CANADA DEPARTMENT OF AGRICULTURE

CLIMATE AND AGRICULTURE IN CENTRAL BRITISH COLUMBIA

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KNOW YOUR WEATHER

Low temperatures in the spring and fall restrict the growth of crops mainly to the six weeks following mid-June in central British Columbia. The total rainfall for the growing season is not high, but frequent light showers severely limit the number of days when farm work can be done. On account of the showers, haymaking is often unsatisfactory; the quality suffers and occasionally all the crop is lost.

Temperatures, evaporation and hours of sunshine drop rapidly after August 1, while the rainfall increases. These conditions retard the development of crops, and especially the maturing of cereal grains. As a result, damp grain and wet soil often make a grain crop too costly to produce.

Taking the weather records for this region as their guide, farmers should:

- Grow perennial grasses and legumes, as these are the crops best suited to the climate.
- Grow only the earliest varieties of oats and barley, and only to help establish perennial forage crops.
- Be prepared to harvest cereals and forage crops as silage.
- Make the best use of every possible working day throughout the growing season.

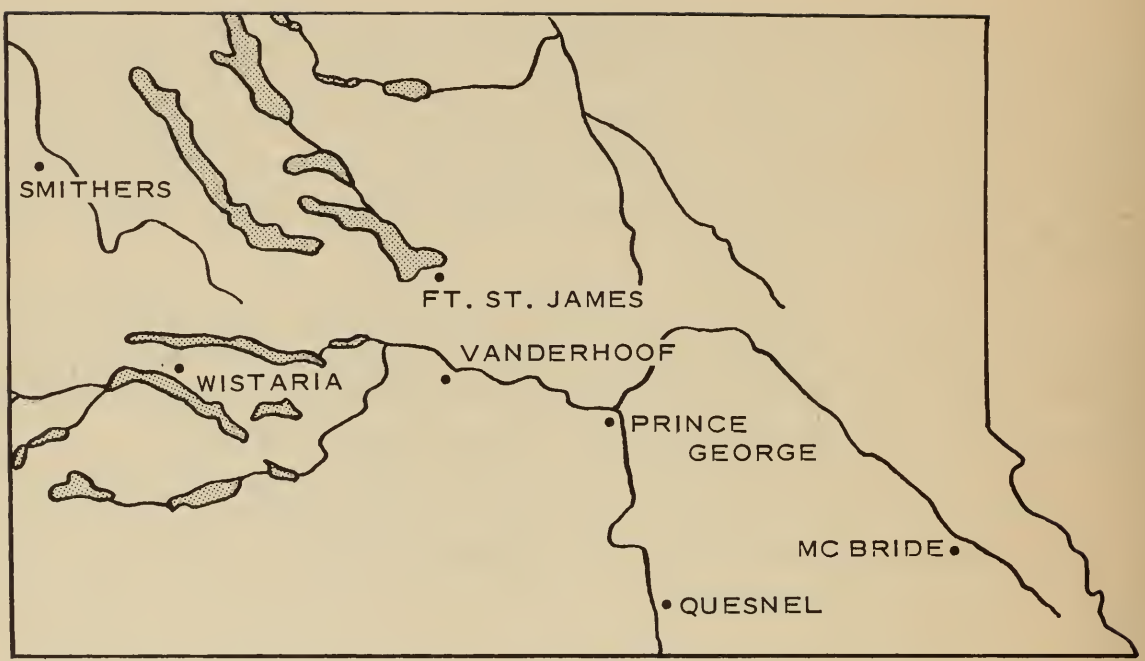

Figure 1—Localities in central British Columbia where weather records were taken.

CLIMATE AND AGRICULTURE IN CENTRAL BRITISH COLUMBIA

B. K. McDonald
Experimental Farm, Prince George, B.C.

In central British Columbia, near the province's northern limit for farming, the climate severely restricts the production of field crops. But those who know the kind of weather to expect can choose the crops that are adapted to it and plan their work accordingly. This report is based on 20 years of daily weather records at eight locations in the region, grouped in five-day periods from April 1 to September 30.

The region lies within the 300-mile-wide Nechako plateau between the Coast Mountains and the Rocky Mountains, which have a major effect on the precipitation and temperature. Prevailing, moisture-laden winds from the Pacific rise and are cooled as they cross the Coast Mountains, and drop most of their moisture on the west side of the range. This accounts for the lower rainfall in the Wistaria and Vanderhoof areas on the east side. But, as the westerly winds pass over the plateau, they absorb moisture and deposit it in the Prince George and Quesnel areas, where they are again cooled on rising to pass over the Rocky Mountains.

Elevation and nearness to water may affect rainfall and temperature markedly (Table 1). For example, the Quesnel station is close to river level on a site typical of the soils found in the flood plains of the Fraser River. The Quesnel Airport station, 200 feet above the river, has much lower temperatures and slightly higher rainfall. The most extensive area for farming in this district is about 200 feet above the airport weather station, where the temperatures are even lower and the rainfall higher.

Silts and clays are the main soil types of the region (Table 1). These have an important bearing on the effect of the climate on crop production. In general, the clay soils absorb water slowly and, in prolonged periods of wet weather and low evaporation, present critical soil and crop management problems.

TABLE 1: FACTORS AFFECTING CROP GROWTH AT REPRESENTATIVE LOCATIONS IN CENTRAL BRITISH COLUMBIA, 1941-60

Station	Main soil type	Elevation[1] Feet	Precipitation[1], inches Apr.-Aug.	Precipitation[1], inches Annual	Heat Units[2] Apr.-Aug.	Mean Temperature[1], ° F Apr.-Aug.	Mean Temperature[1], ° F Annual
McBride	Silt loam	2,360	8.10	20.33	1,840	53	40
Quesnel	Silt loam	1,600	9.47	16.74	2,078	55	41
Quesnel Airport	Silt loam, clay	1,787	8.85	20.63	1,971	54	39
Prince George	Clay	2,218	10.34	23.63	1,666	51	37
Vanderhoof	Silty clay loam	2,100	7.62	14.25	1,521	50	36
Ft. St. James	Clay	2,280	7.77	16.03	1,516	50	35
Wistaria	Loam	2,950	7.32	18.00	1,310	50	37
Smithers	Loam, clay	1,675	7.91	18.36	1,551	51	38

[1] From *Climate of British Columbia, Report for 1959.*

[2] The number of day-degrees above 42° F.

TABLE 2: THE CLIMATE OF REPRESENTATIVE LOCATIONS IN WESTERN CANADA

Location	Precipitation Apr.-Aug. Day	Precipitation Apr.-Aug. Inches	Precipitation Annual Inches	Heat Units Apr.-Aug.	Mean temperature, °F Apr.-Aug.	Mean temperature, °F Annual	Sunshine, hours Apr.-Aug.	Sunshine, hours Annual	Wind, m.p.h. Apr.-Aug. Average
Prince George	64	9.08	22.16	1,824	53	39	1,155	1,785	6.8
Penticton	40	4.80	11.50	2,852	61	48	1,274	2,009	5.9
Grand Prairie	47	8.50	16.80	1,844	53	35	1,298	2,105	10.1
Edmonton	46	11.27	17.63	2,057	54	37	1,341	2,173	9.5
Saskatoon	44	9.18	14.40	2,367	56	35	1,396	2,367	11.6

[1] From *Canada Year Book,* 1959 and 1960.

PRECIPITATION

On many soils of central British Columbia, crops depend almost entirely on current seasonal rainfall. Although the heavy clay soils (the main arable soils in the region) can hold a lot of moisture, only a little of it is used by plants. Most of the roots of field crops penetrate these clay soils only to the depth of tillage. This shallow root zone provides little more than half an inch of moisture for crops. Under such conditions, the amount and the distribution of rainfall throughout the growing season are critical.

Annual precipitation is not a reliable guide when you are comparing crop production in different regions. The annual precipitation in the prairie areas is much less than in most of central British Columbia, but more of the prairie rainfall comes during the growing season. Prince George receives considerably more moisture in a year than Saskatoon does, but the rainfall during the growing season is almost the same at these two locations (Table 2). Also, the faster evaporation at Saskatoon is offset to some extent at Prince George, where the soil stores less available moisture and small, ineffective showers are more frequent. This shows the need for timing farm operations to use the moisture in the soil efficiently and to allow for prolonged periods of wet weather.

The rainfall varies widely from year to year, but the averages (Figures 2 and 3) indicate the amounts that are most likely to occur. The pattern of precipitation throughout the growing season is about the same at all locations, although the total amounts differ. Here are the important features:

- Prince George consistently has the highest rainfall, but the fluctuations during the growing season are considerably greater at Quesnel, Vanderhoof and Fort St. James.

- In general, rainfall is low until May 5, and then it increases gradually until June 20.

- There is a sharp increase in rainfall in late June at all locations except Smithers and Wistaria, where the peak occurs in early June.

- Rainfall is low everywhere during the first two weeks of July, but it rises to a second peak in early August.

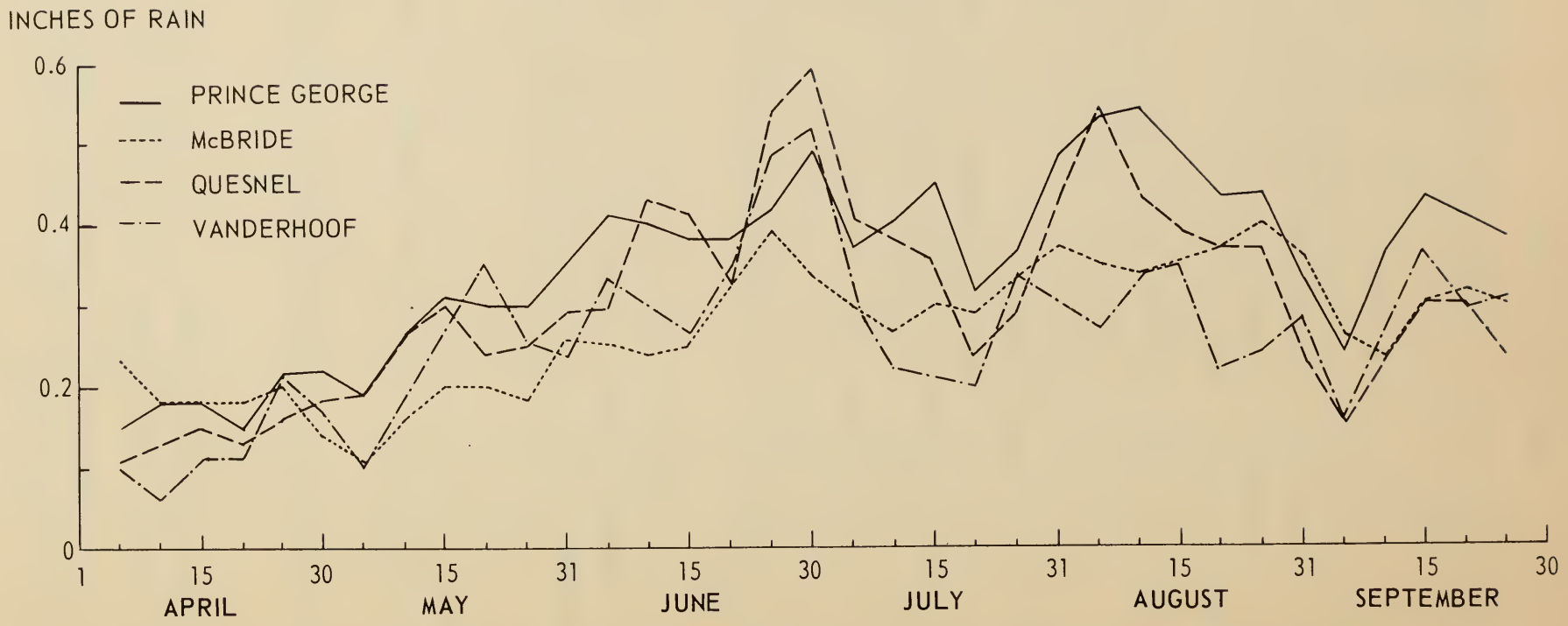

Figure 2—Average rainfall in each five-day period of the growing season at four locations, 1941-60.

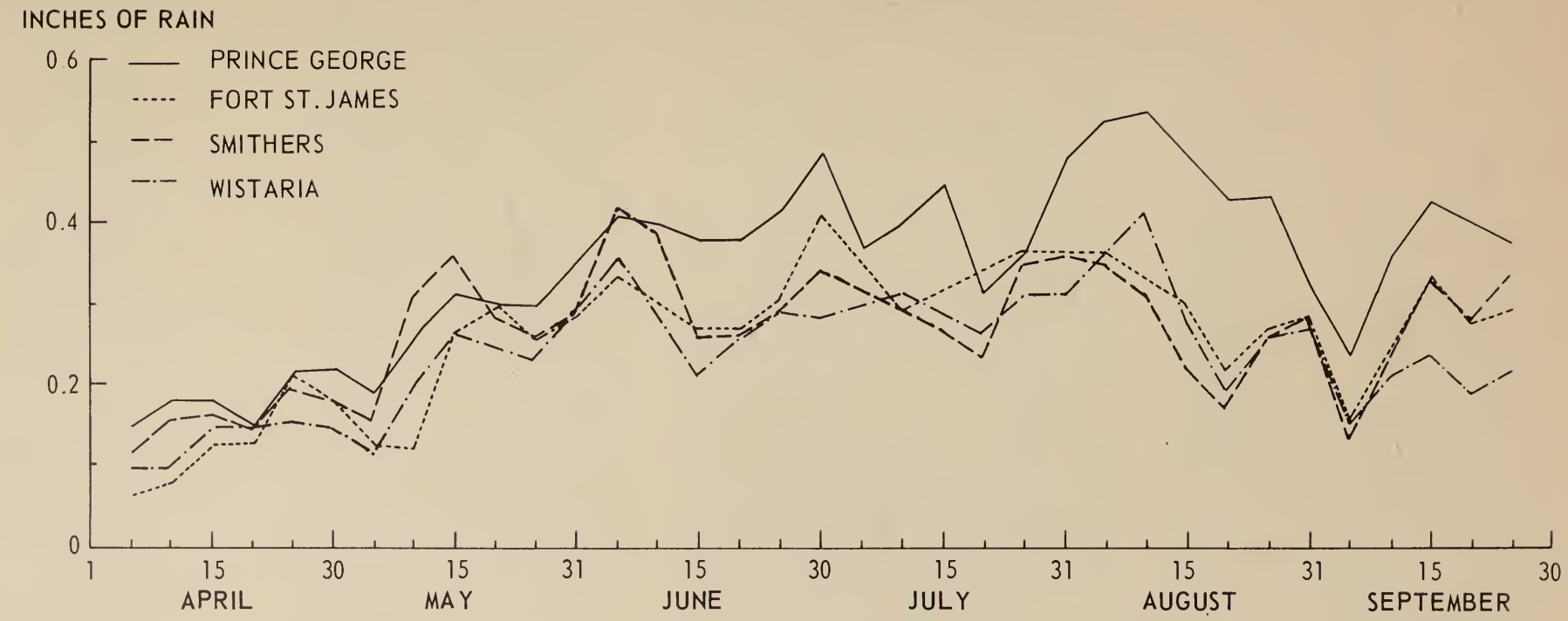

Figure 3—Average rainfall in each five-day period of the growing season at four locations, 1941-60.

- Although the rainfall is low in late August and early September, crops ripen slowly because of heavy night dews, low evaporation, shorter days and lower temperatures.

- On the heavy clay soils, even moderate precipitation delays fall operations considerably.

TEMPERATURES

Frosts

Frosts (32° F) have been recorded in every month at all locations except Quesnel, but they cause little damage to field crops recommended for central British Columbia. Neither are killing frosts (28°) in spring and fall much of a problem (Table 3). No killing frosts have been recorded in August for the past 20 years at Quesnel. Prince George and Vanderhoof have each had one killing frost in August, and Smithers has had three in August. Killing frosts are rare in June. Most frosts occur within 10 days of the dates shown in Table 3. Thus, a reasonably long period without killing frosts can be expected at all locations except Vanderhoof, but this should not be taken to mean that late crops are adapted to the region.

Averages

As with precipitation, the dates of frosts and the average annual temperatures may be misleading when crop areas are compared (Tables 2 and 3). Although the average annual temperature at Prince George is considerably higher than in some other major crop-producing areas, average temperatures during the crop season are appreciably lower. Average temperatures are somewhat higher in the growing season at McBride and Quesnel than at the other locations (Table 1).

Heat Units

A more accurate means of comparing temperatures in different areas is the "degree-day," or "heat unit." The common field crops grow vigorously only when the temperature is above 42°, and as the temperature rises the plants grow faster. The number of heat units in a day is the number of

TABLE 3: AVERAGE DATES OF SPRING AND FALL FROSTS AT 11 LOCATIONS, 1942-60

Location	Frost (32° F)			Killing Frost (28° F)		
	Frost-free days	Last spring frost	First fall frost	Frost-free days	Last spring frost	First fall frost
McBride	82	June 10	Aug. 31	122	May 19	Sep. 18
Quesnel	118	May 25	Sep. 20	146	May 10	Oct. 3
Quesnel Airport	95	June 8	Sep. 11	130	May 18	Sep. 25
Prince George	72	June 14	Aug. 25	119	May 19	Sep. 15
Vanderhoof	52	June 22	Aug. 13	95	June 3	Sep. 6
Fort St. James	67	June 15	Aug. 21	112	May 24	Sep. 13
Wistaria	67	June 16	Aug. 22	113	May 25	Sep. 15
Smithers	62	June 16	Aug. 15	109	May 24	Sep. 10
Grand Prairie[1]	104	May 23	Sep. 4			
Edmonton[1]	100	May 29	Sep. 6			
Saskatoon[1]	112	May 24	Sep. 13			

[1] From *Canada Year Book*, 1959 and 1960.

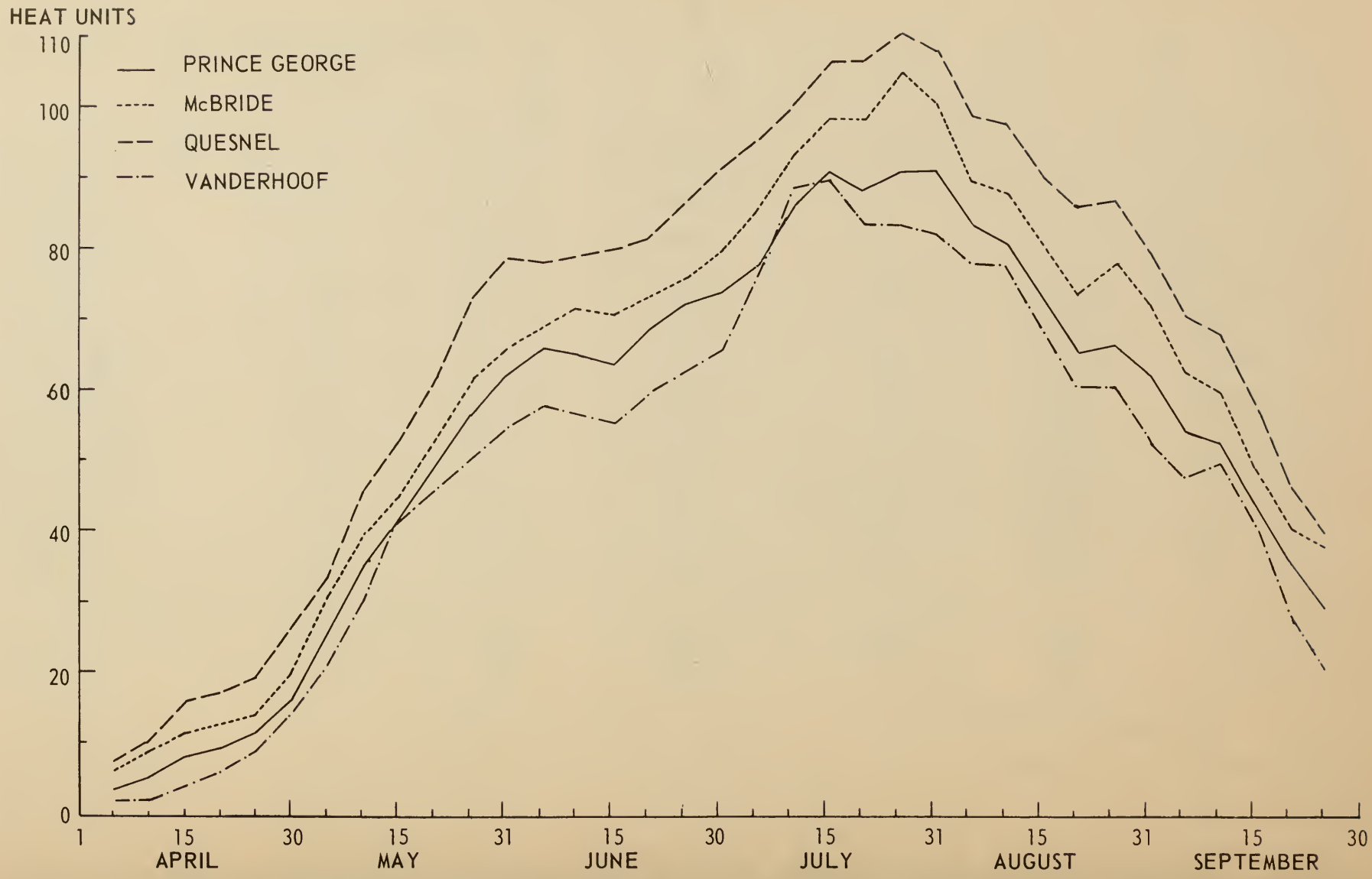

Figure 4—Average number of heat units (day-degrees above 42° F) in each five-day period of the growing season at four locations, 1941-60.

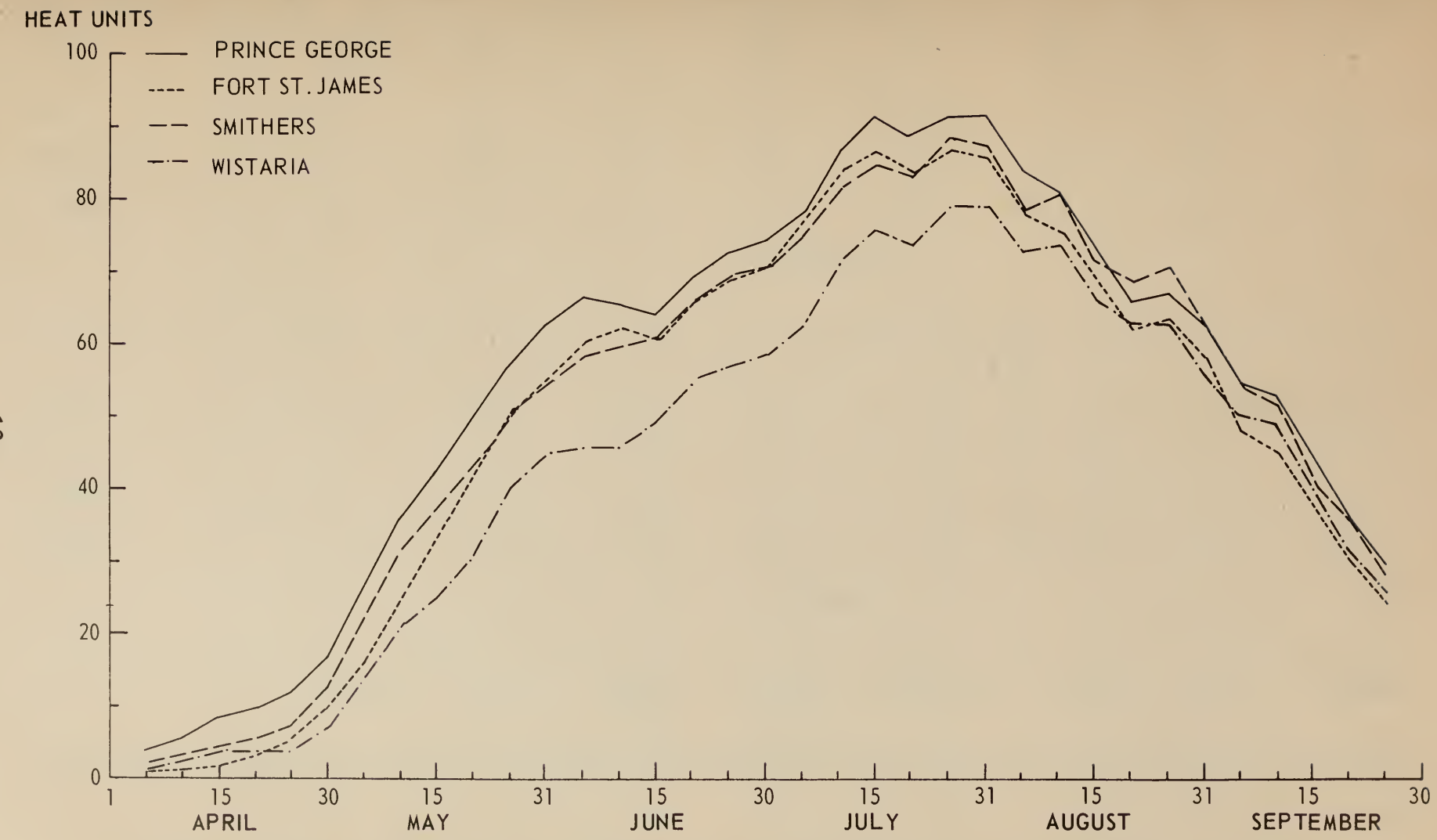

Figure 5—Average number of heat units in each five-day period of the growing season at four locations, 1941-60.

TABLE 4: RAINFALL AND NUMBER OF WORKING DAYS; SEASONAL AVERAGES FOR 1941-60

	McBride	Quesnel	Quesnel Airport	Prince George	Vanderhoof	Fort St. James	Wistaria	Smithers
				Rainfall				
Spring	3.30	3.67	3.52	4.25	3.28	3.26	3.15	3.83
Summer	2.61	3.15	3.06	3.21	2.64	2.66	2.38	2.45
Fall	3.91	4.03	4.69	4.97	3.34	3.46	3.01	3.23
Total	9.82	10.85	11.27	12.43	9.26	9.38	8.54	9.51
				Working Days				
Spring	62.7	63.1	63.0	55.5	65.6	63.7	64.6	62.5
Summer	23.9	26.4	23.0	18.0	26.7	23.6	24.2	24.0
Fall	30.9	34.9	30.1	26.5	33.9	35.0	34.3	33.2
Total	117.5	124.4	116.1	100.0	126.2	122.3	123.1	119.7

degrees that the mean temperature is above 42°. Thus, a day on which the mean temperature is 56° has 56—42=14 heat units. Days on which the mean temperature is 42° or less have no heat units.

The general pattern of heat units is similar at all the locations (Figures 4 and 5). Only 15 percent of the total heat units for the growing season can be expected before May 31. Half of the total is received in June and July, 20 percent in August and 15 percent in September. The records emphasize the need for cool-climate crops in central British Columbia (see also Tables 1 and 2).

WORKING DAYS

A working day is considered here to mean a day when farm operations can be carried out successfully on a clay soil. It is determined by the rainfall, temperature and evaporation records, allowing for the type of farm work done in each season. Winter moisture in the soil seldom permits any tillage during April. Spring tillage and seeding are the main operations from May 1 until June 20, haying continues until July 31, and the grain harvest is the main operation in the rest of the season.

The average number of working days within each five-day period of the past 20 years was calculated (Figures 6 and 7), and found to follow a similar pattern at all the locations. With the exception of a favorable period in late May, the number of working days decreased gradually from May 1 to June 30. An increase in July was maintained throughout August at Prince George but fluctuated greatly at other locations. Low evaporation was the main cause of the sharp decrease in the number of working days after September 1.

Prince George has the lowest number of working days of all the locations. In the spring it usually has 10 to 15 percent fewer working days. Hay-harvesting days (July) are 53 percent fewer and grain-harvesting days (August) are 15 to 20 percent fewer than at the other locations.

Figure 6—Average number of working days in each five-day period of the growing season at four locations, 1941-60.

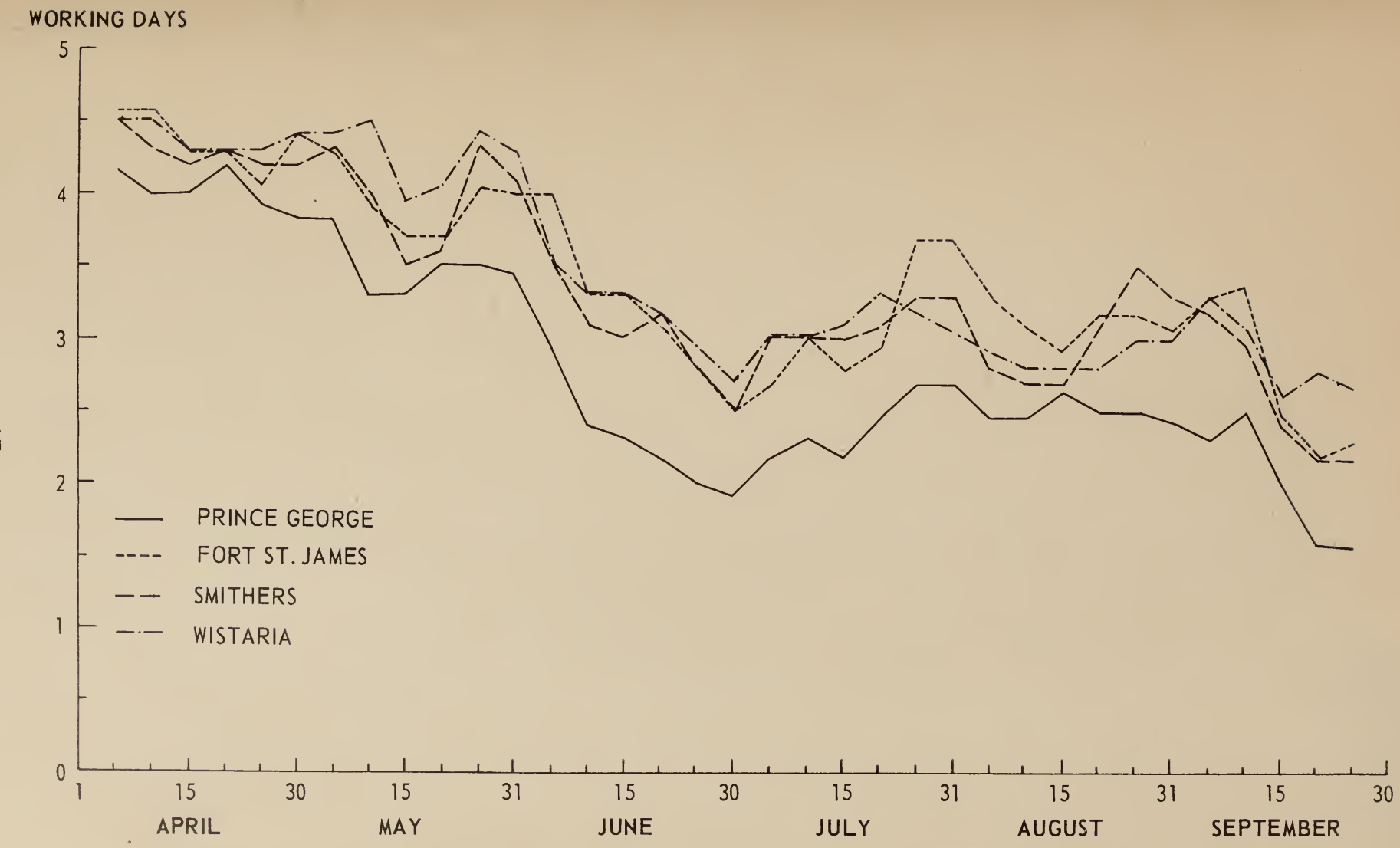

Figure 7—Average number of working days in each five-day period of the growing season at four locations, 1941-60.

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