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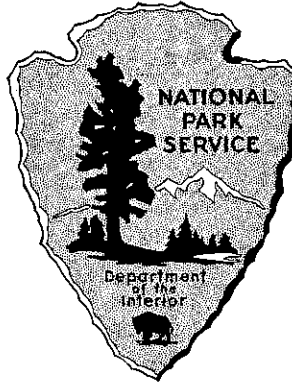
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Weather

Glacier National Park



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PUBLISHED BY THE GLACIER NATURAL HISTORY ASSOCIATION



IN COOPERATION WITH THE NATIONAL PARK SERVICE

TEXT BY
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U. S. WEATHER BUREAU, HELENA, MONTANA

BULLETIN NUMBER 7
MARCH, 1961

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WEST GLACIER, MONTANA

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COVER — LAKE McDONALD, GLACIER NATIONAL PARK

CLIMATE OF GLACIER NATIONAL PARK, MONTANA

by R. A. Dightman, State Climatologist,
U. S. Weather Bureau, Helena, Montana

Within the boundaries of Glacier National Park, which is located along both sides of the Northern Montana Rocky Mountains, lies some of the most spectacularly rugged mountain country to be found anywhere in North America. The mountainous character of the area has marked effects on its climate, which varies widely within short distances. Elevations within Park boundaries range from about 3,100 ft. along the shores of Lake McDonald to well over 10,000 ft. above sea level on a number of the higher mountain peaks. The valley-ridge configurations have marked effects on day-to-day weather, which show up in climate records as large differences between higher and lower elevations, and between lee and windward sides of mountains and ridges. In a popular sense the climate may be classed as Alpine, but a more strict climate classification would be continental, with decided Pacific maritime modifications, particularly on western slopes, during all seasons except summer.

Actually the area is subject to such a wide variation in weather that exceptions to the climate classification are frequent and large. In some of the glacier cirques precipitation may average well over 100 inches a year, most of it falling as snow, while along some parts of the Park's eastern border (at Babb 6NE, for example), annual totals average less than 20 inches a year. In this comparison, the Park boundary near Babb would be classed as semi-arid, while the mountain ridges would be classed as very wet -- even though horizontal distances between some of the wetter and drier areas of the Park are only a few miles. It would obviously be impossible, because of the many such variations and the lack of data for most of them, to cover all such cases. The few examples that are available, most of which are mentioned below, serve to emphasize the marked character of these intra-Park climate differences.

Average monthly and annual precipitation for three stations on the Park boundary are listed in tables on Pages 7-9. These stations were selected on the basis of location adjacent to the Park and length and quality of record (both temperature and precipitation). It should be noted that Summit, at an elevation of 5,213 ft. at the top of Marias Pass, is the highest of the three, and is high enough to represent to some degree the mountain precipitation pattern in general. However, almost all of the Park's mountain country is not only higher than Summit, but also is more rugged than the area around Summit. Precipitation measurements for eleven years near Grinnell Glacier, for example, have showed an estimated annual average of 108.4 inches. At a second gage in the Grinnell Basin the average for five years has been 151.4 inches. Annual precipitation therefore may be said to vary from around 20 inches a year in some of the drier locations, mostly along the northeast Park Boundary south of the Canadian Border, to well over 100 inches a year (perhaps nearly 200 inches on some of the more favored mountain slopes) in most of the mountains above about 6,000 or 7,000 ft.

Over and west of the mountain ranges winter is the wettest season by quite a margin (cf. West Glacier, Polebridge, Summit tables), but along the eastern border winter snows are much lighter, and May and June are the wettest months. Noteworthy to the tourist is the fact that the driest months of the year for the Park as a whole are July, August, and September. In the northeastern fringes of the Park, June rainfall usually is 4 inches or more, but July averages less than 2. Snowfall is very heavy at times most winters, but is of course heaviest over the mountain ridges. Summit has averaged 256 inches of snowfall a year since 1935, but there are other sites (Walton Ranger Station, for example) at even lower elevations which receive more, and it seems likely that higher elevations receive much more. In fact, to support an annual precipitation of 150 inches a year, assumed as a reasonable estimate for much of the higher Park area, it is further estimated that snowfall for such areas may exceed 1,000 inches in most years. Snow doesn't occur during the late June-September tourist season, except over some of the higher country (above about 7,500 ft.) in June or September. July and August snow is rare, except on the higher peaks and ridges (above about 9,000 ft.).

The entire Park is snow covered almost continuously during every winter, and most mountain slopes accumulate depths of 8 to 10 feet or more most winters before spring melting begins. Several years of snow depths are tabulated on Page 11 for Summit (Marias Pass) and West Glacier for the first day of each winter and early spring month.

Snow is generally gone from the lower elevations, such as the shores of Lake McDonald, by about May 1, but may linger in drifts on some higher Park trails until mid-August. It is fairly common for some of the glaciers to remain under snow all summer, and several higher peaks are permanently snow covered. It is from this abundance of winter snow that Park streams and lakes mostly are supplied with their clear, cold water. By quite a margin, most of the Park's moisture is derived from snowfall.

Temperatures average quite cold during most winters, as reference to the general data tables will indicate. Too, none of the Park area escapes subzero temperatures for at least a few days every winter. These severely cold spells, which result from movement of Arctic air masses from the north, generally last only a few days. Along the Park's eastern slopes, from about East Glacier northward to the Canadian Border, the so-called "Chinook" wind is a common feature of a winter season, and it can blow for days at a time, accompanied by temperatures as much as 20°F. or more warmer than on the west side. These winds can develop very high speeds, on occasion having been estimated at over 100 m.p.h.

Of most importance to most persons, however, is the fact that summer heat in the Park is never oppressive, even though most summertime afternoons produce highs in the 65-to-85-degree range. The warmest areas, of course, are those at lowest elevations. At Sperry Chalets, for example, the warmest temperatures in July and August 1960 were 84 and 76, respectively, while at West Glacier highs for both months were 93 and 87. Sperry Chalets are over 4,000 ft. higher than West Glacier. After sunset, temperatures cool quite quickly, and in most valley bottoms frost can occur on an occasional night even in mid-summer. In these situations, when the valleys cool under clear skies, it is often warmer at night on the mountain slopes and ridges. It should be remembered that the area has to be cool and wet, as a whole, to support glacial activity, and even though summers are relatively dry and warm for the area, rainy and cool days can occur during the June-September season, and are more likely in June and September.

All seasons except summer experience persistent cloudiness, as one would expect from the precipitation and other records, with the area of most persistent cloudiness being along the western slopes of the Continental Divide. Some of the western valleys, Lake McDonald, forks of the Flathead River, etc., also experience considerable late autumn and early winter fog. However, sunshine is frequent during summer, periods of successive sunny days occurring several times throughout the Park most June-September periods. Relative humidity can be high during winter storms and fogs, and on some of the cooler summer mornings. On the warmer summer days, however, relative humidity is seldom higher than 40 or 50 per cent, and never reaches an oppressive level. In fact, oppressive combinations of heat and humidity simply do not occur in Glacier National Park, and one might classify summer weather for the area in general as cool and pleasant.

STATION HISTORIES

West Glacier The longest record of climate used in this report dates from December, 1913, at a point 3-1/2 miles north of Belton, as West Glacier then was known. On October 27, 1918 it was moved to the present Park Headquarters site where it has remained since, with only a small move of the rain gage in 1931 to obtain a better exposure. The last 30 years of record have been used in this report. The National Park Service has maintained this station from the beginning.

Polebridge This station dates from August, 1933, when observations began at Polebridge Park Ranger Station. However, the earlier records were kept intermittently because of frequent absences on other business of Ranger Station personnel, and reasonable continuity started when Ben and Annette Rover at the Post Office took over on June 1, 1947. They continued until June 1, 1955, and Theodore Ross has handled the station since. Although not a long record, its quality is excellent, particularly since 1947.

Summit (Marias Pass) This station dates from February 1, 1935, when E. Ross, an employee of the Great Northern Railroad started observations. He was followed on 10/20/45 by H. J. Dupros; on 12/20/45 by the Upper Columbia Snow Lab.; on 6/24/47 by J. Henry DeGroot (Lab. closed); on 10/17/53 by F. S. June; on 3/24/54 by J. T. Hinds; on 10/21/55 by R. Sinclair; by W. J. Gee on 3/20/56; by J. A. Gregg on 8/16/56; W. A. Molgard on 12/11/57; E. E. Clott on 4/1/58; and W. O. Gulbranson on 4/17/59. All except the Upper Columbia Snow Laboratory were employees of the Great Northern Railway cooperating with the Weather Bureau. Equipment is located, rent free, on railroad land with company permission.

(Continued on Pg. 11)

LATITUDE 48° 30'
 LONGITUDE 113° 59'
 ELEV. (GROUND) 3154

U. S. DEPARTMENT OF COMMERCE, WEATHER BUREAU
 IN COOPERATION WITH NATIONAL PARK SERVICE
 CLIMATOGRAPHY OF THE UNITED STATES NO. 20 - 24

CLIMATOLOGICAL SUMMARY

STATION WEST GLACIER, MONTANA

MEANS AND EXTREMES FOR PERIOD 1931-1960

Month (a)	Temperature (°F)						Mean degree days	Precipitation Totals (Inches)						Mean number of days													
	Means			Extremes				Year	Mean	Greatest daily	Year	# Snow, Sleet			Precip. 10 inch	or more	90° and above	Temperatures		Month							
	Daily maximum	Daily minimum	Monthly	Record highest	Record lowest	Year						Year	Mean	Maximum				Greatest	Year		Mean	Monthly	Year	above 32° and below	32° and below	Min.	° and below
JAN	28.0	11.1	21.1	52	-37	1931	30	3.13	1.24	1951+	30	36.4	74.5	1954	30	0	17	30	30	JAN							
FEB	32.9	15.8	24.3	58	-40	1950	30	2.42	2.09	1951	30	26.5	57.5	1937	30	0	11	27	30	FEB							
MAR	41.3	21.4	31.4	64	-30	1941	30	1.81	0.95	1947	30	16.2	35.5	1951	30	0	4	28	28	MAR							
APR	54.2	29.4	41.8	80	-8	1939	30	1.87	1.29	1951	30	4.3	24.0	1948	30	0	*	0	21	APR							
MAY	64.9	37.2	51.1	91	13	1936	30	2.36	1.22	1938	30	0.4	5.0	1956+	30	*	0	7	0	MAY							
JUN	70.3	43.6	57.0	92	24	1911+	30	3.02	1.87	1947	30	T	T	1955+	30	*	0	1	0	JUN							
JUL	80.6	47.3	64.0	101	34	1934	30	1.27	1.22	1932	30	T	T	1954+	30	3	0	0	0	JUL							
AUG	78.5	45.5	62.0	95	31	1911	30	1.33	2.08	1947	30	0.0	0.0	0.0	30	1	0	0	0	AUG							
SEP	67.2	39.4	53.3	88	16	1914+	30	1.89	1.59	1952	30	T	1.0	1949	30	0	0	5	0	SEP							
OCT	53.6	32.5	43.1	79	-9	1942	30	2.64	1.76	1955	30	2.3	28.0	1951	30	0	0	17	*	OCT							
NOV	37.6	24.2	30.9	67	-29	1948	30	3.06	1.50	1932	30	15.8	58.3	1959	30	0	7	26	1	NOV							
DEC	31.6	19.7	25.7	57	-22	1931	30	3.26	1.02	1937	30	31.4	74.2	1951	30	0	15	29	2	DEC							
Year	53.4	30.8	42.1	101	-40	JUL 1934	30	28.06	2.09	1951	30	133.3	74.5	JAN 1954	30	4	54	191	15	Year							

(a) Average length of record, years.

T Trace, an amount too small to measure.

** Base 65°F (estimated)

+ Also on earlier dates, months, or years.

* Less than one half.

Hail was included in these values from July 1948 through December 1955.

LATITUDE 48° 19'
 LONGITUDE 113° 21'
 ELEV. (GROUND) 5213

U. S. DEPARTMENT OF COMMERCE, WEATHER BUREAU
 IN COOPERATION WITH NATIONAL PARK SERVICE
 CLIMATOGRAPHY OF THE UNITED STATES NO. 20 - 21
CLIMATOLOGICAL SUMMARY

STATION SUMMIT, MONTANA
 (MARIAS PASS)

MEANS AND EXTREMES FOR PERIOD 1935-1960

Month	Temperature (°F)						Precipitation Totals (Inches)						Mean number of days								
	Means			Extremes			Mean	Greatest daily	Year	# Snow, Sleet			Precip. .10 inch or more	Temperatures		Month					
	Daily maximum	Daily minimum	Monthly	Record highest	Year	Record lowest				Year	#	Maximum monthly		Year	Greatest daily		Year	Max.	Min.		
(a)	26	26	26	26	26	26	26	26	26	26	22	22	22	22	22	25	26	25	25	26	JAN
	23.6	7.2	15.4	47	1940	-55	1540	4.26	2.95	1953	48.0	123.0	1954	22.0	1953	11	0	23	31	10	FEB
	27.2	8.8	18.0	56	1958	-53	1320	3.54	1.28	1949	40.4	81.4	1940	17.0	1940	10	0	19	28	8	MAR
	33.5	13.7	23.6	62	1960	-42	1280	3.08	1.45	1945	39.3	72.7	1956	26.5	1947	11	0	13	30	6	APR
	44.7	22.9	33.8	75	1936	-30	940	2.78	1.96	1951	25.8	87.0	1954	18.0	1954+	8	0	3	26	1	MAY
	56.3	30.8	43.6	81	1936	0	660	2.86	1.85	1938	7.9	28.5	1938	15.0	1938	8	0	0	20	0	JUN
	61.8	37.2	49.5	90	1936	15	470	3.70	2.26	1943	1.4	16.5	1943	16.5	1943	9	0	0	7	0	JUL
	73.7	40.4	57.0	93	1960	25	240	1.24	0.90	1958	1.4	16.5	1955+	16.5	1950+	4	0	0	4	0	AUG
	71.5	38.5	54.9	94	1940	19	310	1.52	1.71	1946	1.6	0.5	1952	0.5	1952	4	0	0	8	0	SEP
	61.7	33.8	47.8	91	1950	6	520	2.52	1.60	1940	4.6	17.0	1947	10.0	1954+	7	0	11	14	0	OCT
	49.4	28.7	39.1	82	1957	-30	800	3.10	1.55	1951	11.0	61.0	1951	30.0	1951	8	0	2	20	0	NOV
	33.5	18.3	25.9	61	1947	-42	1170	3.96	1.79	1942	37.0	76.9	1946	23.0	1951	10	0	13	27	3	DEC
	28.5	13.7	21.1	57	1939	-38	1360	4.31	1.45	1939	40.9	94.1	1949	18.5	1938	12	0	20	30	5	
Year	47.1	24.5	35.8	94	AUG 1940	-55	10610	36.87	2.95	JAN 1953	256.3	123.0	JAN 1954	30.0	OCT 1951	102	*	93	245	33	Year

(a) Average length of record, years.

T Trace, an amount too small to measure.

** Base 65°F

+ Also on earlier dates, months, or years.

* Less than one half.

Hail was included in these values from July 1948 through December 1955.

U. S. DEPARTMENT OF COMMERCE, WEATHER BUREAU
 IN COOPERATION WITH NATIONAL PARK SERVICE
 CLIMATOGRAPHY OF THE UNITED STATES NO. 20 - 24
CLIMATOLOGICAL SUMMARY

LATITUDE
 LONGITUDE
 ELEV. (GROUND)

STATION POLEBRIDGE, MONTANA

MEANS AND EXTREMES FOR PERIOD 1933-1960

Month (a)	Temperature (°F)					Mean degree days **	Precipitation Totals (Inches)					Mean number of days					Year									
	Means		Extremes				Greatest daily	Year	# Snow, Sleet			Precip. .10 inch or more	Temperatures			Year										
	Daily maximum	Daily minimum	Monthly	Record highest	Year				Record lowest	Year	Maximum monthly		Year	Greatest daily	90° and above			32° and below	32° and below	0° and below						
JAN	27.1	5.9	20	51	1954	-46	1957+	11	2.73	1.53	24	18	91.2	18	18	20	17	17	17	17	18	18	18	18	JAN	
FEB	33.4	8.3	20.9	55	1958+	-45	1936	1188	1.93	1.06	1951	18	59.7	18	18	0	19	30	11	30	0	19	30	11	FEB	
MAR	41.3	14.9	28.1	63	1960	-38	1960	1162	1.64	1.50	1954	18	30.5	18	18	0	10	28	7	28	0	10	28	7	MAR	
APR	53.0	24.7	38.9	86	1936	-12	1936	807	1.56	0.85	1934	18	24.8	18	18	0	5	30	4	30	0	5	30	4	APR	
MAY	64.7	32.8	48.8	92	1936	-5	1954	521	1.70	1.73	1959	18	8.7	18	18	*	*	*	*	26	*	*	26	*	MAY	
JUN	70.2	39.0	54.6	96	1937	21	1951	321	2.17	1.75	1951	18	0.7	18	18	*	*	*	*	15	*	*	15	*	JUN	
JUL	81.2	41.1	61.2	101	1936+	28	1959+	150	1.16	1.33	1948	18	T	18	18	4	0	0	0	5	0	0	5	0	JUL	
AUG	79.0	38.7	58.8	96	1959+	25	1937	200	1.31	1.34	1954	18	T	18	18	4	2	0	0	2	0	0	5	0	AUG	
SEP	69.1	32.8	51.0	94	1950	5	1934	417	1.28	1.03	1959	18	4.0	18	18	0	0	15	0	15	0	0	15	0	SEP	
OCT	54.6	27.1	40.8	85	1955	-21	1935	746	1.87	1.50	1934	18	16.5	18	18	0	0	0	0	0	0	0	0	0	0	OCT
NOV	37.9	18.8	28.3	63	1936	-38	1959	1116	2.30	1.56	1946	18	53.2	18	18	0	0	0	0	0	0	0	0	0	0	NOV
DEC	30.6	13.3	22.0	52	1957	-32	1955	1319	2.77	1.11	1955	18	60.9	18	18	0	0	0	0	0	0	0	0	0	0	DEC
Year	53.5	24.8	39.2	101	JUL 1936+	-46	JAN 1957+	9444	22.42	1.75	JUN 1951	18	123.8	18	18	6	58	238	31	238	6	58	238	31	JAN 1954	

(a) Average length of record, years.

T Trace, an amount too small to measure.

** Base 65° F

+ Also on earlier dates, months, or years.

* Less than one half.

Hail was included in these values from July 1948 through December 1955.

WEST GLACIER, MONTANA

Average Temperature (°F)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Ann'l
1931	28.0	27.0	32.9	42.8	52.0	59.0	63.6	62.7	52.8	42.6	27.6	25.2	43.0
1932	20.3	23.8	27.0	41.3	50.8	58.6	63.0	63.2	52.2	41.4	34.0	18.6	41.2
1933	25.1	18.6	34.0	40.8	47.9	59.0	63.8	62.1	50.2	43.4	36.4	29.1	42.5
1934	30.5	29.8	36.7	48.2	55.4	57.6	65.0	64.0	50.3	44.8	37.2	27.6	45.6
1935	20.5	24.8	30.0	35.7	48.6	56.2	63.6	60.6	54.8	41.4	27.2	26.9	40.9
1936	25.4	3.8	30.5	40.6	56.1	60.8	68.6	65.6	53.1	44.4	26.2	26.2	41.7
1937	1.1	20.8	32.6	41.2	52.0	57.8	65.0	59.9	55.2	44.7	32.3	25.8	40.7
1938	24.0	22.2	33.7	42.2	49.3	58.4	63.8	60.5	59.1	45.8	29.6	26.3	42.9
1939	29.2	19.8	33.0	45.1	53.2	55.0	65.2	63.4	55.4	44.6	34.1	30.6	44.0
1940	21.1	29.4	38.6	43.8	54.4	60.9	66.6	64.1	59.8	46.4	24.8	27.8	44.8
1941	24.9	28.6	36.8	46.1	52.2	59.5	67.4	63.8	49.0	41.6	35.0	27.8	44.4
1942	19.4	24.1	34.4	44.9	49.6	55.2	65.0	63.8	54.9	44.8	29.0	28.2	42.8
1943	14.4	27.2	24.6	45.4	47.8	53.1	63.0	62.0	54.8	45.2	33.0	24.6	41.3
1944	24.0	26.2	28.8	44.6	52.8	58.2	63.5	61.0	55.2	46.6	33.9	22.8	43.1
1945	27.3	28.4	32.8	38.9	51.4	55.8	65.4	65.2	51.0	44.4	30.2	26.1	43.1
1946	27.3	29.4	36.5	43.6	50.3	55.6	64.4	62.4	52.2	38.5	26.5	23.8	42.5
1947	20.5	25.1	32.8	45.9	53.1	54.8	65.2	61.2	53.2	46.0	30.4	27.6	43.0
1948	24.0	22.2	26.8	40.6	51.4	59.8	60.0	60.8	53.2	40.8	32.8	17.8	40.9
1949	5.6	19.0	29.1	44.3	52.5	56.3	62.5	63.1	52.7	39.9	36.1	23.3	40.4
1950	4.9	26.1	29.7	38.7	47.9	55.1	63.0	61.4	52.7	43.6	30.1	28.5	40.2
1951	18.7	23.4	24.5	39.5	49.1	52.6	63.4	60.1	48.9	38.8	29.7	16.7	38.8
1952	18.3	27.4	31.0	44.0	51.4	56.4	61.4	61.9	55.7	45.7	31.3	27.2	42.6
1953	32.1	30.1	34.9	38.8	48.9	55.1	63.9	62.4	54.9	45.4	35.3	29.5	44.3
1954	19.6	31.8	26.9	35.8	50.4	53.3	62.4	59.5	51.7	40.0	37.0	27.8	41.3
1955	25.7	21.7	23.5	37.4	46.1	57.8	61.3	61.4	52.1	42.7	22.1	21.7	39.5
1956	22.7	21.1	30.8	39.9	51.1	57.0	64.2	61.2	53.8	42.4	30.5	26.0	41.7
1957	9.3	22.8	31.3	40.7	54.0	57.5	62.9	60.8	54.0	39.6	31.0	30.0	41.2
1958	27.5	28.8	31.9	41.4	57.5	59.1	63.0	66.5	53.3	42.4	30.0	27.4	44.1
1959	22.3	22.2	34.1	41.5	46.4	57.0	62.8	58.7	50.4	40.8	24.1	25.9	40.5
1960	18.3	24.0	30.5	40.6	48.0	56.8	66.1	57.9	52.9	42.8	30.2	22.9	40.9

WEST GLACIER, MONTANA

Total Precipitation (Inches)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Ann'l
1931	1.29	1.15	2.70	0.98	2.44	2.52	1.94	T	3.47	1.44	1.65	3.14	22.72
1932	3.29	3.71	4.43	2.22	2.45	1.53	1.60	2.16	0.56	2.44	6.03	3.91	34.33
1933	4.16	2.76	1.41	1.34	1.56	3.48	0.05	2.91	3.21	5.96	2.60	7.53	36.97
1934	3.60	0.21	3.17	1.08	1.86	2.19	0.34	0.32	1.00	2.75	3.26	2.93	22.71
1935	4.59	0.44	1.64	1.09	1.15	1.61	1.12	0.82	0.52	1.00	2.38	1.07	17.43
1936	4.76	2.48	1.85	1.19	3.36	2.40	0.38	0.17	1.25	0.91	0.27	4.02	23.04
1937	2.40	2.99	0.64	3.25	2.03	3.10	0.72	0.99	1.53	2.61	3.89	3.82	27.97
1938	2.30	1.95	0.68	1.67	3.73	2.07	1.59	1.90	0.79	2.71	2.41	4.68	26.48
1939	3.49	2.08	1.32	0.99	1.88	4.15	0.79	0.29	1.39	0.81	1.57	3.37	22.13
1940	1.32	5.87	2.00	2.62	1.65	1.72	1.56	0.06	1.99	2.01	3.53	2.92	27.25
1941	2.91	0.46	0.51	0.39	3.50	1.71	0.75	0.48	3.78	1.53	3.19	3.01	22.22
1942	0.74	1.46	0.94	2.10	4.29	3.87	2.33	0.62	1.73	2.29	3.71	3.36	27.44
1943	2.61	2.66	1.62	1.21	2.38	3.69	0.50	0.36	0.74	3.65	0.94	1.48	21.84
1944	0.67	0.88	1.36	1.32	2.62	2.00	0.70	1.98	2.74	0.27	2.55	1.50	18.59
1945	2.62	1.86	2.58	2.59	2.12	3.16	0.20	0.45	4.19	4.18	4.22	2.11	30.28
1946	3.96	1.78	1.33	2.05	3.12	3.77	1.78	1.15	2.09	5.43	6.75	3.98	37.19
1947	4.01	1.89	2.54	1.45	0.76	6.00	0.95	4.73	1.54	4.08	1.94	1.69	31.58
1948	2.27	3.05	1.47	4.50	2.86	3.90	3.79	0.67	0.39	0.94	3.70	3.53	31.07
1949	1.29	4.20	1.56	1.08	2.27	2.12	1.93	0.55	1.61	3.45	2.73	3.86	26.65
1950	4.71	2.32	3.46	1.63	0.91	3.52	1.02	1.78	1.10	5.87	2.35	5.17	33.84
1951	4.77	4.88	1.89	1.67	3.08	2.92	1.75	2.59	4.00	4.92	2.25	4.25	38.97
1952	2.51	1.29	1.13	0.27	3.17	4.56	1.56	1.44	1.94	0.08	0.68	2.43	21.06
1953	7.07	3.24	1.62	3.19	2.99	3.95	0.09	1.17	0.60	0.89	2.73	4.78	32.32
1954	4.98	2.69	2.47	2.91	2.13	3.60	3.15	5.14	1.64	1.70	2.94	1.79	35.14
1955	1.58	2.33	1.55	1.49	1.82	2.75	4.10	0.00	2.25	5.08	3.55	2.80	29.30
1956	2.50	2.50	1.94	1.89	1.09	2.66	1.53	1.67	1.77	3.27	1.05	4.78	26.65
1957	2.60	3.67	1.60	1.58	1.62	3.99	0.73	0.69	0.35	2.68	1.36	3.57	24.44
1958	3.04	3.29	1.41	3.45	1.40	3.36	0.97	0.62	3.87	1.80	5.64	3.38	32.23
1959	5.31	2.29	1.49	2.62	3.05	2.33	0.05	1.55	4.08	2.69	7.52	1.15	34.13
1960	2.63	2.33	2.06	2.14	3.65	1.96	0.00	2.75	0.59	1.70	4.52	1.84	26.17

SUMMIT (MARIAS PASS), MONTANA

Average Temperature (°F)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Ann'l
1935		25.6	21.1	24.8	40.2	49.0	56.8	53.9	49.0	35.4	23.4	23.8	
1936	18.2	-5.2	21.7	34.2	48.5	53.0	60.8	57.0	48.2	41.8	28.2	18.9	35.4
1937	-3.3	14.6	22.6	32.9	44.0	49.4	56.8	54.2	46.8	42.2	27.2	19.8	33.9
1938	20.4	13.6	26.0	35.1	41.8	51.5	58.6	53.9	53.6	41.0	23.1	20.3	36.6
1939	23.4	12.4	26.8	36.2	46.2	46.2	57.4	55.4	49.7	40.0	36.8	28.1	38.2
1940	15.8	20.2	31.1	33.0	46.3	52.2	57.8	56.2	52.0	42.3	18.4	23.0	37.4
1941	21.4	19.8	28.7	37.4	44.2	50.5	57.6	54.5	42.2	37.2	32.0	21.5	37.2
1942	18.4	15.8	25.8	37.6	41.3	47.0	55.5	54.2	48.3	41.0	23.8	24.0	36.1
1943	7.0	23.9	17.8	38.2	39.3	45.0	56.8	55.2	49.3	40.7	31.2	21.2	35.5
1944	22.8	16.5	19.4	36.3	45.4	49.0	54.6	52.2	47.6	45.0	26.4	17.7	36.1
1945	21.1	20.0	25.7	28.2			57.0	56.0	44.1	43.0	25.9	20.4	
1946	24.4	25.0	30.8	38.4	43.9	49.1	58.5	55.4	46.9	32.3	21.5	22.0	37.4
1947	16.0	19.3	25.3	37.2	46.0	48.6	58.9	53.8	47.2	40.6	23.0	23.9	36.6
1948	20.2	12.4	18.4	32.6	42.6	53.3	53.6	55.4	48.6	40.2	25.7	12.9	34.7
1949	1.2	14.5	23.0	40.3	46.1	50.4	55.6	56.6	46.3	33.9	37.4	12.7	34.9
1950	-5.3	23.4	20.1	30.0	39.6	47.5	55.0	54.3	47.2	39.1	24.1	26.0	33.4
1951	13.3	17.4	17.5	31.5	42.6	44.3	56.5	53.2	43.5	33.6	25.7	11.3	32.5
1952	14.1	22.5	21.9	37.9	45.0	49.3	54.6	54.7	51.2	43.7	25.2	24.3	37.4
1953	26.0	23.7	28.6	28.8	41.1	48.4	56.8	56.1	50.1				
1954	9.5	29.6	18.3	28.9	40.8	47.7	56.4	53.1	46.0	36.2	35.8	24.1	35.6
1955	19.8	15.8	15.6	34.1	41.3	51.4	58.0	57.3	45.5	40.4	12.9	15.9	34.0
1956	16.7	15.2	25.5	32.9		50.7	57.3	54.2	47.9	36.6			
1957	6.6	18.1	25.9	31.5	46.0	50.4	57.4	55.2	49.7	34.1	26.2	26.8	35.7
1958	26.4	22.8	23.2	33.8	50.1	49.2	53.4	59.5	46.4	41.4	22.6	22.1	37.6
1959	16.1	14.2	28.3	34.2	40.4	53.2	59.5	52.8	44.4	35.5	20.9	34.8	35.3

SUMMIT (MARIAS PASS), MONTANA

Total Precipitation (Inches)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Ann'l
1935		0.59	4.48	3.69	1.49	1.44	0.84	0.54	1.21	1.36	1.23	0.95	
1936	6.28	3.96	3.92	1.23	1.21	2.60	0.59	1.34	1.73	2.10	0.64	5.34	30.94
1937	2.24	4.78	1.15	2.75	1.82	5.52	0.27	1.09	2.23	2.48	2.96	5.20	32.49
1938	3.19	2.95	3.73	2.78	5.27	2.94	2.23	1.54	1.24	3.78	4.27	5.96	39.88
1939	4.01	1.94	2.40	2.40	1.78	3.41	0.41	0.78	1.95	2.06	0.86	3.30	25.30
1940	0.94	5.51	1.62	3.75	1.16	1.36	1.18	0.67	4.50	1.68	2.95	1.74	27.06
1941	2.03	0.67	0.98	1.02	3.92	5.47	1.31	1.07	4.37	2.03	3.29	5.10	31.26
1942	0.45	1.32	2.69	1.07	5.13	4.38	2.09	1.42	3.60	1.87	7.43	3.42	34.87
1943	4.86	3.70	3.50	2.69	3.86	6.81	0.44	0.70	1.97	2.89	1.12	1.63	34.17
1944	1.68	1.86	2.58	0.60	4.37	3.00	0.45	2.58	3.28	0.84	2.36	1.86	25.46
1945	3.15	2.98	3.62	4.15	2.12	4.79	0.88	0.92	3.28	2.77	4.45	3.03	36.14
1946	4.23	2.77	2.05	0.85	1.49	2.80	1.25	2.85	1.98	7.16	7.28	5.34	40.05
1947	3.43	2.38	3.17	1.21	1.12	3.69	0.45	3.05	1.95	4.51	2.36	2.32	29.64
1948	5.04	5.69	4.26	3.34	3.81	6.68	1.78	0.60	0.78	1.23	5.54	5.30	44.05
1949	2.29	6.27	2.40	2.04	4.18	1.40	1.59	0.62	3.17	3.06	5.13	8.73	40.88
1950	9.35	3.55	4.94	3.12	1.87	5.44	2.02	1.89	1.69	7.53	5.92	5.95	53.27
1951	5.51	6.58	3.93	3.01	3.21	4.32	2.31	2.95	4.36	6.20	3.20	4.65	50.23
1952	4.35	2.15	2.55	0.65	2.30	4.05	1.05	2.00	1.55	0.75	1.63	3.12	26.15
1953	14.00	4.50	3.20	5.78	6.29	5.10	0.21	1.03	2.38	2.58	3.91	6.53	55.51
1954	8.52	5.24	3.27	4.45	2.04	3.03	1.52	2.52	3.42	3.32	3.57	3.71	44.61
1955	1.66	2.50	4.52	1.75	3.13	3.89	3.49	0.00	2.16	5.03	7.81	6.39	42.33
1956	3.76	5.56	4.73	2.55	2.95	1.77	1.60	3.23	2.19	3.48	2.58	6.85	41.25
1957	2.43	6.23	1.67	2.67	2.75	4.45	1.06	0.95	1.30	2.24	1.99	6.11	33.85
1958	3.33	2.80	1.38	4.75	1.25	5.50	2.81	0.81	4.03	2.47	8.21	4.20	41.54
1959	6.05	3.48	4.09	4.98	3.00	0.95	0.19	1.62	4.02	4.90	6.20	2.94	42.42
1960	3.64	2.02	3.26	4.91	2.82	1.49	0.12	2.71	1.05	2.20	6.08	2.50	32.80

POLEBRIDGE, MONTANA

Average Temperature (°F)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Ann'l
1933								60.4	48.6			24.4	
1934	29.3	25.6	35.4	45.9	55.0	53.2	61.4	60.2	47.9	41.2	36.7	23.2	42.9
1935	19.0				42.3	52.1		56.7	50.9	38.2	24.4	23.9	
1936	20.5	-1.8	28.2	38.2	53.7	58.2	65.2	61.1	49.6	42.1	25.4	21.8	38.5
1937	-3.0	19.1		40.2	50.0	55.8	63.6	59.1	54.1	44.8	33.1	21.0	
1938	19.4	20.4	31.4	38.8	46.6	56.6	62.8	57.0	56.6				
1945												24.1	
1946	25.5	27.0				55.0	61.8	59.6	50.4		24.2		
1947	18.3		31.2		51.4	53.6	63.6	58.6	51.0	44.0	27.6	24.8	
1948	20.0	18.8	23.6	38.8	49.6	59.0	58.0	59.5	50.1	40.3	28.7	12.4	38.3
1949	1.3	15.8	27.9	42.6	50.9	53.8	59.6	59.4	50.8	37.7	35.4	19.0	37.9
1950	1.0	24.6	27.4	36.9	45.8	53.3	60.0	58.9	50.4	41.8	27.2	27.7	37.9
1951	15.1	21.2	22.2	37.4	48.1	50.5	60.5	57.0	48.5	38.3	27.1	11.3	36.4
1952	15.7	24.4	27.4	41.8	48.8	54.1	59.3	58.5	53.6	42.6	27.2	24.4	39.9
1953	30.4	26.5	32.1	36.6	47.2	52.8	60.4	59.9	52.4	43.8	34.0	25.1	41.7
1954	15.6	29.9	23.6	33.6	47.7	51.7	59.8	57.6	49.5	38.6	35.9	24.6	39.0
1955	21.3	18.8	20.7	35.8	44.6	54.9	59.8	57.9	49.3	42.8	19.7	16.6	36.9
1956	20.4	18.1	28.1	37.7	49.9	54.7	61.5	59.1	51.2	39.8	26.6	22.9	39.1
1957	3.7	20.7	28.9	38.6	51.5	55.9	59.6	56.7	51.7	37.3	28.0	26.3	38.3
1958	24.7	28.1	27.9	39.3	54.8	57.3	61.0	63.6	51.4	40.6	26.3	24.3	41.6
1959	19.6	18.3	32.2	39.5	44.4	55.7	60.5	56.8	50.9	39.9	21.6	21.2	38.4
1960	14.3	20.2	29.6	39.0	45.8	54.0	64.4	57.8	51.6	41.2	29.5	20.1	39.0

POLEBRIDGE, MONTANA

Total Precipitation (Inches)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Ann'l
1933								2.02	2.50			9.47	
1934	3.14	0.29	2.98	1.45	1.40	1.88	0.05	0.59	1.00	3.34	2.94	2.91	21.97
1935	6.21	0.37			0.52	1.48	1.10	0.80	0.43	1.32	1.40	0.64	
1936		2.31	1.63	1.78	1.39	1.28	0.25	0.38	1.29	0.39	0.05	2.82	
1937	1.25	2.97		2.40	1.31	1.87	0.59	0.89	1.47	1.45	2.50	3.55	
1938	1.40	2.22	1.64	1.43	2.00	1.95	1.91	0.97	1.03			4.22	
1939		2.07											
1941											2.66	3.24	
Ø 1942	0.58	0.99			3.79		1.81	1.16	1.67	1.09	3.47	1.35	
Ø 1943	3.37	1.37	2.04	0.74	1.77	1.98	0.72	1.24	0.33	1.78	0.43	1.49	17.26
Ø 1944	0.81	0.89	0.86	0.68	2.01	1.98	0.41	1.45	1.18	0.25	1.11		
Ø 1945		1.64	2.29	2.25	1.35	1.98	1.59	0.91	2.08	1.79	3.69	2.00	
1946	2.14	1.49	1.44	0.63	1.50	2.19	1.03	1.11	1.28	2.92	5.31	2.06	23.10
1947	2.08	1.39	1.73	0.36	0.90	2.97	0.32	2.99	0.67	3.70	0.85	1.22	19.18
1948	1.54	2.69	1.74	2.24	1.88	3.44	3.74	1.16	0.09	0.52	2.58	2.06	23.68
1949	1.07	4.38	1.25	1.08	2.18	1.37	2.74	0.63	1.01	1.32	2.96	3.06	23.05
1950	4.28	1.74	2.73	0.88	0.70	1.61	1.02	0.96	0.70	3.51	2.07	2.34	22.54
1951	3.48	3.19	2.05	1.26	2.45	2.55	1.38	3.14	2.91	4.34	1.77	4.69	33.21
1952	2.19	0.99	0.59	0.48	1.40	3.35	0.90	0.72	0.39	0.07	0.49	1.50	13.07
1953	6.32	1.86	0.86	2.47	1.70	3.10	0.08	1.14	0.96	0.43	2.32	4.13	25.37
1954	6.92	3.04	2.93	3.39	0.97	1.65	1.96	4.81	0.91	1.16	1.55	0.96	30.25
1955	0.67	1.94	1.95	1.01	1.36	1.68	2.14	T	1.37	2.77	2.86	4.47	22.22
1956	1.99	1.51	1.82	1.81	1.40	2.45	1.60	1.09	1.34	1.44	0.64	2.99	20.08
1957	1.54	3.27	0.71	1.52	1.89	3.44	1.58	0.54	0.43	3.31	0.53	2.75	21.51
1958	1.99	2.64	1.09	2.57	1.18	3.59	0.74	1.09	2.06	1.68	4.21	2.49	25.33
1959	5.54	1.97	0.52	2.71	3.38	1.40	0.11	1.21	4.45	3.22	4.79	1.57	30.87
1960	1.44	1.25	1.59	1.12	2.47	0.61	0.10	1.86	0.56	1.12	4.08	1.17	17.37

STATION HISTORIES
(Continued from Pg. 4)

WEST GLACIER

SUMMIT

SNOW TABLES

Snow Depth (in.) 1st of Month				Snow Depth (in) About 1st of Mo.								
Year	Dec.	Jan.	Feb.	Mar.	Apr.	May	Year	Jan.	Feb.	Mar.	Apr.	May
1931	7	12	11	11	0		1935	35	32	36	-	31
1932	2	19	25	22	13	8	1936	24	26	51	61	8
1933	0	21	27	41	18	28	1937	29	40	52	47	28
1934	2	8	5	0	0	19	1938	34	40	44	51	19
1935	4	15	23	22	27	5	1939	46	55	66	42	5
1936	0	15	30	34	37		1940	6	12	40	29	11
1937	3	7	35	28	8	T	1941	17	26	26	15	T
1938	0	6	19	17	2	1	1942	17	17	24	30	1
1939	0	12	28	35	T	22	1943	34	54	61	66	22
1940	8	3	9	13	0	4	1944	20	19	27	29	4
1941	0	14	21	16	0	38	1945	24	24	34	46	38
1942	8	3	6	10	0	19	1946	30	50	48	45	19
1943	0	17	31	32	17	??	1947	51	63	63	61	??
1944	2	6	4	7	T	37	1948	24	30	51	69	37
1945	8	11	8	7	6	27	1949	36	45	63	63	27
1946	23	16	41	24	4	63	1950	40	66	70	83	63
1947	10	31	40	31	19	46	1951	28	45	58	67	46
1948	13	6	9	19	16	24	1952	43	52	56	58	24
1949	T	25	29	29	24	45	1953	17	38	48	48	45
1950	14	13	32	32	31	91	1954	49	67	75	82	91
1951	1	8	20	23	18	39	1955	19	24	49	55	39
1952	0	25	22	25	18	51	1956	41	48	76	65	51
1953	T	7	9	18	T	42	1957	30	44	57	54	42
1954	T	7	30	24	35	39	1958	30	40	42	36	39
1955	3	8	15	22	20	50	1959	31	52	61	59	50
1956	0	18	28	35	19	40	1960	26	37	43	37	40
1957	2	10	28	25	19							
1958	6	13	18	16	5							
1959	14	11	22	24	13							
1960	2	10	21	27	8							

Courtesy U. S. Geological Survey
from Summit Snow Course Readings

There have been short records kept in many other places in and around the Park's periphery and some of these stations are still operating. However, it is beyond the scope or purpose of this report to list details of these records, most of which are of short duration or are seasonal in character. Stations now operating, with some details of their programs, are listed:

East Glacier	National Park Service	Measures precipitation only.
Essex (Walton R.S)	National Park Service	Temperature and Precipitation, intermittent record since 1951.
Babb 6NE	U.S. Bur. Reclamation	Class A evaporation station, 1906 to date, not used in this report because of distance from Park boundary.
Grinnell Glacier	National Park Service	Seasonal precipitation, summer temperatures, for glacier studies since 1949.
Sperry Chalets	National Park Service (Mrs. Ross Luding)	Summer (July-August) data only. Started June 29, 1960.

In addition partial, and in some cases, unofficial and substandard data have been observed for short periods at:

St. Mary Ranger Station	Sherburne Reservoir (dam site)
Many Glacier Ranger Station	Bear Creek
Lubec (east of Summit)	Upper Columbia Snow Lab.
Sherburne Ranger Station	Upper Lake McDonald

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The Association aids the Park in developing its library and roadside exhibits; offers natural history books for sale; assists in the acquisition of non-federally owned lands within the Park; and cooperates fully with the United States Government in helping to make Glacier a better Park. Revenue derived from its activities is devoted entirely to these purposes. Any person interested in the furtherance of these purposes may become a member upon payment of the annual fee of one dollar. Tax-free gifts and donations may be made for land acquisition or general use.



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