS THAN 1 HOUR AGO	4 - 3 TO 4 HOURS AGO	7 - 6 TO 12 HOURS AGO
2 - 1 TO 2 HOURS AGO	5 - 4 TO 5 HOURS AGO	8 - MORE THAN 12 HOURS AGO
3 - 2 TO 3 HOURS AGO	6 - 5 TO 6 HOURS AGO	9 - UNKNOWN

Figure 28. Synoptic Station 18-Hour Precipitation Recorded at the Regional Fire Weather Central on 5 June (Step 7.4).

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APPENDIX I

FORMS REQUIRED

in

FIRE WEATHER FORECASTING

APPENDIX I

FORMS REQUIRED IN FIRE WEATHER FORECASTING

Seven basic forms are used in fire weather forecasting in the Maritime Provinces. Some are used only by the Forest Services, some are used exclusively at the Fire Weather Central, and some by both organizations. Four of these forms are included in the example; they are to be found on the following pages of the appendix. The other three forms record: (a) special observations in the event of going fires (#50), (b) monthly calculated drought/danger indices for all areas (#61), and (c) daily rainfall for all stations (#71). All forms are printed on 8½ x 11 inch paper and four different color codes are employed (Table 6).

A number with the second digit, 0, indicates that the form may be used in regions of Canada other than the Atlantic Provinces. There is nothing - not even the time zone - printed on forms #10, 20, 30, or 50 to suggest the Atlantic Provinces.

The second digit, 1, indicates that the form is exclusive to the Atlantic Provinces. Form #41 is comprised of three sections - one for New Brunswick (zones 1-3), one for Nova Scotia (zones 4-6), and a combined section for Newfoundland (zones 7-9) and Prince Edward Island (zone 0). Only the New Brunswick section is included in the appendix but the others are identical except for changes in local area names and numbers.

Table 6. Forms used in fire weather forecasting in the Maritime Provinces

Form name	Form number	Color code	Used by[a]
Monthly Fire Weather Summary	10	Yellow	F.S.
Daily Fire Weather Summary	20	White	F.S.
Daily Fire Weather Summary	30	White	F.W.C.
Daily Fire Weather Forecast	41	Pink	F.W.C. - F.S.
Special Fire Weather Forecast	50	Pink	F.W.C. - F.S.
Monthly Fire Weather Record	61	Yellow	F.W.C.
Daily Fire Weather Record	71	Green	F.W.C.

[a] F.S. = Forest Services (and Industry), F.W.C. = Fire Weather Central.

Earlier versions of #20 and #30 contained station names and numbers and, consequently, were restricted to the region. This was a problem because stations frequently change (either new ones added or old ones abandoned) and it was difficult to keep abreast of the changes. This is no longer a problem with the new system; the numbers need only be entered just before recording the data.

Certain specifications were insisted upon in drafting these forms. Essentially they were that the forms be printed on 8½ x 11 inch paper and that the columns of the daily "headquarters" form (#20) be arranged in similar fashion to the columns on the monthly "station" form (#10). These specifications were not easy to meet, particularly as one also wanted to be sure that there was sufficient space to write legibly in the boxes.

Shading is used for emphasis in a number of ways. In the case of #10, it is employed to denote parameters that cannot be determined by direct observation. Shading in forms #20 and #41 is used to separate columns of figures that are to be typed in groups. On the front of form #30, only those columns that need to be typed for the computer are shaded; on the back, the shaded 6-hour precipitation amounts must be added.

Worked-out examples of the first four forms are to be found in the steps listed in Table 7.

Table 7. Forms illustrated in the example

Form name	Form number	Side	Step number	
Monthly Fire Weather Summary	10	Front	1.1	7.1
Daily Fire Weather Summary	20	Front	1.2	7.2
Daily Fire Weather Summary	30	Front	1.4	
Daily Fire Weather Summary	30	Back	5.1	7.4
Daily Fire Weather Forecast	41	Front	3.3	5.4

The only real difference between the front and back of form #20 is that the latter contains teletype instructions. The instructions on the reverse sides of #10 and #41 are not illustrated in the steps although #10 does have a "Quick Reference" guide on the front. Besides the instructions and an example, form #10 has space for recording "Special Observations". These observations are only taken if requested by the Fire Weather Central in the event of going fires. The back of #41 contains information on how to prepare and interpret the fire weather forecasts.

CANADIAN PRESS, HFX.
FIRE WX. CENTRAL, HFX.

FOREST FIRE INDEX NO. 82.

HFX: HERE IS THE FOREST FIRE DANGER FORECAST FOR TODAY (WEDNESDAY).

NOVA SCOTIA AND PRINCE EDWARD ISLAND:
ALL AREAS LOW.

NEW BRUNSWICK:
EASTERN N.B. COUNTIES
ALL AREAS LOW.

LOWER ST. JOHN RIVER VALLEY
WEST CHARLOTTE, SOUTH QUEENS, SOUTH SUNBURY AND YORK MODERATE.
ALL OTHER AREAS LOW.

UPPER ST. JOHN RIVER AND BAY OF CHALEUR
CARLETON, VICTORIA, MADAWASKA, WEST AND CENTRAL RESTIGOUCHE MODERATE.
EAST RESTIGOUCHE AND GLOUCESTER LOW.

IWD JUNE 5, 19xx (0645 ADT)

Figure 23. Fire Danger Forecast Transmitted to the Canadian Press on 5 June (Step 6.1).

6. ISSUING THE FORECAST

6.2 Transmitting to the Forest Service

As explained in step 5.4, column S is not transmitted in the morning but otherwise the format is identical to that of the afternoon message. However, unlike the 24-hour forecast that was issued Monday afternoon, the Wednesday morning forecast contains rain.

It might be mentioned that the order in which the messages are sent to the Forest Service and Canadian Press is reversed in the morning from that of the afternoon. The objective in the afternoon is to get the message to the Forest Service as quickly as possible. In the morning, it is more urgent to reach the news media because it is hoped the message will be available for the 7.00 AM news broadcasts.

MONTHLY FIRE WEATHER SUMMARY (#10)

MONTH	YEAR	STATION NAME	NO.	MORNING	AFTERNOON	TIME ☐ STANDARD ☐ DAYLIGHT	INITIALS	REGION

QUICK REFERENCE

DETAILS ON REVERSE SIDE

1	2	3		A	B	4	5	6	7	8	9	10	11	12
MORNING				AFTERNOON										
TEMP		RAIN		INDEX		TEMP		RH	WX	CL	WIND		RAIN	RAIN
MAXIMUM	MINIMUM	20 HOUR	DATE	DROUGHT	DANGER	DRY BULB	WET BULB	RELATIVE HUMIDITY	WEATHER	CLOUD	DIRECTION	SPEED	24 HOUR (COL. 3 + 12)	4 HOUR
			30/31											
			1											
			2											
			3											
			4											
			5											
			6											
			7											
			8											
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			30											
			31											

RAIN

X – NO RAIN
T – TRACE

WEATHER

1 – HAZE
2 – RAIN*
3 – LIGHTNING
4 – FOG
5 – DRIZZLE
6 – RAIN
7 – SNOW
8 – SHOWERS
9 – TH'STORM
0 – FAIR

*(not at station)

CLOUD

0 – CLEAR
1 – SCATTERED
2 – BROKEN
3 – OVERCAST
4 – OBSCURED

DIRECTION

1 – NE
2 – EAST
3 – SE
4 – SOUTH
5 – SW
6 – WEST
7 – NW
8 – NORTH
0 – CALM

SHADED COLUMNS MUST BE CALCULATED

F-2204 (12/69)

USE THE 24 HOUR CLOCK

9:30 AM = 0930

9:30 PM = 2130

MORNING	0900 9 AM DAYLIGHT TIME	=	0800 8 AM STANDARD TIME
AFTERNOON	1300 1 PM DAYLIGHT TIME	=	1200 NOON STANDARD TIME

WEATHER (During the Past Hour)

1 – HAZE (VISIBILITY REDUCED)
2 – RAIN (BUT NOT AT STATION)
3 – LIGHTNING (BUT NO THUNDER)
4 – FOG
5 – DRIZZLE
6 – RAIN (AT STATION)
7 – SNOW (OR MIXED RAIN AND SNOW)
8 – RAIN SHOWERS (OR HAIL SHOWERS)
9 – THUNDERSTORM (WITH OR WITHOUT RAIN)

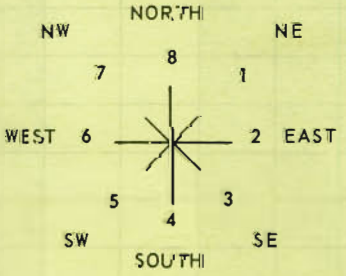
ENTER ONLY THE MOST SUITABLE NUMBER. USE ZERO (0) IF NONE OF THE ABOVE APPLY.

CLOUD

0 – CLEAR (0-tenths)
1 – SCATTERED (1 to 5-tenths)
2 – BROKEN (6 to 9-tenths)
3 – OVERCAST (10-tenths)
4 – OBSCURED (by haze, fog or smoke)

WIND DIRECTION

True direction (NOT MAGNETIC) from which wind is blowing



0 – CALM

RAIN (EXAMPLES)

3 AM RAIN (20 HOUR)	DATE
	30/31

11 PM RAIN (24 HOUR (COL. 3 + 12))	12 PM RAIN (4 HOUR)
.14	X
.01	.01
1.06	.30

.14	1
T	2
.76	3

X – NO RAIN

T – TRACE

EXAMPLE

1 TEMP	2 TEMP	3 RAIN	DATE	A INDEX	B INDEX	4 TEMP	5 TEMP	6 RH	7 WX	8 CL	9 WIND	10 WIND	11 RAIN	12 RAIN
			30/31	7	13									
81	49	.02	1	8	9	76	60	38	0	1	6	9	.03	.01

MONTH	YEAR	STATION NAME	NO.	SPECIAL OBSERVATIONS	INITIALS	REGION

DAY	HOUR	4 TEMP DRY BULB	5 TEMP WET BULB	6 RH RELATIVE HUMIDITY	7 WX WEATHER	8 CL CLOUD	9 WIND DIRECTION	10 WIND SPEED [ADD + G IF GUSTY]

DAY	HOUR	4 TEMP DRY BULB	5 TEMP WET BULB	6 RH RELATIVE HUMIDITY	7 WX WEATHER	8 CL CLOUD	9 WIND DIRECTION	10 WIND SPEED [ADD + G IF GUSTY]

DAILY FIRE WEATHER SUMMARY (#20)

MONTH	DAY	YEAR	LOCATION	FIELD STATIONS	INITIALS	REGION

	12Y	X		1	2	3		A	B	4	5	6	7	8	9	10	11	12
				MORNING				AFTERNOON										
	RAIN	RAIN		TEMP		RAIN		INDEX		TEMP		RH	WX	CL	WIND		RAIN	RAIN
	FROM COL. 12 YESTERDAY	24 HOUR (COL. 12Y + 3)		MAXIMUM	MINIMUM	20 HOUR	STATION NO.	DROUGHT	DANGER	DRY BULB	WET BULB	RELATIVE HUMIDITY	WEATHER	CLOUD	DIRECTION	SPEED	24 HOUR (COL. 3 + 12)	4 HOUR
			1															
			2															
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			5															
			6															
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			32															

F-2205 (12/69)

MONTH	DAY	YEAR	LOCATION	FIELD STATIONS	INITIALS	REGION

12Y	X		1	2	3		A	B	4	5	6	7	8	9	10	11	12
			MORNING				AFTERNOON										
RAIN	RAIN		TEMP		RAIN		INDEX		TEMP		RH	WX	CL	WIND		RAIN	RAIN
FROM COL. 12 YESTERDAY	24 HOUR (COL. 12Y + 3)		MAXIMUM	MINIMUM	20 HOUR	STATION NO.	DROUGHT	DANGER	DRY BULB	WET BULB	RELATIVE HUMIDITY	WEATHER	CLOUD	DIRECTION	SPEED	24 HOUR (COL. 3 + 12)	4 HOUR
		33															
		34															
		35															
		36															
		37															
		38															
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		60															

TELETYPE INSTRUCTIONS

	STA. NO.	TEMP	RAIN	STA. NO.	INDEX	TEMP	RH WX CL	WIND	RAIN	RAIN
EXAMPLE	Morning Message: 722	8149	002	Afternoon Message: 722	0809	7660	3801	609	003	001

TYPE 000 IF A TRACE OF RAIN; LEAVE **BLANK** IF NO RAIN.

DAILY FIRE WEATHER SUMMARY (# 30)

MONTH	DAY	YEAR	LOCATION	SYNOPTIC STATIONS	INITIALS	REGION

0 NH MAX. NIGHT HUMIDITY	STATION NO.	A NOON INDEX DROUGHT	B NOON INDEX DANGER	P NOON PR SEA LEVEL PRESSURE	V NOON VIS VISIBILITY	IDENTIFIER	4 STANDARD TIME TEMP DRY BULB	5 TEMP DEW POINT	6 RH RELATIVE HUMIDITY	7 WX PRESENT WEATHER	8 CL CLOUD	9 WIND DIRECTION	10 WIND SPEED + GUSTS TO	11 RAIN 24 HOUR (AT 18Z)	REMARKS
													+		
													+		
													+		
													+		
													+		
													+		
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CLOUD

- ○ – CLEAR
- ◐ – SCATTERED
- ◑ – BROKEN
- ⊕ – OVERCAST
- ⊗ – OBSCURED

VISIBILITY

REPORTED IN STATUTE MILES AND FRACTIONS

(V = VARIABLE)

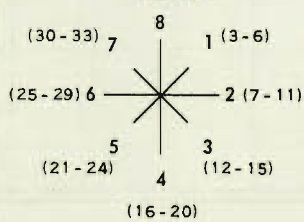
PRESENT WEATHER

A – HAIL	F – FOG	RW – RAIN SHOWERS
AP – SMALL HAIL	GF – GROUND FOG	S – SNOW
BD – BLOWING DUST	H – HAZE	SG – SNOW GRAINS
BN – BLOWING SAND	IC – ICE CRYSTALS	SP – SNOW PELLETS
BS – BLOWING SNOW	IF – ICE FOG	SW – SNOW SHOWERS
D – DUST	K – SMOKE	T – THUNDERSTORM
E – SLEET	L – DRIZZLE	ZL – FREEZING DRIZZLE
EW – SLEET SHOWERS	R – RAIN	ZR – FREEZING RAIN

PRECIPITATION INTENSITIES

– – = VERY LIGHT – = LIGHT (NO SIGN) = MODERATE + = HEAVY

WIND DIRECTION



WIND SPEED

CIRCLE IF LOWERED

F-2206 (8/69)

MONTH	DAY	YEAR	PARAMETER		INITIALS	REGION
			PRECIPITATION	SYNOPTIC STATIONS		

IDENTIFIER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	STATION NO.
	EVENING				NIGHT			MORNING				AFTERNOON				
	PRESENT WEATHER	6 HOUR (7RR – –)	BEG./END.	24 HOUR (2 RRRR)	PRESENT WEATHER	6 HOUR (7RR – –)	BEG./END.	PRESENT WEATHER	6 HOUR (7RR – –)	BEG./END.	24 HOUR (2 RRRR)	PRESENT WEATHER	6 HOUR (7RR – –)	BEG./END.	24 HOUR (2 + 6 + 9 + 13)	
	00Z				06Z			12Z				18Z				

TIME PRECIPITATION BEGAN/ENDED (7 – – R_t –)

1 – LESS THAN 1 HOUR AGO
2 – 1 TO 2 HOURS AGO
3 – 2 TO 3 HOURS AGO
4 – 3 TO 4 HOURS AGO
5 – 4 TO 5 HOURS AGO
6 – 5 TO 6 HOURS AGO
7 – 6 TO 12 HOURS AGO
8 – MORE THAN 12 HOURS AGO
9 – UNKNOWN

DAILY FIRE WEATHER FORECAST (# 41)

MONTH	DAY	YEAR	_____ HOUR FORECAST NO. _____	PROVINCE	INITIALS	REGION
				NEW BRUNSWICK		1

AREA CODE	S		A	B	C	FORECAST NO.	1	2	3	4	5	6	7	8	9
			FORECASTED				TEMP	CL	RH	WIND		RAIN		RAIN	
	TODAY'S DANGER	_____ DAY FORECAST FOR	DROUGHT	DANGER	DANGER CLASS		DRY BULB	CLOUD	RELATIVE HUMIDITY	DIRECTION	SPEED + GUSTS TO	DURATION	AMOUNT	REMARKS	PROB'LITY
1	EASTERN N.B. COUNTIES														
10		N. NORTHUM'LAND									+				
11		S. NORTHUM'LAND									+				
12		E. NORTHUM'LAND									+				
13		WEST KENT									+				
14		EAST KENT									+				
15		W. WESTMORLAND									+				
16		E. WESTMORLAND									+				
17		ALBERT									+				
2	LOWER ST. JOHN RIVER VALLEY														
20		WEST CHARLOTTE									+				
21		EAST CHARLOTTE									+				
22		ST. JOHN									+				
23		WEST KINGS									+				
24		EAST KINGS									+				
25		NORTH QUEENS									+				
26		SOUTH QUEENS SUNBURY									+				
27		NORTH SUNBURY									+				
28		NORTH YORK									+				
29		SOUTH YORK									+				
3	UPPER ST. JOHN RIVER AND BAY OF CHALEUR														
30		CARLETON									+				
31		SOUTH VICTORIA									+				
32		NORTH VICTORIA									+				
33		MADAWASKA									+				
34		WEST RESTIGOUCHE									+				
35		CENT. RESTIGOUCHE									+				
36		EAST RESTIGOUCHE									+				
37		WEST GLOUCESTER									+				
38		EAST GLOUCESTER									+				

GENERAL REMARKS

DANGER CLASS: LOW (1-4) MODERATE (5-8) HIGH (9-10) VERY HIGH (11-12) EXTREME (13-16)

F-2201 REV. 3/70

ATLANTIC PROVINCES

TEMPERATURE, CLOUD COVER, RELATIVE HUMIDITY AND WIND ARE FORECAST FOR 1300 ATLANTIC DAYLIGHT TIME. RAIN IS FORECAST FOR THE 24-HOUR PERIOD, 1500 TO 1500 ATLANTIC DAYLIGHT TIME.
NOTE: THESE TIMES ARE FOR MARITIME PROVINCES: 30 MINUTES **MUST BE ADDED** FOR NEWFOUNDLAND

REGION 1

CLOUD COVER

0 – CLEAR (0-TENTHS)

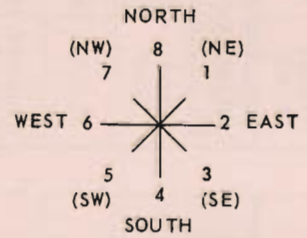
1 – SCATTERED (1 TO 5-TENTHS)

2 – BROKEN (6 TO 9-TENTHS)

3 – OVERCAST (10-TENTHS)

4 – OBSCURED (BY HAZE OR FOG)

WIND DIRECTION



0 – CALM 9 – VARIABLE

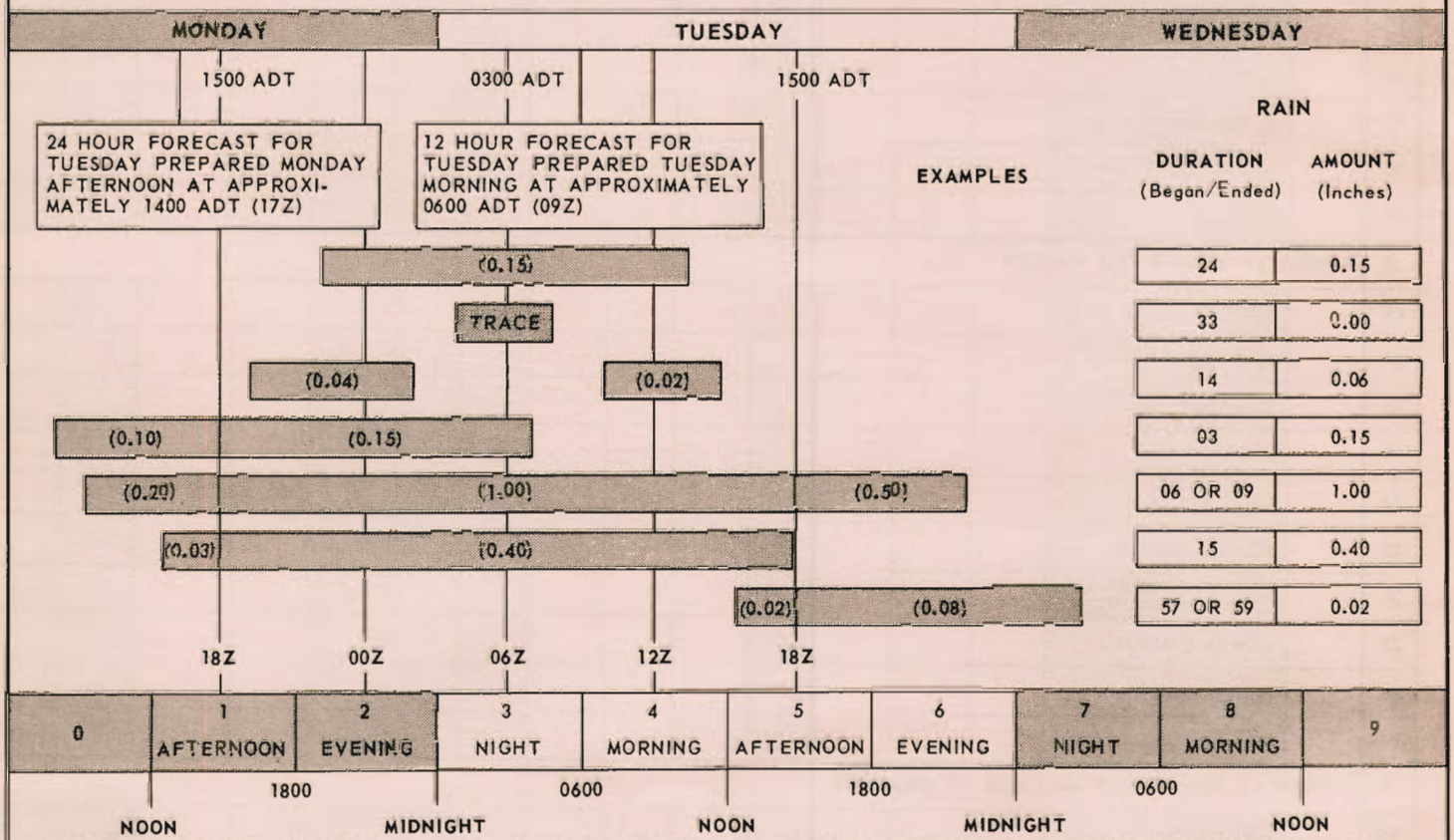
WIND SPEED

TO BE ESTIMATED IN MILES PER HOUR FOR APPROXIMATELY 20 FEET IN THE OPEN

00 – CALM

EXAMPLES 05 – 5 MPH

10 – 10 MPH



EXAMPLES

RAIN

DURATION (Began/Ended)	AMOUNT (Inches)
24	0.15
33	0.00
14	0.06
03	0.15
06 OR 09	1.00
15	0.40
57 OR 59	0.02

9 MAY BE USED IN PLACE OF 6, 7 OR 8 IF THE TIME THE PRECIPITATION WILL STOP CANNOT SATISFACTORILY BE FORECAST

RAIN REMARKS

INT: Intermittent CONT: Continuous

	LIGHT		MODERATE		HEAVY	
	INT	CONT	INT	CONT	INT	CONT
DRIZZLE	50	51	52	53	54	55
DRIZZLE AND RAIN	58		59			
RAIN	60	61	62	63	64	65
RAIN AND SNOW	68		69			
SNOW	70	71	72	73	74	75
RAIN SHOWERS	80		81			
THUNDERSTORM (with rain)	95				97	
THUNDERSTORM (with hail)	96				99	

RAIN PROBABILITY

(PERCENT OF AREA AFFECTED)

10, 20, 30 } WIDELY SCATTERED

40, 50, 60 } SCATTERED SHOWERS

70, 80, 90 } SHOWERS WIDESPREAD

00 – GENERAL RAIN