Climatological Data for August, 1910.

DISTRICT No. 12, COLUMBIA VALLEY.

EDWARD A. BEALS, District Editor.

GENERAL SUMMARY.

There has been a deficiency in precipitation in the Columbia Valley during every one of the last 6 months, and in many localities no rain has fallen for over 2 months. Out of a total of 346 stations in this district there were 162 that reported no rain in measurable quantities during the month of August. Such a drought is unprecedented, and it has caused the streams to become the lowest on record and the ranges to dry up and become bare of feed. The long dry spell was the means of promoting forest fires, which were more numerous than for many years, and they were not under control until near the end of the month, when a few small showers occurred that checked their spreading and cleared the atmosphere of smoke. The temperatures ranged below normal, and there were no damaging hot spells. The harvesting of the grain crop proceeded without interruption, and good yields were reported of fall sown grain, but the spring sown crop was light and in some places was nearly a failure.

TEMPERATURE.

The mean temperature, as determined from the records of 234 stations, was 62.7°, which is 2.8° below the district average. Only 3 stations reported means above the normal. The mean temperatures ranged between 52. 4° at Pleasant Valley, in northern Montana, and 73.6° at Ephrata, in central Washington. The warmest sections were in the central portion of the Snake River Valley in Idaho, and in the Valley of the Columbia River in central Washington and north-central Oregon, where mean temperatures above 70° occurred. The coolest sections were in northwestern Montana and northwestern Washington, with mean temperatures of 53° at some stations.

The month was unseasonably cool throughout. The presence of much smoke in the atmosphere prevented the occurrence of the ordinary high maximum temperatures during the day, and also interfered with rapid radiation at night. The highest temperatures occurred generally during the latter part of the second decade, and the lowest were recorded generally from the 23d to the 25th, at which time frost formed east of the Cascade Mountains, and did some slight damage to tender vegetation. During this cool period at some stations the lowest recorded August minimum temperatures occurred. The highest recorded temperature was 110° at Vale, Oreg., elevation 2,450 feet, on the 11th, and the lowest was 10° at Alta, Wyo., on the 24th.

PRECIPITATION.

The average precipitation, as determined from the records of 346 stations, was 0.20 inch, which is 0.43 inch below the normal for the district. At 162 stations there was either no rain or only a trace of precipitation, and only 7 stations reported monthly amounts in excess of the normal. The heaviest rainfall occurred in northern Washington, northeastern Oregon, western Montana, and near the headwaters of the Snake River in southeastern Idaho and western Wyoming. In central and southern Oregon and southwestern Idaho the month was practically rainless. The rains of consequence occurred mostly from the 7th to the 16th, and during the last 3 days of the month.

The greatest monthly precipitation was 2.33 inches at Ophir, Mont., elevation 8,800 feet, and the greatest monthly snowfall was 10.1 inches at Bison Mountain, Mont., elevation 7,240 feet. The greatest 24-hour rainfall was 1.25 inch at Ophir, Mont., on the 29th, while amounts of 1.00 inch occurred at Ovanda, Mont., on the 29th, at Northport, Wash., on the 24th, and at Granite Falls, Wash., on the 31st.

THE RIVERS.

On account of the continued drought the Columbia River, together with its feeders and all other mountain streams in the district, was unusually low at the close of the month, and with few exceptions the mean stages were the lowest for August ever recorded. The mean stage at The Dalles, 9.4 feet, is the lowest in a record of 16 years, and at Portland the stage of 4.8 feet is the lowest in 17 years.

The Columbia River averaged 1.9 foot below the the normal for the month, being 2.3 feet below at Vancouver, 3.8 feet below at The Dalles, and 2.8 feet below at Wenatchee. Compared with the July mean stages, the average was 5.5 feet lower, the August stage being 4.1 feet lower at Vancouver, 5.6 feet lower at The Dalles, and 9.2 feet lower at Wenatchee.

The Willamette averaged 0.5 foot below the normal for August, ranging between 0.3 foot below at Albany and 1.8 foot below at Portland. This river averaged 0.8 foot below the July mean stage, being 0.1 foot lower at Salem, 0.4 foot lower at Albany, 0.5 foot lower at Wilsonville, and 3.7 feet lower at Portland. The stages at Portland are not strictly comparable with those of the other Willamette River stations on account of the effect of tidewater during periods when the water stages are low. In this instance, however, the greater difference is properly attributed to the effectsof back water from the Columbia during the preceding months.

Navigation on the Columbia was not interrupted during the month, and on the Willamette conditions remained about the same, the regular boats only going as far as Newberg, except that the last of the month the steamer *Oregona* began making trips to Mission, a few miles beyond the mouth of the Yamhill River.

The Snake River averaged 1.5 foot below the August normal, and was 1.5 foot lower than the mean stage for July, the stage at Lewiston, Idaho, on the 31st being 0.4 foot below the zero of the gage.

MISCELLANEOUS PHENOMENA.

Westerly winds prevailed over the district during the month; on the 24th and 25th a high pressure area of considerable strength moving southeast from British Columbia produced a strong east wind over the greater part of the district, carrying smoke and ashes from forest fires. A velocity of 42 miles from the west was recorded at Lewiston, Idaho, on the 22d.

The number of cloudy days was less than usual, but the amount of sunshine received was also below the normal, the discrepancy being due to the heavy pall of smoke that covered a large portion of the district during the latter part of the month.

Freezing temperatures occurred on the 24th and 25th at many places in the northern part of the district, killing tender vegetation; the staple crops, however, were not injured. Snow fell in western Montana and at high altitudes in northern Idaho on the 23d and 24th.

Few thunderstorms occurred and none of a destructive nature were recorded.

DRY SEASON IN IDAHO.

CHARLES A. DONNEL, Assistant Observer, Weather Bureau.

The State is experiencing a dry spell of unusual duration. Except in the northern part, where the deficiency in precipitation did not become marked till late in the spring, the dry spell may be said to have begun in March. At the close of August it remained unbroken over the greater part of the State.

Considering the State as a whole, the month of March, with one exception, was the driest since the beginning of authentic records in 1894; in April and May the precipitation was deficient by about 20 per cent; June broke all records for dryness during that month; in July the rainfall was less than one-half the normal; and August was the driest month of any name in the history of

the service in Idaho. The normal precipitation for the State for the 6 months beginning with March is 7.94 inches; during the current season the fall averaged 4.61 inches, which is but 58 per cent of the normal. The deficiency in moisture is most marked in the eastern part of the State where the fall has averaged less than 40 per cent of the normal. The table below gives for all stations in that part of Idaho included in District No. 12, and having a record covering 10 years or more, the total precipitation and departure from the normal, in inches, together with the percentage of the normal, for the 6 months from March to August, inclusive.

Station.	Precipitation, March to August, 1910, incl.	Departure from normal.	Percentage of normal.
	Inches.	*Inches.*	*Inches.*
Blackfoot	2.24	−2.83	44
Boise	3.37	−1.76	66
Cambridge	4.92	−1.79	73
Chesterfield	2.83	−4.67	38
Forney	4.90	−3.88	56
Garnet	2.13	−0.90	68
Idaho Falls	1.26	−5.75	18
Lewiston	5.53	−0.32	95
Moscow	6.33	−2.63	71
Payette	2.46	−2.01	55
Pocatello	3.41	−4.74	42
Porthill	5.72	−2.49	70

NOTES.

(Furnished by Section Director Edward L. Wells, Boise, Idaho.)

Rapid progress is being made on the work of widening and lining the main canal of the Payette–Boise Project of the U. S. Reclamation Service.

Owing to some difficulties that have arisen between the Grandview Land and Irrigation Company and the settlers under its canal, a receiver has been appointed for the company. It is announced, however, that an amicable agreement has been reached, and that money will be forthcoming to repair the dam on the Bruneau River, which has been out of commission during the present season.

Plans have been made to build the dam of the Crane Creek Irrigation Land and Power Company during the present year. When complete, the dam will create a reservoir of approximately 3,000 acres in extent, having a capacity of 70,000 acre-feet.

Work on the dam of the Idaho Irrigation Company on Wood River is progressing and it is expected that the structure will be completed during the present year.

The engineer in charge of the Salmon River Dam south of Twin Falls reports that the dam will be completed in November.

The state land board has granted the Twin Falls West End Company a delay of 5 months in the construction of its irrigation system.

The College of Agriculture of the University of Idaho, at Moscow, announces a course in farm engineering.

Some question having arisen as to the stability of the Lost River Dam, 5 miles above Mackay, Idaho, the state land board appointed a committee consisting of Daniel G. Martin, State Engineer; A. J. Wiley, of Boise, and J. H. Quinton, of Los Angeles, to make a critical inspection of the dam. The report of this committee, which was made public on September 10, states in substance that the foundation of the dam is insecure, and that to complete it according to the original specifications and fill it to its capacity would inevitably result in disaster.

Hon. Daniel G. Martin, State Engineer for Idaho, reports that, leaving out of the reckoning filings for less than 100 second-feet, there were applications for the appropriation of public waters to the number of 110 filed during the 3 months ending August 31. Of these 59 were for irrigation, 36 for power, 11 for irrigation and power combined, 2 for mining, and 2 for mining and power combined. These filings are from every county in the State, and include water from more than 50 streams.

REVIEW OF THE SPOKANE RIVER HYDROELECTRIC POWER PLANTS.

By J. C. RALSTON, Mem. Am. Soc. C. E.

OROGRAPHY.

The intermountain territory of northeastern Washington, northern Idaho, and the Rocky Mountain region of western Montana, all embraced between latitude 46° to 50° N., and longitude 113° to 119° W., was by a profound system of faulting and trenching subdivided into a large complex of separate mountain ranges. These ranges have a north-south, northwest-southeast course, conformable to the basal trenches which stamped the complex into its rather rude rhombohedral subdivisions. Such ranges as the Livingston, Big Belt, Galton, Flathead, Cabinet, and Bitterroot, together with the Cœur d'Alene Mountains and others are included within the dynamic folding of this interesting territory.

The great fault zones, which subdivided these ranges, were largely the great waterways of early geologic times; but part of them, after having served through a varied history, as valleys for lava flows, retreating ice escarpments, and mighty gravel depositories, finally terminated their Pleistocene eras in the power streams of to-day. Such streams, clearly, are the Columbia, Clark Fork, or Missoula, the Kootenai, the Flathead, the Spokane, and others. Great as were their dynamic offices in the misty past, their aggregate commercial power to-day will probably exceed one million horse. The altitudes of the rivers range from 1,000 to 2,000 feet above sea level, and the mountains rise from these levels up to 8,000 and 9,000 feet. The ranges generally, particularly those south of the International Boundary, are thickly forested. The pre-Cambrian slopes are steep on all the mountain sides, including those of the Cœur d'Alenes. The latter constitutes the drainage basin of the Spokane River. Considerable of this whole complex is characterized by extensive terraces of post-Tertiary gravels, so that in the case of either the steep mountain slopes or the level terraces, the forest cover has little effect on precipitation or its run-off.

These physiographic facts coupled with the meteorologic conditions of the entire region, lying as it does between the Columbia River plateaus and the high table-lands of the Rocky Mountain foothills, places the whole area strikingly within the purview of Dr. Willis L. Moore's recent classic on precipitation as affected by forest cover.

GENERAL FEATURES OF THE SPOKANE RIVER AND ITS CATCHMENT BASIN.

The catchment basin of the Cœur d'Alene Lake, which is the head of the Spokane River, lies between latitude 46° 45′ and 47° 45′ N., and longitude 115° 30′ and 117° 0′ W. It has an area of approximately 4,000 square miles. The basin is flanked on the east by the summit of the Bitterroot Mountains, and on the west by Cœur d'Alene Lake; the former at altitudes of from 6,000 to 8,000 feet, and the latter at 2,122 feet. There are but two water courses, with their several branches, that drain the entire area. Both discharge into the lake. The whole district is mountainous, and much of it rugged. The two rivers, the St. Joseph and the Cœur d'Alene, flow through comparatively narrow valleys —from one-quarter to two miles in width. These streams on the lower stretches for about the last 30 miles have level gradients, and are virtually arms of the lake. They are regularly navigated by the largest steamboats on the lake. With the exception of narrow strips of a levee-like nature 200 to 300 feet wide, comprising the banks of each river, the valley land up to the head of navigation is a low worthless marsh. At low water both valleys are covered with marsh grass, sedge, tules, and cattails, interspersed with bunches of willow and cottonwood. At high water they are inundated. Much of the flood water remains standing on the marshes until it has been carried off by evaporation, while the main channel of the rivers within the same period drops 4 to 6 feet. The higher banks of the chan-