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SURFACE WATERS OF WYOMING AND THEIR UTILIZATION

BY

ROBERT FOLLANSBEE

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INTRODUCTION.

By NATHAN C. GROVER.

The United States Geological Survey and the State engineer of Wyoming have collected records of stream flow in that State since 1894, at times in cooperation and at times independently. These records have served as a basis for the development of irrigation and power and for the adjudication of water rights, and they are constantly becoming more valuable in connection with the further utilization of the surface waters of the State. Their increasing value becomes apparent when it is realized that more than a million and a half acres of land in Wyoming is now irrigated, an additional million acres is under completed ditch, and still another million acres is proposed for irrigation. Though not all of this area will be irrigated, because of inadequate water supply or of excessive cost, the reclamation of large additional areas by irrigation is certain.

The development of water power in Wyoming has been rather unimpressive, for not more than 8,000 horsepower has been utilized in the State, doubtless because of the relatively small demand for power and the availability of cheap fuel, both oil and coal. The Commissioner of Corporations [1] has estimated the minimum potential water power in Wyoming at 773,000 horsepower and the maximum at 1,305,000 horsepower. Even the minimum estimated is probably far in excess of the power that may practicably be developed, but in spite of the large producing oil fields in the State and of good coal near both its northern and southern borders, it does not appear unreasonable to expect, with the growth of cities, a large increase in the demand for water power for pumping and other industrial uses and for lighting, heating, and traction, so that the development reached might amount to 200,000 horsepower.

The necessity for exact knowledge concerning water available for all uses will become more urgent as those uses increase. The stability of water rights and of land values and the safety of investments will be even more dependent in the future than at present on reliable records of stream flow and of the beneficial use of the surface waters. The published records of stream flow are scattered through reports issued by the Geological Survey and by the State engineer, and many

[1] Report of the Commissioner of Corporations on water-power development in the United States, 1912.

of the reports are out of print. The records of use of the water and of irrigation and power projects are even less accessible than the records of stream flow, for most of them are unpublished and are to be found only in the files of the State engineer or of practicing hydraulic and irrigation engineers.

Mr. Follansbee has here assembled in one volume the essential facts regarding the surface-water supply of the State and its use. He has not attempted to discuss in detail either the water rights or the adequacy of the water supply for particular projects, except a few of the larger water-power projects. He has sought merely to set forth the facts in convenient form, so that present or prospective water users and their engineers and attorneys, as well as State and Federal officials, may have a basis for investigations leading to the future development of the State's resources, not only in agriculture by irrigation but in stock raising, mining, and other industries.

SURFACE WATERS OF WYOMING AND THEIR UTILIZATION.

By ROBERT FOLLANSBEE.

SCOPE OF REPORT.

This report presents, in form for ready reference, the available data pertaining to the present and future utilization of the surface waters of Wyoming and includes records of run-off and information relating to irrigation, water power, and storage.

The run-off data given herein have been taken chiefly from the original records of the United States Geological Survey and comprise only the records of monthly discharge. A few records that were shown by later information to be erroneous have been revised. No special surveys have been made by the Geological Survey to obtain for this report data pertaining to the utilization of the surface waters.

The areas irrigated in each drainage basin have been determined largely from tables showing rights under adjudicated ditches and under ditches completed but not yet adjudicated, published in the fourteenth biennial report of the State engineer. The brief descriptions of the larger projects have been abstracted from diverse sources which are believed to be authentic. The areas susceptible of future irrigation have been determined by reference to proposed Carey Act projects and to special investigations made by the United States Reclamation Service and the State engineer. To determine the water supply in the larger streams, the mean run-off for median year—the middle year when the years covered by the records are arranged in order of magnitude of run-off—has been used if no considerable storage is available, to determine that of streams susceptible of more or less complete regulation through storage, the average of the run-off for the years covered by the records has been used.

Information concerning developed water power was obtained from the managers of power plants. To determine the undeveloped water power, rough profiles of the larger streams were prepared from the topographic maps of the Geological Survey; for a few of the streams the information thus obtained was supplemented by special surveys made by private interests and reported to the State engineer. The

water supply available for the development of power was estimated from the records of run-off published in this report. As the topographic maps and special surveys do not cover all the streams, the information relating to the undeveloped water powers of the State is incomplete.

The data concerning developed storage were obtained chiefly from the operators of the reservoirs; for undeveloped storage the information was obtained from records filed in the State engineer's office, supplemented when possible by estimates of run-off at the reservoir site based on records of run-off. For the larger reservoir sites, allowance has been made for losses due to evaporation, a special study of which was made for this report. (See pp. 320–326.)

ARRANGEMENT OF REPORT.

The data are, for convenience, grouped by drainage basins and follow a description of the general features of State.

The rivers are divided into nine groups. The first four groups comprise Big Horn, Tongue, Powder rivers, and Clark Fork, and their tributaries, which flow to the Missouri through Yellowstone River; the fifth group is made up of North Platte River and its tributaries, whose waters join those of the South Platte in Nebraska to form Platte River; the sixth consists of Green River and its tributaries; the seventh comprises streams in the Little Snake River basin, which are tributary to Green River through the Yampa; the eighth comprises Bear River and its tributaries, whose waters flow into Great Salt Lake; and the ninth is made up of Snake River and its tributaries, which flow into Columbia River.

The data are presented in the order indicated by the grouping. Data for Wind and Big Horn rivers, for example, are followed by those for each important tributary arranged in order beginning at the source, and records of run-off are followed by data pertaining to irrigation, water power, and storage.

A map of Wyoming (Pl. I), in the pocket at the end of the volume, shows the boundaries of the principal drainage basins, the location of gaging stations, the areas covered by adjudicated water rights, and the boundaries of the larger irrigation projects, those proposed as well as those under construction.

COOPERATION AND ASSISTANCE.

Some of the earliest records in the State were furnished by the State engineer, who cooperated in maintaining the gaging stations during 1911–12 and 1915–1921 and maintained the stations independently during 1913 and 1914. Most of the records for 1913 and 1914 have been recomputed to insure consistency and conformity to the standards of the United States Geological Survey.

The United States Reclamation Service paid for the installation and operation of the stations on the North Platte and Sage Creek above Pathfinder and on Bull Lake Creek and Dinwoody Creek near Lenore and furnished complete records at a number of stations in the North Platte drainage basin, as noted in the description of the stations. The United States Indian Service paid for the installation and operation of stations on the Wind River Diminished Reservation established in 1921. The United States Forest Service furnished gage-height records for stations on Green River near Kendall, Pine Creek, Squaw Creek, and Middle Fork of Popo Agie River, and paid for installing the recording gage on Tongue River near Dayton. The State engineer of Colorado furnished records for stations in the Little Snake River basin and cooperated in maintaining the stations on Laramie River at Glendevey and Laramie River near Jelm. Gage-height records and transportation have been furnished by the Laramie Water Co. for stations in the Laramie River basin; the L. Z. Leiter estate for stations in the Clear Creek basin (incomplete records); the Hawk Springs Development Co. for the station on Horse Creek near Lagrange; and Johnson & Cronberg for the station on Medicine Bow River near Medicine Bow. Gage-height records were furnished by the Wyoming Irrigation Co. for Shell Creek at Shell; the Eden Land & Irrigation Co. for Big Sandy Creek near Farson; and the Buffalo Manufacturing Co. for Clear Creek near Buffalo. The Rock Creek Conservation Co. furnished records for stations in the Rock Creek basin. The Eden Land & Irrigation Co. paid for installing the recording gage on Big Sandy Creek near Farson. The Douglas Reservoirs Co. installed the station on La Prele Creek near Douglas. Mr. F. R. Richards furnished gage heights and other assistance for the station on Muddy Creek near Shirley. The Uinta Development Co. and later the Heber Land & Livestock Co. paid the observer on Blacks Fork near Urie for several years.

The stream-gaging records for this report have been compiled by P. V. Hodges, assisted by J. B. Spiegel and Mrs. Esther D. Rae.

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PHYSICAL FEATURES OF WYOMING.

BOUNDARIES AND AREA.

The boundaries of Wyoming are the same as those of the Territory of Wyoming, which are defined in the following clause from the act creating the territory [2] July 25, 1868.

That all that part of the United States described as follows: Commencing at the intersection of the twenty-seventh meridian of longitude west from Washington with the forty-fifth degree of north latitude, and running thence west to the thirty-fourth meridian of west longitude, thence south to the forty-first degree of north latitude,

[2] Gannett, Henry, Boundaries of the United States and of the several States and Territories, with an outline of the boundary of all important changes of territory (third edition): U. S. Geol. Survey Bull. 226, p. 132, 1904.

thence east to the twenty-seventh meridian of west longitude, and thence north to the place of beginning, be, and the same is hereby, organized into a temporary government by the name of the Territory of Wyoming.

As computed from the Smithsonian tables, the area of the State, comprising 7 degrees of longitude and 4 degrees of latitude, is 97,914 square miles.

TOPOGRAPHY.

The topography of Wyoming is diversified. The State is traversed by the Rocky Mountains, whose more or less parallel ranges trend in general north and south and are separated by high valleys. From the Nebraska line on the east to the front range of the Rockies, a distance increasing from about 60 miles at the southern border to 150 miles at the northern, the State is part of the Great Plains. The generally level surface of the Great Plains rises gradually from 5,000 feet above the sea at the eastern edge of the area to 6,500 feet at the western, and in it the streams have cut valleys that are bounded in most places by well-defined bluffs. In the extreme northeast corner of the State spurs of the Black Hills of South Dakota rise from 1,000 to 1,500 feet above the general level of the plains.

The front range of the Rockies is made up of the Laramie Mountains, which extend northward from the Colorado line to North Platte River, rising from 1,500 to 3,000 feet above the plains to the east; Bridger Mountains, beyond the North Platte, in general elevation 1,000 feet above the plains; and the rugged Big Horn Mountains, which reach elevations of 12,000 to 13,000 feet.

West of the front range is a high plateau crossed by more or less disconnected mountain ranges except in the northwestern part of the State, where the ranges merge. In the northern part of the plateau bounded by the Big Horn Mountains on the east and the Shoshone and Absaroka mountains on the west and nearly inclosed on the south by spurs of the Shoshone and Big Horn mountains, is the Big Horn Basin, in which badland districts are numerous but changes in elevation are relatively slight. South of the mountain spurs that form the southern boundary of the basin the plateau is as a rule level as far south as the Rattlesnake Mountains (north of Sweetwater River) and the Sweetwater Hills and Seminoe Mountains (south of the river), isolated ranges whose general trend is east.

Still farther south, beyond the Sweetwater Hills, is the treeless, dreary waste known as Red Desert, which extends south of the Union Pacific Railroad. The slope of this region is toward the center, so that it is in effect a closed basin in which the water is lost by evaporation and seepage. The level surface of the high plateau extends southward to the Colorado line but is broken near the southern edge by the northern spurs of the Uinta Mountains of Utah.

West of the Red Desert and south of the southern extension of the merged mountain ranges of the northwestern part of the State, extending to the State line in each direction, the plateau maintains a general elevation of 7,000 feet above sea level.

PRINCIPAL DRAINAGE SYSTEMS.

Heading on the crest of the continent, the streams of Wyoming find their way to both the Atlantic and Pacific oceans. The Atlantic receives, by way of the Mississippi-Missouri, the waters of Yellowstone, Clark Fork, Big Horn, Tongue, Powder, Little Missouri, Cheyenne, and North Platte rivers; the Pacific receives Green River through the Colorado and Snake River by way of the Columbia. The streams of a small area in the southwestern part of the State are tributary to Great Salt Lake through Bear River. A small area in the northwestern part of Yellowstone National Park is drained by headwaters of the Missouri, including a stretch of Madison River. In the southeast corner of the State, between the southern boundary of the North Platte basin and the Colorado line, is a small area drained by tributaries of the South Platte.

PRECIPITATION.

Records of precipitation in Wyoming of greater length than 10 years are relatively few, and many of them are not more than 7 years long, so that the distribution of precipitation throughout the State is not determinable from a long-time mean.

The records show, in general, the distribution of precipitation over the plains areas and intermountain valleys but give little indication of that in the higher mountains. A rough estimate of the precipitation in the mountains has been given by Gannett,[3] who discovered that about 20 inches of rainfall was needed for plant growth and that the run-off added to the 20-inch need for vegetation was a measure of the precipitation.

In the eastern part of Wyoming the mean annual precipitation decreases from 20 inches at the northeast corner to 16 inches near the base of the Big Horn Mountains, and then increases with increase in altitude to about 40 inches at the crest. Farther south the precipitation decreases from 18 inches at the Nebraska line to 14 inches at the base of the Laramie Mountains and then increases to 20 inches and more at the crest. West of the Big Horn Mountains the precipitation decreases very rapidly to 12 inches at the base and to 6 inches or even less in the Big Horn Basin itself. In the Shoshone and Absaroka ranges, which form the western boundary of the Big Horn Basin, the

[3] U. S. Geol. Survey Water-Supply Papers 301-312, Pls. I and II, 1912.

precipitation increases to 40 inches. Through the central part of the State the precipitation decreases from 16 inches at the Nebraska line to 10 inches in the Big Horn River and Sweetwater River basins, and then increases to 14 inches at the base of the Shoshone and Wind River mountains. In the mountains it increases rapidly to more than 40 inches at the crest.

West of the Laramie Mountains the precipitation decreases to 10 inches at the base and to 8 inches or less in the Red Desert. In the Medicine Bow Mountains and Sierra Madre the precipitation increases to 25 inches.

The precipitation west of the Red Desert is about 8 inches in the Green River basin and increases to 25 inches in the Wyoming Mountains, which form its western boundary. In the southwest corner of the State it increases from 8 inches in the Green River basin to 14 inches in the vicinity of Evanston.

FORESTATION.[4]

In Wyoming forests, or large bodies of trees, as distinguished from the scattered growths seen chiefly along the streams, are found only in the mountains, where the precipitation is sufficient to support their growth. The lower limit of forestation ranges from 6,000 feet in the northern part of the State to 8,000 feet in the southern part. Although precipitation increases in general with increase in altitude, forests do not grow at the higher altitudes in the mountains but stop at a more or less definite limit known as timber line. The altitude of timber line ranges from 10,000 feet in the northern part of the State to 10,500 feet in the southern part. Practically all the forested area except that in the Wind River Diminished Reservation is included in national forests, and by far the greater part of it is in the northwestern part of the State, in the Shoshone, Bridger, Washakie, Targhee, Teton, and Wyoming forests. The next largest area is in the Big Horn Mountains in the forest of the same name. Besides these areas there are much smaller areas of forest in the Sierra Madre and Medicine Bow Mountains, in the southern part of the State, included in the Hayden and Medicine Bow forests.

Within the forests are large nonforested tracts, comprising areas above timber line, grass lands, and barren lands, where the topography is too rugged for tree growth. There are also considerable areas of burned-over land, but as most of these are in various stages of reproduction they are not included in the nonforested areas.

In the following table the "protection area" consists of timberland, woodland, and burned-over land.

[4] Compiled chiefly from data furnished by U. S. Forest Service.

National forest areas in Wyoming.

Forest.	Net area (square mile).	Protection area (square mile).	Protection stand (M feet b. m.).	
			Total.	Per square mile of protection area.
Shoshone	2,457	1,141	2,044,905	1,792
Big Horn	1,756	1,073	1,500,568	1,398
Bonneville	948	447	1,236,000	2,765
Bridger	1,122	437	1,034,563	2,367
Washakie	384	207	250,000	1,208
Targhee	127	100	151,214	1,512
Teton	3,056	1,671	5,050,083	3,022
Wyoming	1,406	873	842,152	965
Hayden	684	575	750,000	1,305
Medicine Bow	734	599	3,132,866	5,320

The region of greatest density is the Medicine Bow Forest, in the North Platte basin, where the stand of protection cover per square mile is 5,320 M feet b. m. Next in density is the Teton Forest, in the Snake River basin, with 3,022 M feet b. m. The timber in the remaining forests is less dense, decreasing from 2,765 M feet b. m. in the Bonneville Forest to 965 M feet b. m. in the Wyoming Forest.

BIG HORN RIVER BASIN.

LOCATION AND BOUNDARIES.

The area drained by Big Horn River occupies the central part of the State, extending northward to the State line. The average distance from the north to the south side of the basin is 140 miles; that from the east to the west side is 180 miles. The area is bounded by an almost continuous ring of mountains except on the southeast, where the mountains give way to low hills. On the west it is bounded by the Absaroka and Shoshone mountains, which extend from the State line southward to Wind River, where they merge in the Wind River Mountains, which form the boundary on the southwest as far as Lander. Beyond this point the boundary becomes less well defined as the mountains give way to the high rolling plains that extend northward and gradually become rougher and higher until they merge into the Big Horn Mountains, which form the eastern boundary.

TOPOGRAPHY.

Elevations in the basin of Big Horn River range from more than 12,000 feet in the Wind River and Shoshone mountains to less than 3,600 feet at the Montana line. The nonmountainous parts of the area consist principally of broad rolling plains and smaller scattered badland areas, varied by intermediate erosion forms, such as fragmentary mesas, flat-topped buttes, and sharp-crested, steep-sided ridges separated by valleys and gulches of steep gradient.

The plains rise from Wind River to 6,000 feet at the foot of the Owl Creek Mountains, on the northwest, and to nearly 7,000 feet at the foot of the Wind River Mountains, on the southwest. From the outer edge of the river valley the surface rises, generally in a succession of terraces or gravel-covered benches, some of which, as at Riverton and above the mouth of Little Wind River, are of great width, to heights of 100 feet or more above the river, where they give way to plains and other upland features.[5]

The greater part of the area drained by Big Horn River lies in the Big Horn Basin, which extends from the Owl Creek Mountains to the Montana line as a broad structural valley bordered on nearly all sides by high mountain ranges. Along the outer portion of the valley a number of secondary ridges of moderate prominence extend in a direction nearly parallel to the trend of the higher mountain ranges. The interior of the valley is characterized by high badland slopes which terminate in irregular ridges of sharp peaks or are capped by older gravel terraces. The streams that cross the basin flow in deep but broad sloping valleys, bordered by terraces rising to adjoining highlands. On the eastern edge the mountains generally rise abruptly from the plains to an altitude of about 8,000 feet and then more gradually toward the summit line of the range, which reaches in places an altitude of about 10,000 feet. On the western edge the plains rise abruptly to the mountain masses. South of Greybull River the transition between mountain and plain is more gradual, until at the southwestern corner of the basin many of the prominent mountain ridges extend far out into the basin province.[6]

PRECIPITATION.

South of the Big Horn Basin the precipitation decreases from more than 30 inches at the crest of the Wind River and Shoshone mountains to 12 inches at their base, this amount being approximately the average for the nonmountainous part of the area. In the Owl Creek Mountains, which form the southern border of the basin, the precipitation increases to 14 inches. Within the basin itself the precipitation ranges between 6 and 12 inches and probably averages 7 inches. In the eastern part, just west of the Big Horn Mountains, the precipitation may be less than 6 inches, as the only available records for that area indicate a mean precipitation as low as 4.5 inches. In the Big Horn Mountains on the eastern boundary the precipitation rapidly increases with increase in altitude to 30 inches or more at the crest and the increase is similar on the western boundary.

[5] Schrader, F. C., Gold placers on Wind and Big Horn rivers, Wyo.: U. S. Geol. Survey Bull. 580, pp. 128–129, 1913.

[6] Fisher, C. A., Geology and water resources of the Big Horn Basin, Wyo.: U. S. Geol. Survey Prof. Paper 53, pp. 1–5, 1906

FORESTATION.[7]

The forested areas in the Big Horn River basin are found in the mountainous areas that form the rim of the basin, above an altitude which ranges between 6,000 and 7,000 feet, the lower limit applying to the northern part of the area, and the higher to the southern part. Practically all these areas, except 400 square miles in the Wind River Diminished Reservation, are included in the Bonneville and Shoshone forests on the west, the Washakie Forest on the south, and the Big Horn Forest on the east.

The total area of the forests, including the area of the Wind River Diminished Reservation above the lower limit of forestation, is about 4,500 square miles. Large nonforested tracts within the forests comprise areas above timber line (elevation 10,000 feet), grass lands, and barren lands, where the topography is too rugged to permit tree growth. Most of the considerable areas of burned-over land are in various stages of reproduction. The nonforested areas comprise about 1,700 square miles, leaving 2,800 square miles in the Big Horn drainage basin classed as forested.

As an indication of the average density, it may be stated that the total timber cover, divided between commercial and protection stands, is 4,500,000 M feet b. m., an average of 1,610 M feet b. m. per square mile. The predominant species is lodgepole pine. Next in abundance are Englemann spruce, Douglas fir, Alpine fir, and yellow pine.

PRINCIPAL STREAMS.

Wind River and the Big Horn.—Big Horn River is formed by the junction of Wind and Popo Agie rivers. As Wind River is much the larger it is considered the headwater stream.

Wind River rises on the southern slopes of the Shoshone Mountains and the adjoining eastern slopes of the Wind River Mountains, at Twogwotee Pass, on the Continental Divide, 9,600 feet above sea level, and flows southeastward nearly 100 miles to Riverton, where it is joined by Popo Agie River to form the Big Horn. Just below the junction the Big Horn turns sharply to the north, and it continues in a general northerly direction to the Montana line. It joins Yellowstone River at Junction, Mont.

In its upper course Wind River flows through a narrow, steep-sided valley, which gradually widens out below Dubois, where the side slopes become gentler. The valley continues to the crossing of the Owl Creek and Bridger mountains, where the river has cut a narrow gorge to a maximum depth of 2,250 feet.[8] Below this gorge as far as the mouth of Meeyero Creek the valley is narrow, but at that

[7] Compiled chiefly from data furnished by the United States Forest Service.

[8] Darton, N. H., Geology of the Owl Creek Mountains: 59th Cong., 1st sess., S. Doc. 219, p. 11, 1906.

point it again widens and between Meeyero Creek and Greybull River its average width is 2 miles. Below Greybull River the valley becomes very narrow, merging into Black Canyon, where the Big Horn cuts through Sheep Mountain, about 15 miles north of Greybull. Below Black Canyon the valley continues narrow, with very little bottom land, until it again disappears near the Montana line, where the river cuts through the Big Horn Mountains in a canyon.

The principal tributaries of Wind River from the north are Du Noir, Horse, Beaver, Crow, and Dry creeks; those from the south are Jakeys Fork, Torrey, Dinwoody, and Bull Lake creeks. All these tributaries rise in the mountains bounding the Wind River basin. The chief tributaries of Big Horn River from the west are Owl, Meeyero, and Gooseberry creeks, and Greybull and Shoshone rivers; from the east, Badwater, Buffalo, Shell, Kirby, Nowood, Bear, and Alkali creeks. Of the eastern tributaries only Nowood and Shell creeks are perennial tributaries of importance. The Big Horn receives no perennial tributaries that rise in the basin itself. Only those tributaries for which stream-flow records are available are described herein.

Popo Agie and Little Wind rivers.[9]—Popo Agie River is formed by the junction of its North and Middle forks near Lander and flows northwestward through a comparatively shallow valley to a point near Riverton, where it joins Wind River to form the Big Horn. Both forks rise in small lakes on the eastern slope of the Wind River Mountains, near the Continental Divide, and flow through canyons with very heavy fall.

At Arapahoe Popo Agie River receives its principal tributary, Little Wind River, which is formed near Fort Washakie by the junction of its North and South forks and flows eastward. North Fork rises in lakes near the crest of the Wind River Mountains, at an elevation of more than 10,000 feet. Its upper course is in a canyon for a distance of 9 miles but below the canyon the valley gradually widens.

South Fork at the head of the highest of the lakes is 10,820 feet above sea level. About 29 miles above the forks the South Fork widens in Tuygee Lake, which is about 9,900 feet above sea level and covers an area of 198 acres. Below Tuygee Lake it flows in a valley that alternately widens, forming flats and narrows; the slope is much greater in the narrow stretch. One of the largest of the flats is 20 miles above the mouth. About 16 miles above its mouth the stream enters a deep canyon where the fall is 800 feet to a mile.

Horse Creek.—Horse Creek, one of the headwater tributaries of Wind River, rises at an elevation of 11,000 feet and flows southward to its junction with Wind River at Dubois. The principal tributaries

[9] Taken chiefly from unpublished report by E. C. Murphy on storage and power possibilities in the Wind River Indian Reservation.

are West Fork and Burroughs and Little Horse creeks. The drainage area lies north of Wind River on the southern slope of the Absaroka Mountains.

The topography is extremely rugged in the upper part of the basin but gradually becomes more rolling toward the lower end.

Dinwoody Creek.—Dinwoody Creek, one of the principal tributaries of Wind River, drains a narrow strip lying on the eastern slope of the Wind River Mountains within the Wind River Diminished Reservation. It rises in small glacier-fed lakes that lie just below the Continental Divide at an elevation of at least 11,000 feet. The two largest, Klondike and Downs lakes, have areas of 250 and 160 acres, respectively.

The general course of the creek is northeast. Beginning at a point 20 miles above the mouth, Dinwoody Creek flows for 7 miles through a narrow, deep canyon and has an average fall of 315 feet to a mile. Near the lower end of the stretch, at a place called the natural bridge, the creek flows underground. Below the canyon section Dinwoody Creek flows for 12 miles through a gradually widening valley to its mouth. In the upper 3 or 4 miles of the valley the average fall is 100 feet to a mile. Below this stretch the creek flows through the Dinwoody Lakes, a series of small lakes 6 miles long having a combined area of about 800 acres. From the lower end of the lakes to the mouth, a distance of 3 miles, the creek falls 200 feet.[10]

The basin is extremely rugged and ranges in elevation from 6,200 to 13,000 feet. Above 10,000 feet the surface is chiefly granitic rock without vegetation or soil.

Dry Creek.—Dry Creek rises near the crest of the Wind River Mountains and flows northeastward until it joins Wind River 8 miles above Lenore. The drainage area lies on the eastern slope of the Wind River Mountains.

Willow Creek.—Willow Creek rises on the lower slope of the mountains and flows northeastward into Wind River near Lenore. The drainage area lies west of Wind River and east of the Wind River Mountains.

Bull Lake Creek.—Bull Lake Creek, the principal tributary of Wind River, drains a long, narrow strip on the eastern slope of the Wind River Mountains west of Wind River. It has two main forks, both of which rise in the glaciers around Fremont Peak and drain small lakes on the headwaters. The combined area of the three largest lakes in the South Fork basin is 215 acres. For 6 miles above the forks North Fork flows in a deep canyon with steep sides and has an average slope of 530 feet to a mile. Above that stretch the slope is much less.

[10] Murphy, E. C., op. cit.

From the forks Bull Lake Creek flows eastward 16 miles through a gradually widening valley having an average slope of 22 feet to a mile. In this valley, which is partly filled with glacial deposits, is Bull Lake, whose area is 1,600 acres.

The basin is extremely rugged and ranges in elevation from 6,200 to 13,000 feet. Above 10,000 feet the surface is mainly granitic rock without vegetation or soil.

Owl Creek.—Owl Creek, which drains the northern slope of the Owl Creek Mountains, is formed by the junction of its North and South forks, both of which rise at the south end of the Shoshone Mountains near the Washakie Needles, at an elevation of 11,000 feet. South Fork, which is much the larger stream, passes through a deep canyon in the west end of the Owl Creek Mountains and flows across the Big Horn Basin on the north side of the range, being joined by the North Fork about 6 miles east of Embar. Above the North Fork the Middle Fork and Red Creek join the South Fork; below it there is but one important tributary, Mud Creek, which also rises on the north slope of the mountains.[11]

Precipitation in the Owl Creek basin decreases from about 25 inches on the headwaters and 14 inches in the Owl Creek Mountains, on the southern boundary, to 10 inches at the mouth. For the part of the area in the Big Horn Basin the precipitation ranges between 10 and 12 inches.

Nowood Creek.—Nowood Creek, probably the largest tributary of the Big Horn from the east, drains the southeastern part of the Big Horn Basin and the western slope of the Big Horn Mountains as far north as Shell Creek. Nowood Creek itself is a plains stream, rising in the low hills forming the southern rim of the Big Horn Basin east of Big Horn River. Its general course is north and northwest, and it enters the Big Horn near Manderson. Its chief tributaries—those which make it a perennial stream—are Tensleep and Paintrock creeks, which rise high in the Big Horn Mountains. Other perennial tributaries are Spring, Otter, and Little Canyon creeks. No important tributaries enter from the west.

The eastern part of the drainage basin comprises the western slopes of the Big Horn Mountains—a region of extremely rugged topography, with steep slopes terminating in high cliffs, through which Tensleep and Paintrock creeks cut their way in canyons that reach a depth of 2,000 feet.[12]

West of the mountains the drainage basin is chiefly a badlands district, consisting of long, gradual slopes terminating in irregular ridges and sharp peaks. Along the high divide between Nowood and

[11] Darton, N. H., Geology of the Owl Creek Mountains: 59th Cong., 1st sess., S. Doc. 219, p. 11, 1906.

[12] Fisher, C. A., Geology and water resources of the Big Horn Basin, Wyo.: U. S. Geol. Survey Prof. Paper 53, pp. 1–5, 1906.

Nowater creeks are a number of isolated peaks which rise to altitudes of 5,800 to 6,000 feet.

Throughout its length Nowood Creek flows through a shallow valley, perhaps a mile in average width. After leaving the mountains Tensleep and Paintrock creeks flow through similar valleys.

The precipitation decreases rapidly on the western slope of the Big Horn Mountain from 30 inches and more at the crest to 8 inches at the base of the mountains and to 6 inches at the mouth. At the base of the mountains the precipitation may be even less than 8 inches, as a fragmentary record at Hyattville indicates an annual precipitation of 4.5 inches.

Greybull River.—Greybull River drains the eastern slopes of the Shoshone Mountains and the portion of the Big Horn Basin bounded by Shoshone River on the north and Owl and Gooseberry creeks on the south. The river rises near the crest of the Shoshone Mountains, a few miles west of Kirwin, at an elevation of 11,000 feet, flows northward 15 miles, then turns abruptly and follows an easterly course for 25 miles to the point at which it is joined by Wood River, where it turns and flows northeastward about 50 miles, joining Big Horn River near Greybull. In its upper course Greybull River is joined by a number of mountain tributaries, the largest of which are Rock, Rawhide, and Meeteetse creeks, from the north, and Wood River and Franks Creek from the south. Below the mouth of Meeteetse Creek there are no perennial tributaries, as the precipitation east of the mountains is too slight to afford any but intermittent run-off.

In the upper 15 miles of its course Greybull River flows through canyons, but below that stretch it flows across the Big Horn Basin. Below Four Bear, a few miles east of the mountains, the Greybull Valley is relatively wide, but 10 miles farther down, near Pitchfork ranch, it narrows rapidly and is bordered on either side by high bluffs, which follow the river for 30 miles, to Fenton, where they recede from the river and the valley again widens to 5 or 6 miles and maintains this width nearly to the mouth of the river. North of Greybull Valley there is a high terrace more or less dissected by ravines. The part of the drainage basin that extends from the Greybull Valley to Big Horn River consists of badlands.[13]

The precipitation decreases rapidly from about 20 inches at the source to 12 inches at the base of the mountains. In the basin region the precipitation decreases from 12 inches to 7 inches at the mouth, being less than 8 inches over the greater part.

Shell Creek.—Shell Creek, one of the largest tributaries of Big Horn River, rises at the crest of the mountains about 8 miles northwest of Cloud Peak, and within 5 miles of its source flows through a

[13] Fisher, C. A., Geology and water resources of the Big Horn Basin, Wyo.: U. S. Geol. Survey Prof. Paper 53, pp. 1–5, 1906.

number of tiny mountain lakes that lie at elevations between 9,000 and 10,500 feet. Below the lakes the creek continues its northwesterly course for 19 miles, flowing through a canyon much of the way. It then leaves the mountains, flows for 20 miles eastward across the Big Horn Basin, and discharges into Big Horn River a few miles north of Greybull. Across the lowlands the creek flows through a relatively wide valley of gentle slope.[14] It receives numerous short mountain tributaries, the largest of which are Willitt, Granite, Cedar, White, Trapper, Horse, and Beaver creeks.

Shell Creek drains the western slope of the Big Horn Mountains from Paintrock Basin on the south to Bear Creek basin on the north. The upper two-thirds of the drainage basin is on the western slope of the Big Horn Mountains, where elevations range from 5,000 feet at the base to 11,000 feet at the crest, and the topography is very rugged. West of the mountains much of the area is badlands, whose long, gradual slopes terminate in irregular and sharp peaks.

The precipitation decreases rapidly from 25 inches or more at the upper end of the drainage basin to 8 inches at the base of the mountains, and then gradually decreases to 6 inches at the mouth.

Shoshone River.—Shoshone River, the largest tributary of the Big Horn, drains the northwestern part of the Big Horn Basin. It rises in the Shoshone Mountains near Shoshone Pass, at an elevation of 10,500 feet, and flows northeastward for 65 miles until it is joined by the North Fork.

Throughout the upper 25 miles of its course Shoshone River flows through a canyon, then the valley gradually widens and the side slopes become gentler. Just below the mouth of North Fork the river enters a canyon, which is 65 feet wide in the narrowest part and 3 miles long, 1 mile of which is cut in solid granite having vertical walls several hundred feet high in the narrowest part. Below the canyon the Shoshone flows across the Big Horn Basin in a valley bordered by bench lands, and unites with Big Horn River near Kane.

North Fork rises in the Absaroka Mountains at an elevation of 10,500 feet. For the first 30 miles its course is roughly semicircular from west to east, with a radius of 6 miles; thence the course lies eastward for 35 miles until it joins Shoshone River just above the Shoshone Canyon in the Shoshone reservoir of the United States Reclamation Service. It flows through a canyon for nearly its entire length.

Both forks receive numerous mountain tributaries, the largest of which are Saddle, Needle, Cabin, Deer, Boulder, Ishawooa, Bobcat, and Carter creeks for the main fork, and Torrent, James, Crow,

[14] Fisher, C. A., Geology and water resources of the Big Horn Basin, Wyo.: U. S. Geol. Survey Prof. Paper 53, pp. 1-5, 1906.

Grinnell, Eagle, Fishhawk, Clearwater, Sweetwater, Clócktower, Craig, Trout, and Rattlesnake creeks and Wapiti River for the North Fork.

The upper part of the basin, including the eastern slopes of the Shoshone and Absaroka mountains, is a high, deeply dissected plateau, traversed by many deeply cut canyons and bordered by a broad belt of low foothills. The altitude ranges from 7,000 to more than 12,000 feet. The part of the drainage basin east of the mountains and south of the river is made up of gradual slopes which are traversed by high ridges and deep ravines, the southern boundary of the basin being a high escarpment that slopes gradually to the south. North of the river the drainage basin is bounded by the high plateau that separates it from the basin of Clark Fork. Garland Flats, a broad level area comprising about 100 square miles, extends from the base of the mountains northeastward as far as Garland, and from the river to the high plateau at the north. Between Garland and Cowley is a series of low, irregular sandstone hills separated by wide shallow valleys that lead to Shoshone River. To the east the surface rises gradually toward the hogback ridges that border the base of the divide between Clark Fork and Shoshone River.[15]

The annual precipitation increases from 6 inches at the lower end of the drainage basin to 10 inches at the reservoir. Beyond that point the increase is much greater, reaching a maximum of more than 30 inches at the crest of the mountain ranges.

MEASURED DRAINAGE AREAS.

Measured drainage areas in the Big Horn River basin.

Big Horn River and its tributaries above Popo Agie River.

Stream.	Drainage area above—	Area in square miles.
Wind River	Dubois, including Horse Creek	486
Do	Crow Creek	1,410
Do	Gaging station at Riverton	2,320
Big Horn River	Gaging station at Thermopolis	8,080
Do	Shoshone River	15,900
Do	Montana line	18,700
Du Noir River	Mouth	90
Warm Spring Creek	do	89
Jakeys Creek	do	65
Torreys Creek	do	68
North Fork of Wind River	do	398
East Fork of North Fork	do	159
Bear Creek	do	68
West Fork of Wind River	do	200
Dry Creek	do	94
Crow Creek	do	101
Dry Creek	do	186
Badwater Creek	do	835
Bridger Creek	do	169
Muddy Creek	do	455
Buffalo Creek	do	130
Kirby Creek	do	270
Meeyero Creek	do	432
Cottonwood Creek	do	211
Grass Creek	do	148
Gooseberry Creek	do	422

[15] Fisher, C. A., Geology and water resources of the Big Horn Basin, Wyo.: U. S. Geol. Survey Prof. Paper 53, pp. 1-5, 1906.

Measured drainage areas in the Big Horn River basin—Continued.

Horse Creek and tributaries.

Stream.	Drainage area above—	Area in square miles.
Horse Creek	West Fork	30
Do	Burroughs Creek	52
Do	Mouth	122
West Fork	....do	8
Burroughs Creek	....do	10

Popo Agie and Little Wind rivers.

Middle Fork of Popo Agie River	Sec. 24, T. 32 N., R. 101 W	84
Do	Forks	204
Baldwin Creek	Mouth	61
Popo Agie River	Little Wind River	815
Do	Mouth near Riverton	2,010
North Fork of Popo Agie River	Forks	185
Little Popo Agie River	Twin Creek	116
Do	Mouth	346
Beaver Creek	Mouth near Arapahoe	436
North Fork of Little Wind River	Forks	241
South Fork of Little Wind River	....do	121
Little Wind River	Mouth at Arapahoe	716

Owl Creek and its tributaries.

North Fork	Forks	101
South Fork	....do	179
Owl Creek	Gaging station in sec. 16, T. 43 N., R. 95 W	463
Do	Mouth	477
Mud Creek	....do	118

Nowood Creek and its tributaries.

Nowood Creek	Tensleep Creek	843
Do	Gaging station in sec. 13, T. 49 N., R. 91 W	1790
Do	Mouth	2260
Lost Creek	....do	96
Otter Creek	....do	93
West Tensleep Creek	Outlet of West Tensleep Lake	30
Do	Mouth of East Tensleep Creek	53
East Tensleep Creek	Outlet of East Tensleep Lake	6
Do	Mouth of West Tensleep Creek	38
Tensleep Creek	Mouth of Lee Creek	113
Do	Mouth of Childs Creek	139
Do	Mouth of Canyon Creek	167
Do	Sec. 12, T. 47 N., R. 88 W	228
Do	Mouth	264
Canyon Creek	....do	61
Brokenback Creek	....do	81
Paintrock Creek	Mouth of North Fork	34
Do	Mouth of Middle Fork	45
Do	Mouth of South Fork	103
Do	Mouth of Medicinelodge Creek	199
Do	Mouth	398
North Fork of Paintrock Creek	....do	7
Middle Fork of Paintrock Creek	Outlet of Lake Solitude	14
Do	Mouth	35
South Fork of Paintrock Creek	....do	33
Medicinelodge Creek	....do	97

Greybull River and its tributaries.

Greybull River	Wood River	406
Do	Gaging station at Meeteetse	690
Do	Mouth	1,170
Wood River	Gaging station at mouth	218
Meeteetse Creek	Mouth	81

Measured drainage areas in the Big Horn River basin—Continued.

Shell Creek and tributaries.

Stream.	Drainage area above—	Area in square miles.
Shell Creek	Sec. 34, T. 53 N., R. 88 W	31
Do	Mouth of Willitt Creek	39
Do	Mouth of Granite Creek	71
Do	Mouth of Cedar Creek	100
Do	Shell post office	256
Do	Mouth	561
Willitt Creek	do	20
Granite Creek	do	16
Cedar Creek	do	35
White Creek	do	38
Trapper Creek	do	56
Horse Creek	do	30
Beaver Creek	do	84

Shoshone River and its tributaries.

Shoshone River	Mouth of Elk Creek	6
Do	Mouth of Red Creek	57
Do	Mouth of Saddle Creek	135
Do	Mouth of Cabin Creek	196
Do	Mouth of Ishawooa Creek	315
Do	Sec. 26, T. 51 N., R. 104 W	532
Do	Mouth of North Fork	676
Do	Sec. 7, T. 53 N., R. 100 W	1,740
Do	Mouth	2,690
Elk Creek	do	6
Red Creek	do	14
Saddle Creek	do	8
Cabin Creek	do	22
Boulder Creek	do	36
Ishawooa Creek	do	74
North Fork of Shoshone River	Mouth of Torrent Creek	12
Do	Mouth of Jones Creek	55
Do	Mouth of Eagle Creek	194
Do	Mouth of Fishhawk Creek	254
Do	Mouth of Blackwater Creek	368
Do	Mouth of Wapiti River	423
Do	Mouth of Crag Creek	622
Do	Mouth	826
Torrent Creek	do	5
Jones Creek	do	26
Eagle Creek	do	57
Blackwater Creek	do	14
Wapiti River	do	144
Crag Creek	do	25

GAGING-STATION RECORDS.

BIG HORN AND WIND RIVER BASINS.

WIND RIVER AT DUBOIS, WYO.

LOCATION.—In sec. 7, T. 41 N., R. 106 W., on footbridge at Dubois. Horse Creek enters 100 feet above.

DRAINAGE AREA.—486 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—August 4, 1910, to June 30, 1912.

GAGE.—Vertical staff; read by H. Earl French.

EXTREMES OF DISCHARGE.—1910–1912: Maximum stage recorded, 10.6 feet June 18, 1911 (discharge, 5,550 second-feet); minimum discharge, 80 second-feet February 9, 14, March 2, 1911, when stage-discharge relation was affected by ice.

DIVERSIONS.—Above the station adjudicated diversions of 65 second-feet from Wind River and its tributaries, prior to January 1, 1910.

ACCURACY.—Gage read once daily. Rating curve well defined below 500 second-feet. Records good below 500 second-feet; fair above.

Monthly discharge of Wind River at Dubois, Wyo., for 1910–1912.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1910.				
August 4–31	235	165	203	11,300
September	200	150	175	10,400
1910–11.				
October	200	122	162	9,960
November	182	110	138	8,210
December	131	90	111	6,820
January	85	85	85	5,230
February	85	80	84.4	4,690
March	135	80	110	6,760
April	200	110	131	7,800
May	770	135	445	27,400
June	5,550	1,160	2,760	164,000
July	1,250	481	783	48,100
August	445	218	308	18,900
September	295	218	231	13,700
The year	5,550	80	446	322,000
1911–12.				
October	275	130	194	11,900
November	207	130	179	10,700
December	200	150	169	10,400
January	165	110	147	9,040
February	150	135	142	8,170
March	165	135	146	8,980
April	243	150	182	10,800
May	1,130	159	439	27,000
June	4,400	1,190	2,650	158,000
The period				255,000

WIND RIVER AT RIVERTON, WYO.

LOCATION.—In sec. 2, T. 1 S., R. 4 E., at highway bridge three-quarters of a mile east of Riverton, Fremont County. Popo Agie River enters three-quarters of a mile below.

DRAINAGE AREA.—2,320 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—May 14, 1911, to September 30, 1921. From May 14, 1906, to November 1, 1908, a station was maintained at Walker's Ferry, 1 mile above present station. As no streams enter between, the records at the two points are comparable.

GAGE.—Friez water-stage recorder installed April 4, 1917, referred to chain gage on downstream side of first pier bent from left bank used since May 15, 1911. From May 14, 1906, to November 1, 1908, staff gage at Walker's Ferry; read by Andrew Walker.

EXTREMES OF DISCHARGE.—1906–1908, 1911–1921: Maximum discharge 12,300 second-feet; mean daily on June 14, 1906. Maximum stage recorded, 12.8 feet at 11 a. m. June 16, 1918 (discharge, 9,300 second-feet); minimum discharge recorded, 226 second-feet on February 27, 1919.

DIVERSIONS.—Water is diverted from Wind River and its tributaries for the irrigation of about 35,000 acres. Under the Wyoming law of 1 second-foot for 70 acres, this would require 500 second-feet.

ACCURACY.—Gage read once daily May 16, 1906, to November 1, 1908, twice daily May 15, 1911, to April 4, 1917, after which date there is a continuous record. Rating curves fairly well defined except from April 1, 1915, to August 15, 1917, for which they are well defined. Records fair before 1915; excellent, April 1, 1915, to August 15, 1917; good, August 15, 1917, to September 30, 1921; fair, winter periods.

Monthly discharge of Wind River at Riverton, Wyo., for 1906–1908, 1911–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1906.				
May 14–31	5,330	1,760	3,550	127,000
June	12,300	2,240	4,480	267,000
July	5,690	2,600	3,500	215,000
August 1–25	5,550	1,800	3,080	153,000
The period				762,000
1907.				
August 24–31	2,200	1,770	2,020	32,100
September	1,940	656	882	52,500
The period				84,600
1907–8.				
October	890	640	741	45,600
November	640	391	559	33,300
December 1–9	626	605	607	10,800
May	2,500	720	1,390	85,500
June	8,260	1,640	4,370	260,000
July	7,780	3,600	5,110	314,000
August	3,520	1,280	2,480	152,000
September	1,210	850	1,040	61,900
1908.				
October	1,140	680	909	55,900
1911.				
May 15–31	2,160	895	1,520	51,300
June	10,600	2,470	7,020	418,000
July	6,080	2,390	4,310	265,000
August	2,240	825	1,480	91,000
September	1,100	441	683	40,600
The period				866,000
1911–12.				
October	672	400	525	32,300
November	489		[a] 425	25,300
December			[a] 385	23,700
January			[a] 365	22,400
February			[a] 355	20,400
March			[a] 350	21,500
April	685		406	24,200
May	3,200	388	1,020	62,700
June	8,450	2,890	5,950	354,000
July	6,140	2,330	3,800	234,000
August	5,660	1,180	2,240	138,000
September	1,550	712	974	58,000
The year	8,450		1,400	1,020,000
1912–13.				
October	930	536	709	43,600
November			375	22,300
December			300	18,400
January			275	16,900
February			265	14,700
March			300	18,400
April	1,120	436	775	40,000
May	9,490	658	3,270	201,000
June	9,290	4,040	6,130	365,000
July	5,340	2,880	3,680	226,000
August	2,780	1,420	2,060	127,000
September	1,950	697	1,320	78,600
The year	9,490		1,620	1,170,000

[a] Estimated.

NOTE.—Records for 1913 and 1914 revised.

Monthly discharge of Wind River at Riverton, Wyo., for 1906–1908, 1911–1921—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913–14.				
October	715	490	613	37,700
November			375	22,300
December			300	18,400
January			275	16,900
February			265	14,700
March			300	18,400
April	715	280	465	27,700
May	5,880	312	2,640	162,000
June	7,900	2,600	4,740	282,000
July	4,100	1,820	3,070	189,000
August	3,480	1,040	1,880	116,000
September	955	658	803	47,800
The year	7,900		1,320	953,000
1914–15.				
October	918	571	701	43,100
November			400	23,800
December			325	20,000
January			300	18,400
February			300	16,700
March			325	20,000
April	2,060	450	780	46,400
May	2,850	725	1,420	87,300
June	4,640	1,620	2,730	162,000
July	4,640	1,720	2,710	167,000
August	1,830	1,030	1,370	84,200
September	3,660	725	1,590	94,600
The year	4,640		1,080	784,000
1915–16.				
October			860	52,900
November			400	23,800
December			300	18,400
January			265	16,300
February			350	20,100
March			650	40,000
April	1,690	422	665	39,600
May	2,320	930	1,460	89,800
June	7,120	2,090	4,740	282,000
July	5,160	2,710	3,880	239,000
August	2,850	970	1,790	110,000
September	1,010	478	684	40,700
The year	7,120		1,350	973,000
1916–17.				
October	610	478	561	34,500
November			350	20,800
December			280	17,200
January			270	16,600
February			275	15,300
March			275	16,900
April			496	29,500
May	2,640	378	1,430	87,900
June	8,360	1,420	4,970	296,000
July	9,080	3,290	5,800	357,000
August	2,870	1,320	1,710	105,000
September	1,410	762	1,020	60,700
The year	9,080		1,470	1,060,000
1917–18.				
October	736	335	512	31,500
November			340	20,200
December			275	16,900
January			265	16,300
February			270	15,000
March			300	18,400
April			440	26,200
May	1,690	465	1,290	79,300
June	9,300	1,640	5,890	350,000
July	3,070	1,700	2,370	146,000
August	1,900	860	1,260	77,500
September	1,110	800	879	52,300
The year	9,300		1,170	850,000

Monthly discharge of Wind River at Riverton, Wyo., for 1906–1908, 1911–1921—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	874	680	759	46,500
November	670	305	516	30,700
December	.....	.....	287	17,600
January	.....	.....	231	14,200
February	.....	.....	235	13,100
March	445	235	349	21,500
April	773	368	501	29,800
May	2,220	485	1,110	68,200
June	1,750	731	875	52,100
July	1,780	679	819	50,400
August	1,780	600	885	54,400
September	1,020	486	736	43,800
The year	2,220	.....	611	442,000
1919–20.				
October	615	418	530	32,600
November	460	295	374	22,300
December	.....	.....	355	21,800
January	.....	.....	379	23,300
February	.....	.....	332	19,100
March	925	345	554	34,100
April	466	240	328	19,500
May	4,340	418	1,520	93,500
June	7,880	2,760	5,770	343,000
July	5,950	2,310	3,990	245,000
August	2,450	848	1,590	97,800
September	832	552	650	38,700
The year	7,880	240	1,370	991,000
1920–21.				
October	585	466	522	32,100
November	.....	.....	340	20,200
December	.....	.....	270	16,600
January	.....	.....	265	16,300
February	.....	.....	280	15,600
March	.....	.....	318	19,600
April	541	270	401	23,900
May	6,180	345	2,210	136,000
June	11,200	4,000	7,190	428,000
July	4,000	1,270	2,320	143,000
August	1,990	1,000	1,320	81,200
September	1,120	469	686	40,800
The year	11,200	.....	1,340	973,000

BIG HORN RIVER AT THERMOPOLIS, WYO.

LOCATION.—In sec. 36, T. 43 N., R. 95 W., at highway bridge between Thermopolis and Hot Springs, Hot Springs County. Nearest tributary, Buffalo Creek, enters 3 miles upstream.

DRAINAGE AREA.—8,080 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—May 28, 1900, to December 31, 1905; June 30, 1910, to September 30, 1921. State engineer maintained station during 1913 and 1914.

GAGE.—Chain gage attached to downstream handrail of bridge; installed May 4, 1916, at datum 1.00 foot lower than staff previously used.

EXTREMES OF DISCHARGE.—1900–1905, 1910–1921: Maximum stage from high-water mark, 13.4 feet on June 10, 1921 (discharge, 20,800 second-feet); minimum stage recorded, 0.2 foot 5 p. m., April 5, 1904 (discharge, 180 second-feet).

DIVERSIONS.—Prior to July 1, 1921, there were adjudicated diversions of 16 second-feet from Big Horn River above station and 214 second-feet below for irrigation. In addition, an adjudicated permit of 366 second-feet for power.

ACCURACY.—Gage read twice daily except for occasional periods when it was read once. Rating curves fairly well defined for 1900 to 1905, well defined for 1910 to 1920, and poorly defined for 1921. Records fair 1900 to 1905, good 1910 to 1914, 1921, and excellent 1915–1920. Estimates for winter periods fair.

Monthly discharge of Big Horn River at Thermopolis, Wyo., for 1900–1905, 1910–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1900.				
June	12,600	7,270	9,620	572,000
July	7,050	2,870	4,700	289,000
August	3,530	2,210	2,730	168,000
September 1–18	2,210	674	1,370	48,900
The period				1,080,000
1901.				
May	17,000	2,980	10,100	621,000
June	14,600	5,840	8,740	520,000
July	6,720	4,300	5,890	362,000
August	4,300	1,990	2,920	180,000
September	3,530	1,550	2,110	126,000
The period				1,810,000
1902.				
June	9,890	2,830	5,140	306,000
July	4,790	1,430	2,830	174,000
August	4,090	850	2,630	162,000
September	1,280	400	690	41,000
The period				683,000
1903.				
March 27–31	1,220	621	943	9,350
April	1,350	550	784	46,700
May	3,040	990	1,650	101,000
June	9,840	2,200	6,850	408,000
July	6,940	2,950	4,160	256,000
August	2,860	1,480	2,150	132,000
September	1,700	880	1,240	73,800
The period				1,030,000
1903–4.				
October	880	620	797	49,000
April	1,600	218	873	51,900
May	12,800	1,400	4,980	306,000
June	14,200	7,110	10,400	619,000
July	9,350	3,820	6,550	403,000
August	3,920	1,870	2,950	181,000
September	2,800	930	1,470	87,500
1904–5.				
October	1,400	620	974	59,900
April	825	210	486	28,900
May	5,940	778	1,590	97,800
June	10,400	5,400	7,160	426,000
July	7,450	3,200	4,660	287,000
August	3,120	1,440	2,060	127,000
September	1,900	685	1,130	67,200
1905.				
October	1,260	555	818	50,300
November	685	298	546	32,500
December	335	210	244	15,000
1910.				
August	3,300	1,020	1,640	10,100
September	1,790	740	952	56,600
1910–11.				
October	940	740	805	49,500
November	830	580	672	40,000
December	660	510	594	36,500
January			475	29,200
February			475	26,400
March			525	32,300
April	730	450	632	37,600
May	2,910	810	1,900	117,000
June	18,000	2,590	10,300	613,000
July	7,280	2,270	4,740	291,000
August	2,270	810	1,640	101,000
September	1,060	450	727	43,300
The year	18,000		1,960	1,420,000

Monthly discharge of Big Horn River at Thermopolis, Wyo., for 1900-1905, 1910-1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911-12.				
October	890	485	718	44,100
November	1,060	520	682	40,600
December	.....	.....	550	33,800
January	.....	.....	500	30,700
February	.....	.....	450	25,900
March	1,660	360	510	31,400
April	3,070	590	1,170	69,600
May	4,730	730	1,850	114,000
June	19,500	5,110	11,200	666,000
July	11,900	2,570	5,750	354,000
August	6,540	1,540	3,100	191,000
September	2,140	1,180	1,620	96,400
The year	19,500	.....	2,350	1,700,000
1912-13.				
October 1-7	1,750	1,230	1,410	19,600
May 18-31	14,700	3,270	7,010	195,000
June	13,900	5,500	8,960	533,000
July	7,810	3,520	5,250	323,000
August	4,180	2,040	2,700	166,000
September	3,020	1,390	1,920	114,000
1913-14.				
October	1,280	980	1,060	65,200
November	.....	.....	640	38,100
December	.....	.....	480	29,500
January	.....	.....	440	27,100
February	.....	.....	450	25,000
March	.....	.....	560	34,400
April	2,360	800	1,310	78,000
May	9,710	1,620	4,260	262,000
June	12,800	4,180	7,110	423,000
July	4,510	2,450	3,630	223,000
August	4,510	1,280	2,300	141,000
September	1,390	1,180	1,260	75,000
The year	12,800	.....	1,960	1,420,000
1914-15.				
October	1,390	980	1,220	75,000
November	.....	.....	700	41,700
December	.....	.....	520	32,000
January	.....	.....	480	29,500
February	.....	.....	510	28,300
March	.....	.....	600	36,900
April	2,530	720	1,200	71,400
May	4,510	1,390	2,590	159,000
June	10,900	3,930	5,490	327,000
July	6,000	2,530	4,040	248,000
August	3,190	1,740	2,350	144,000
September	4,680	1,620	2,440	145,000
The year	10,900	.....	1,850	1,340,000
1915-16.				
October	3,110	1,280	1,740	107,000
November	1,180	440	672	45,300
December	.....	.....	400	24,600
January	.....	.....	400	24,600
February	.....	.....	625	36,000
March	1,880	720	1,330	81,800
April	3,190	980	1,350	80,300
May	3,850	1,740	2,510	154,000
June	12,400	3,360	7,180	427,000
July	8,300	3,190	5,220	321,000
August	3,520	1,230	2,260	139,000
September	1,180	685	906	53,900
The year	12,400	.....	2,060	1,490,000

NOTE.—Records for 1913 and 1914 revised.

Monthly discharge of Big Horn River at Thermopolis, Wyo., for 1900-1905, 1910-1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916-17.				
October	1,030	720	919	56,500
November	935	390	658	39,200
December	.....	.....	430	26,400
January	.....	.....	400	24,600
February	.....	.....	400	22,200
March	.....	.....	635	39,000
April	1,740	650	1,160	69,000
May	6,000	890	2,900	178,000
June	19,400	3,360	10,300	613,000
July	16,900	5,340	9,650	593,000
August	5,170	1,740	2,460	151,000
September	1,880	1,180	1,560	92,800
The year	19,400	.....	2,620	1,900,000
1917-18.				
October	1,180	685	929	57,100
November	1,030	760	864	51,400
December	845	375	667	41,000
January	800	350	568	34,900
February	620	441	545	30,300
March	1,080	563	832	51,200
April	1,440	760	961	57,200
May	3,190	890	2,330	143,000
June	19,000	3,020	12,200	726,000
July	6,000	2,040	4,370	269,000
August	2,700	1,030	1,580	97,200
September	1,390	1,030	1,160	69,000
The year	19,000	350	2,250	1,630,000
1918-19.				
October	1,390	980	1,130	69,500
November	980	484	785	46,700
December	760	390	540	33,200
January	535	390	440	27,100
February	510	390	436	24,200
March	845	441	628	38,600
April	1,280	562	766	45,600
May	4,340	845	1,950	120,000
June	4,840	1,030	1,580	94,000
July	2,610	890	1,140	70,100
August	3,600	760	1,310	80,600
September	1,390	800	1,060	63,100
The year	4,840	390	985	713,000
1919-20.				
October	1,560	740	1,160	71,300
November	1,070	514	856	50,900
December	611	416	510	31,400
January	820	425	511	31,400
February	860	425	565	32,500
March	7,660	425	2,360	145,000
April	1,510	684	1,090	64,900
May	8,520	1,570	3,760	231,000
June	13,800	5,550	9,280	552,000
July	7,500	2,710	5,350	329,000
August	2,540	1,130	1,900	117,000
September	1,130	860	967	57,500
The year	13,800	416	2,360	1,710,000
1920-21.				
October	1,080	812	892	54,800
November	1,120	380	782	46,500
December	700	300	476	29,300
January	860	385	532	32,700
February	2,540	394	804	44,700
March	2,220	590	1,020	62,700
April	1,080	590	854	50,800
May	10,500	660	3,860	237,000
June	20,800	6,920	13,000	774,000
July	6,840	1,660	3,590	221,000
August	3,040	1,290	1,810	111,000
September	1,410	820	1,040	61,900
The year	20,800	300	2,380	1,730,000

HORSE CREEK.

HORSE CREEK AT DUBOIS, WYO.

LOCATION.—At Dubois, in sec. 7, T. 41 N., R. 106 W., 100 yards above the mouth.

DRAINAGE AREA.—133 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—August 4, 1910, to June 30, 1912.

GAGE.—Staff gage read by H. Earl French.

EXTREMES OF DISCHARGE.—1910–1912: Maximum stage recorded, 12.3 feet June 18, 1911 (discharge, 1,000 second-feet based on comparison of flow with Wind River at Dubois); minimum stage recorded, 8.75 feet September 29, 30, October 1, 7 (discharge, 14 second-feet).

DIVERSIONS.—Prior to July 1, 1912, adjudicated diversions of 15 second-feet above gaging station.

ACCURACY.—Gage read once daily. Rating curve well defined below 150 second-feet. Records good below 150 second-feet; fair above.

Monthly discharge of Horse Creek at Dubois, Wyo., for 1910–1912.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1910.				
August 4–31	41	22	29.1	1,620
September	25	14	19.2	1,140
1910–11.				
October	25	14	19.9	1,220
November 1–19	28	15	20.8	785
May 7–31	180	56	93.6	4,640
June	1,000	180	436	25,900
July	340	98	196	12,100
August	90	28	51.9	3,190
September	41	28	31.5	1,870
1911–12.				
October	36	18	25.8	1,590
November 1–6	32	24	27.5	327
April 8–30	39	14	23.3	1,060
May	215	18	83.7	5,150
June	780	94	357	21,200

DINWOODY CREEK.

DINWOODY CREEK NEAR LENORE, WYO.

LOCATION.—In sec. 10, T. 5 N., R. 5 W., at highway bridge on road from Riverton to Dubois, 14 miles northwest of Lenore.

DRAINAGE AREA—114 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—April 10 to October 31, 1909; May 15, 1918, to September 30, 1921.

GAGE.—Staff gage used in 1909; Stevens 8-day recording gage installed May 15, 1918, on left bridge abutment, referred to datum of original gage.

EXTREMES OF DISCHARGE.—1909 and 1918–1921: Maximum discharge during period, 1,460 second-feet at 5 p. m. June 12, 1921 (gage height, 3.5 feet). Minimum discharge recorded, 10 second-feet during winter.

DIVERSIONS.—One small ditch diverts water from Dinwoody Creek above station.

ACCURACY.—In 1909 gage read once daily and since 1918 gage heights obtained from continuous record. Rating curve fairly well defined in 1909 and well defined below 700 second-feet since 1918. Records good for 1909 and excellent since 1918, except during winter, for which they are fair.

Monthly discharge of Dinwoody Creek, near Lenore, Wyo., for 1909, 1918–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1909.				
May 14–31	186	30	94.1	3,360
June	754	160	438	26,100
July	1,030	285	640	39,400
August	714	250	476	29,300
September	954	50	287	17,100
October	116	50	76.4	4,700
The period	.....	.....	353	120,000
1918.				
May 16–31	151	82	108	3,430
June	1,320	137	825	49,100
July	782	347	561	34,500
August	768	205	389	23,900
September	296	88	166	9,880
The period	.....	.....	.....	121,000
1918–19.				
October	100	37	59.0	3,630
November	36	11	24.1	1,430
December	.....	.....	13.0	799
January	14	12	13.5	830
February	.....	.....	14.0	778
March	17	12	13.8	848
April	21	13	14.4	857
May	437	22	104	6,400
June	470	98	257	15,300
July	710	459	548	33,700
August	686	356	430	26,400
September	464	92	264	15,700
The year	710	.....	147	107,000
1919–20.				
October	105	33	62.8	3,860
November	46	12	22.1	1,320
December	26	10	17.8	1,090
January	16	10	13.9	855
February	24	13	18.5	1,060
March	24	13	16.6	1,020
April	20	16	17.8	1,060
May	319	16	106	6,520
June	645	194	440	26,200
July	625	495	590	36,300
August	600	226	427	26,300
September	355	47	143	8,510
The year	645	10	157	114,000
1920–21.				
October	50	35	38.9	2,390
November	.....	.....	26.1	1,550
December	.....	.....	25.5	1,570
January	.....	.....	14.0	861
February	.....	.....	11.6	644
March	.....	.....	14.0	861
April	24	14	19.4	1,150
May	435	19	134	8,240
June	1,410	319	825	49,100
July	870	292	552	33,900
August	487	284	364	22,400
September	391	44	133	7,910
The year	1,410	.....	180	131,000

DRY CREEK.

DRY CREEK NEAR LENORE, WYO.

LOCATION.—In SW. ¼ sec. 12, T. 4 N., R. 5 W., half a mile above head of Dry Creek ditch and 12 miles west of Lenore on Wind River Diminished Reservation. Little Dry Creek enters 2 miles below.

DRAINAGE AREA.—73 square miles.

RECORDS AVAILABLE.—May 19 to September 30, 1921.

GAGE.—Gurley water-stage recorder at left bank.

EXTREMES OF DISCHARGE.—Maximum stage from high-water mark, 3.9 feet about June 12 (discharge, 1,100 second-feet); minimum discharge recorded, 2.2 second-feet on February 23, 1921.

DIVERSIONS.—One small ditch diverts water above station. Prior to July 1, 1921, adjudicated diversions of 12 second-feet from Dry Creek below station.

ACCURACY.—Gage heights from continuous record except during high-water period when recorder did not operate. Rating curves fairly well defined below 500 second-feet. Records good below 500 second-feet; fair above.

Monthly discharge of Dry Creek near Lenore, Wyo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 19–31	250	71	137	3,530
June	1,050	183	511	30,400
July	238	77	142	8,730
August	104	46	58.7	3,610
September	54	15	27.7	1,650
The period				47,900

WILLOW CREEK.

WILLOW CREEK AT J. K. RANCH, NEAR LENORE, WYO.

LOCATION.—About sec. 29, T. 4 N., R. 3 W., at highway bridge at J. K. ranch, 3 miles south of Lenore.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 17 to October 31, 1909.

GAGE.—Staff gage on downstream side of bridge near center.

EXTREMES OF DISCHARGE.—1909: Maximum stage recorded, 4.5 feet June 5 (discharge, 408 second-feet); minimum stage recorded, 1.0 foot September 13, October 26–31 (discharge, 3 second-feet).

DIVERSIONS.—One or two ditches divert water from Willow Creek above station.

ACCURACY.—Gage read once daily. Rating curve well defined below 175 second-feet. Records good below and fair above 175 second-feet.

Monthly discharge of Willow Creek at J. K. ranch, near Lenore, Wyo., for 1909.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 15–31	115	8	28.5	961
June	408	32	177	10,500
July	224	14	70.4	4,330
August	30	6	13.4	824
September	20	3	12.4	738
October	10	3	7.7	473
The period				17,800

BULL LAKE CREEK.

BULL LAKE CREEK NEAR LENORE, WYO.

LOCATION.—Near north line sec. 17, T. 3 N., R. 2 W., at highway bridge 14 miles southeast of Lenore. No tributary between station and mouth, a quarter of a mile below.

DRAINAGE AREA.—132 square miles (measured on base map of Wyoming; scale, 1 : 500,000).

RECORDS AVAILABLE.—May 18, 1918, to September 30, 1921. During 1909 eight discharge measurements made, but no daily gage heights obtained.

GAGE.—Stevens 8-day recording gage fastened to downstream pier of bridge.

EXTREMES OF DISCHARGE.—1918–1921: Maximum stage from water-stage recorder, 4.2 feet at 2 p. m., June 16, 1918 (discharge, 3,990 second-feet); minimum discharge recorded, 18 second-feet March 21–28, 1921.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversion of 3 second-feet above station; none below.

ACCURACY.—Gage heights from continuous record. Rating curve well defined below 2,200 second-feet. Records excellent except during winter, for which they are fair.

Monthly discharge of Bull Lake Creek near Lenore, Wyo., for 1918–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918.				
May 18–31	320	204	258	7,160
June	3,900	345	2,270	135,000
July	1,090	463	768	47,200
August	866	229	436	26,800
September	310	149	200	11,900
The period	.....	.....	.....	228,000
1918–19.				
October	222	78	142	8,730
November	78	35	55.2	3,280
December	.....	.....	25.0	1,540
January	.....	.....	20.0	1,230
February	.....	.....	18.0	1,000
March	.....	.....	20.0	1,230
April	66	20	26.6	1,580
May	1,690	80	417	25,600
June	1,220	366	539	32,100
July	612	475	552	33,900
August	612	306	398	24,500
September	475	134	313	18,600
The year	1,690	.....	212	153,000
1919–20.				
October	221	125	165	10,100
November	.....	.....	50	2,980
December	.....	.....	25	1,540
January	.....	.....	25	1,540
February	.....	.....	25	1,440
March	.....	.....	27	1,660
April	54	25	39.2	2,330
May	1,260	46	397	24,400
June	2,180	668	1,470	87,500
July	1,590	810	1,180	72,600
August	800	290	536	33,000
September	253	118	165	9,820
The year	2,180	.....	345	250,000
1920–21.				
October	118	54	90.3	5,550
November	.....	.....	75	4,460
December	.....	.....	50	3,070
January	.....	.....	40	2,460
February	.....	.....	35	1,940
March	32	18	23.2	1,430
April	100	19	66.7	3,970
May	1,510	77	529	32,500
June	2,950	1,180	1,830	109,000
July	1,550	626	1,080	66,400
August	811	535	659	40,500
September	600	81	213	12,700
The year	2,950	.....	392	284,000

POPO AGIE AND LITTLE WIND RIVER BASINS.

MIDDLE FORK OF POPO AGIE RIVER NEAR LANDER, WYO.

[Formerly Popo Agie River near Lander, Wyo.]

LOCATION.—In center of sec. 24, T. 32 N., R. 101 W., at Middle Fork ranger station, 2½ miles above the "Sinks" and 11 miles southwest of Lander, Fremont County. Nearest tributary enters from south, 3 miles below.

DRAINAGE AREA.—84 square miles (measured on map in Forest Service atlas).

RECORDS AVAILABLE.—April 1, 1911, to June 30, 1912; April 9, 1918, to August 15, 1921.

GAGE.—Stevens water-stage recorder installed October 1, 1919, and referred to vertical staff fastened to downstream side of Forest Service bridge used previously. Vertical staff gage a short distance downstream used in 1911 and 1912; referred to different datum.

EXTREMES OF DISCHARGE.—1911–12; 1918–1921: Maximum stage recorded, 4.1 feet on June 1, 1921 (discharge, 2,720 second-feet); minimum discharge, 6 second-feet on February 4, 7, 8, 1919.

DIVERSIONS.—None above station. Prior to July 1, 1921, adjudicated diversions of 180 second-feet from Middle Fork below station.

ACCURACY.—Staff gage read once daily during 1911 and 1912, twice daily during 1918 and 1919; continuous record during 1920 and 1921, except during periods when observer was away. Rating curve fairly well defined. Records good.

Discharge of Middle Fork of Popo Agie River above and below the "Sinks" in sec. 17, T. 32 N., R. 100 W.

Date.	Discharge in second-feet.	
	Above "Sinks."	Below "Sinks."
February 28, 1919	9.2	12.6
January 15, 1921	13.5	14.8
February 21, 1921	16.1	20.6
January 16, 1922	17.8	24.5

Monthly discharge of Middle Fork of Popo Agie River near Lander, Wyo., for 1911–1912, 1918–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
April	77	10	22	1,310
May	423	43	211	13,000
June	708	348	507	30,200
July	351	152	250	15,400
August	137	30	79.8	4,910
September	60	20	32.2	1,920
The period				66,700
1911–12.				
October	106	20	43.8	2,690
November	26	12	14	833
December			14	861
January			10	615
February			8	460
March			8	492
April			8	476
May	513	10	131	8,060
June	693	252	483	28,700
The period				43,200

Monthly discharge of Middle Fork of Popo Agie River near Lander, Wyo., for 1911–1912, 1918–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918.				
April 9–30	135	25	72.8	3,180
May	255	103	190	11,700
June	1,240	228	511	30,400
July	255	76	183	11,300
August	119	19	52.9	3,250
September	129	23	62.8	3,740
The period				63,600
1918–19.				
October	100	11	52.0	3,200
November	30	9	14.5	863
December	20	12	15.9	978
January	14	7	11.2	689
February	8	6	7.6	422
March	16	8	9.5	584
April	160	9	41.6	2,480
May	870	48	257	15,800
June	285	109	186	11,100
July	117	25	51.9	3,190
August	65	10	23.3	1,430
September	70	12	29.8	1,770
The year	870	6	58.7	42,500
1919–20.				
October	72	17	33.1	2,040
November	31	11	15.7	934
December	26	11	8.6	1,140
January	19	12	15.6	959
February	14	10	10.6	610
March	16	10	13.7	842
April	28	14	19.3	1,150
May	618	28	223	13,700
June	1,140	406	671	39,900
July	561	152	313	19,200
August	152	24	94.2	5,790
September	60	21	37.6	2,240
The year	1,140	10	122	88,500
1920–21.				
October	47	24	34.4	2,120
November			20	1,190
December			18	1,110
January			14	861
February			15	833
March	26		21	1,290
April	74	25	44.8	2,670
May	818	35	327	20,100
June	2,720	640	1,300	77,400
The period				108,000

POPO AGIE RIVER BELOW ARAPAHOE, WYO.

(Formerly Little Wind below Arapahoe, Wyo.)

LOCATION.—In sec. 23, T. 1 S., R. 3 E., at highway bridge half a mile below Arapahoe in Fremont County. Nearest tributary, Little Wind River, enters 200 yards above. Little Wind River enters Wind River 6 miles below.

DRAINAGE AREA.—1,530 square miles (measured on base map of Wyoming; scale, 1:500,000.)

RECORDS AVAILABLE.—May 11, 1906, to November 27, 1909; May 14, 1911, to September 30, 1918. Station maintained 1913–14 by State engineer.

GAGE.—Inclined staff at left bank just below bridge, installed October 7, 1916; referred to same datum as vertical staff located on downstream side of first pier from left bank, which was read previously. From June 19 to July 19, 1911, a temporary gage was used, whose datum was 2.95 feet higher; during 1915 a temporary gage was used whose datum was 0.55 foot higher. All readings have been reduced to the original datum.

EXTREMES OF DISCHARGE.—1906–1909, 1911–1918: Maximum stage, 9.3 feet as determined from water marks observed soon after high water during several days in latter part of June, 1917 (discharge, 9,710 second-feet); minimum discharge recorded, 50 second-feet September 25–27, 1911. Minimum discharge may occur during winter when records are discontinued.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 583 second-feet from Popo Agie River and tributaries above station.

ACCURACY.—Gage read twice daily except from May 11, 1906, to November 27, 1909, when it was read once daily. Rating curves well defined below 6,000 second-feet. Records good except above 6,000 second-feet and for winter periods, for which they are fair.

Monthly discharge of Popo Agie River below Arapahoe, Wyo., for 1906–1909, 1911–1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1906.				
May 11–31	5,120	1,340	2,740	114,000
June	6,880	1,520	3,200	190,000
July	3,850	945	2,290	141,000
August	1,620	450	845	52,000
September	555	285	390	23,200
1906–7.				
October	360	200	263	16,200
March 8–31	511	125	220	10,100
April	567	225	364	21,700
May 1–20	1,810	285	661	26,200
August 9–31	1,520	627	884	40,300
September	663	255	417	24,800
1907–8.				
October	360	255	293	18,000
November 1–12	285	255	266	6,330
April	850	130	401	23,900
May	1,360	490	908	55,800
June	4,310	850	2,310	137,000
July	3,520	920	1,890	116,000
August	1,500	490	896	55,100
September	490	255	365	21,700
1908–9.				
November 1–8	380	325	358	5,680
April 18–30	324	184	250	6,470
May	1,940	254	181	48,000
June	6,210	1,640	4,420	263,000
July	5,240	815	2,590	159,000
August	1,210	480	807	49,600
September	1,600	348	729	43,400
1909.				
October	368	161	269	16,500
November 1–23	176	116	146	6,660
1911.				
May 14–31	1,250	595	990	35,300
June	9,660	1,560	3,890	231,000
July	2,530	540	1,430	87,900
August	485	81	239	14,700
September	202	50	83.4	4,960
The period				374,000
1911–12.				
October	354	180	258	15,900
November	212		160	9,520
December			150	9,220
January			135	8,300
February			130	7,480
March			140	8,610
April	516		250	14,900
May	3,820	196	915	56,300
June	6,780	1,850	4,140	246,000
July	3,320	626	1,710	105,000
August	1,480	288	670	41,200
September	798	280	527	31,400
The year	6,780		766	554,000

Monthly discharge of Popo Agie River below Arapahoe, Wyo., for 1906-1909, 1911-1918—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1912-13.				
October	935	366	621	38,200
April	1,180	375	647	38,500
May	4,300	570	1,910	117,000
June	4,000	1,380	2,670	159,000
July	2,170	570	1,160	71,300
August	690	162	420	25,800
September	450	162	269	16,000
1913-14.				
October	450	290	365	22,400
March 23-31	226	174	204	3,640
April	834	174	362	21,500
May	5,210	570	2,020	124,000
June	5,460	1,220	2,470	147,000
July	1,500	302	895	55,000
August	946	116	339	20,800
September	140	84	107	6,370
1914-15.				
October	252	140	219	13,500
April	1,300	122	348	20,700
May	1,570	439	845	52,000
June	3,560	1,150	2,130	127,000
July	1,660	280	944	58,000
August	490	226	322	19,800
September	1,850	321	792	47,100
1915-16.				
October	1,000	366	591	36,300
November	.....	.....	250	14,900
December	.....	.....	165	10,100
January	.....	.....	150	9,220
February	.....	.....	145	8,340
March	.....	.....	205	12,600
April	800	204	339	20,200
May	1,520	625	926	56,900
June	4,100	1,130	2,380	142,000
July	2,160	598	1,260	77,500
August	518	147	278	17,100
September	151	109	127	7,560
The year	4,100	.....	571	413,000
1916-17.				
October	340	96	254	15,600
November 1-9	252	164	213	3,800
April	463	248	319	19,000
May	2,263	318	1,020	62,700
June	9,710	1,280	5,100	303,000
July	7,100	1,130	3,200	197,000
August	926	300	473	29,100
September	510	282	391	23,300
1917-18.				
April 11-30	396	189	277	11,000
May	1,110	265	821	50,500
June	5,340	1,110	3,010	179,000
July	970	100	583	35,800
August	158	38	76.8	4,720
September	372	41	199	11,800

NOTE.—Records for 1913 and 1914 revised.

LITTLE POPO AGIE RIVER AT HUDSON, WYO.

LOCATION.—At highway bridge three-eighths mile southwest of Hudson in Fremont County. No tributary between station and mouth of river, half a mile below.

DRAINAGE AREA.—346 square miles (measured on base map of Wyoming, scale 1:500,000).

RECORDS AVAILABLE.—August 26, 1907, to November 16, 1909; June 19, 1911, to October 31, 1912; April 2, 1914, to September 30, 1917. Station maintained by State engineer during 1914.

GAGE.—Vertical staff gage at downstream end of center pier of bridge. This gage was installed August 25, 1915, at a datum 1 foot higher than the previous gage, which was a vertical staff attached to right abutment and used from May 27, 1912, to October 31, 1912. The original gage was a vertical staff at bridge section and referred to same datum as gage used from May 27 to October 31, 1912. On June 13, 1908, a chain gage was located 300 feet below the bridge and set to read the same as bridge gage at the time it was installed. This gage was used until May 27, 1912.

EXTREMES OF DISCHARGE.—1907–1909, 1911–12, 1914–1918. Maximum stage recorded, 6.6 feet for about one week, June 19–26, 1917, as determined by leveling to high-water marks (discharge, 1,490 second-feet); minimum discharge occur during winter.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions from Little Popo Agie above the station amounted to 59 second-feet.

ACCURACY.—Gage read twice daily. Rating curves 1907 to 1912 fairly well defined below 600 second-feet, and from 1914 to 1918 well defined below 600 second-feet. Records are good below and fair above 600 second-feet from 1907 to 1912, and excellent below and good above 600 second-feet from 1914 to 1918, except for periods of shifting control for which they are fair.

Monthly discharge of Little Popo Agie River at Hudson, Wyo., for 1907–1909, 1911–1912, 1914–1917.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1907.				
August 26–31	73	70	70.5	839
September	70	40	51.3	3,050
1907–8.				
October	56	40	47.0	2,890
November	50	31	41.2	2,450
December 1–24	35	25	28.3	1,350
April	108	35	66.9	3,980
May	216	85	138	8,480
June	749	164	296	17,600
July	326	84	181	11,100
August	314	53	81.4	5,010
September	73	44	49.5	2,950
1908–9.				
October	111	63	74.9	4,610
November 1–10	68	53	63.5	1,260
April 8–30	112	34	66.3	3,020
May	364	66	183	11,300
June	913	396	654	38,900
July	671	82	280	17,200
August	66	41	50.8	3,120
September	164	34	62.6	3,720
1909.				
October	66	30	38.5	2,370
November 1–16	30	21	27.7	879
1911.				
June 19–30	748	269	449	10,700
July	280	29	107	6,580
August	30	20	23.1	1,420
September	28	16	19.8	1,180
1911–12.				
October	47	25	36.2	2,230
November 1–11	47	41	44.6	972
April	80	28	50.6	3,010
May	594	45	189	11,600
June	836	311	561	33,400
July	704	52	383	23,600
August	206	39	68.5	4,210
September	122	45	74.9	4,460
1912.				
October	164	66	94.8	5,830

Monthly discharge of Little Popo Agie River at Hudson, Wyo., for 1907–1909, 1911–1912, 1914–1917—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1914.				
April 2–30	306	60	164	9,430
May	782	157	339	20,800
June	790	160	347	20,600
July	190	73	116	7,130
August	108	50	63.3	3,890
September	57	21	51.6	3,070
The period				64,900
1914–15.				
October	138	34	94.6	5,820
April	185	63	91.4	5,440
May	458	79	160	9,840
June	690	154	309	18,400
July	171	57	107	6,580
August	296	62	86.7	5,330
September	527	67	124	7,380
1915–16.				
October	107	81	88.6	5,450
November 1–26	90	63	79.2	4,080
April	234	70	115	6,840
May	380	186	247	15,200
June	551	214	368	21,900
July	326	48	179	11,000
August	57	33	38.7	2,380
September	46	37	41.5	2,470
1916–17.				
October	94	44	55.3	3,400
November 1–9	46	42	44.9	802
April	162	67	114	6,780
May	653	94	289	17,800
June	1,490	325	910	54,100
July	1,160	139	458	28,200
August	112	58	76.8	4,720
September	74	57	64.8	3,860

NOTE.—Records for 1914 revised.

NORTH FORK OF LITTLE WIND RIVER AT FORT WASHAKIE, WYO.

LOCATION.—In SW. ¼ sec. 33, T. 1 N., R. 1 W., at Fort Washakie on Wind River Diminished Reservation. North and South forks unite a quarter of a mile below.

DRAINAGE AREA.—241 square miles (measured on base map of Wyoming; scale, 1: 500,000).

RECORDS AVAILABLE.—May 13 to September 30, 1921.

GAGE.—Gurley water-stage recorder at left bank a quarter of a mile above highway bridge.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 4.1 feet at 11 p. m., June 6 (discharge, 2,840 second-feet); minimum discharge recorded, 22 second-feet on February 22, 1921.

DIVERSIONS.—Several small ditches divert water above station.

ACCURACY.—Gage heights obtained from continuous record. Rating curve fairly well defined below 1,200 second-feet. Records good.

Monthly discharge of North Fork of Little Wind River at Fort Washakie, Wyo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 13–31	1,140	145	443	16,700
June	2,070	462	1,090	64,900
July	444	134	237	14,600
August	139	62	93.9	5,770
September	67	39	55.0	3,270
The period				105,000

SOUTH FORK OF LITTLE WIND RIVER NEAR FORT WASHAKIE, WYO.

LOCATION.—In SE. ¼ sec. 1, T. 1 S., R. 2 W., 2½ miles above junction with North Fork at Fort Washakie, on Wind River Diminished Reservation.

DRAINAGE AREA.—121 square miles (measured on base map of Wyoming; scale, 1: 500,000.)

RECORDS AVAILABLE.—May 11 to September 30, 1921.

GAGE.—Gurley water-stage recorder at right bank 500 feet above head of Ray ditch.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 5.8 feet at 6 a. m. June 12, 1921 (discharge, 3,500 second-feet); minimum discharge recorded, 14 second-feet on February 22, 1921.

DIVERSIONS.—A few small ditches divert water above station. Several ditches divert water below station, the largest being Ray ditch, which irrigates 6,000 acres.

ACCURACY.—Gage heights from continuous record. Rating curves fairly well defined below 1,200 second-feet. Records good.

Monthly discharge of South Fork of Little Wind River near Fort Washakie, Wyo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 11-31	880	167	408	17,000
June	1,810	596	1,040	61,900
July	619	140	343	21,100
August	167	78	110	6,760
September	97	40	62.9	3,740
The period				110,000

LITTLE WIND RIVER AT FORT WASHAKIE, WYO.

LOCATION.—In sec. 33, T. 1 N., R. 1 W., at suspension footbridge, 1 mile below Fort Washakie post office and seven-eighths of a mile below junction of North and South forks.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 1, 1908, to September 23, 1909.

GAGE.—Chain gage about 10 yards downstream from suspension bridge; read by J. J. Guyer.

EXTREMES OF DISCHARGE.—1908-9: Maximum stage recorded, 5.4 feet June 6, 1909 (discharge, 2,950 second-feet); minimum stage recorded, 1.7 feet November 23 and 25, 1908 (discharge, 70 second-feet).

DIVERSIONS.—No data.

ACCURACY.—Gage read once daily. Rating curve fairly well defined below 2,600 second-feet. Records good.

Monthly discharge of Little Wind River at Fort Washakie, Wyo., for 1908-9.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
November	175	70	108	6,430
December	120	88	94.8	5,830
January			90	5,530
February			70	3,890
March	60	34	50	3,070
April	88	28	45	2,680
May	542	62	231	14,200
June	2,950	410	1,900	113,000
The period				155,000

LITTLE WIND RIVER ABOVE ARAPAHOE, WYO.

LOCATION.—In sec. 23, T. 1 S., R. 3 E., at railroad bridge opposite the Indian subagency, a quarter of a mile above Arapahoe, in Fremont County. Popo Agie River enters a quarter of a mile below.

DRAINAGE AREA.—716 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—May 14, 1911, to September 30, 1918. From May 11, 1906, to December 17, 1909, a station was maintained a short distance above the present one. The flow at the two points is comparable. Station maintained by State engineer during 1913–14.

GAGE.—Chain gage on upstream side of railroad bridge.

EXTREMES OF DISCHARGE.—1906–1909, 1911–1918: Maximum stage recorded, 6.6 feet 7 a. m. June 17, 1911 (discharge, 3,840 second-feet); minimum discharge recorded 24 second-feet 7.20 a. m. September 29, 1916. Minimum discharge may occur during winter when observations are discontinued.

DIVERSIONS.—Water is diverted from Little Wind River and tributaries for the irrigation of about 52,000 acres. Under the Wyoming law of 1 second-foot for 70 acres this would require 743 second-feet.

ACCURACY.—Gage read twice daily except from May 11, 1906, to December 17, 1909, when it was read once daily. Rating curves fairly well defined. Records generally good, except during winter, for which they are fair.

Monthly discharge of Little Wind River above Arapahoe, Wyo., for 1906–1909, 1911–1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1906.				
May 11–31	2,060	420	966	40,200
June	2,840	685	1,410	83,900
July	1,640	420	1,050	64,600
August	615	174	325	20,000
September	192	97	134	7,970
The period				217,000
1906–7.				
October	125	50	78.3	4,810
March	157	68	83	5,100
April	185	84	117	6,960
May 1–20	450	72	192	7,620
August 9–31	960	310	512	23,400
September	360	110	182	10,800
1907–8.				
October	140	80	120	7,380
November 1–12	140	80	112	2,670
April	285	55	140	8,330
May	601	175	339	20,800
June	1,700	260	907	54,000
July	1,700	491	943	58,000
August	1,240	255	484	29,800
September	215	130	158	9,400
1908–9.				
November 1–8	145	145	145	2,300
April 18–30	135	92	107	2,760
May	522	105	239	14,700
June	2,280	468	1,610	95,800
July	2,320	390	1,140	70,100
August	670	250	420	25,800
September	664	190	390	23,200
1909.				
October	230	120	164	10,100
November	190	92	142	8,450
1911.				
May 14–31	422	155	284	11,300
June	3,730	470	1,820	108,000
July	1,540	315	830	51,000
August	285	37	127	7,810
September	73	18	31.1	1,850
The period				180,000

Monthly discharge of Little Wind River above Arapahoe, Wyo., for 1906-1909, 1911-1918— Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911–12.				
October	128	52	83.7	5,150
November	76	40	55	3,270
December	.....	.....	55	3,380
January	.....	.....	50	3,070
February	.....	.....	50	2,880
March	.....	.....	50	3,070
April	265	58	88.7	5,280
May	1,250	50	313	19,200
June	2,820	635	1,670	99,400
July	1,350	314	773	47,500
August	855	120	350	21,500
September	273	100	190	11,300
The year	2,820	.....	311	225,000
1912–13.				
October	355	170	234	14,400
April	260	112	155	9,220
May	1,790	125	518	31,900
June	1,650	495	1,040	61,900
July	911	232	440	27,100
August	232	26	118	7,260
September	154	26	85.5	5,090
1913–14.				
October	164	104	132	8,120
March 26–31	72	50	64.3	765
April	214	35	89.9	5,350
May	1,780	130	529	32,500
June	2,400	370	848	50,500
July	480	130	307	18,900
August	286	45	124	7,620
September	39	15	25.3	1,510
1914–15.				
October	95	35	73.5	4,520
April	472	55	129	7,680
May	730	169	321	19,700
June	1,700	500	856	50,900
July	695	101	401	24,700
August	175	74	95.6	5,880
September	730	74	289	17,200
1915–16.				
October	401	101	194	11,900
November	.....	.....	70	4,170
December	.....	.....	55	3,380
January	.....	.....	50	3,070
February	.....	.....	60	3,450
March	.....	.....	70	4,300
April	175	50	78.1	4,650
May	365	100	208	12,800
June	1,760	445	993	59,100
July	955	230	566	34,800
August	230	46	110	6,760
September	53	25	37.3	2,220
The year	1,760	.....	209	151,000
1916–17.				
October	98	24	69.7	4,290
November 1–14	78	44	63.1	1,750
April 8–30	166	80	99.2	4,530
May	955	101	368	22,600
June	3,220	390	1,670	99,400
July	2,640	625	1,460	89,800
August	500	80	170	10,500
September	230	110	162	9,640
1918.				
April 11–30	130	52	92	3,650
May	311	76	220	13,500
June	2,290	334	1,340	79,700
July	499	33	261	16,000
August	37	21	26.7	1,640
September	100	22	55.2	3,280

TROUT CREEK AT WIND RIVER, WYO.

LOCATION.—About sec. 3, T. 1 S., R. 1 W., at footbridge 100 yards south of Wind River post office. No tributaries below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 8 to August 31, 1909.

GAGE.—Vertical staff on upstream side of bridge near right bank; read by James Miller.

DIVERSIONS.—Very little water diverted above or below.

ACCURACY.—Gage read once daily. Rating curve fairly well defined below 100 second-feet. Records good.

Monthly discharge of Trout Creek at Wind River, Wyo., for 1909.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 6–31	56	11	28.0	1,440
June	93	27	60.2	3,580
July 1–26	27	6	21.5	1,110

OWL CREEK.

OWL CREEK NEAR THERMOPOLIS, WYO.

LOCATION.—About sec. 16, T. 43 N., R. 95 W., at Whetstine's ranch, 6 miles northwest of Thermopolis, in Hot Springs County. No tributary between station and mouth.

DRAINAGE AREA.—463 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—July 30, 1910, to October 31, 1912; April 1, 1915, to November 30, 1917. Station maintained by State engineer during 1913 and 1914.

GAGE.—Slope gage read by W. E. Whetstine; installed October 13, 1915, at footbridge 50 feet downstream from chain gage used by State engineer, and referred to same datum; owing to slope of creek, gage read approximately 0.1 foot lower. From 1910 to 1912 chain gage was located on upstream side of highway bridge a quarter of a mile above. No definite relation between gage readings.

EXTREMES OF DISCHARGE.—1910–1912, 1915–1917: Maximum stage recorded, 7.6 feet at 6 a. m. June 10, 1915 (discharge, 1,160 second-feet). Creek is dry some years during irrigation period.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 16 second-feet from Owl Creek above station and 66 second-feet below.

ACCURACY.—Gage read twice daily. Rating curve July 30, 1910, to October 31, 1912, fairly well defined; and April 1, 1915, to November 30, 1917, well defined. Records good.

Monthly discharge of Owl Creek near Thermopolis, Wyo., for 1910–1912, 1915–1917.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1910.				
August	10	0.5	1.39	855
September	197	1.5	21.9	1,300
The period				2,160
1910–11.				
October	6.5	2.5	4.10	256
November	6.5	6.5	6.50	387
March 12–31	46	6.5	18.6	1,140
April	6.5	2.5	3.83	228
May	6.5	1.5	2.85	175
June	197	2.5	123	7,320
July	24	2.5	9.63	592
August	24	1.5	3.81	234
September	2.5	1.5	1.73	103
1911–12.				
October	4.0		2.44	150
May	110	8.7	41.9	2,580
June	201	17	78.9	4,690
July	315	0	39.0	2,400
August	127	3.7	21.9	1,350
September	45	3.7	15.8	940
1912.				
October	93	22	40.9	2,510
1915.				
April	38	.7	6.88	409
May	264	1.2	26.9	1,650
June	944	96	388	23,100
July	223	.6	55.6	3,420
August	195	1.6	47.3	2,910
September	333	53	108	6,430
The period				37,960
1915–16.				
October	102	51	72.1	4,430
November	59	44	51.9	3,090
March 26–31	90	47	68.0	809
April	103	16	38.1	2,270
May	90	7	34.4	2,120
June	110	8	50.9	3,030
July	47	.6	12.3	756
August	.6	0	.37	22.8
September	1.0	0	.37	22.0
1916–17.				
October	19	4	9.4	578
May	515	6	143	8,790
June	740	149	411	24,500
July	315	6	71.7	4,410
August	12	1.7	4.09	251
September	5.5	.5	2.07	123
1917.				
October	14	.6	6.85	421
November	15	10	11.6	690

NOWOOD CREEK BASIN.

NOWOOD CREEK AT BONANZA, WYO.

LOCATION.—In sec. 13, T. 49 N., R. 91 W., at Bonanza, in Big Horn County. Nearest tributary, Paintrock Creek, enters some distance above.

DRAINAGE AREA.—1,790 square miles (measured on base map of Wyoming; scale, 1 : 500,000).

RECORDS AVAILABLE.—July 29, 1910, to September 30, 1921. Station maintained 1913–14 by State engineer.

GAGE.—Chain gage at left bank 1,000 feet below the store at Bonanza. Datum may be slightly different from that used 1910 to 1912, as bench mark had been destroyed and there were no means of checking old gage.

EXTREMES OF DISCHARGE.—1910–1921: Maximum stage recorded, 7.8 feet at 5 p. m. June 12–13, 1918 (discharge, 4,080 second-feet); minimum stage recorded, 1.55 feet from July 27 to 31, 1919 (discharge, 1.5 second-feet).

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 81 second-feet for irrigation above station and 48 second-feet below. Also power decree for 115 second-feet below.

ACCURACY.—Gage read once daily prior to 1918, inclusive, and twice daily since that date. Rating curves well defined. Records good.

Monthly discharge of Nowood Creek at Bonanza, Wyo., for 1910–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1910.				
August	125	63	73	4,490
September	248	63	152	9,040
1910–11.				
October	302	192	218	13,400
November	247	140	187	11,100
March 19–31	194	125	154	3,970
April	232	40	144	8,579
May	1,330	138	575	35,400
June	1,730	500	994	59,100
August	268	45	88.8	5,460
September	138	50	90.0	5,360
1911–12.				
October	264	145	164	10,100
November 1–9	187	156	171	3,050
June 16–30	1,960	1,120	1,520	45,200
July	3,460	232	823	50,600
August	765	180	388	23,900
September	590	198	365	21,700
1912–13.				
October	540	325	382	23,500
April	1,910	340	1,070	63,700
May	2,700	550	1,350	83,000
June	2,100	340	987	58,700
July	1,320	150	475	29,200
August	1,000	130	283	17,400
September	288	130	202	12,000
1913–14.				
October	288	225	269	16,500
April	1,890	240	671	39,900
May	3,940	570	1,770	109,000
June	3,400	750	1,540	91,600
July	912	115	424	26,100
August	460	63	146	8,980
September	240	65	142	8,450
1914–15.				
October	342	170	252	15,500
April	1,380	215	451	26,800
May	2,090	315	872	53,600
June	2,930	1,130	1,960	117,000
July	2,010	330	893	54,900
August	675	228	330	20,300
September	1,100	270	398	23,700
1915–16.				
October	502	255	349	21,500
November	460	382	395	23,500
April	1,240	212	378	22,500
May	1,820	502	906	55,700
June	3,780	1,170	1,840	109,000
July	1,520	150	544	33,400
August	212	88	125	7,690
September	122	67	101	6,010
1916–17.				
October	383	122	228	14,000
November 1–13	246	180	219	5,650
April 8–30	960	271	462	21,100
May	2,880	271	1,240	76,200
June	3,480	960	2,020	120,000
July	1,740	156	807	49,600
August	331	37	143	8,790
September	201	108	160	9,520

Monthly discharge of Nowood Creek at Bonanza, Wyo., for 1910–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917–18.				
October	271	156	188	11,600
November	290	185	220	13,400
March 24–31	705	290	485	7,700
April	1,310	290	560	33,300
May	1,820	331	1,290	79,300
June	4,080	830	2,460	146,000
July	1,240	234	578	35,500
August	185	60	138	8,480
September	375	70	181	10,800
1918–19.				
October	475	217	286	17,600
November 1–26	290	252	264	13,600
May 8–31	1,660	331	1,080	51,400
June	615	142	33.5	19,900
July	131	1.5	24.7	1,520
August	58	6.2	33.4	2,050
September	201	34	102	6,070
1919–20.				
October	315	150	224	13,800
November	275	135	193	11,500
March 17–31	3,180	310	1,160	34,500
April	530	234	315	18,700
May	2,980	375	1,640	101,000
June	3,880	1,310	2,110	126,000
July	1,900	185	798	49,100
August	449	115	206	12,700
September	271	128	203	12,100
1920–21.				
October	228	185	209	12,900
November	238	155	204	12,100
December 1–9	231	148	192	3,430
March 7–31	267	199	213	10,600
April	332	199	236	14,000
May	2,750	193	1,020	62,700
June	2,750	570	1,480	88,100
July	514	37	171	10,500
August	70	33	55.8	3,430
September	143	54	109	6,490

TENSLEEP CREEK NEAR TENSLEEP, WYO.

LOCATION.—In sec. 12, T. 47 N., R. 88 W., 800 feet east of county bridge 5 miles above Tensleep, in Washakie County. Nearest tributary, Canyon Creek, enters a quarter of a mile upstream.

DRAINAGE AREA.—228 square miles (measured on base map of Wyoming; scale, 1: 500,000).

RECORDS AVAILABLE.—September 21, 1910, to December 31, 1912; April 19, 1915, to September 30, 1921.

GAGE.—Stevens water-stage recorder installed May 11, 1918, at left bank 800 feet above county bridge, opposite vertical rock cliff; referred to inclined gage previously used. Datum lowered 1 foot September 26, 1916.

EXTREMES OF DISCHARGE.—1910–1912, 1915–1921: Maximum stage recorded, 6.81 feet at 4 a. m. June 11, 1918 (discharge, 2,360 second-feet); minimum discharge recorded, 34 second-feet at 10 a. m. March 6, 1920 (gage height, 0.90 foot).

DIVERSIONS.—There is a diversion of about 8 second-feet for power above the station. Prior to July 1, 1921, adjudicated diversions of 1.2 second-feet for irrigation above, and 36 second-feet below station.

ACCURACY.—Gage read twice daily during high water and once during remainder of period ending May 10, 1918. Continuous record after May 10, 1918, except for short periods. Rating curves well defined. Records good except for July, August, and September, 1918, and during winter periods, for which they are fair.

Monthly discharge of Tensleep Creek near Tensleep, Wyo., for 1910–1912, 1915–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1910.				
September 21–30	115	79	93	1,840
1910–11.				
October	84	65	74	4,550
November	70	59	63	3,750
December	62	56	59	3,630
January			60	3,070
February			60	2,780
March	55	45	47.3	2,910
April	94	45	55.2	3,290
May	640	76	286	17,700
June	940	122	537	32,000
July	195	76	105	6,460
August	88	45	64.1	3,940
September	55	45	51.3	3,050
The year	940		120	87,100
1911–12.				
October	65	45	56.1	3,450
November	60	45	49.3	2,930
December	50	45	46.6	2,870
January	48	40	45.1	2,770
February	47	36	43.5	2,500
March	60	39	44.5	2,740
April	55	46	49.1	2,920
May	1,000	52	237	14,600
June	1,840	492	1,050	62,500
July	920	82	436	26,800
August	566	89	233	14,300
September	155	70	107	6,370
The year	1,840	36	200	145,000
1912.				
October	128	82	103	6,330
November	82	50	67.9	4,040
December	57	48	51.4	3,160
1915.				
April 19–30	330	205	308	9,470
May	990	144	378	23,200
June	1,190	281	686	40,800
July	910	217	491	30,200
August	266	100	166	10,200
September	296	93	131	7,800
The period				122,000
1915–16.				
October	174	111	140	8,610
November	115	65	93.5	5,560
December	84	65	73.7	4,530
January	76	56	65.5	4,030
February	71	55	62.8	3,650
March	263	59	83.8	5,150
April	312	62	92.9	5,530
May	791	130	350	21,500
June	1,430	495	865	51,500
July	639	139	327	20,100
August	168	82	118	7,260
September	80	62	73.2	4,360
The year	1,430	55	195	142,000
1916–17.				
October	120	63	78.6	4,830
November	74	50	65.4	3,890
December	71	63	65.5	4,030
January			60	3,690
February			50	2,780
March			62	3,810
April	76	50	59.3	3,530
May	775	49	304	18,700
June	1,760	294	877	52,200
July	1,110	158	531	32,600
August	253	50	108	6,640
September	128	66	87.8	5,220
The year	1,760		196	142,000

Monthly discharge of Tensleep Creek near Tensleep, Wyo., for 1910–1912, 1915–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917–18.				
October	82	54	70.8	4,350
November	.....	.....	55	3,270
December	.....	.....	50	3,070
January	.....	.....	48	2,950
February	.....	.....	45	2,500
March	212	45	68.9	4,240
April	190	45	56.7	3,370
May	802	52	328	20,200
June	1,850	236	940	55,900
July	360	130	204	12,500
August	125	62	93.1	5,720
September	123	58	78.2	4,650
The year	1,850	.....	170	123,000
1918–19.				
October	123	64	97.8	6,010
November	77	42	63.6	3,780
December	64	50	57.8	3,550
January	54	48	51.8	3,190
February	51	45	48.0	2,670
March	53	46	48.1	2,960
April	224	46	81.7	4,860
May	950	108	491	30,200
June	290	116	193	11,500
July	116	36	58.9	3,620
August	66	42	49.0	3,010
September	66	43	57.9	3,450
The year	950	36	109	78,800
1919–20.				
October	68	54	62.0	3,810
November	67	45	56.5	3,360
December	54	45	48.8	3,000
January	55	43	45.9	2,820
February	48	44	45.7	2,630
March	60	37	48.2	2,960
April	66	47	49.9	2,970
May	1,050	58	290	17,800
June	1,900	380	957	56,900
July	850	160	401	24,700
August	228	99	139	8,550
September	203	91	125	7,440
The year	1,900	37	189	137,000
1920–21.				
October	90	51	70.3	4,320
November	.....	.....	65	3,870
December	.....	.....	60	3,690
January	56	49	51.5	3,170
February	56	40	50.6	2,810
March	49	43	46.6	2,870
April	52	43	47.5	2,830
May	1,200	48	439	27,000
June	1,020	228	563	33,500
July	216	56	115	7,070
August	78	48	57.6	3,540
September	70	45	55.7	3,310
The year	1,200	40	135	98,000

PAINTROCK CREEK NEAR HYATTVILLE, WYO.

LOCATION.—In sec. 25, T. 50 N., R. 89 W., at mouth of canyon, 6 miles above Hyattville, Big Horn County. Nearest tributary, Luman Creek, enters three-quarters of a mile downstream.

DRAINAGE AREA.—164 square miles (measured on topographic map).

RECORDS AVAILABLE.—August 8, 1920, to September 30, 1921.

GAGE.—Gurley water-stage recorder at right bank, 1,000 feet upstream from bridge at State fish hatchery.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder, 5.2 feet at midnight May 28, 1921 (discharge, 1,370 second-feet); minimum stage, 0.29 foot from 10 a. m. to 1 p. m. February 17, 1921 (discharge, 14 second-feet).

DIVERSIONS.—Above all diversions except that for Rhinehart ditch, which irrigates 12 acres.

ACCURACY.—Gage heights from continuous records. Rating curve well defined. Records excellent except during winter, for which they are fair.

Monthly discharge of Paintrock Creek near Hyattville, Wyo., for 1921–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1920.				
August 8–31	188	55	97.1	4,620
September	107	46	66.3	3,950
1920–21.				
October	45	29	38.6	2,370
November	.....	.....	23	1,370
December	.....	.....	20	1,230
January	.....	.....	20	1,230
February	.....	.....	20	1,110
March	23	21	22.1	1,360
April	35	22	27.4	1,630
May	1,030	36	393	24,200
June	915	240	627	37,300
July	205	58	111	6,820
August	63	35	48.8	3,000
September	40	31	35.6	2,120
The year	1,030	.....	115	83,700

PAINTROCK CREEK NEAR BONANZA, WYO.

LOCATION.—About sec. 19, T. 49 N., R. 90 W., at Paumer's ranch, 1½ miles above Bonanza. No tributary between station and mouth, half a mile below.

DRAINAGE AREA.—398 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—July 28, 1910, to October 31, 1913; April 19, 1915, to September 30, 1921. Station maintained by State engineer during 1913.

GAGE.—Vertical staff at right bank 300 feet below ranch house. From July 28, 1910, to October 31, 1913, there was a chain gage near house. No definite relation between two gages as high water changed channel between.

EXTREMES OF DISCHARGE.—1910–1913, 1915–1921: Maximum stage recorded, 5.3 feet at 8 a. m. June 12, 1918 (discharge, 3,390 second-feet); minimum stage recorded, 0.67 foot July 27, 1919 (discharge, 0.7 second-foot).

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 68 second-feet from Paintrock Creek; all above station.

ACCURACY.—Gage read twice daily. Rating curves fairly well defined 1910–1913, and well defined 1915–1918 except for periods of shifting control in 1916–1918. Records good for 1910–1913, 1915, 1920; excellent for 1917 and 1921; fair for 1916 and 1918, and winter periods.

Monthly discharge of Paintrock Creek near Bonanza, Wyo., for 1910–1913, 1915–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1910.				
August	25	16	19.6	1,210
September	79	16	33.0	2,320
The period				3,530
1910–11.				
October	89	66	76.4	4,700
November	77	54	66.4	3,950
December	57		51.4	3,160
January			40	2,460
February			40	2,220
March			35.3	2,170
April	39	10	21.1	1,280
May	750	13	303	18,600
June	950	120	556	33,100
July	165	14	56.8	3,490
August	130	13	36.5	2,240
September	54	10	25.5	1,520
The year	950		109	78,900
1911–12.				
October	82	45	61.3	3,770
November	68		51.9	3,090
December			35	2,150
January			35	2,150
February			35	2,010
March			35	2,150
April	54	34	39.3	2,340
May	790	36	192	11,800
June	1,850	575	1,130	67,200
July	1,430	102	474	29,100
August	590	30	176	10,800
September	234	18	104	6,190
The year	1,850		197	143,000
1912–13.				
October	240	79	120	7,380
November			70	4,170
December			50	3,070
January			45	2,770
February			45	2,500
March			50	3,070
April	565	92	241	14,300
May	1,820	156	731	44,900
June	1,280	239	590	35,100
July	986	123	276	17,000
August	205	90	162	9,960
September	171	92	127	7,560
The year	1,820		200	152,000
1913.				
October	182	156	165	10,100
1915.				
April 19–30	946	121	393	9,350
May	834	39	272	16,700
June	1,440	296	656	39,000
July	958	140	430	26,400
August	250	62	97.0	5,960
September	350	51	117	6,960
The period				104,000
1915–16.				
October	182	105	134	8,240
November	105	80	88.2	5,250
December			65	4,000
January			55	3,380
February			55	3,160
March			60	3,690
April	137	53	71.4	4,250
May	825	63	228	14,000
June	2,620	332	893	53,000
July	650	55	228	14,000
August	80	9	28.8	1,770
September	38	14	21.9	1,300
The year	2,620		160	116,000

NOTE.—Records for 1913 revised.

Monthly discharge of Paintrock Creek near Bonanza, Wyo., for 1910–1913, 1915–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916–17.				
October	99	41	77.8	4,780
November			55	3,270
December			50	3,070
January			45	2,770
February			40	2,220
March			40	2,460
April			35	2,080
May	935	39	363	22,300
June	2,180	285	1,010	60,100
July	815	139	423	26,000
August	180	12	56.4	3,470
September	83	35	58.0	3,450
The year	2,180		188	136,000
1917–18.				
October	108	30	60.0	3,690
November	91	66	77.8	4,630
December			50	3,070
January			35	2,150
February			35	1,940
March			30	1,840
April	184	39	63.2	3,760
May	895	68	309	19,000
June	2,620	342	1,310	78,000
July	456	55	214	13,200
August	188	28	56.5	3,470
September	159	28	73.7	4,390
The year	2,620		192	139,000
1918–19.				
October	247	90	124	7,620
November	100		75	4,460
December			50	3,070
January			35	2,150
February			30	1,670
March			25	1,540
April	375	21	87.7	5,220
May	922	105	460	28,300
June	280	47	147	8,750
July	44	.7	8.98	552
August	8	1.7	3.73	229
September	30	2.0	14.7	875
The year	922	.7	89.9	64,400
1919–20.				
October	78	34	63.8	3,920
November			50	2,980
December			40	2,460
January			30	1,840
February			30	1,780
March			38	2,340
April	66	25	37.0	2,200
May	1,060	37	269	16,500
June	1,990	298	983	58,500
July	850	58	327	20,100
August	170	34	60.6	3,730
September	72	30	52.9	3,150
The year	1,990		164	119,000
1920–21.				
October	74	49	64.3	3,950
November	92	52	69.6	4,140
December			50	3,070
January			40	2,460
February			40	2,220
March			42	2,580
April	55	25	47.1	2,800
May	1,500	19	409	25,100
June	1,160	242	734	43,700
July	199	11	53.8	3,310
August	21	3	10.7	658
September	30	11	18.3	1,090
The year	1,500	3	131	95,100

GREYBULL RIVER BASIN.

GREYBULL RIVER AT MEETEETSE, WYO.

LOCATION.—In sec. 4, T. 48 N., R. 100 W., at Meeteetse, Park County. Nearest tributary, Meeteetse Creek, enters 3 miles downstream.

DRAINAGE AREA.—690 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 11 to September 30, 1897; September 14, 1910, to October 31, 1912; June 6, 1915, to September 30, 1916; July 18, 1920, to September 30, 1921.

GAGE.—Gurley water-stage recorder at left bank, 1,000 feet above highway bridge at Meeteetse; installed August 20, 1920. Staff gage at highway bridge used during 1897. From 1910 to August 19, 1920, gage at private bridge at Wilson's ranch 4½ miles upstream. Flow at two locations practically comparable.

EXTREMES OF DISCHARGE.—1897; 1911–12; 1915–16; 1921: Maximum discharge recorded, 4,400 second-feet on July 3, 1912; minimum stage occurred during winter.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 102 second-feet from Greybull River above station, and 755 second-feet below; also diversion of 149 second-feet from tributaries entering above.

ACCURACY.—Staff gage read once daily until August 20, 1920, after which date gage heights from continuous record. Rating curves fairly well defined. Records good except for 1915, for which they are fair, and for 1916 for which they are poor.

Monthly discharge of Greybull River at Meeteetse, Wyo., for 1897, 1910–1912, 1915–16, 1920–21.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1897.				
June 11–30	1,500	320	1,020	40,500
July	1,610	245	513	31,500
August	636	105	299	18,400
September	135	65	104	6,190
The period				96,600
1910.				
September 14–30	889	124	228	7,690
1910–11.				
October	206	141	181	11,100
November	185	120	149	8,870
March 15–31	190	120	147	4,960
April	190	105	137	8,150
May	1,160	164	427	26,300
June	3,140	336	1,510	89,800
July	1,300	355	646	39,700
August	355	166	239	14,700
September	190	176	180	10,700
1911–12.				
October	176	151	159	9,780
November	180	149	160	9,520
April 7–30	217	145	165	7,850
May	1,300	158	493	30,300
June	3,950	850	1,970	117,000
July	4,400	900	1,600	98,400
August	1,960	180	588	36,200
September	395	140	240	14,300
October	395	120	222	13,600
1915.				
June 6–30	2,260	725	1,160	57,500
July	2,260	328	744	45,700
August	650	260	425	26,100
September	1,150	328	534	31,800
The period				161,000

Monthly discharge of Greybull River at Meeteetse, Wyo., for 1897, 1910–1912, 1915–16, 1920–21—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915–16.				
October	485	202	319	19,600
November 1–9	202	168	194	3,460
March 21–31	163	95	121	2,640
April	517	80	195	11,600
May	1,030	221	477	29,300
June	2,000	638	1,160	69,000
July	885	548	687	42,200
August	615	390	485	29,800
September	438	156	236	14,000
1920.				
July 18–31	966	535	705	19,600
August	845	172	362	22,300
September	189	138	158	9,400
1920–21.				
October	139	110	124	7,620
April	158	78	105	6,250
May	1,840	97	855	52,600
June	3,640	1,150	2,030	121,000
July	1,030	240	465	28,600
August	669	191	301	18,500
September	204	152	179	10,700

WOOD RIVER NEAR MEETEETSE, WYO.

LOCATION.—Near line between secs. 22 and 27, T. 48 N., R. 101 W., 1,200 feet above the mouth of Wood River and 7 miles southwest of Meeteetse, in Park County.

DRAINAGE AREA.—218 square miles (measured on base map of Wyoming; scale, 1 : 500,000).

RECORDS AVAILABLE.—September 15, 1910, to October 31, 1912; May 10, 1915, to November 11, 1916.

GAGE.—Chain gage at left bank 400 feet above bridge, used since April 25, 1916; read by Mrs. Adah River. Original gage, which was used during 1910–1912, was vertical staff at bridge. From May 10, 1915, to April 24, 1916, vertical staff located at bridge but referred to different datum from original gage.

EXTREMES OF DISCHARGE.—1910–1912, 1915–1917: Maximum stage recorded, 4.4 feet at 5 p. m. May 15, 1917 (discharge uncertain on account of shifting control); minimum discharge probably occurs during winter.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 74 second-feet from Wood River.

ACCURACY.—Gage read once daily. Rating curves fairly well defined. Records good except during winter, for which they are fair.

Monthly discharge of Wood River near Meeteetse, Wyo., for 1910–1912, 1915–1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1910.				
September 15–30	102	64	76	2,410
1910–11.				
October	79	44	58.7	3,610
November	58	49	53.8	3,200
December	53		46.4	2,850
January			40	2,460
February			35	1,940
March			41.1	2,530
April	53	30	37.2	2,210
May	140	41	77.5	4,770
June	665	138	313	18,600
July	246	129	197	12,100
August	153	76	108	6,640
September	85	50	68.7	4,090
The year	665		89.8	65,000
1911–12.				
October	72	28	53.2	3,270
November	90	78	72.3	4,300
December			50	3,070
January			45	2,770
February			40	2,300
March			40	2,460
April	120	38	60.5	3,600
May	600	58	227	14,000
June	1,700	415	745	44,300
July	468	135	272	16,700
August	466	76	170	10,500
September	176	49	109	6,490
The year	1,700		156	114,000
1911.				
October	170	115	144	8,850
1915.				
May 10–31	322	135	191	8,330
June	494	228	353	21,000
July	380	115	196	12,100
August	268	105	165	10,100
September	575	146	246	14,600
The period				66,100
1915–16.				
October	218	115	150	9,220
November	115	81	93.8	5,580
December			75	4,610
January			50	3,070
February			40	2,300
March	119		62	3,810
April	195	49	84.0	5,000
May	405	107	220	13,500
June	867	258	431	25,600
July	321	138	224	13,800
August	216	80	121	7,440
September	84	66	72.3	4,300
The year	867		136	98,260
1916.				
October	84	66	75.4	4,640
November 1–11	71	52	62.3	1,360

SHELL CREEK.

SHELL CREEK AT SHELL, WYO.

LOCATION.—Near west edge of sec. 26, T. 53 N., R. 91 W., 450 feet above headgate of Shell canal, three-quarters of a mile northeast of Shell, Big Horn County. Nearest tributary, Trapper Creek, enters a short distance above.

DRAINAGE AREA.—256 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—April 3, 1913, to September 30, 1921. From April 3, 1913, to October 31, 1914, station maintained by the Wyoming Irrigation Co.

GAGE.—Vertical staff at left bank 450 feet above canal headgate. Prior to June 18, 1918, gage at opposite bank and referred to datum 2.80 feet lower.

EXTREMES OF DISCHARGE.—1913–1921: Maximum stage from high-water mark, 8.35 feet on June 11, 1918 (discharge, 1,910 second-feet); minimum stage recorded, 1.25 feet at 5 p. m. April 29, 1921 (discharge, 30 second-feet).

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 8 second-feet from Shell Creek above station and 106 second-feet below.

REGULATION.—Flow controlled to a certain extent by storage of water in Adelaide reservoir on Shell Creek, 25 miles above Shell; capacity of reservoir 1,410 acre-feet.

ACCURACY.—Gage read twice daily. Rating curves not well defined owing to shifting control. Records fair.

Monthly discharge of Shell Creek at Shell, Wyo., for 1913–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913.				
April 3–30	535	99	294	16,300
May	1,390	210	662	40,700
June	888	246	470	28,000
July	300	160	218	13,400
August	199	90	129	7,930
September	128	94	108	6,430
The period				113,000
1913–14.				
October	128	97	113	6,950
November	120		97	5,770
December			65	4,000
January			50	3,070
February			45	2,500
March			40	2,460
April	192	41	78.2	4,650
May	1,510	80	706	43,400
June	1,420	270	656	39,000
July	270	102	161	9,900
August	115	72	88.0	5,410
September	102	70	84.8	5,050
The year	1,510		182	132,000
1914–15.				
October	105	85	93.4	5,740
November			75	4,460
December			60	3,690
January			55	3,380
February			50	2,780
March			50	3,070
April	653	66	194	11,500
May	683	91	235	14,400
June	623	219	421	25,100
July	399	113	230	14,100
August	129	94	104	6,400
September	137	94	110	6,550
The year	683		140	101,000
1915–16.				
October	102	72	81.7	5,020
November	72	58	66.1	3,930
December			55	3,380
January			50	3,070
February			50	2,880
March			50	3,070
April	145	83	91.9	5,470
May	684	95	217	13,300
June	1,300	191	645	38,400
July	350	102	194	11,900
August	102	83	89.5	5,500
September	78	62	67.1	3,990
The year	1,300		133	99,900

NOTE.—Records for 1914 revised. Winter discharge estimated.

Monthly discharge of Shell Creek at Shell, Wyo., for 1913–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916–17.				
October	91	74	78.9	4,850
November	.....	.....	70	4,170
December	.....	.....	60	3,690
January	.....	.....	50	3,070
February	.....	.....	50	2,780
March	.....	.....	50	3,070
April	68	54	60.3	3,590
May	480	58	222	13,600
June	1,420	192	665	39,600
July	528	98	259	15,900
August	108	86	95.1	5,850
September	110	72	88.2	5,250
The year	1,420	.....	145	105,000
1917–18.				
October	84	72	80.7	4,960
November	.....	.....	75	4,460
December	.....	.....	60	3,690
January	.....	.....	55	3,380
February	.....	.....	55	3,060
March	.....	.....	65	4,000
April	78	64	67.8	4,030
May	375	68	185	11,400
June	1,910	345	1,060	63,100
July	310	134	203	12,500
August	150	109	122	7,500
September	120	99	113	6,720
The year	1,910	.....	178	129,000
1918–19.				
October	131	75	102	6,270
November	91	74	83.5	4,970
December	.....	.....	60	3,690
January	.....	.....	55	3,380
February	.....	.....	55	3,060
March	78	.....	62	3,810
April	242	53	96.0	5,710
May	920	98	382	23,500
June	230	83	148	8,810
July	81	53	65.5	4,030
August	62	48	56.8	3,490
September	51	47	48.5	2,890
The year	920	.....	102	73,600
1919–20.				
October	69	51	57.7	3,550
November	62	.....	55	3,270
December	.....	.....	50	3,070
January	.....	.....	50	3,070
February	.....	.....	50	2,880
March	82	.....	60	3,690
April	70	53	62.4	3,710
May	559	62	158	9,720
June	1,670	235	830	49,400
July	568	119	238	14,600
August	133	97	112	6,890
September	117	85	96.5	5,740
The year	1,670	.....	152	110,000
1920–21.				
October	83	72	75.4	4,640
November	77	67	72.1	4,290
December	75	60	67.4	4,140
January	70	53	61.3	3,770
February	57	48	51.5	2,860
March	48	36	43.6	2,680
April	43	32	38.8	2,310
May	1,180	38	305	18,800
June	1,010	190	454	27,000
July	190	79	114	7,010
August	98	61	68.8	4,230
September	65	50	56.7	3,370
The year	1,180	32	118	85,100

SHOSHONE RIVER.

SHOSHONE RIVER NEAR ISHAWOOA, WYO.

[Formerly South Fork of Shoshone River near Ishawooa, Wyo.]

LOCATION.—In SW. ¼ sec. 23, T. 51 N., R. 104 W., at Hartung's private bridge, 1½ miles north of Ishawooa, in Park County. Nearest tributary, Bull Creek, enters 1½ miles downstream.

DRAINAGE AREA.—532 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—May 7, 1915, to September 30, 1921.

GAGE.—Chain installed July 24, 1921, 500 feet below private bridge, replacing vertical staff fastened to bridge piling. Prior to May 24, 1918, gage was half a mile upstream at Spaulding's ranch. Flow at two points comparable.

EXTREMES OF DISCHARGE.—1915–1921: Maximum stage recorded, 7 feet at 6.45 a. m. June 14, 1918 (discharge, 7,740 second-feet); minimum discharge probably occurs during winter.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 30 second-feet from Shoshone River above station, and 164 second-feet between it and Shoshone reservoir.

ACCURACY.—Gage read once daily during 1915–1917, and twice daily during remainder of period. Rating curve well defined during 1915–16, not well defined during 1917–18, fairly well defined from 1919 to 1921, inclusive. Records good.

Monthly discharge of Shoshone River near Ishawooa, Wyo., for 1915–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915.				
May 23–31	1,480	562	866	15,500
June	2,560	988	1,480	88,100
July	2,280	618	1,190	73,200
August	645	339	480	29,500
September	890	299	471	28,000
The period				234,000
1915–16.				
October	623	257	363	22,300
November 1–13	257	170	224	5,780
March 19–31	235	179	198	5,100
April	890	170	339	20,200
May	1,200	292	687	42,200
June	4,760	765	2,590	154,000
July	4,200	1,300	2,440	150,000
August	1,590	380	774	47,600
September	380	207	266	15,800
1916–17.				
October	312	200	241	14,800
November 1–11	200	167	190	4,150
April 22–30	167	107	142	2,540
May	2,410	107	729	44,800
June	4,210	501	2,440	145,000
July	4,420	860	2,670	164,000
August	965	401	585	36,000
September	378	254	288	17,100
1917–18.				
October	256	128	172	10,600
November	197	108	153	9,100
March 24–31	197	108	143	2,270
April	340	125	217	12,900
May	1,120	160	618	38,000
June	6,780	780	4,370	260,000
July	3,050	860	1,830	113,000
August	990	244	471	29,000
September	510	208	262	15,600

Monthly discharge of Shoshone River near Ishawooa, Wyo., for 1915–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	425	190	268	16,500
November 1–22	196	158	176	7,680
April	600	69	202	12,000
May	2,610	240	1,180	72,600
June	844	335	582	34,600
July	308	115	187	11,500
August	264	95	141	8,670
September	360	98	173	10,300
1919–20.				
October	150	125	134	8,240
November	150	90	121	7,200
March 22–31	125	96	105	2,080
April	125	91	109	6,490
May	1,820	129	740	45,500
June	3,390	790	2,380	142,000
July	3,690	1,210	2,220	136,000
August	2,280	252	751	46,200
September	252	148	187	11,100
1920–21.				
October	142	99	115	7,070
November	109	85	96.6	5,750
March 13–31	100	84	91.4	3,440
April	190	88	134	7,970
May	2,620	160	1,120	68,900
June	4,600	1,660	2,730	162,000
July	1,660	353	834	51,300
August	518	218	312	19,200
September	256	183	211	12,600

SHOSHONE RIVER AT MARQUETTE, WYO.

[Formerly South Fork of Shoshone River at Marquette, Wyo.]

LOCATION.—In sec. 12, T. 52 N., R. 103 W., at highway bridge at Marquette, 12 miles west of Cody. On April 4, 1906, station was moved 1¾ miles downstream to a point half a mile above Shoshone dam. Nearest tributary, North Fork, enters a short distance downstream.

DRAINAGE AREA.—500 square miles.

RECORDS AVAILABLE.—April 26 to November 30, 1903; May 1, 1905, to June 5, 1908.

GAGE.—Vertical staff.

EXTREMES OF DISCHARGE.—1903, 1905–1908: Maximum stage recorded, 6.1 feet July 4, 1907 (discharge, 5,300 second-feet); minimum stage recorded, 0.35 foot November 29–30, 1905 (discharge, 53 second-feet).

DIVERSIONS.—Prior to June 5, 1908, adjudicated diversions of 66 second-feet from Shoshone River above the station.

ACCURACY.—Gage read twice daily. Rating curves fairly well defined. Records good.

Monthly discharge of Shoshone River at Marquette, Wyo., for 1903, 1905–1908.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1903.				
April 26–30	412	270	338	3,350
May	980	227	410	25,200
June	3,740	1,030	1,980	118,000
July	2,590	705	1,070	65,800
August	777	255	409	25,100
September	352	202	287	17,100
The period				255,000
October	270	202	237	14,600
November	255	202	209	12,400
1905.				
May	1,550	149	474	29,100
June	3,200	990	1,730	103,000
July	2,100	590	1,330	81,800
August	558	189	314	19,300
September	212	63	143	8,510
The period				242,000
1905–6.				
October	149	87	110	6,766
November	149	53	117	6,960
April 4–30	900	126	325	17,400
May	3,090	255	971	59,700
June	4,560	686	1,500	89,300
July	2,440	686	1,650	101,000
August	1,340	306	577	35,500
September	413	126	215	12,800
1906–7.				
October	188	105	129	7,930
March	269	115	161	9,900
April	413	161	243	14,500
May	2,000	218	844	51,900
June	3,630	1,100	2,120	126,000
July	5,309	1,650	3,030	186,000
August 1–14	2,260	914	1,500	41,700
1908.				
April	1,220	161	481	28,600
May	1,720	347	713	43,800
June 1–5	1,400	950	982	9,740

SHOSHONE RIVER AT CODY, WYO.

LOCATION.—At highway bridge three-fourths of a mile northeast of Cody.

DRAINAGE AREA.—1,400 square miles.

RECORDS AVAILABLE.—May 1, 1902, to May 14, 1909.

GAGE.—Vertical staff attached to bridge pier.

EXTREMES OF DISCHARGE.—1902–1909: Maximum stage recorded, 8.0 feet July 4, 1907 (discharge, 15,800 second-feet); minimum stage is not known because of uncertainty of gage-height record.

DIVERSIONS.—Prior to May 14, 1909, adjudicated diversions of 91 second-feet from Shoshone River and North Fork above station.

ACCURACY.—Gage probably read once daily. Rating curve fairly well defined. Records are only fair because of uncertainty of gage-height record.

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Monthly discharge of Shoshone River at Cody, Wyo., for 1902–1909.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1902.				
May	7,360	655	2,700	166,000
June	10,500	3,420	5,650	336,000
July	3,780	2,440	2,780	171,000
August	2,440	655	1,340	82,400
September	655	655	655	39,000
The period	10,500			794,000
1902–3.				
October	655	655	655	40,300
January	390	270	303	18,600
February	295	245	283	15,700
March	925	223	333	20,500
April	2,360	295	847	50,400
May	2,900	878	1,560	95,900
June	10,100	3,420	6,820	406,000
July	6,070	2,060	3,560	219,000
August	2,280	878	1,580	97,200
September	720	585	650	38,700
1903–4.				
October	1,070	295	618	38,000
November	878	270	499	26,700
December	830	120	441	27,100
January	295	80	192	11,800
February	425	245	301	16,700
March	425	295	345	21,200
April	2,440	295	1,150	68,400
May	8,290	1,450	3,770	232,000
June	12,000	4,440	7,080	421,000
July	8,290	2,440	6,590	405,000
August	2,440	1,120	2,020	124,000
September	1,120	560	862	51,300
The year	12,000	80	2,000	1,440,000
1904–5.				
October	550	360	427	26,300
November	465	370	416	24,800
December	370	320	342	21,000
January	365	190	270	16,600
February	630	190	351	19,500
March	1,230	630	833	51,200
April	1,230	630	972	57,800
May	3,700	420	1,400	86,100
June	7,850	3,070	5,750	342,000
July	5,880	1,960	3,890	239,000
August	2,680	800	1,290	79,300
September	900	255	559	33,300
The year	7,850	190	1,380	997,000
1905–6.				
October	350	220	295	18,100
November	410	220	303	18,000
December	350	190	270	16,600
January	310	225	285	17,500
February	310	287	301	16,700
March	388	287	310	19,100
April	2,890	360	1,030	61,300
May	5,840	870	2,890	178,000
June	12,600	2,590	4,550	271,000
July	6,720	2,150	4,860	299,000
August	2,500	1,070	1,580	97,200
September	1,070	415	680	40,500
The year	12,600	190	1,450	1,050,000
1906–7.				
October	445	310	376	23,100
November	780	197	371	22,100
December	360	190	313	19,200
January	310	175	234	14,400
February	387	160	291	16,200
March	1,160	245	442	27,200
April	1,540	540	926	55,100
May	5,670	725	2,520	155,000
June	9,150	2,760	5,630	335,000
July	15,800	5,100	8,280	509,000
August	5,440	1,640	2,690	165,000
September	1,510	820	1,120	66,600
The year	15,800	160	1,940	1,410,000

Monthly discharge of Shoshone River at Cody, Wyo., for 1902–1909—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1907–8.				
October	820	425	641	39,400
November	425	212	366	21,800
December	560	195	325	20,000
January	350	250	310	19,100
February	250	210	218	12,500
March	700	180	246	15,100
April	2,700	210	1,170	69,600
May	3,840	1,060	1,970	121,000
June	9,570	2,520	5,380	320,000
July	10,400	3,840	6,680	411,000
August	3,890	1,250	2,200	135,000
September	1,120	550	744	44,300
The year	10,400	180	1,700	1,230,000
1908–9.				
October	1,250	550	707	43,500
November	620	265	449	26,700
December	265	190	219	13,500
January	420	190	284	17,500
February	265	265	265	14,700
March	480	265	319	19,600
April	700	310	434	25,800
May 1–14	1,870	480	1,060	30,400
The period	.....	.....	.....	192,000

SHOSHONE RIVER AT CORBETT DAM, WYO.

LOCATION.—In NE. ¼ sec. 7, T. 53 N., R. 100 W., at Corbett diversion dam, 8 miles below Cody.

DRAINAGE AREA.—1,740 square miles.

RECORDS AVAILABLE.—April 20, 1908, to September 30, 1920.

GAGE.—Staff gage 40 feet upstream from crest of dam; readings represent height of water above crest; gage read by employees of United States Reclamation Service.

DETERMINATION OF DISCHARGE.—Discharge computed by considering dam as a weir and sluices as submerged orifices. Water diverted through Corbett tunnel has been added to the flow passing dam.

EXTREMES OF DISCHARGE.—1908–1920: Maximum daily discharge during period, 18,700 second-feet June 15, 1918; no flow November 19, 1909.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions for water supply of Cody, and 500 second-feet for power, the latter being returned to river above gaging station. Below the station, diversions of 441 second-feet for irrigation.

REGULATION.—Shoshone reservoir, with a capacity of 456,000 acre-feet, regulates flow.

ACCURACY.—Stage-discharge relation practically permanent. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table and adding flow through sluice gates and Corbett tunnel. Earlier records considered fair and later records good.

Monthly discharge of Shoshone River at Corbett dam, Wyo., for 1908–1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1908.				
April 20–30	2,620	786	1,520	33,200
May	3,030	930	1,720	106,000
June	8,380	2,340	4,630	276,000
July	9,020	2,850	5,360	330,000
August	2,980	1,020	1,770	109,000
September	930	500	689	41,000
The period				875,000
1908–9.				
October	1,100	548	687	42,200
November 1–14	516	484	502	13,900
May 15–31	4,230	889	2,520	85,000
June	12,300	2,760	8,189	487,000
July	15,600	2,710	6,300	387,000
August	2,580	903	1,660	102,000
September	1,970	626	1,060	63,100
1909–10.				
October	804	178	655	40,300
November	984	0	627	37,300
March 13–31	1,370	529	868	32,700
April	3,690	575	1,680	100,000
May	4,210	1,500	2,770	170,000
June	3,340	2,230	3,050	181,000
July	3,430	2,960	3,260	200,000
August	2,940	1,350	2,120	130,000
September	1,370	485	769	45,800
1910–11.				
October	1,200	398	562	34,600
November	566	282	430	25,600
December	428	306	370	22,800
January	944	232	380	23,400
February	456	210	297	16,500
March	715	254	447	27,500
April	980	414	629	37,400
May	1,730	836	1,310	80,500
June	3,980	1,879	3,030	180,000
July	4,290	3,010	4,070	250,000
August	3,820	3,110	3,570	220,000
September	3,080	1,510	2,380	142,000
The year	4,290	210	1,460	1,060,000
1911–12.				
October 1–25	1,470	232	913	45,300
January	1,210	816	1,040	64,000
February	372	270	325	18,700
March	550	222	323	19,900
April	908	490	605	36,000
May	4,010	556	1,470	90,400
June	5,200	1,260	2,570	153,000
July	2,340	2,100	2,230	137,000
August	2,400	2,250	2,340	144,000
September	2,360	2,260	2,290	136,000
1912–13.				
October	2,300	2,080	2,220	136,000
November	2,130	1,980	2,070	123,000
December	2,020	1,710	1,870	115,000
January	1,740	358	1,100	67,600
February	530	270	366	20,300
March	470	134	345	21,200
April	1,380	400	735	43,700
May	1,400	371	851	52,300
June	7,220	658	2,380	142,000
July	6,080	2,850	4,420	272,000
August	4,210	1,170	2,220	136,000
September	1,580	609	948	56,400
The year	7,220	134	1,630	1,190,000

Monthly discharge of Shoshone River at Corbett dam, Wyo., for 1908–1920—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913–14.				
October	833	521	622	38,200
November	639	346	415	24,700
December	386	344	369	22,700
January	358	330	345	21,200
February	358	246	317	17,600
March	614	270	480	29,500
April	645	530	569	33,900
May	5,320	539	2,430	149,000
June	7,730	2,950	5,050	300,000
July	4,230	1,040	2,550	157,000
August	1,460	400	790	48,600
September	1,320	498	666	39,600
The year	7,730	246	1,220	882,000
1914–15.				
October	1,710	483	855	52,600
November			690	41,100
December			664	40,800
January			639	39,300
February			630	35,000
March			598	36,800
April	691	514	601	35,800
May	1,930	432	697	42,900
June	5,450	2,250	3,300	196,000
July	5,170	1,350	3,230	199,000
August	2,130	789	1,070	65,800
September	3,230	737	977	58,100
The year			1,160	843,000
1915–16.				
October	818	609	732	45,000
November	1,400	622	845	50,300
December			711	43,700
April 10–30	709	572	648	27,000
May	2,090	525	1,330	81,800
June	16,200	2,960	5,780	343,000
July	9,576	3,140	5,810	357,000
August	2,830	804	1,660	102,000
September	1,610	585	927	55,200
1916–17.				
October	873	701	796	49,600
November	768	438	612	36,400
December			651	40,000
January	743	692	718	44,100
February	725	658	670	37,200
March	692	658	661	40,600
April	833	592	710	42,200
May	2,070	633	1,310	80,600
June	9,730	1,350	4,830	287,000
July	9,380	1,630	5,830	358,000
August	1,800	1,040	1,440	88,500
September	1,900	709	1,310	78,000
The year	9,730	438	1,630	1,180,000
1917–18.				
October	875	660	735	45,200
November	923	692	758	45,100
December	692	692	692	42,500
January	692	692	692	42,500
February	692	692	692	38,400
March	692	692	692	42,500
April	750	543	672	40,000
May	1,740	697	1,040	64,000
June	18,700	1,420	9,940	591,000
July	5,980	1,980	4,220	259,000
August	2,180	1,110	1,860	114,000
September	1,930	508	1,270	75,600
The year	18,700	508	1,930	1,400,000

Monthly discharge of Shoshone River at Corbett dam, Wyo., for 1908–1920—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	693	500	668	41,100
November	1,580	678	1,460	86,900
December	592	592	592	36,400
January	513	513	513	31,500
February	513	513	513	28,500
March	529	498	514	31,600
April	731	526	617	36,700
May	1,300	545	1,060	65,200
June	2,220	1,190	1,550	92,200
July	1,380	858	1,250	76,900
August	990	603	783	48,100
September	663	569	617	36,700
The year	2,220	498	845	612,000
1919–20.				
October	593	546	557	34,200
November	593	593	593	35,300
December	593	577	589	36,200
January	530	515	516	31,700
February	593	530	583	33,500
March	593	530	557	34,200
April	637	577	604	35,900
May	1,960	608	936	57,600
June	1,790	1,350	4,370	260,000
July	8,040	2,660	5,390	331,000
August	3,220	858	1,840	113,000
September	1,190	605	798	47,500
The year	8,040	515	.....	1,050,000

NOTE.—Mean discharge for November, December, 1914; January, February, March, December, 1915; and December, 1916, is estimated. During the irrigation season of 1908 there was about 32,000 acre-feet diverted through Corbett tunnel that is not included in river discharge.

Monthly discharge of Corbett tunnel at Corbett dam for 1909–1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1909.				
May 15–31	107	102	105	3,540
June	198	106	137	8,150
July	207	189	196	12,100
August	218	192	208	12,800
September	171	0	131	7,800
The period	.....	.....	.....	44,400
1909–10.				
October	199	120	144	8,850
November 1–12	111	0	88	2,090
March 13–31	75	46	72.7	2,740
April	276	43	128	7,620
May	258	42	126	7,750
June	293	188	275	16,400
July	277	187	262	16,100
August	276	132	211	13,000
September	172	127	146	8,690
1910–11.				
October	284	26	170	10,500
November	39	10	33.3	396
March 7–31	51	0	36.5	579
April 19–30	84	0	48.8	1,160
May	206	34	137	8,420
June	386	0	210	12,500
July	338	120	224	13,800
August 1–26	236	64	135	6,960
September 5–30	170	58	106	5,470

Monthly discharge of Corbett tunnel at Corbett dam for 1909–1920—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911–12.				
October 1–21	236	84	129	5,370
April 20–30	54	54	54.0	1,180
May	307	47	121	7,440
June	346	163	247	14,700
July	326	101	201	12,400
August	295	80	148	9,100
September	152	29	72.5	4,310
1912–13.				
October	43	0	20.3	1,250
November	58	0	9.7	577
April 27–30	146	61	88.8	705
May	330	146	233	14,300
June	337	98	230	13,700
July	414	49	255	15,700
August	336	128	239	14,700
September	207	17	117	6,960
1913–14.				
October	112	24	60.1	3,700
November	57	0	28.1	1,670
December 1–12	19	9	17.6	419
April 4–30	54	12	34.3	1,840
May	198	25	115	7,070
June	207	31	138	8,210
July	247	118	203	12,500
August	216	77	148	9,100
September	108	24	62	3,690
1914–15.				
October	193	26	105	4,170
April 11–30	372	89	254	10,100
May	345	174	252	15,500
June	366	129	262	15,600
July	534	275	400	24,600
August	376	63	224	13,800
September	337	153	220	10,500
1915–16.				
October 27–31	119	59	105	1,040
November 1–12	323	41	221	5,260
April 10–30	217	46	137	5,710
May	421	176	274	16,800
June	636	0	385	22,900
July	710	277	576	35,400
August	574	259	371	22,800
September	365	58	229	13,600
1916–17.				
October	141	58	71.5	4,400
November 1–10	283	72	211	4,180
April 13–16, 24–26	141	45	91.7	1,270
May	326	7	126	7,750
June	758	29	476	28,300
July	822	596	712	43,800
August	823	278	490	30,100
September 1–21	318	57	238	9,910
1917–18.				
October	215	25	58.4	3,590
November 1–10	231	159	197	3,910
April 16–30	160	0	53.5	1,590
May	778	101	349	21,500
June	928	512	717	42,700
July	852	277	615	37,800
August	808	247	539	33,100
September	463	83	282	16,800
1918–19.				
October	164	75	90.6	5,570
November 1–22	86	54	84.5	3,690
April 12–30	447	58	224	8,440
May	784	438	615	37,800
June	867	404	711	42,300
July	929	699	848	52,100
August	680	461	546	33,600
September	488	290	378	22,500
1919–20.				
April 22–30	71	30	57.2	1,020
May	851	0	366	22,500
June	914	523	780	46,400
July	941	437	765	47,000
August	883	457	657	40,400
September	602	491	501	29,800

SHOSHONE RIVER AT LOVELL, WYO.

LOCATION.—About in sec. 10, T. 56 N., R. 96 W., at ferry landing at Lovell. No important tributary between station and mouth of river.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 23, 1897, to September 30, 1898.

GAGE.—Staff gage fastened to landing pier of the Lovell ferry on south side of river; read by Henry Cockrell.

EXTREMES OF DISCHARGE.—1897–98: Maximum stage recorded, 4.0 feet May 28, 1898 (discharge, 12,300 second-feet); minimum stage recorded, −1.30 feet September 29–30, 1898 (discharge, 150 second-feet).

ACCURACY.—Gage read once daily. Rating curve not well defined. Records fair.

Monthly discharge of Shoshone River at Lovell, Wyo., 1897–98.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1897.				
May 23–31	9,000	6,830	8,200	146,000
June	9,440	3,640	6,120	364,000
July	6,250	1,250	3,150	194,000
August	1,650	430	777	47,800
September	360	360	360	21,400
The period				773,000
1897–98.				
October 1–16	500	360	373	11,900
April	3,640	270	886	52,700
May	12,300	600	4,370	269,000
June	11,200	3,350	7,460	444,000
July	8,280	1,250	4,580	282,000
August	2,770	270	1,290	79,300
September	2,190	150	414	24,600

IRRIGATION.

PRESENT DEVELOPMENT.

The headwaters and tributaries of the Big Horn are used more extensively for irrigation than the Big Horn itself on account of the greater areas of irrigable land adjacent to them. The following table shows the areas under adjudicated ditches and those under completed ditches not yet adjudicated:

Areas covered by completed ditches in the Big Horn basin, in acres.

Stream.	Adjudicated (including territorial rights).	Completed but not adjudicated.	Total.
Wind River and tributaries	13,572	[a] 99,626	113,198
Big Horn River	48,846	25,835	74,681
Popo Agie River and tributaries (including Little Wind River)	25,052	54,681	79,733
Owl Creek and tributaries	19,173	10,332	29,505
Nowood Creek and tributaries	27,629	2,737	30,366
Greybull River and tributaries	61,481	45,944	107,425
Shell Creek and tributaries	11,628	12,718	24,346
Shoshone River and tributaries	32,983	72,060	105,043
Minor tributaries of Big Horn River	17,170	27,942	45,112
	257,534	351,875	609,409

[a] Increased by 35,500 acres to account for Indian ditches completed but not yet approved for filing

BIG HORN RIVER.

Most of the lands irrigated from Big Horn River are the bottom and first bench lands between Thermopolis and Greybull, as the valley above and below this section is very narrow. On Wind River the bottom lands are irrigated in patches beginning at a point above Dubois and extending to Lenore, a distance of 40 miles. Below Lenore considerable land is irrigated on the east side of the river but very little on the west.

Areas covered by principal irrigation developments in Big Horn drainage basin, in acres.

Project.	Source of supply.	Irrigable.	Irrigated in 1921.
Indian Service	Wind River and Little Wind River	74,000	18,530
Riverton	Wind River	125,000	0
Le Clair-Riverton No. 2	do	14,700	8,000
Wyoming No. 2	do	12,000	7,700
Kirby canal	Big Horn	1,900	1,600
Bluff canal	do	2,800	2,500
Tillard canal	do	1,800	1,500
Hanover canal	do	27,000	15,000
Big Horn County canal	do	25,000	16,000
Bench canal	Greybull River	20,000	10,000
Wyoming Irrigation Co	Shell Creek	8,200	2,500
Shoshone	Shoshone River	147,000	45,000
Lakeview canal	do	9,000	4,000
Cody canal	do	12,000	9,000
Lovell canal	do	16,000	10,000
Elden canal	do	12,300	4,500
Big Forks ditch	do	4,000	2,000
		512,700	157,830

The Indian Service has irrigated a considerable area in the lower end of the Wind River Diminished Reservation bounded by Wind and Popo Agie rivers, and also a considerable area on the ceded lands lying east of Wind River covering practically all the irrigable areas between Wind River and the divide forming the southern boundary of the Fivemile drainage basin. The latter amounts to 35,000 acres. The principal crops are alfalfa, oats, wheat, potatoes, sugar beets, and vegetables.

Areas under Indian Service canals in Wind River basin, in acres.

Name.	Source of supply.	Place of diversion.			Irrigable.	Irrigated in 1921.
		Section.	Township.	Range.		
Subagency	Little Wind	11	1 S.	2 E.	7,600	3,500
Coolidge	do	36	1 N.	1 W.	19,500	4,800
Ray [a]	South Fork of Little Wind	6	1 S.	1 W.	18,000	5,370
Upper Wind River system	Wind River	14	5 N.	5 W.	17,500	1,970
Le Clair	do	32	2 N.	2 E.	6,590	1,800
De Shaw	do	21	3 N.	1 W.	920	177
Johnston	do	14	2 N.	1 E.	2,210	528
Aragon	do	32	3 N.	1 E.	1,680	385
					74,000	18,530

[a] Ray Lake reservoir in T. 1 S., R. 1 W., is a natural depression which gives storage of 6,570 acre-feet for range of 5.5 feet.

In addition to the above, the United States Reclamation Service is constructing for the Indian Service the Riverton project, which will irrigate about 125,000 acres of ceded land lying north of the irrigated lands east of Wind River.

The Riverton project embraces 125,000 acres of irrigable land in the Fivemile and Muddy creeks drainage basins and was originally started by Wyoming Central Irrigation Co., which abandoned it before doing any construction work. The general irrigation scheme is the construction of a main canal 31 miles long extending from Wind River in sec. 23, T. 3 N., R. 2 W., in a westward direction to the northeast corner of T. 3 N., R. 3 E., where it will branch into the Dry Muddy and Fivemile laterals. Storage will be provided on Bull Lake which will afford a storage capacity of 78,000 acre-feet by the construction of two earth dams aggregating 2,300 feet in length at the crest, with a maximum height of 50 feet. As the run-off from Bull Lake is not accurately known, provision is made for additional storage in a reservoir at Pilot Butte, on the main canal line 10 miles below the intake. At this point storage amounting to 34,000 acre-feet could be developed. A proposed extension of the Riverton project is the construction of the so-called Fremont canal which would divert water from Wind River 12 miles above the main canal and cover about 90,000 acres lying northwest of the present project.

The Le Clair-Riverton canal No. 2, originally built by the Indian Service, diverts water from the north bank of Wind River in sec. 3, T. 2 N., R. 2 E., and parallels the river at a distance of 2 miles for 13 miles, then turns and runs northeast for 15 miles, covering 14,700 acres between it and Wind River above Wyoming No. 2 canal. The upper end of the canal as far east as sec. 22, T. 1 N., R. 3 E., is operated by the Indian Service for the irrigation of Indian lands. Beyond that point the canal is operated by the Le Clair-Riverton irrigation district for the irrigation of all land in private ownership under the canal.

The Wyoming canal No. 2, which is under joint arrangement with that of the Le Clair-Riverton canal No. 2, diverts water from the north bank of Wind River in sec. 34, T. 1 N., R. 3 E., 6 miles west of Riverton. The canal runs east to Riverton, then turns and runs northeast for 12 miles, covering 12,000 acres of land between it and Big Horn River.

The Kirby canal diverts water from Big Horn River in sec. 19, T. 43 N., R. 94 W., and irrigates 1,900 acres near Kirby Creek.

The Bluff canal diverts water in sec. 10, T. 45 N., R. 94 W., and irrigates 2,800 acres in the vicinity of Meeyero Creek.

The Tillard canal diverts water in sec. 27, T. 51 N., R. 3 W., and irrigates 1,800 acres near Basin.

The Hanover Canal Co. irrigates an area of 27,000 acres on the west side of Big Horn River near Worland. The upper Hanover canal heads on the west side of Big Horn River near Meeyero Creek. It is carried across the river on a metal flume a few miles below the intake and extends for a distance of 25 miles on the east side, covering 12,000 acres, of which 7,000 acres are irrigated. The lower Hanover canal diverts water from the east bank of Big Horn River, a short distance above Nowater Creek, and covers 13,000 acres, of which 8,000 acres are irrigated. The principal crops are alfalfa, grain, and sugar beets.

The land under the Big Horn County canal project lies on the west side of Big Horn River, from Gooseberry Creek to Greybull River. The main canal diverts water from Big Horn River just below the mouth of Gooseberry Creek and parallels Big Horn River at a distance of 2 miles for 35 miles, covering the land between it and the river. This land comprises 25,000 acres, of which 16,000 acres were irrigated in 1921. The principal crops are alfalfa, grain, and sugar beets.

GREYBULL RIVER.

Of the 64,000 acres of land having adjudicated rights from Greybull River, the largest area is on the north side of the river between Burlington and Otto and is irrigated by a number of independent ditches. Besides this area, the bottom lands throughout the length of the river for an average width of 1 mile or more are irrigated and 46,000 acres are under completed ditches not yet adjudicated, of which the largest area is included under the Bench canal.

The Bench Canal Co. has constructed an irrigation system of 20,000 acres, of which 16,000 acres are Carey Act lands, southeast of Germania. Bench canal diverts water from Greybull River in sec. 8, T. 51 N., R. 97 W. About 10,000 acres were irrigated in 1921. The chief crops are alfalfa and grain.

SHELL CREEK.

The adjudicated canals that divert water from Shell Creek and its tributaries cover 11,624 acres and those completed, but not yet adjudicated, cover 12,718 additional acres. Most of these lands lie along the river and its tributaries west of the Big Horn Mountains and are irrigated by individual ditches. The largest project is that of Wyoming Irrigation Co. This project comprises 8,200 acres on the south side of Shell Creek between Shell and the mouth of the creek. Shell canal diverts water from Shell Creek just above the town of Shell. In addition to irrigating its own land, the company expects to furnish water to 1,800 acres having prior rights. To augment the flow during the irrigation season Adelaide reservoir, having a capacity

of 1,410 acre-feet, has been constructed on a tributary of Shell Creek in sec. 36, T. 43 N., R. 88 W. In 1921, 2,500 acres were irrigated. The principal crops are hay and grain.

SHOSHONE RIVER.

Of the adjudicated rights for 33,000 acres and the unadjudicated rights for 72,000 acres (in addition to even larger areas under unfinished ditches) the greater part is included under the Shoshone project and the Cody, Lovell, Sidon, and Big Forks canals. The remaining irrigated lands are scattered areas comprised in the bottom lands along the river and its tributaries. Irrigation advanced beyond the first stage of individual ditches about 1900 and has reached the cooperative ditch stage and also that of the large project with permanent structures. The experience gained by the irrigators enables them to raise successfully alfalfa, grain, sugar beets, vegetables, cattle, hogs, and dairy products. The duty of water for the Shoshone project, which may be taken as applying to the other projects, is 2 acre-feet delivered to the land.

The irrigation plan for the Shoshone project provides for the storage of flood waters of Shoshone River in a reservoir controlled by Shoshone dam, 8 miles above Cody; the diversion of water from Shoshone River by a dam at Corbett tunnel into a canal system covering lands on the north side of the river near Ralston, Powell, Garland, and Frannie; the diversion into Willwood canal for the irrigation of lands lying south of the river; and the diversion into the north side highline canal from Shoshone dam covering lands on north side of river about the Garland system, and extending from the lower end of Shoshone canyon near Cody to the divide between the Shoshone and Clark Fork basins. The entire project includes 147,000 acres, but as the Willwood and Northside highline canals are not yet constructed, about 65,000 acres are now covered by the constructed system, of which 45,000 acres were irrigated in 1921. The most notable feature of the project is the Shoshone reservoir. This reservoir has a capacity of 456,000 acre-feet and is formed by the Shoshone dam near the upper end of the canyon. The dam is a monolithic concrete structure of the arch type, the radius of the center line of the top being 150 feet. The maximum height from rock foundation to crest is 328 feet, and its crest length is 200 feet. The main outlet from the reservoir is a concrete lined tunnel 498 feet long having a section 10 feet square on a 0.6 per cent grade. A second outlet tunnel on the same side has a length of 300 feet and a cross section 10 feet square. On the opposite side of the river several hundred feet upstream a concrete spillway weir, 300 feet long, discharges into an open channel and from there into a tunnel 405 feet long leading to the river below.

The lands under the Lakeview project are irrigated by Hammit canal, which diverts water from Shoshone River in sec. 7, T. 50 N., R. 104 W. This canal extends about 14 miles northeast to sec. 12, T. 51 N., R. 103 W. and irrigates the land between it and the river. The total irrigable area is 9,000 acres, of which 4,000 acres were irrigated during 1921.

The Cody canal, built under the Carey Act, is below the Shoshone Canyon on the south side of the river near Cody. The canal diverts water from Shoshone River above the Shoshone reservoir. Of the 12,000 acres of irrigable area, 9,000 acres were irrigated during 1921. The principal crops are alfalfa, grain, and potatoes. The Cody canal is notable not only for being the first Carey Act project in Wyoming, but for being the first enterprise initiated under that Act.

The lands under the Lovell canal project, which was originally known as the Elk canal, are on the south side of Shoshone River. The main canal diverts water from the river in lot 73, T. 55 N., R. 98 W. It extends for a distance of 15 miles and covers 16,000 acres, of which 10,000 acres were irrigated in 1921. The chief crops are alfalfa, grain, and sugar beets.

About 1900 the settlers of land north of Shoshone River between what are now Byron and Cowley started the Sidon canal and completed it by cooperative effort. It diverts water from Shoshone River about in sec. 7, T. 55 N., R. 97 W., and extends northeastward for a distance of 30 miles, irrigating the land between it and the river. Of the 12,300 acres of irrigable land, 4,500 acres were irrigated during 1921. The chief crops are alfalfa, grain, and potatoes.

The land irrigated by the Big Forks ditch lies north of Shoshone River in the triangle formed by the junction of the Shoshone and the Big Horn. The ditch diverts water from Shoshone River and covers 4,000 acres, of which 2,000 acres were irrigated during 1921. The chief crops are alfalfa, grain, and potatoes.

FUTURE DEVELOPMENT.

No topographic maps are available for the entire basin nor have detailed field investigations been made, so it is impossible to state definitely what additional areas can be irrigated. However, during the 27 years that have elapsed since the passage of the Carey Act, many private investigations have been made and lands segregated into proposed projects. In view of the great activity shown in irrigation matters after the passage of the reclamation act in 1902, probably the possibilities have been covered by the proposed Carey Act projects. Some of these projects have been completed and are described on the preceding pages, but several others, embracing a total of 145,000 acres, have not been constructed.

Areas to be covered by possible future irrigation projects in Big Horn basin, in acres.

Project.	Source of supply.	Area. [a]
Lander Valley	Popo Agie River	13,000
Paintrock	Paintrock Creek	16,000
Tensleep and Bonanza	Nowood Creek	16,000
Oregon basin	Shoshone River	100,000
		145,000

[a] These figures are a rough estimate as detailed surveys have not been made, and for the larger projects the area will depend upon available water supply.

BIG HORN RIVER.

The Tremont canal, a project covering about 18,000 acres east of Big Horn River near Bonneville and Shoshone, was to be supplied by water pumped from the river in sec. 7, T. 1 N., R. 5 E., utilizing power from Boysen dam. The project has finally been abandoned and the land classed as nonirrigable.

POPO AGIE RIVER.

The Lander Valley project lies south of Popo Agie River between the Little Popo Agie and Beaver Creek, and embraces an area of 13,000 acres, which can be irrigated from Popo Agie River. Rights were acquired for this project in 1908, but no work has been started.

GREYBULL RIVER.

In the Buffalo Basin, east of Meeteetse, is a large area, the irrigability of which has been investigated at different times, and a segregation of 50,000 acres has finally been made. The water for irrigating this area will have to come from storage reservoirs on Wood and Greybull rivers, as the flow of Gooseberry Creek is inadequate. As there is more irrigable land than can be supplied with water, the net area is very uncertain. No work has been done on the project and the segregated lands have been relinquished and classed as nonirrigable.

NOWOOD CREEK.

Land amounting to 16,000 acres north of Nowood Creek has been segregated for irrigation from a canal diverting water from Paintrock Creek. Construction work has been started and will probably be completed when the demand for irrigated land warrants such action. Several small reservoir sites in the mountains are available for storage.

The Tensleep and Bonanza project, for which 16,486 acres has been segregated under the Cary Act, contemplates the irrigation of land lying north of Nowood Creek in T. 48 N., Rs. 89 and 90 W. A canal covering these lands will divert water from Tensleep Creek. In addition, it is proposed to irrigate a small area lying west of Nowood Creek in T. 49 N. by direct diversion from the creek.

SHOSHONE RIVER.

The State procured the segregation of 200,000 acres of land lying southeast of Cody, for the purpose of irrigating it from Shoshone River near Ishawooa. Although a great amount of work was done on the project, no part was constructed so fully that any of the land could be irrigated, and the constructing company finally abandoned the work. The chief features of the project are the Shoshone canal, leading to the Oregon Basin. This basin has a storage capacity of 500,000 acre-feet without any dam, the outlet being through a tunnel. The United States Reclamation Service has made an examination of the project with the idea of irrigating the area directly from Shoshone reservoir.

WATER SUPPLY.

Fairly complete records for Big Horn River at Thermopolis are available from 1903 to 1905 and from 1911 to 1921, and for the station at Hardin, Mont., from 1904 to 1921. A well-defined relation exists between the flow at the two points and by means of this relation the discharge at Thermopolis for the period 1906–1910 was estimated. The median years for the 19-year period 1904–1921 were 1908 and 1920, each of which had a total discharge of 1,710,000 acre-feet.

Percentage of total discharge at Thermopolis to discharge for median year.

Year.	Total discharge at Thermopolis in acre-feet.	Percentage of median discharge.	Year.	Total discharge at Thermopolis in acre-feet.	Percentage of median discharge.
1903	1,840,000	107	1913	1,770,000	104
1904	1,850,000	108	1914	1,360,000	79
1905	1,160,000	68	1915	1,340,000	78
1906	[a] 1,520,000	89	1916	1,490,000	87
1907	[a] 1,860,000	109	1917	1,910,000	112
1908	[a] 1,710,000	100	1918	1,630,000	95
1909	[a] 1,870,000	110	1919	713,000	42
1910	[a] 1,210,000	71	1920	1,710,000	100
1911	1,420,000	83	1921	1,730,000	101
1912	1,780,000	104			

[a] Estimated from discharge at Hardin, Mont.

Although both 1908 and 1920 had the median discharge, the record for 1908 has been computed from that at Hardin, and is not as accurate as that for 1920 which has been used in determining the water supply available for irrigation. The consumptive duty of water for irrigation in the Big Horn drainage basin is taken as 1½ acre-feet and the monthly requirements, May 0.30, June 0.42, July 0.48, and August 0.30 acre-foot.

Monthly discharge at Thermopolis and irrigable area for median year.

	May.	June.	July.	August.
Discharge.....acre-feet..	231,000	552,000	329,000	117,000
Irrigable area.....acres..	767,000	1,310,000	685,000	390,000

During the median year 390,000 acres could be completely irrigated, and during the lowest year 146,000 acres could be completely irrigated.

As the area under completed ditches which divert the water from Big Horn River below Thermopolis and above important tributaries is 75,000 acres, the additional area for which water is available without storage is 315,000 acres for a median year and 171,000 acres for the lowest year recorded.

Above Thermopolis the irrigated areas under the larger projects will ultimately be increased by 200,000 acres, water for which will be available as shown by the records at Thermopolis for the median year, but during an extremely low year, the supply will be deficient unless supplemented by storage. A number of reservoir sites are listed on pages 579–580.

WATER POWER.

DEVELOPED POWER.

BIG HORN RIVER.

The Wyoming Power Co. has a reinforced concrete dam at the entrance to Big Horn Canyon in sec. 4, T. 5 N., R. 95 W., 17 miles above Thermopolis. The dam, which is known as the Boysen dam, is 106 feet long and gives a head of 36 feet, with five buttresses 29 feet high on top of the dam for the use of flashboards which will increase the head to 45 feet. As the grade of the Chicago, Burlington & Quincy Railroad is 53 feet above the outlet of the dam, the flashboards can be used only during low water, without danger of flooding the railroad track. Within the dam at the left end is the power plant which contains two 24-inch S. Morgan Smith twin turbines rated at 750 horsepower each under a 45-foot head. The turbines are controlled by Lombard automatic governors and are direct connected by horizontal shafts to two 400-kilowatt 3-phase 2,300-volt alternating-current Westinghouse generators. Two 12-inch turbines are direct connected to two exciter generators of 35-kilowatt capacity. The plant operates continuously and transmits power 38 miles to Shoshone and Riverton at a tension of 33,000 volts. The transmission line consists of No. 5 wire carried on cedar poles. No auxiliary steam power is provided. The available records of Big Horn River show that the minimum discharge occurs during the winter and early spring. The mean monthly discharge during the low-water period is estimated to be 500 second-feet. This will generate 1,440 continuous horsepower at 70 per cent efficiency. By using flashboards during low water a head of 45 feet would be available, which would develop 1,800 horsepower. As the pond above the dam has an area of about 500 acres at low stage sufficient pondage is

available for storage of water during hours of minimum demand. The lowest monthly discharge for the six high months is 975 second-feet, which will generate 2,800 continuous horsepower under the normal head of 36 feet.

The plant of the Hot Springs Light & Power Co. is three-quarters of a mile above Thermopolis. A low rock dam in Big Horn River diverts water into a canal 1,600 feet long leading to the power house, creating an average head of 12 feet. Here are installed two 54-inch American turbines rated at 264 horsepower, each controled by a Woodward governor. One turbine is direct connected to a 280-kilowatt Electrical Machinery Co.'s 3-phase alternating-current generator of 2,400 volts, and the other is belt connected to a 150-kilovolt-ampere Western Electric 3-phase alternating-current generator of 2,300 volts. The power is used in Thermopolis. Owing to the insufficient capacity of the canal, an auxiliary steam plant is used almost daily.

MIDDLE FORK OF POPO AGIE RIVER.

The Sinks Canyon Hydro Power Co.'s plant on Middle Fork of Popo Agie River is in sec. 17, T. 32 N., R. 100 W., a short distance above the "sinks" and 8 miles southwest of Lander. A riveted-steel pipe line 3,145 feet long, decreasing in diameter from 30 to 26 inches and having a capacity of 17 second-feet, leads to the power house at the "rise." Two 47-inch Hug impulse wheels, each operated by two 3-inch nozzles, generate 250 horsepower each, under a 220-foot head. Each wheel, which is controlled by a Lombard oil-pressure generator, is direct connected to a 150-kilowatt 3-phase 60-cycle alternating-current generator operating at 2,300 volts. Power is transmitted at 11,000 volts to Lander by one circuit of No. 6 copper wire suspended from cedar poles. Although the water supply is insufficient during the winter, no auxiliary plant is owned by the company.

NOWOOD CREEK.

The flour and feed mill owned by Henry Jordan is 3 miles east of Manderson. A canal of about 40 second-feet capacity and 10,000 feet long diverts water from Nowood Creek and carries it to the mill, in which is installed a 21-inch McCormick turbine rated at 65 horsepower under the available head of 19 feet. The turbine, which has no governor, is connected with the milling machinery by 200 feet of rope. The mill operates intermittently. By continuing the canal 1 mile or more, a head of 62 feet can be obtained. In a low year the mean flow for seven consecutive days will not exceed 50 second-feet, which would generate 242 horsepower at 70 per cent efficiency.

SHOSHONE RIVER.

The United States Reclamation Service has recently installed at the Shoshone dam two 30-inch Wellman-Seaver-Morgan turbines rated at 1,100 horsepower under a head of 140 feet. The range in head is between 120 and 230 feet. The turbines are controlled by Woodward oil-pressure governors and are direct connected to two 1,000-kilovolt-ampere 3-phase 60-cycle General Electric generators. The current is carried at 33,000 volts by 46 miles of transmission line to the towns on the Shoshone irrigation project. The water supply is adequate at all times, as the capacity of Shoshone reservoir is 456,000 acre-feet.

The Shoshone electric-light plant is just below Cody on Shoshone River. A canal and flume 1,700 feet long, having a capacity of 500 second-feet, lead to the power house, creating a head of 14 feet. In the power house are two 35-inch Samson turbines having a rated capacity of 129 horsepower each. They are controlled by a Woodward governor and are belt connected to a 200-kilowatt Westinghouse 3-phase alternating-current generator of 2,300 volts. The current is carried by 1 mile of transmission line consisting of No. 6 twisted wire carried on cedar poles and furnishes light and power to Cody. The plant operates continuously, except for a short period on Sundays. No auxiliary steam is provided, as the water supply is adequate.

UNDEVELOPED POWER.

No profile surveys are available for streams in the Big Horn drainage basin, and as topographic maps cover only part of the area, it is impossible to describe all feasible sites, especially those that may be situated in the Shoshone and Absaroka mountains on the west and the Wind River Range on the southwest. The known power sites are described in the following pages.

BIG HORN RIVER.

The following table of elevations and distances compiled from different sources is only approximate. The elevations and distances through the lower canyon are taken from records of a detailed survey made by the Big Horn Canyon Irrigation & Power Co.

Elevations and distances along Wind and Big Horn rivers from source at Twogwotee Pass to mouth of lower Big Horn Canyon.

Point on river.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From source.	Point to point.		Total.	Per mile.
Source	0	.....	9,050	.....	.....
Contour crossing	3	3	8,500	550	183
Contour crossing	8	5	8,000	500	100
Contour crossing	16	8	7,500	500	62
Mouth of Du Noir River	23	7	7,240	260	37
Dubois	34	11	6,910	330	30
Sec. 24, T. 41 N., R. 106 W	42	8	6,660	250	31
About sec. 7, T. 40 N., R. 85 W	52	10	6,325	335	34
Mouth of Bull Lake Creek	78	26	5,640	685	26
Ferry near line between Rs. 98 and 99 W	96	18	5,205	435	24
Bridge southeast of Riverton	114	18	4,845	360	20
Head of Big Horn Canyon	158	44	4,620	225	5
Thermopolis	178	20	4,310	310	16
Railroad crossing 1.7 miles below Colter	214	36	4,060	250	7
Railroad crossing at Manderson	238	24	3,875	185	8
Basin	250	12	3,825	50	4
Himes	282	32	3,710	115	4
Kane	297	15	3,630	80	7
Upper end of lower Big Horn Canyon	304	7	3,600	30	4
Sec. 30 T. 58 N., R. 94 W. (2.1 miles above State line)	313	9	3,550	50	6
Sec. 13 T. 9 S., R. 28 E	320.5	7.5	3,500	50	7
	328.9	8.4	3,450	50	6
Sec. 4 T. 8 S., R. 29 E	336.6	7.7	3,400	50	6
Sec. 35 T. 7 S., R. 28 E	343.3	6.7	3,350	50	7
Sec. 5 T. 7 S., R. 30 E	347.9	4.6	3,300	50	11
Sec. 34 T. 6 S., R. 30 E	350.9	3.0	3,250	50	17
Sec. 6 T. 6 S., R. 30 E	354.3	3.4	3,200	50	15
Sec. 18 T. 6 S., R. 31 E. (near mouth of lower canyon)	358.2	3.9	3,170	30	8

Except on the extreme headwaters, where [redacted] off is small, the slope of the river is too slight to warrant laying a pipe line for the development of power. The valley is too wide to provide a favorable site for a dam and reservoir except at a point in sec. 25, T. 42 N., R. 108 W., 2½ miles below Du Noir River. Here the valley narrows to such an extent that a dam 100 feet high would have a width of 75 feet at the base and 200 to 250 feet at the crest. This dam would form a reservoir 4 miles long having an area of 1,475 acres and a capacity of 44,000 acre-feet. If the upper 50 feet of the dam were utilized for storage, a uniform discharge of 138 second-feet could be maintained, which would generate 545 horsepower. This reservoir site would probably be of more value for storage in connection with irrigation than for use in the development of power.

Below the Boysen dam, in the canyon above Thermopolis, the river falls about 100 feet in 4 miles. With a mean monthly discharge of 500 second-feet available during the low-water period, 4,000 horsepower could be developed at 70 per cent efficiency. Below this section the slope of the river decreases to 10 feet to a mile at the mouth of the canyon.

The only large power possibility on Big Horn River is on the lower part of the river, chiefly in Montana. From a point just above the State line to a point 54 miles below, the Big Horn flows through a canyon with a total fall of 430 feet. A detailed survey of the entire

canyon has been made by the Big Horn Canyon Irrigation & Power Co., which shows that a dam 480 feet high and 1,300 feet long on the crest, situated near the mouth of the canyon, would create a reservoir having a capacity of 830,000 acre-feet. The following table was compiled from this survey:

Area and capacity of proposed Big Horn reservoir at different elevations.

Elevation above sea level (feet).	Area (acres).	Total capacity (acre-feet).	Elevation above sea level (feet).	Area (acres).	Total capacity (acre-feet).
3,180	9	36	3,450	2,210	192,000
3,200	47	541	3,500	3,240	328,000
3,250	189	5,970	3,550	4,270	514,000
3,300	399	20,100	3,600	5,330	764,000
3,350	784	49,400	3,610	5,770	830,000
3,400	1,395	103,000			

To determine the water supply, records of Big Horn River at Hardin, 40 miles below the canyon, are available from 1904 to date. The flow at the two points is comparable, as the irrigation diversions between the two more than offset the tributary inflow. As the irrigation projects under construction and proposed in the Big Horn basin above the canyon will reduce the run-off at the power site, an allowance for this decrease must be made in determining the future water supply.

The run-off of [redacted] River for 1921 was 101 per cent of that of the median year. In that year the nonirrigated area under completed projects in the Big Horn Basin was 355,000 acres, and the area of proposed projects was estimated at 145,000 acres, giving a total of 500,000 acres. With a consumptive duty of 1.5 acre-feet to an acre, the run-off for 1921 at the canyon site would have been reduced 750,000 acre-feet. To equalize the discharge completely would require storage amounting to 790,000 acres. By limiting the draw down of water level 200 feet, to the resulting continuous discharge would amount to 3,300 second-feet. With the power house situated just below the dam the average effective head would be 340 feet, which would develop 90,000 horsepower continuously at 70 per cent efficiency. The minimum head would be 240 feet, which would develop 63,000 horsepower.

The lowest year of record was 1919, the flow for which was 42 per cent of the median year. As this year was so dry there would have been a shortage of water for irrigation, and it is probable that the consumptive duty of water would not have exceeded 1 acre-foot to an acre had the 500,000 acres additional been irrigated.

With the recorded flow for 1919 decreased by 500,000 acre-feet, it would have required a storage capacity of 1,280,000 acre-feet to equalize the flow from June, 1918, to May, 1920. By limiting the drawdown to 200 feet, it would have been possible to maintain a continuous discharge at 2,160 second-feet. The average head would have been 340 feet, developing 59,000 horsepower at 70 per cent efficiency.

MIDDLE FORK OF POPO AGIE RIVER.

No topographic maps are available for Middle Fork of Popo Agie River, but the records of the State engineer's office show power filings with accompanying data on available head. One filing shows an apparent fall of 1,640 feet from about sec. 22, T. 32 N., R. 101 W., to sec. 19, T. 32 N., R. 100 W., a distance of 5½ miles. Available records of flow show the discharge for 90 per cent of the time to be 9 second-feet, which would develop 1,180 horsepower at 70 per cent efficiency. For 50 per cent of the time the discharge is 30 second-feet, which would develop 4,000 horsepower.

LITTLE WIND RIVER.

Below Raft Lake, which has an area of 310 acres, the North Fork of Little Wind River flows in a canyon for a distance of 9 miles, and the total fall is 2,500 feet, or 278 feet to a mile. From the mouth of the canyon to the mouth of the river, a distance of 12 miles, the fall is 1,300 feet, or 108 feet to a mile. No topographic maps of this basin are available, and it is impossible to determine the run-off accurately. It appears, however, that with a storage of 10,000 acre-feet on Raft Lake a minimum discharge of 30 second-feet would be available, which would develop 6,000 horsepower in the 9-mile stretch below Raft Lake.

Tuygee Lake lies in sec. 3, T. 33 N., R. 104 W., at an elevation of 9,904 feet, and has an area of 198 acres. In the 8 miles below the lake the South Fork of Little Wind River has a total fall of 1,650 feet or 206 feet to a mile. At the end of this stretch is a flat at an elevation of 8,250 feet which would furnish pondage and site for a power house. Below the flat the river has an additional fall of 1,450 feet in 4 miles. It is impossible to estimate accurately the available discharge, but probably with a small amount of storage on Tuygee Lake a minimum discharge of 10 second-feet would be available. This discharge would develop 1,300 horsepower. In the 4-mile stretch below the flat a discharge of 10 second-feet would develop 1,160 horsepower.

TENSLEEP CREEK.

Elevations and distances along Tensleep Creek from West Tensleep Lake to mouth of Canyon Creek.

[Compiled from topographic maps.]

Point on stream.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From source.	Point to point.		Total.	Per mile.
West Tensleep Lake	0		9,042		
Contour crossing	1.2	1.2	8,800	242	202
Contour crossing	2.9	1.7	8,600	200	118
Contour crossing	4.7	1.8	8,400	200	111
Mouth of East Tensleep Creek	8.4	3.7	7,750	650	175
Contour crossing	9.1	.7	7,500	250	357
Contour crossing	10.9	1.8	7,000	500	278
Contour crossing	13.3	2.4	6,000	1,000	417
Mouth of Lee Creek	15.5	2.2	5,400	600	272
Mouth of Childs Creek	16.9	1.4	5,100	300	214
Mouth of Canyon Creek	20.2	3.3	4,680	420	127

Above the mouth of East Tensleep Creek the fall of the creek is less than for the portion below, and as the run-off is small, no estimate of possible water power has been made.

Undeveloped water power on Tensleep Creek.

Section of creek.	Distance (miles).	Total fall (feet).	Run-off (second-feet).[a]		Horsepower (70 per cent efficiency).	
			90 per cent of time.	50 per cent of time.	90 per cent of time.	50 per cent of time.
Mouth of East Tensleep Creek to contour 7,500	0.7	250	15	24	300	480
Contour 7,500 to contour 7,000	1.8	500	19	29	760	1,160
Contour 7,000 to contour 6,000	2.4	1,000	21	31	1,680	2,480
Contour 6,000 to Lee Creek	2.2	600	23	32	1,100	1,540
Lee Creek to Childs Creek	1.4	300	26	37	624	886
Childs Creek to Canyon Creek	3.3	420	32	49	1,070	1,650

[a] Based on mean drainage area of section.

PAINTROCK CREEK.

Elevations and distances along Paintrock Creek from source to mouth of Luman Creek.

[Compiled from topographic maps.]

Point on stream.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From source.	Point to point.		Total.	Per mile.
Source of North Fork	0	.....	10,000	.....	.....
Contour crossing	4.2	4.2	9,000	1,000	238
Mouth of North Fork	10.7	6.5	8,000	1,000	154
Mouth of Middle Fork	13.4	2.7	7,090	910	357
Mouth of South Fork	16.8	3.4	6,200	890	262
Mouth of Luman Creek	23.1	6.3	4,900	1,300	206

Above the mouth of North Fork the minimum run-off is so small that no estimate of possible water power has been made.

Undeveloped water power on Paintrock Creek.

Section of creek.	Distance (miles).	Total fall (feet).	Run-off (second-feet).[a]		Horsepower (70 per cent efficiency).	
			90 per cent of time.	50 per cent of time.	90 per cent of time.	50 per cent of time.
North Fork to Middle Fork	2.7	910	7	9	510	655
Middle Fork to South Fork	3.4	890	11	18	783	1,280
South Fork to Luman Creek	6.3	1,300	18	27	1,870	2,800

[a] Based on mean drainage area of section.

WOOD RIVER.

A filing in the State engineer's office shows a possible development of power on Wood River in T. 46 N., R. 102 W., with a fall of 550 feet in 3¼ miles. From records of flow at the mouth of Wood River, it is estimated that the discharge for 90 per cent of the time at the junction of the North and South forks is 20 second-feet. This would generate 880 horsepower at 70 per cent efficiency.

SHELL CREEK.

Elevations and distances along Shell Creek from source to Shell post office.

[Compiled from topographic maps.]

Point on stream.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From source.	Point to point.		Total.	Per mile.
Source	0		11,000		
Contour crossing	.6	0.6	10,500	500	833
Contour crossing	2.2	1.6	10,000	500	312
Contour crossing	3.1	.9	9,500	500	555
Contour crossing	7.7	4.6	9,000	500	109
Sec. 34, T. 53 N., R. 88 W	9.0	1.3	8,500	500	385
Mouth of Willitt Creek	11.5	2.5	7,920	580	232
Mouth of Granite Creek	17.0	5.5	6,950	970	176
Mouth of Cedar Creek	22.5	5.5	5,250	1,700	309
Mouth of White Creek	27.0	4.5	4,390	860	191
Shell post office	31	4.0	4,180	210	52

Above an elevation of 8,500 feet the run-off of Shell Creek for 90 per cent and 50 per cent of the time is so small that the available water power has not been estimated. The following table shows the undeveloped power by sections for the remainder of the creek:

Undeveloped water power on Shell Creek.

Section of creek.	Distance (miles).	Total fall (feet).	Run-off (second-feet).[a]		Horsepower (70 per cent efficiency).	
			90 per cent of time.	50 per cent of time.	90 per cent of time.	50 per cent of time.
Sec. 34, T. 53 N., R. 88 W. to Willitt Creek	2.5	580	6	12	279	555
Willitt Creek to Granite Creek	5.5	970	12	21	935	1,630
Granite Creek to Cedar Creek	5.5	1,700	17	30	2,300	4,080
Cedar Creek to White Creek	4.5	860	26	44	1,790	3,040
White Creek to Shell	4.0	210	37	60	610	1,010

[a] Based on mean drainage area of section.

SHOSHONE RIVER.

Elevations and distances along Shoshone River.

[Compiled from topographic maps.]

Point on stream.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From Elk Creek.	Point to point.		Total.	Per mile.
Mouth of Elk Creek	0		8,980		
Mouth of Red Creek	8.3	8.3	7,900	1,080	130
Mouth of Saddle Creek	16.5	8.2	6,990	910	111
Mouth of Cabin Creek	23.9	7.4	6,450	540	73
Mouth of Ishawooa Creek	35.0	11.1	6,050	400	36
Upper end Shoshone reservoir	54.0	19.0	5,360	690	36
Crest of Shoshone dam	59.5	5.5	5,360	0	0
Foot of Shoshone dam	59.5	0	5,140	220	
Cody	66.5	7	4,820	320	46
Below Corbett dam	74.5	8	4,620	200	25
Sec. 35, T. 55 N., R. 99 W	91.5	17.0	4,260	360	21

The portion of the river of the greatest value for power lies between the mouth of Red Creek and the upper end of Shoshone reservoir. Although the river below the reservoir has a fall of 320 feet in 7 miles, the entire flow is controlled in the interest of irrigation. With the planned extension of irrigation in the Shoshone project, doubtless very little water will be discharged from the reservoir during the winter.

Undeveloped water power on Shoshone River.

Section of river.	Distance. (miles).	Total fall (feet).	Run-off (second-feet).a		Horsepower (70 per cent efficiency).	
			90 per cent of time.	50 per cent of time.	90 per cent of time.	50 per cent of time.
Red Creek to Saddle Creek	8.2	910	15	46	1,070	3,300
Saddle Creek to Cabin Creek	7.4	540	26	78	1,100	3,320
Cabin Creek to Ishawooa Creek	11.1	400	38	102	1,200	3,210
Ishawooa Creek to Shoshone reservoir	19.0	690	80	202	4,850	11,000

a Based on mean drainage area of section.

Elevations and distances along North Fork of Shoshone River.

[Compiled from topographic maps.]

Point on stream.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From Torrent Creek.	Point to point.		Total.	Per mile.
Mouth of Torrent Creek	0		8,550		
Mouth of Jones Creek	6.7	6.7	6,870	1,680	250
Mouth of Eagle Creek	14.7	8.0	6,550	320	40
Mouth of Blackwater Creek	23.2	8.5	6,370	180	21
Mouth of Wapiti River	29.9	6.7	6,120	250	37
Mouth of Crag Creek	36.2	6.3	6,000	120	19
Upper end of Shoshone reservoir	46.2	10.0	5,360	640	64

The following table shows the undeveloped power by sections:

Undeveloped water power on North Fork of Shoshone River.

Section of river.	Distance. (miles).	Total fall (feet).	Run-off (second-feet).a		Horsepower (70 per cent efficiency).	
			90 per cent of time.	50 per cent of time.	90 per cent of time.	50 per cent of time.
Torrent Creek to Jones Creek	6.7	1,680	5	16	661	2,120
Jones Creek to Eagle Creek	8.0	320	21	55	530	1,360
Eagle Creek to Blackwater Creek	8.5	180	46	124	650	1,760
Blackwater Creek to Wapiti River	6.7	250	60	161	1,170	3,170
Wapiti River to Crag Creek	6.3	120	89	226	841	2,130
Crag Creek to Shoshone reservoir	10.0	640	110	286	5,360	14,200

a Based on mean drainage area of section.

STORAGE.

DEVELOPED SITES.

Four reservoirs have been built and another is under construction in the Big Horn drainage basin, as shown by the following table. These reservoirs are used for irrigation, as no reservoirs have been constructed for water power.

Developed reservoirs in Big Horn drainage basin.

Name.	Project.	Location.	Height of dam.	Maximum area.	Capacity.
			Feet.	*Acres.*	*Acre-ft.*
Shoshone	United States Reclamation Service.	Shoshone River, 8 miles west of Cody.	328	6,600	456,000
Ralston	do	Sec. 28, T. 55 N., R. 100 W.	50	200	2,100
Ray Lake *a*	United States Indian Service.	Sec. 24, T. 1 S., R. 1 W.	6		6,570
Bull Lake *b*	do	Bull Lake Creek 3 miles above mouth.	50	2,450	78,000
Adelaide	Wyoming Irrigation Co.	Tributary of Shell Creek in sec. 36, T. 53 N., R. W.	25	75	1,410

a Supplied by Ray ditch. *b* Under construction.

UNDEVELOPED SITES.

The mountains inclosing the Big Horn drainage basin afford a number of opportunities for storing water, and reconnaissance surveys have been made by several organizations to show approximate capacities, together with height and length of dams for proposed reservoirs. The following tabulated results of the surveys of the larger sites have been taken chiefly from the State engineer's records:

Undeveloped reservoir sites in Big Horn drainage basin.

Name.	Source of supply.	Location.	Tributary drainage area.	Height of dam.	Crest length.	Area.	Capacity
			Sq. miles.	*Feet.*	*Feet.*	*Acres.*	*Acre-ft.*
Upper Wind River.	Wind River	Sec. 25, T. 42 N., R. 108 W.	230	100	250	1,480	44,000
Dinwoody Lakes.	Dinwoody Creek	Tps. 4 and 5, R. 5 W.	100	40	580	950	26,000
Long Beach	North Fork of Popo Agie.	T. 33 N., R. 102 W.		40	33	670	
Louis Lake	Little Popo Agie River.	Sec. 1, T. 30 N., R. 101 W.		40	240	282	8,410
Raft Lake	North Fork of Little Wind.	Sec. 1, T. 1 S., R. 5 W.		57 107		310	23,000 54,000
Tnygee Lake	South Fork of Little Wind.	Sec. 3, T. 33 N., R. 104 W.		46		198	12,500
Owl Creek	South Fork of Owl Creek.	Sec. 27, T. 43 N., R. 102 W.	35	115	550	145	6,000
Little Buffalo Basin.		Dam in sec. 4, T. 47 N., R. 99 W.		160		1,230	75,800
Buffalo Basin		Dam in sec. 24, T. 49 N., R. 98 W.		88	2,500	1,225	42,800
Buffalo Creek		Secs. 10-14, 24, T. 47 N., R. 99 W.		175	2,700	2,900	145,000
West Tensleep Lake.	West Tensleep Creek.	Sec. 23, T. 50 N., R. 86 W.	20			115	
East Tensleep Lake.	East Tensleep Creek.	Sec. 11, T. 49 N., R. 86 W.	5.5			100	

Undeveloped reservoir sites in Big Horn drainage basin—Continued.

Name.	Source of supply.	Location.	Tributary drainage area	Height of dam.	Crest length.	Area.	Capacity.
			Sq. miles.	*Feet.*	*Feet.*	*Acres.*	*Acre-ft.*
Tensleep Meadows.	East Tensleep Creek.	Secs. 32, 33, T. 49 N., R. 86 W. and sec. 5, T. 48 N., R. 86 W.	38	50	360	337	13,509
Lake Solitude	Middle Fork of Paintrock Creek.	Sec. 31, T. 51 N., R. 86 W.	14	161	585	155	8,570
Summit	Paintrock Creek	Sec. 20, T. 50 N., R. 89 W.	.....	36	1,000	291	5,900
Haymaker	Greybull	Secs. 11 and 14, T. 47 N., R. 105 W.	80	100	850	.....	16,000
Canyon	do	Just below Haymaker site.	82	100	800	.....	15,000
Upper Greybull	do	Sec. 36, T. 48 N., R. 105 W.	118	100	900	.....	23,000
Greybull	do	Secs. 19–21, 28–30, T. 48 N., R. 104 W.	406	190	2,200	6,250	84,000
Upper Sunshine	Greybull and Wood rivers.	South of Greybull River in T. 48 N., R. 101 W.	624	153	1,000	1,110	49,500
Lower Sunshine	do	do	624	162	1,660	880	42,600
Farmers	Wood River	Sec. 31, T. 47 N., R. 97 W.	.....	100	1,100	543	14,500
Meadows	do	Mouth of Jojo Creek in T. 46 N., R. 103 W.	28	133	2,160	372	22,700

The dam site on upper Wind River is in the main valley of the stream, 2½ miles below the mouth of Du Noir River. The valley here narrows to 75 feet at the bottom and 250 feet at a point 100 feet above the bottom. The outcropping rock at the dam site is soft sandstone, and the area that would be submerged is good bottom land. The mean annual discharge at this site is estimated at 250,000 acre-feet.

Dinwoody Lakes are a series of natural lakes, 6 miles long, the lowest 3 miles above the mouth of the creek. A dam 40 feet high at the outlet of the second lake upstream, in sec. 28, T. 5 N., R. 5 W., would have a crest length of 550 feet and create a reservoir of 26,000 acre-feet capacity. A dam 20 feet high at the outlet of the first lake in sec. 16, T. 5 N., R. 5 W., would have a crest length of 250 feet and create additional storage of 4,000 acre-feet, making a combined capacity of 30,000 acre-feet. The mean of four years' records shows the total run-off at the reservoir site to be 120,000 acre-feet.

Raft Lake is on the eastern slope of the Wind River Range at an elevation of 9,290 feet. The run-off is roughly estimated at 20,000 acre-feet.

Tuygee Lake is on the eastern slope of the Wind River Range at an elevation of 9,904 feet. If a dam were built at the outlet to raise the water surface to 9,950 feet, and a tunnel built enabling water to be drawn down to 9,900 feet level, storage amounting to 12,500 acre-feet could be obtained. No estimate of run-off has been made.

The Owl Creek site is a small basin lying just above Owl Creek Canyon. The State engineer made a survey of this site, which showed

that a dam having a maximum height of 123 feet and a crest length of 550 feet would store 6,690 acre-feet.

Area and capacity of proposed Owl Creek reservoir at different elevations.

Elevation (feet).	Area (acres).	Capacity (acre-feet).	Elevation (feet).	Area (acres).	Capacity (acre-feet).
8,210	0	0	8,275	61	1,540
8,225	7	50	8,300	102	3,590
8,250	26	456	8,325	145	6,690

No records showing the total run-off of Owl Creek are available, but by comparison with the flow of Wind River the run-off at the reservoir site is estimated to be 25,000 acre-feet.

The Buffalo Basin, Little Buffalo Basin, and Buffalo Creek reservoir sites are on intermittent streams that can not be relied on to furnish an adequate water supply, and so must depend on the flow of Greybull and Wood rivers. From a comparison of the fragmentary records of Greybull River with the records of the Big Horn, it is estimated that the mean annual run-off of Greybull River below Wood River is 300,000 acre-feet. The land under adjudicated ditches and that under completed but unadjudicated ditches is 108,000 acres. With a consumptive duty of 1½ acre-feet to an acre, 162,000 acre-feet would be required to satisfy these rights, leaving about 138,000 acre-feet available for storage.

West Tensleep Lake is on the west slope of the Big Horn Mountains at an elevation of 9,040 feet. By a short diversion the run-off from a tributary entering West Tensleep Creek 2 miles below the lake can be diverted into the lake, increasing its tributary area to 29 square miles. Without this diversion the tributary area is 16 square miles. The mean annual run-off from the 29 square miles is estimated from records on Tensleep Creek to be 23,000 acre-feet.

East Tensleep Lake is on the western slope of the Big Horn Mountains at an elevation of 9,735 feet. The mean annual run-off is estimated to be 5,000 acre-feet.

At the Tensleep Meadows, on East Tensleep Creek 5 miles below East Tensleep Lake, at an elevation of 8,300 feet, the mean annual run-off is estimated to be 28,000 acre-feet, which includes the run-off available for storage in East Tensleep Lake.

Lake Solitude is on the west side of the Big Horn Mountains at an elevation of 9,375 feet and surrounded by steep slopes. The mean annual run-off is estimated to be 13,000 acre-feet.

The Haymaker and Canyon sites, according to a reconnaissance made by the State engineer, are near each other. It is estimated that for the Haymaker (upper) site a dam 60 feet high and 500 feet long would store 7,000 acre-feet, and a dam 100 feet high and 850

feet long would store 16,000 acre-feet. At the Canyon (lower) site a dam 50 feet high and 450 feet long would store 6,000 acre-feet, and a dam 100 feet high and 800 feet long would store 15,000 acre-feet. By comparison of the discharge of Greybull River near Meeteetse, the mean annual run-off at the two reservoir sites is estimated to be 65,000 acre-feet.

At the Upper Greybull site, according to a reconnaissance made by the State engineer, a dam 50 feet high and 400 feet long would store 8,000 acre-feet, and a dam 100 feet high and 900 feet long would store 23,000 acre-feet. By comparison of the discharge of Greybull River near Meeteetse the mean annual run-off at the reservoir site is estimated to be 94,000 acre-feet, including the flow at the Haymaker and Canyon sites.

At the Greybull site, as shown by a reconnaissance made by the State engineer, a dam 190 feet high and 2,260 feet in maximum length would provide storage for 84,000 acre-feet. By comparison of the flow of Greybull and Wood rivers the mean annual run-off at this site is 270,000 acre-feet, or 176,000 acre-feet in addition to that passing the upper reservoir sites.

Sunshine Basin, lying between Greybull and Wood rivers near their junction, contains two reservoir sites that have been surveyed in detail. These sites, known as the upper and lower sites, are in the channel of Sunshine Creek and can be supplied from Greybull and Wood rivers. The following tables have been compiled from maps filed in the State engineer's office:

Area and capacity of proposed upper Sunshine reservoir at different elevations.

Elevation (feet).	Area (acres).	Capacity (acre-feet).	Elevation (feet).	Area (acres).	Capacity (acre-feet).
5,890	0	0	5,970	345	8,250
5,900	2	7	5,980	434	12,100
5,910	12	74	5,990	556	17,100
5,920	24	258	6,000	670	23,200
5,930	44	590	6,010	788	30,500
5,940	114	1,370	6,020	950	39,100
5,950	189	2,900	6,030	1,110	49,500
5,960	269	5,190			

Area and capacity of proposed lower Sunshine reservoir at different elevations.

Elevation (feet).	Area (acres).	Capacity (acre-feet).	Elevation (feet).	Area (acres).	Capacity (acre-feet).
6,111	0	0	6,190	280	5,610
6,120	3	12	6,200	358	8,800
6,130	7	68	6,210	456	12,900
6,140	18	196	6,220	542	17,900
6,150	35	455	6,230	637	23,700
6,160	65	933	6,240	734	30,600
6,170	109	1,790	6,250	829	38,400
6,180	189	3,260	6,255	880	42,600

The source of supply is the same as for the Buffalo Basin site, and 138,000 acre-feet is estimated as available for storage. (See p. 81.)

The meadows site is at the junction of Wood River and Jojo Creek, just above the rapids on Wood River. The State engineer surveyed this site and found that a dam 133 feet high and 2,160 feet long would store 22,700 acre-feet.

Capacity of proposed Meadows reservoir at different elevations.

Elevation (feet).	Capacity (acre-feet).	Elevation (feet).	Capacity (acre-feet).
8,175	0	8,250	7,700
8,200	600	8,275	14,300
8,225	3,100	8,300	22,700

By comparison of records of flow at the mouth of Wood River the annual run-off at the reservoir site is estimated to be 20,000 acre-feet.

CLARK FORK BASIN.

GENERAL FEATURES.

The area in Wyoming drained by Clark Fork of Yellowstone River comprises the extreme northwest corner of the Big Horn Basin and the eastern slope of the mountain forming the boundary of that part of the basin. On the east the Clark Fork Basin is bounded by the Shoshone River basin.

Of the 1,350 square miles included in the drainage area of Clark Fork at the State line, about 1,000 square miles is in the Beartooth and Absaroka ranges, a region of perennial run-off. The Absaroka Mountains extend in a north-south line for more than 80 miles with an average width of 50 miles At the north end of the range the broad valley of Clark Fork sharply separates the range from the Beartooth Mountains, the river flowing closely under the cliffs that mark the northern escarpment of this vast pile of lavas. The Absaroka Mountains present a broad, deeply eroded plateau with irregular lateral spurs, putting out from a high, well-defined divide. Along the east side this mass of lava rises out of the plain from an elevation of about 5,000 feet. Index Peak, the highest point in the basin, has an elevation of 11,740 feet.[16]

Between Clark Fork and Shoshone River there is a ridge extending from the vicinity of Heart Mountain, a few miles north of Cody, to Pryor Mountain, in Montana. At the southwest end of the ridge the divide is very narrow, but to the northeast it is continued as a broad plateau which is one of the prominent topographic features of the northern part of the Big Horn Basin. On either side of

[16] Hague, Arnold, U. S. Geol. Survey Geol. Atlas, Absaroka folio (No. 52) 1889.

Clark Fork the surface rises gradually toward the surrounding highlands West of Clark Fork, between the valley and the high mountains, there are a number of prominent hills, some of which have an altitude of nearly 7,000 feet.

In the lower part of the basin near the State line the precipitation is about 11 inches, but in the upper part it increases rapidly with altitude, reaching 30 inches or more on the divide.

Clark Fork rises in the south end of the Beartooth Mountains about 10 miles north of the Wyoming-Montana line. It flows southeast for 28 miles, then east for 5 miles, again southeast for 10 miles until being joined by Sunlight Creek it makes a right-angle turn and flows northeast for 30 miles and crosses the State line 10 miles north of Clark post office. Its upper course is through a broad valley, but just below Crandall Creek it enters an imposing gorge known as Clark Fork canyon, through which it flows for 23 miles. The canyon is a narrow defile with nearly vertical walls rising in places over 1,200 feet above the stream. Below the gorge the river again flows through a broad valley to the State line. It enters Yellowstone River a few miles east of Laurel, Mont.

MEASURED DRAINAGE AREAS.

Measured drainage areas in Clark Fork Basin, in square miles.

Stream.	Drainage area above—	Area.
Clark Fork	Mouth of Pilot Creek	120
Do	Mouth of Crandall Creek	307
Do	Mouth of Dead Indian Creek	728
Do	Mouth of canyon	800
Do	Gaging station in sec. 8, T. 56 N., R. 102 W	929
Do	Montana line	1,350
Pilot Creek	Mouth	17
Crandall Creek	Mouth of North Fork	113
Do	Mouth	174
North Fork of Crandall Creek	do	46
Sunlight Creek	Head of canyon	142
Do	Mouth	220
Dead Indian Creek	do	62
Paint Creek	do	27
Pat O'Hara Creek	do	89
Bennett Creek	do	83

GAGING-STATION RECORDS.

CLARK FORK NEAR CLARK, WYO.

LOCATION.—In sec. 8, T. 56 N., R. 102 W., at highway bridge, 9 miles below mouth of canyon and 4 miles south of Clark, Park County. Nearest tributary, Pat O'Hara Creek, enters 400 feet upstream.

DRAINAGE AREA.—929 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—April 20, 1919, to September 30, 1921.

GAGE.—Gurley water-stage recorder at bridge, installed April 24, 1921; referred to chain gage on bridge previously used.

EXTREMES OF DISCHARGE.—1919–1921: Maximum stage recorded, 7.35 feet at 2 a. m., June 12, 1921 (discharge, 10,500 second-feet); minimum discharge occurred during winter.

DIVERSIONS.—One canal diverts water from Clark Fork just above station. Maximum measured discharge, 34 second-feet. Prior to July 1, 1921, adjudicated diversion of 98 second-feet from Clark Fork below station in Wyoming, and 82 second-feet from tributaries entering above.

ACCURACY.—Staff gage read twice daily during 1919 and 1920; gage heights from continuous record during 1921. Rating curve well defined. Records excellent except during winter, for which they are fair.

Monthly discharge of Clark Fork near Clark, Wyo., for 1919–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
April 20–30	1,240	410	772	16,800
May	6,730	664	2,980	183,000
June	2,370	960	1,630	97,000
July	940	370	551	33,900
August	640	240	343	21,100
September	530	195	281	16,700
The period				368,000
1919–20.				
October	420	210	239	14,700
November	290		200	11,900
December			180	11,100
January			170	10,500
February			160	9,200
March			170	10,500
April	272	170	217	12,900
May	3,160	272	1,450	89,200
June	7,160	1,610	4,890	291,000
July	6,310	1,860	3,790	233,000
August	1,990	565	1,160	71,300
September	565	350	419	24,900
The year	7,160		1,090	790,000
1920–21.				
October	362	222	286	17,600
November	243	150	206	12,300
December			150	9,220
January			150	9,220
February			140	7,780
March			175	10,800
April	370	241	294	17,500
May	6,100	301	2,460	151,000
June	9,920	3,670	6,110	364,000
July	3,420	910	1,880	116,000
August	990	394	573	35,200
September	485	229	326	19,400
The year	9,920		1,060	770,000

IRRIGATION.

The lands along Clark Fork and its principal tributaries are irrigated extensively by individual ditches.

Areas covered by completed ditches in Clark Fork basin, in acres.

[Compiled from Fourteenth Biennial Report of State engineer.]

Stream.	Adjudicated (including territorial rights).	Completed but not adjudicated.
Clark Fork	6,036	1,828
Crandall Creek and tributaries	0	679
Sunlight Creek and tributaries	160	811
Paint Creek and tributaries	2,671	602
Pat O'Hara Creek and tributaries	946	353
Bennett Creek and tributaries	4,993	1,432
Line Creek and tributaries	842	968
Minor tributaries	191	881
	15,839	7,554

WATER POWER.

DEVELOPED POWER.

With the exception of one or two small plants temporarily installed to operate sawmills, no water power is developed in the Clark Fork Basin.

UNDEVELOPED POWER.

No profile surveys have been made for streams in the Clark Fork Basin, but topographic maps cover the greater part of the mountainous region and make it possible to determine the power possibilities of the larger streams. Besides those described below, the other mountain tributaries could be made to yield power, but as they enter the river above the canyon section and do not have the heavy fall at their mouths they are of less value than those described.

MAIN STREAM.

Elevations and distances along Clark Fork from State line near source to mouth of canyon.

[Compiled from topographic maps.]

Point on river.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From source.	Point to point.		Total.	Per mile.
State line	0	0	7,250		
Mouth of Pilot Creek	4.4	4.4	6,910	340	77
Mouth of Lake Creek	10.4	6.0	6,620	290	48
Mouth of Squaw Creek	14.1	3.7	6,480	140	38
Mouth of Crandall Creek	17.9	3.8	6,300	180	47
Mouth of Dead Indian Creek	34.0	16.1	4,900	1,400	87
Mouth of canyon	41.0	7.0	4,260	640	92

The section of river best suited to the development of power is in the lower end of the canyon between Sunlight and Dead Indian creeks, which enter close together, and the mouth of the canyon. In this 7-mile stretch the river falls about 640 feet. A reservoir of 450,000 acre-feet capacity would insure a continuous discharge of 1,000 second-feet during a normal year, which would develop 51,000 horsepower at 70 per cent efficiency. The height of dam necessary to afford the required storage has not been determined.

Between the mouth of Crandall Creek and Sunlight Creek, a distance of 16 miles, the river falls about 1,400 feet. A storage reservoir with a capacity of 280,000 acre-feet just below Crandall Creek would insure a uniform discharge of 640 second-feet. This would develop 71,000 horsepower in the 16-mile stretch of river below the reservoir.

LAKE CREEK.

Between the outlet of the lake and the mouth of Lake Creek the creek falls 1,150 feet in 2½ miles. The mean annual discharge is

estimated as 22,000 acre-feet. It is estimated that with sufficient storage to regulate completely the flow at the lake the continuous flow in a normal year would be 30 second-feet. This would develop 2,750 horsepower in the distance between the lake and the mouth.

BEARTOOTH CREEK.

Beartooth Lake is about 5 miles from the mouth of Beartooth Creek, at an elevation 2,650 feet above Clark Fork. The mean annual run-off at the lake is estimated as 40,000 acre-feet. With sufficient storage on the lake for complete regulation, the uniform discharge would be 56 second-feet, which would develop 11,900 horsepower between the lake and river.

SUNLIGHT CREEK.

Elevations and distances along Sunlight Creek from Sulphur Creek to the mouth.

[Compiled from topographic maps.]

Point on creek.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From source.	Point to point.		Total.	Per mile.
Mouth of Sulphur Creek	0	0	7,200	.....	.....
Sulphur Lake	3.1	3.1	7,040	160	52
Mouth of Little Sunlight Creek	7.7	4.6	6,890	150	33
Mouth of Dry Creek	10.5	2.8	6,800	90	32
Head of canyon	15.5	5.0	6,400	400	80
Mouth	19.3	3.8	4,900	1,500	395

The best power site on Sunlight Creek is at the lower end, where the creek falls swiftly through a canyon to meet Clark Fork, which is in a deep canyon at that point. The mean annual run-off at the head of the canyon is estimated as 142,000 acre-feet, which with complete storage would give a uniform flow of 195 second-feet. This would develop 23,000 horsepower in the 3.8 miles of canyon.

DEAD INDIAN CREEK.

Elevations and distances along Dead Indian Creek from source to mouth.

[Compiled from topographic maps.]

Point on creek.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From source.	Point to point.		Total.	Per mile.
Source	0	0	11,100	.....	.....
Contour crossing	2.6	2.6	9,000	2,100	807
Mouth of tributary from south	5.2	2.6	8,000	1,000	385
Contour crossing	9.0	3.8	7,000	1,000	263
Contour crossing	14.1	5.1	6,200	800	157
Mouth	17.0	2.9	4,900	1,300	448

The most feasible power site is in the lower 2.9 miles of the creek, where it falls 1,300 feet in a canyon before it joins Clark Fork. The mean annual run-off is estimated as 54,000 acre-feet, which with complete storage would give a uniform flow of 75 second-feet. This would develop 7,800 horsepower in 2.9 miles of canyon.

TONGUE RIVER BASIN.

GENERAL FEATURES.

The area drained by Tongue River in Wyoming comprises the eastern slope of the Big Horn Mountains from the Montana line southward to the drainage basin of Clear Creek, a distance of 35 miles, and from the mountains northeastward to the State line.

Of the 1,340 square miles comprising the drainage area of Tongue River at the State line, about 214 square miles is in the Big Horn Mountains and forms a region of perennial run-off. The Big Horn Mountains rise abruptly from the plains, though they are flanked by several lines of low hogback ridges. The salient features are the central region of high ridges of granite and the front range of sedimentary rocks. The central area of the Tongue River basin forms an elevated plateau, 9,000 feet in general altitude, which presents broad areas of tabular surfaces, especially near the divides, but is deeply cut by numerous canyons. The plains area is rugged, altitudes within it ranging from 3,500 feet at the State line to 5,000 feet on the divides.[17] It contains much badland area through which tributary streams have cut deep valleys.

The average annual precipitation in the drainage basin of Tongue River is higher than that of any other plains stream in the State. At the State line it is 16 inches, but it increases to 18 inches at the base of the mountains and to 30 inches or more at the crest.

Tongue River rises at the summit of the Big Horn Mountains in sec. 1, T. 55 N., R. 91 W., at an elevation of 9,400 feet, and follows an easterly course across the high plateau that forms the Big Horn Mountains, debouching upon the plains 3 miles above Dayton. Across the plains its course is more or less tortuous, but beyond Carneyville it turns sharply and flows northeastward to the State line. It joins Yellowstone River at Miles City, Mont. In its upper course, through the mountains, the river flows through a fairly well defined valley, but on crossing the front range, just before it enters the plains, it flows through a deep gorge whose sides have a maximum height of 2,000 feet. Across the plains its course runs through a valley averaging three-quarters of a mile in width, bounded by gently sloping sides and badland districts. Before reaching the plains Tongue River is joined by many short tributaries, the largest of which are Fool Creek, South Fork, Horse Creek, and Sheep Creek. Within the plains region the river is joined by Amsden Creek, Little Tongue River, and South, Columbus, Wolf, and Goose creeks, all of which rise in the mountains, and a number of intermittent tributaries, which rise in the plains. Just before leaving Wyoming Tongue River is joined by Prairiedog Creek, a stream rising in the foothills of the Big Horn Mountains, south of Sheridan.

[17] Darton, N. H., Geology of the Big Horn Mountains, Wyo.: U. S. Geol. Survey Prof. Paper 51, pp. 10-12, 1906.

MEASURED DRAINAGE AREAS.

Measured drainage areas in the Tongue River basin, in square miles.

Stream.	Drainage area above—	Area.
Tongue River	SE. ¼ sec. 16, T. 55 N., R. 90 W.	10
Do	Line between secs. 3 and 4, T. 55 N., R. 89 W.	47
Do	Mouth of South Fork	87
Do	Mouth of Sheep Creek	192
Do	SE. ¼ sec. 2, T. 51 N., R. 87 W.	204
Do	Carneyville	495
Do	Montana line (including Prairiedog Creek)	1,340
South Fork	Mouth	88
Sheep Creek	do	9
Amsden Creek	do	9
Wolf Creek	do	66
Goose Creek	Dome Lake	15
Do	NE. ¼ sec. 35, T. 55 N., R. 86 W.	108
Do	Beckton	148
Do	Mouth of Little Goose Creek	182
Do	Mouth	406
Little Goose Creek	Sec. 30, T. 54 N., R. 84 W.	71
Do	Mouth	159
Prairiedog Creek	Dutch Creek	132
Do	Mouth	359
Dutch Creek	do	171

GAGING-STATION RECORDS.

TONGUE RIVER NEAR DAYTON, WYO.

LOCATION.—In SE. ¼ sec. 2, T. 56 N., R. 87 W., at mouth of canyon 3½ miles southwest of Dayton, Sheridan County. Nearest tributary, Amsden Creek, enters 1½ miles downstream.

DRAINAGE AREA.—204 square miles (measured on topographic map).

RECORDS AVAILABLE.—November 18, 1918, to September 30, 1921.

GAGE.—Stevens water-stage recorder at right bank, 1,000 feet below head of Highline canal.

EXTREMES OF DISCHARGE.—1919–1921: Maximum stage during period, 4.35 feet at midnight June 10, 1920 (discharge, 1,700 second-feet); minimum stage, 1 foot at 9 p. m., November 29, 1919 (discharge, 15 second-feet).

DIVERSIONS.—Only diversion above station is Highline canal, which diverts from 4,000 to 5,000 acre-feet each year. Prior to July 1, 1921, adjudicated diversions of 256 second-feet from Tongue River below station in Wyoming, of which 75 second-feet are for power.

ACCURACY.—Gage heights from continuous record. Rating curves well defined. Records excellent.

Monthly discharge of Tongue River near Dayton, Wyo., 1919–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	----------	----------	75	4,610
November	----------	----------	70	4,170
December	86	47	70.5	4,330
January	67	59	65.5	3,900
February	69	54	63.1	3,500
March	82	52	59.5	3,660
April	348	58	135	8,030
May	575	194	364	22,400
June	360	95	214	12,700
July	111	59	81.1	4,990
August	69	43	53.5	3,290
September	57	37	44.4	2,640
The year	575	37	108	78,200

Monthly discharge of Tongue River near Dayton, Wyo., 1919–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919-20.				
October	69	40	56.5	3,470
November	59	18	46.6	2,770
December	47	35	40.1	2,470
January	54	36	46.7	2,870
February	52	40	46.7	2,690
March	57	38	48.0	2,950
April	59	40	49.5	2,950
May	1,020	62	349	21,500
June	1,400	435	858	51,100
July	460	112	233	14,300
August	114	68	93.0	5,720
September	76	60	66.9	3,980
The year	1,400	18	161	117,000
1920-21.				
October	76	38	62.7	3,860
November	64	31	51.4	3,060
December	60	47	51.9	3,190
January	57	46	52.8	3,250
February	66	44	58.2	3,230
March	64	46	55.8	3,430
April	110	62	84.1	5,000
May	623	77	322	19,800
June	508	216	340	20,200
July	222	155	183	11,300
August	167	70	122	7,500
September	78	57	66.0	3,930
The year	623	31	121	87,800

TONGUE RIVER AT DAYTON, WYO.

LOCATION.—At highway bridge at Dayton, in Sheridan County. Nearest tributary, Little Tongue River, enters a short distance above.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 1 to October 31, 1903.

GAGE.—Vertical staff attached to bridge pier; read by T. S. Wilson.

ACCURACY.—Gage read twice daily. Rating curve not well defined. Records fair.

Monthly discharge of Tongue River at Dayton, Wyo., for 1903.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May	666	111	348	21,400
June	935	582	757	45,000
July	594	173	352	21,600
August	285	97	152	9,350
September	175	142	153	9,100
October	215	132	154	9,470
The period	.....	.....	.....	116,000

TONGUE RIVER AT CARNEYVILLE, WYO.

LOCATION.—In sec. 20, T. 57 N., R. 84 W., at highway bridge at Carneyville, in Sheridan County. Nearest important tributary, Goose Creek, enters 3 miles below.

DRAINAGE AREA.—495 square miles (measured on base map of Wyoming; scale, 1 : 500,000).

RECORDS AVAILABLE.—May 25, 1911, to October 31, 1912; April 4, 1915, to June 30, 1917.

GAGE.—Chain gage on downstream side of bridge; read by Walter Bone.

EXTREMES OF DISCHARGE.—1911–12, 1915–1917: Maximum stage recorded, 7.3 feet at 11.30 a. m. June 18, 1917 (discharge, 2,690 second-feet); minimum stage recorded, 2.5 feet August 20, 21, September 13, 1911 (discharge, 49 second-feet).

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 188 second-feet from Tongue River above station and 33 second-feet below.

ACCURACY.—Gage read once daily 1911–12 and twice daily 1915–1917. Rating curves fairly well defined. Records good.

Monthly discharge of Tongue River at Carneyville, Wyo., for 1911–12, 1915–1917.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
May	580	200	342	21,000
June	603	138	368	21,900
July	200	58	101	6,210
August	168	49	86.9	5,340
September	125	49	86.3	5,140
The period				59,600
1911–12.				
October	153	65	101	6,210
November	112	75	82.9	4,930
March 27–31	2,010	320	1,100	10,900
April	580	100	213	12,700
May	1,770	145	598	36,800
June	1,950	630	1,260	75,000
July	835	155	414	25,500
August	320	78	137	8,420
September	490	70	181	10,800
October	380	170	232	14,300
1915.				
April 4–30	715	42	175	9,370
May	1,780	164	695	42,700
June	2,200	690	1,160	69,000
July	895	147	398	24,500
August	360	80	132	8,120
September	280	109	177	10,500
The period				164,000
1915–16.				
October	260	133	167	10,300
November	158	108	134	7,970
March 15–31	158	94	132	4,450
April	540	116	215	12,800
May	1,070	256	663	40,800
June	1,600	690	1,040	61,900
July	540	133	278	17,100
August	152	84	110	6,760
September	120	88	100	5,950
1916–17.				
October	198	94	128	7,870
November 1–12	140	88	113	2,690
April 8–30	730	126	234	10,700
May	1,990	135	700	43,000
June	2,600	986	1,620	96,400

GOOSE CREEK AT SHERIDAN, WYO.

LOCATION.—At West Loucks Street Bridge, Sheridan, in Sheridan County. Nearest tributary, Little Goose Creek, enters a short distance below. Old station maintained in 1896 and 1897 was in northern part of Sheridan at Fifth Avenue Bridge, below mouth of Little Goose Creek.

DRAINAGE AREA.—182 square miles. (Old station 341 square miles.)

RECORDS AVAILABLE.—May 14, 1911, to October 31, 1912; April 1, 1915, to September 30, 1916. State engineer maintained station at this point during 1913. April 10 to September 30, 1896, May 21 to August 2, 1897, records kept at old station.

GAGE.—Vertical staff on inside face of left abutment; installed April 20, 1916; read by William Yeager. Gage installed May 14, 1911, was vertical staff on footbridge at City Park several hundred yards below. On August 14, 1915, gage was moved to left abutment of footbridge and referred to datum 1.0 foot higher. During 1896 and 1897, staff gage fastened to piles of Fifth Avenue Bridge; read by Felix O'Connor.

EXTREMES OF DISCHARGE.—1911–12, 1915–16: Maximum mean daily stage recorded, 7.25 feet June 9, 1912 (discharge, 2,860 second-feet); minimum mean daily stage recorded, 2.84 feet July 22, 1911 (discharge, 2.8 second-feet).

DIVERSIONS.—During irrigation season greater part of flow diverted above station.

ACCURACY.—Gage read twice daily. Rating curves fairly well defined. Records fair.

Monthly discharge of Goose Creek at Sheridan, Wyo., for 1896–97, 1911–12, 1915–16.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1896.				
April 10–30	132	71	88.7	3,690
May	526	40	193	11,900
June	650	42	242	14,400
July	100	40	60.0	3,690
August	55	26	38.7	2,380
September	31	17	21.4	1,270
The period				37,300
1897..				
May 21–31	595	179	349	7,540
June	307	64	132	7,860
July	75	7	37.2	2,290
The period				17,700
1911.				
May 14–31	380	119	198	7,080
June	530	21	243	14,500
July	37	2.8	14.6	898
August	58	3.6	17.8	1,090
September	30	7.2	16.9	1,010
The period				24,600
1911–12.				
October	43	17	26.5	1,630
November	43	29	33.4	1,990
April	53	34	41.9	2,490
May	1,320	48	320	19,700
June	2,860	127	1,090	64,900
July	480	39	144	8,850
August	80	34	52.8	3,250
September	160	29	82.8	4,930
October	158	106	122	7,500
1915.				
April	224	22	75.5	4,490
May	997	87	295	18,200
June	1,860	423	847	50,400
July	541	13	202	12,400
August	26	4	13.2	812
September	166	13	71.0	4,220
The period				90,500
1915–16.				
October	166	56	96.7	5,950
November	173	38	87.2	5,190
March 18–31	59	22	35.9	997
April	149	30	68.4	4,070
May	508	120	242	14,900
June	1,180	245	585	34,800
July	317	5	89.7	5,520
August	12	4	6.8	418
September	23	6	14.0	833

LITTLE GOOSE CREEK NEAR BIG HORN, WYO.

LOCATION.—In secs. 30, T. 54 N., R. 84 W., at highway bridge at Hilman's ranch, 3. miles southwest of Big Horn, Sheridan County. Nearest tributary, Teepee Creek, enters 7 miles upstream.

DRAINAGE AREA.—71 square miles (measured on topographic map).

RECORDS AVAILABLE.—May 4, 1919, to September 30, 1921.

GAGE.—Chain fastened to downstream side of bridge.

EXTREMES OF DISCHARGE—1919–1921: Maximum stage recorded during period, 3.5 feet at 7 a. m., June 12, 1920 (discharge, 595 second-feet); minimum stage recorded 0.22 foot in afternoon of September 30, 1921 (discharge, 6 second-feet).

DIVERSIONS.—Four ditches, Last Chance, D. Cross, Red Hill, and Peralta, divert water above station. The latter receives its supply from Cross Creek, which is diverted into Little Goose Creek. Prior to July 1, 1921, adjudicated diversions of 180 second-feet from creek below station.

ACCURACY.—Gage read twice daily. Rating curves well defined. Records good except during winter, for which they are fair.

Monthly discharge of Little Goose Creek near Big Horn, Wyo., for 1919–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
May	225	46	116	7,130
June	108	64	83.3	4,960
July	76	23	53.5	3,290
August	33	15	21.5	1,320
September	16	8	10.1	601
The period	.....	.....	.....	17,300
1919–20.				
October	17	8	12.1	744
November	32	13	19.2	1,140
December	.....	.....	14	861
January	.....	.....	13	799
February	.....	.....	13	748
March	.....	.....	12	738
April	19	12	15.3	910
May	410	19	246	15,100
June	595	185	338	20,100
July	182	50	88.3	5,430
August	67	21	32.4	1,990
September	20	16	18.0	1,070
The year	595	.....	68.5	49,600
1920–21.				
October	19	14	16.0	984
November	18	12	16.1	958
December	15	10	13.6	836
January	14	12	12.7	781
February	14	12	13.0	722
March	15	12	13.6	836
April	24	13	18.5	1,100
May	215	23	99.3	6,110
June	185	64	115	6,840
July	91	56	74.5	4,580
August	63	15	34.8	2,140
September	16	6	11.8	702
The year	215	6	36.7	26,600

LITTLE GOOSE CREEK AT SHERIDAN, WYO.

LOCATION.—At footbridge about 200 yards above point where stream parallels Chicago, Burlington & Quincy Railroad and a quarter of a mile above junction with Goose Creek.

DRAINAGE AREA.—159 square miles.

RECORDS AVAILABLE.—May 1, 1896, to August 1, 1897; May 14, 1911, to October 31 1912.

GAGE.—Vertical staff on downstream end of right abutment of footbridge. Gage read from May 1, 1896, to August 1, 1897, was at Broadway Bridge 600 feet below site of present gage.

EXTREMES OF DISCHARGE.—Maximum mean daily stage recorded 4.3 feet June 9, 1912 (discharge, 410 second-feet). Creek reported dry several times during June and July, 1896, and June and July, 1911.

DIVERSIONS.—During the irrigation season the greater part of the stream is diverted above the station.

ACCURACY.—Gage read twice daily. Rating curves fairly well defined. Records good.

Monthly discharge of Little Goose Creek at Sheridan, Wyo., for 1896–97, 1911–12.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1896.				
May	130	20	58.1	3,570
June	130	0	33.1	1,970
July	4.0	0	2.39	147
The period				5,690
1897.				
May 21–31	207	72	129	2,810
June	111	8	42.0	2,500
July	16	8	8.5	523
The period				5,830
1911.				
May 14–31	82	1.9	21.9	782
June	92	.0	9.11	542
July	4	.0	1.43	87.9
August	12	1.0	5.47	336
September	22	2.7	6.65	397
The period				2,140
1911–12.				
October	24	20	22.0	1,350
November	36	22	26.5	1,580
April	74	48	61.9	3,680
May	392	86	217	13,300
June	410	80	226	13,400
July	96	9	42.0	2,580
August	90	8	27.0	1,660
September	90	10	46.8	2,780
October	112	70	89.9	5,530

IRRIGATION.

PRESENT DEVELOPMENT.

With the exception of Tongue River itself the streams in the Tongue River basin are fully appropriated, and further development is dependent upon additional storage.

Areas covered by completed ditches in Tongue River basin, in acres.

[Compiled from Fourteenth Biennial Report of State engineer.]

Stream.	Acreas covered by ditches.	
	Adjudicated (including territorial rights).	Completed but not adjudicated.
Tongue River	10,273	0
Little Tongue River	1,543	25
Wolf Creek and tributaries	10,213	0
Goose Creek and tributaries	64,429	1,756
Prairiedog Creek and tributaries	3,984	984

The 10,273 acres under ditch from Tongue River represents chiefly valley land, as very little bench land has been irrigated. East of the mountains the fall of the river is so slight and the sides of the valley so steep that long winding ditches with numerous flumes would be required to reach the bench lands.

Not only is the natural run-off of Wolf Creek fully appropriated, but water is diverted into it from the North Fork of Goose Creek near sec. 16, T. 54 N., R. 87 W., and also by the Patrick ditch, which heads in Goose Creek near the mouth of the canyon.

Of the 66,000 acres under completed ditch from Goose Creek and tributaries, the greater area is in the Little Goose basin. The streams are all fully appropriated, as this is one of the oldest and most successfully irrigated regions in the State.

The waters of Prairiedog Creek are so fully appropriated that an additional supply sufficient to irrigate 15,700 acres additional is diverted into it from Piney Creek through two ditches, making a total of 20,700 acres irrigated in the drainage basin.

FUTURE DEVELOPMENT.

Tongue River, the waters of which are not fully appropriated, affords the only opportunity for irrigating any considerable new area. On account of the expensive work involved probably irrigation will not be extended in the near future. One project has been under consideration for at least 15 years.

An irrigation district was formed under the State laws by citizens of Parkman for the purpose of irrigating 10,000 acres in that vicinity. The water supply is to be brought from Tongue River by a ditch to be located somewhere in the canyon. No construction work has been done, but surveys have been made. A mean of four years' records at Carneyville, below most of the diversions from Tongue River, shows a flow of 125,000 acre-feet from May to September, inclusive.

WATER POWER.

DEVELOPED POWER.

TONGUE RIVER.

The Dayton roller mill and electric-light plant are operated by water power. A canal of 30 second-feet capacity diverts water from Tongue River 1 mile above Dayton and carries it to a timber forebay 16 feet high, which contains an 18-inch turbine of unknown type, installed many years ago. The turbine, which generates 30 horsepower under a head of 14 feet, is between the mill and electric-light plant. On one side the turbine is bevel geared to a horizontal shaft leading to the mill, and on the other side it is bevel geared to a shaft leading to the light plant. The shaft leading to the light plant is belt connected to a 17-kilowatt Westinghouse direct-current generator of 125 volts operating at 1,125 revolutions a minute. A transmission line of 6,240 feet, consisting of No. 8 wire for the main line and of Nos. 10 and 12 wire for the side line, carries the current to Dayton. The mill operates nine hours a day for three or four months in the year, and the electric-light plant is operated at night. A 40-horsepower gas engine is installed in the plant but is not used, as the water supply is adequate during the entire year.

GOOSE CREEK.

At the Beckton flour mill a short canal from Goose Creek creates a fall of about 7 feet, and this is utilized by a turbine developing about 20 horsepower.

The Sheridan Manufacturing Co.'s flour mill at Sheridan has a canal one-third of a mile long, that leads from a concrete diversion dam in Goose Creek to an open concrete forebay at the mill, giving an operating head of 13 feet. A 21-inch McCormick turbine developing 37 horsepower is bevel geared to a horizontal shaft, belt connected to the machinery in the mill. The turbine has a hand governor. The mill operates continuously. The water supply is adequate except during the late irrigation season. At that time the mill is operated by an electric motor obtaining power from the city light company.

UNDEVELOPED POWER.

No profile surveys are available for streams in the Tongue River basin, but topographic maps cover the mountainous part of it, where the possible power sites are situated.

TONGUE RIVER.

Elevations and distances along Tongue River from source to Montana-Wyoming State line.

[Compiled from topographic map.]

Point on river.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From source.	Point to point.		Total.	Per mile.
Source	0	.....	9,400	.....	.....
Sec. 16, T. 55 N., R. 90 W	4.5	4.5	8,500	900	200
Line between secs. 3 and 4, T. 55 N., R. 89 W	11.5	7	8,000	500	71
Mouth of South Fork	20.7	9.2	6,990	1,010	110
Mouth of Sheep Creek	26.0	5.3	4,880	2,110	252
Mouth of Amsden Creek	31.2	5.2	4,000	880	169
Ranchester	39.2	8	3,750	250	31
Mouth of Slater Creek	49.7	10.5	3,650	100	10
Sec. 6, T. 57 N., R. 83 W. (3 miles above State line)	64.8	15.1	3,500	150	10

Several investigations of Tongue River have been made to determine the power possibilities, but the most comprehensive was that made by the United States Forest Service. From the report of this survey [18] data regarding reservoir sites, conduits, and operating head have been taken.

The section of greatest power is that between the South Fork and the mouth of the canyon. To determine the water supply, records of discharge at the mouth of the canyon are available form 1919 to 1921. Long-time records in northern Wyoming show that 1919 was the year of smallest run-off in the 19-year period 1903–1921, and that 1920 was a median year. By using the later record the results obtained are those to be expected 50 per cent of the time with storage just sufficient to equalize the flow for that year. If the storage capacity is increased, it will be possible to carry water over from the wet years and increase the percentage of time the full power will be available. With the present records it is impossible to determine the capacity needed to insure full power 100 per cent of the time.

Two possibilities for the development of power present themselves. One is to build a reservoir near the mouth of South Fork and utilize the head in the section 2 miles below South Fork, and the other is to build a reservoir on Tongue River below South Fork and utilize the head between it and the mouth of the canyon.

A reservoir on South Fork in sec. 33, T. 56 N., R. 88 W., having a capacity of 26,000 acre-feet, would completely regulate the discharge for a median year, giving a continuous discharge of 75 second-feet. With a tunnel 13,000 feet long extending to the power-house site just above the reservoir site on Tongue River an operating head of 575 feet would be available, developing 3,400 horsepower at 70 per cent efficiency.

[18] Whitsit, L. A., Hydroelectric power resources of the Tongue River, Wyo.: U. S. Forest Service, 1918.

With the regulation of South Fork additional storage of 26,000 acre-feet by a reservoir in sec. 22, T. 56 N., R. 88 W., 2 miles below South Fork, would regulate completely the flow at that point, insuring a continuous discharge of 145 second-feet for the median year. A tunnel 11,000 feet long leading north to Sheep Creek, thence a pipe line 19,000 feet long leading to the power-house site, 3 miles above the mouth of the canyon, in sec. 9, T. 56 N., R. 87 W., would give an operating head of 2,270 feet. This would develop 26,000 horsepower at 70 per cent efficiency. By extending the pipe line 4,500 feet farther downstream the operating head would be increased to 2,700 feet, which would develop 31,000 horsepower.

Without the South Fork reservoir, storage of 52,000 acre-feet would be required at the Tongue River site, to equalize the flow during the median year.

GOOSE CREEK.

Elevations and distances along Goose Creek from Dome Lake to Beckton.

[Compiled from topographic maps.]

Point on stream.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From source.	Point to point.		Total.	Per mile.
Dome Lake	0	.....	8,790	.....	.....
Mouth of tributary from west	3.5	3.5	7,950	840	240
Contour crossing	7.5	4.0	7,000	950	238
NE. ¼ sec. 35, T. 55 N., R. 86 W	11.5	4.0	4,500	2,500	625
Beckton	16.4	4.9	4,040	460	94

The unit run-off varies so greatly, owing to seepage losses through the underground channels in the streams that drain the eastern slope, that, in the absence of actual records, no attempt has been made to estimate the undeveloped power on Goose Creek.

STORAGE.

Excellent reservoir sites of considerable capacity, three of which are now utilized, have been surveyed by several organizations. The United States Forest Service made detailed surveys of the North Fork, South Fork, and Rockwood sites in connection with a possible power project. The data for these sites are taken from the report of that survey.[19] Data on the other sites were obtained from reliable sources.

[19] Whitsit, L. A., op. cit.

Principal features of reservoir sites in Tongue River basin.

Name.	Source of supply.	Location.	Tributary drainage area.	Height of dam.	Crest length.	Maximum area.	Capacity.
			Sq. miles.	*Feet.*	*Feet.*	*Acres.*	*Acre-feet.*
North Fork.....	North Fork of Tongue River.	Secs. 4, 5, 8, 9, T. 55 N., R. 89 W.	45	130	3,150	860	42,500
South Fork.....	South Fork of Tongue River.	Secs. 4, 5, 8, 9, T. 55 N., R. 88 W., and sec. 33, T. 56 N., R. 88 W.	88	125	650	370	19,000
Rockwood.....	Tongue River.....	Secs. 21, 22, 23, T. 56 N., R. 88 W.	180	320	360	280	31,000
Park[a].....	East Fork of Goose Creek and Cross Creek.	Secs. 15, 16, 21, T. 53 N., R. 86 W.	.....	80	600	268	7,360
Dome Lake[b].....	West Fork of Goose Creek.	Sec. 11, T. 53 N., R. 87 W.	15	.....	.....	211	3,170
Big Horn[b].....	Cross Creek.....	Secs. 28 and 33, T. 53 N., R. 87 W.	.....	32	381	150	2,620

[a] Partly developed. [b] Developed.

The North Fork site is at the mouth of Bull Creek, at an elevation of 8,000 feet. The general characteristic of the site is that of an open, treeless country. The reservoir bottom consists of alluvial deposit surrounded by bench land 50 to 300 feet above the bottom. The only dam site would require a dam having a crest length of 3,150 feet. The annual run-off is estimated as 28,000 acre-feet.

The South Fork site is immediately above the box canyon portion of the South Fork. It has a comparatively level valley bottom and steep rocky sides covered with more or less dense timber. The height of 125 feet for the dam is limited by a low saddle half a mile northwest of the dam site. A dam 125 feet high would require a low dike 1,500 feet long at this point. The annual run-off is estimated as 52,000 acre-feet.

The Rockwood site is on the main stream just above the box canyon and has a comparatively flat bottom area. The sides of the reservoir are steep and rise to an elevation of 500 to 1,000 feet above the valley. The entire south slope and part of the north slope are covered with a dead timber burn and thick underbrush. As the dam site is in the narrow part of the canyon a high arch dam can be used. The annual run-off is estimated as 100,000 acre-feet.

Area and capacity of Rockwood reservoir.

Height of dam (feet).	Area (acres).	Capacity (acre-feet).
100	30	700
150	77	3,400
200	137	8,700
250	190	16,800
300	260	28,000
320	280	31,000

The Park reservoir site, which is utilized to the extent of 2,000 acre-feet capacity, is in the Big Horn Mountains at an elevation of 8,200 feet. Water from this reservoir is diverted to Little Goose Creek. It is expected that the dam will be raised to a height of 80 feet, increasing the capacity to 7,360 acre-feet.

Dome Lake, at an elevation of 8,800 feet, is utilized by the Dome Lake Reservoir Co. The stored water is used to irrigate land in Goose Creek valley.

The Big Horn reservoir is situated at an elevation of 8,600 feet. It is utilized by the Wyoming Securities Co. to store water which is discharged into Little Goose Creek and used to irrigate land in that valley.

POWDER RIVER BASIN.

GENERAL FEATURES.

Powder River and its numerous tributaries drain an area in the northeastern part of the State that extends from a point within a few miles of North Platte River to the Montana line and from the Big Horn and Bridger mountains on the west to a north-south line a few miles west of Gillette, on the east. The drainage basin is bounded on the northwest by that of Tongue River, on the south by the divide separating it from the basin of the North Platte, and on the east by the low divide separating it from the basins of Little Powder, Belle Fourche, and Cheyenne rivers.

With the exception of the headwater regions of the North Fork and Crazy Woman and Clear creeks, the area drained lies in the plains, where the topography is rolling and in places rugged, there being extensive badlands.

The precipitation decreases from 16 inches at the Montana line to 14 inches at the forks. In the area drained by the South Fork it further decreases to 10 inches at the headwaters; in that drained by the North Fork it increases to 25 inches or more in the Big Horn Mountains. In the drainage area of the two chief tributaries, Crazy Woman and Clear creeks, the precipitation decreases from 30 inches or more to 16 inches. Over the greater part of this area it is 16 inches.

Powder River is formed by the junction of its North and South forks in T. 43 N., R. 80 W., a few miles east of Kaycee. North Fork rises on the southeastern slope of the Big Horn Mountains and flows southeastward to its confluence with the South Fork. It has a number of tributaries that rise in the southern extensions of the Big Horn Mountains, the largest being Middle Fork. South Fork rises in T. 34 N., R. 89 W., and flows northeastward to its junction with the North Fork. As it drains a plains area it has few tributaries, Wallace, Cave, and Willow creeks being the only perennial ones. Below the forks Powder River flows eastward for 15 miles to a point

where it turns abruptly to the north and flows northward to the Montana line. Beyond that line it flows northeastward to Yellowstone River. Except Salt Creek, which empties into it a few miles below the forks, Powder River has no perennial tributaries for 50 miles, measured in a straight line. Beyond that stretch Crazy Woman and Clear creeks join it from the west. Both streams rise in the Big Horn Mountains and flow perennially.

MEASURED DRAINAGE AREAS.

Measured drainage areas in Powder River basin, in square miles.

Stream.	Drainage area above—	Area.
South Fork of Powder River	Cave Creek	325
Do	Willow Creek	853
Do	Mouth	1,230
Powder River	Crazy Woman Creek	4,920
Do	Arvada	6,050
Do	Clear Creek	6,580
Do	Montana line	7,920
Willow Creek	Mouth	165
Middle Fork of Powder River	Red Fork	448
Do	Mouth	989
Buffalo Creek	do	231
Red Fork	do	148
North Fork of Powder River	do	306
Salt Creek	Castle Creek	348
Do	Mouth	838
Castle Creek	do	173
North Fork of Crazy Woman Creek	do	289
Crazy Woman Creek	do	944
Middle Fork	do	116
South Fork	do	116
Clear Creek	Rock Creek	205
Do	Piney Creek	429
Do	Gaging station near mouth	1,110
North Fork of Clear Creek	South Fork	33
Do	Center sec. 6, T. 50 N., R. 82 W	122
South Fork of Clear Creek	Sour Dough Creek	19
Do	Middle Fork	22
Do	Mouth	65
Sour Dough Creek	do	21
Middle Fork of South Fork	do	42
Rock Creek	do	128
Piney Creek	Gaging station at Kearney	117
Do	Mouth	253
North Piney Creek	SW. ¼ sec. 9, T. 53 N., R. 84 W	30
Do	SE. ¼ sec. 11, T. 53 N., R. 84 W	37
Do	South Piney Creek	41
South Piney Creek	Cloud Peak Lake	12
Do	Sec. 13, T. 52 N., R. 85 W	31
Do	SW. corner sec. 28, T. 53 N., R. 84 W	66
Do	North Piney Creek	73
North Fork of South Piney	Kearney Lake	17

GAGING-STATION RECORDS.

MIDDLE FORK OF POWDER RIVER AT KAYCEE, WYO.

LOCATION.—In sec. 12, T. 43 N., R. 32 W., at highway bridge at Kaycee. Nearest tributary, North Fork, enters 4 miles downstream.

RECORDS AVAILABLE.—May 1, 1911, to October 31, 1912.

DRAINAGE AREA.—965 square miles.

GAGE.—Vertical staff attached to middle pier of highway bridge.

EXTREMES OF DISCHARGE.—1911–12: Maximum mean daily gage height recorded, 8.0 feet May 30, 1912 (discharge, 1,440 second-feet); minimum mean daily gage height recorded, 2.8 feet July 13-30, 1911 (discharge, 10 second-feet).

DIVERSIONS.—The greater part of the flow is diverted above the gage during the irrigation season.

ACCURACY.—Gage read twice daily. Rating curves well defined for 1911, but poorly defined for 1912. Records good for 1911; poor for 1912.

Monthly discharge of Middle Fork of Powder River at Kaycee, Wyo., for 1911 and 1912.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
May	365	130	163	10,000
June	210	36	80.2	4,770
July	53	10	16.8	1,030
August	325	10	54.0	3,320
September	73	36	44.5	2,650
The period				21,800
1911-12.				
October	120	53	64.8	3,980
November	95	50	60.0	3,570
April	392	53	106	6,310
May	1,440	50	437	26,900
June	1,320	215	600	35,700
July	290	20	119	7,320
August	1,410	20	138	8,480
September	680	54	125	7,440
October	166	89	107	6,580

POWDER RIVER AT ARVADA, WYO.

LOCATION.—In sec. 16, T. 54 N., R. 77 W., at highway bridge at Arvada, Sheridan County. Nearest tributary, Wildhorse Creek, an intermittent stream, enters a quarter of a mile downstream.

DRAINAGE AREA.—6,050 square miles (measured on topographic maps and base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—May 4, 1919, to September 30, 1921.

GAGE.—Chain fastened to downstream side of bridge.

EXTREMES OF DISCHARGE.—1919–1921: Maximum stage recorded, 8.25 feet at 10 a. m. June 19, 1920 (discharge, 10,700 second-feet); minimum discharge, river dry during part of summers of 1919 and 1921.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 11 second-feet from tributaries entering above. Below the station, no adjudications for diversions from Powder River in Wyoming.

ACCURACY.—Gage read once daily. Rating curves fairly well defined. Records fair.

Monthly discharge of Powder River at Arvada, Wyo., for 1919–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
May	450	228	346	21,300
June	1,250	2	197	11,700
July	825	0	86.2	5,300
August	615	0	80.5	4,950
September 8–30	56	0	6.8	312
The period				43,600
1919–20.				
October	500	0	208	12,800
November	555	190	256	15,200
March 14–31	6,680	415	2,030	72,500
April	3,000	280	736	43,800
May	9,000	1,130	2,370	146,000
June	10,600	740	2,000	119,000
July	2,480	138	528	32,500
August	1,840	11	141	8,670
September	332	49	91.2	5,430

Monthly discharge of Powder River at Arvada, Wyo., for 1919–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1920–21.				
October	439	85	214	13,200
November	550	80	286	17,000
December 1–16	447	40	204	6,470
March 14–31	495	280	378	13,500
April	585	312	430	25,600
May	1,480	312	685	42,100
June	3,920	250	1,160	69,000
July	2,870	26	480	29,500
August	1,480	1	123	7,560
September	9	0	2.7	161

POWDER RIVER NEAR ARVADA, WYO.

LOCATION.—Near line between Tps. 56 and 57 N., R. 76 W., at State bridge 17 miles north of Arvada, in Sheridan County. Nearest tributary, Clear Creek, enters 200 yards below.

DRAINAGE AREA.—6,580 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—July 22, 1915, to April 29, 1919.

GAGE.—Chain gage fastened on upstream guardrail of bridge since May 4, 1916. Prior to that date gage was inclined staff 1 mile upstream at K ranch.

EXTREMES OF DISCHARGE.—1915–1918: Maximum stage recorded, 8.75 feet at 3.30 p. m. July 14, 1918 (discharge, 10,800 second-feet); minimum stage recorded, 2.48 feet September 17, 1916 (discharge, 1 second-foot).

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 11 second-feet from tributary of Powder River, above the station, and none between it and the State line.

ACCURACY.—Gage read once daily. Rating curve not well defined because of shifting control during 1915 and 1916, but well defined during 1917 and 1918. Records fair.

Monthly discharge of Powder River near Arvada, Wyo., for 1915–1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915.				
September	5,520	255	1,330	79,100
1916.				
October	1,020	265	382	23,500
November 1–17	343	240	286	9,640
May 4–31	1,080	433	671	37,300
June	5,270	290	812	48,300
July	6,080	75	488	30,000
August 1–23	4,740	132	488	22,300
September 13–30	34	1	16.8	600
1916–17.				
October	295	34	140	8,610
November 1–10	192	159	174	3,450
May 1–30	8,780	390	2,340	139,000
June 8–30	3,180	1,050	2,080	94,900
July	975	48	286	17,600
August	100	6	30.5	1,880
September	87	31	48.7	2,900

Monthly discharge of Powder River near Arvada, Wyo., for 1915–1919—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917–18.				
October	159	48	88.8	5,460
November	192	104	141	8,390
March 25–31	485	255	319	4,430
April	850	192	369	22,000
May	2,920	175	947	58,200
June	7,160	255	1,480	88,100
July	10,800	72	1,690	104,000
August	1,240	60	204	12,500
September	143	51	93.6	5,570
1918–19.				
October	196	130	151	9,280
November 1–18	228	159	182	6,500
March 23–31	210	93	167	2,980
April 1–29	485	116	193	11,100

CLEAR CREEK NEAR BUFFALO, WYO.

LOCATION.—In sec. 6, T. 50 N., R. 82 W., just above power house of Buffalo Manufacturing Co., 4 miles west of Buffalo, Johnson County.

DRAINAGE AREA.—120 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 16, 1917, to September 30, 1921. From June 1 to September 30, 1894, and May 2, 1896, to February 28, 1900, State engineer maintained station at measuring flume 1 mile upstream.

GAGE.—Chain gage at left bank 300 feet above power house. Original gage was Carpenter recording gage referred to vertical staff fastened to side of flume.

EXTREMES OF DISCHARGE.—1896–1899, 1917–1921: Maximum stage recorded, 4.2 feet at 6.30 a. m. June 18, 1917 (discharge, 1,120 second-feet); minimum discharge occurred during winter.

DIVERSIONS.—Pipe line of power house diverts water from Clear Creek, 1½ miles upstream. Separate record of flow through pipe line kept, and flow added to that at gaging station to give total flow of creek. Four Lakes and French Creek canal and North Fork and French Creek canal divert about 10,000 acre-feet annually from North Fork of Clear Creek into French Creek.

ACCURACY.—Gage heights from 1896–1899 from recording gage which was fairly satisfactory; no information regarding rating curve nor accuracy of records. Gage read twice daily 1917 to 1921. Rating curve well defined. Records excellent from 1917 to 1921 except during high-water periods, for which they are good, and during winter, for which they are fair.

Monthly discharge of Clear Creek near Buffalo, Wyo., for 1894, 1896–1899, 1917–1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1894.				
June	853	168	283	16,800
July	242	62	148	9,100
August	80	46	54	3,320
September	80	46	55	3,270
The period				32,500

Monthly discharge of Clear Creek near Buffalo, Wyo., for 1894, 1896–1899, 1917–1919—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1896.				
May	406	64	136	8,360
June	504	82	227	13,500
July	323	64	115	7,070
August	134	40	66.1	4,060
September	56	40	46.6	2,770
The period				35,800
1896–97.				
October 1–19	47	29	36.2	1,360
May	632	189	352	21,600
June	657	189	280	16,700
July	246	55	112	6,890
August	82	39	54	3,320
1898.				
May 15–31	1,060	118	542	18,300
June	853	303	584	34,800
July	303	82	184	11,300
August	92	17	48.2	2,960
September	40	17	27.5	1,640
The period				69,000
1898–99.				
October	46	29	36.5	2,240
November	29	22	25.8	1,540
May	228	29	99.8	6,140
June	778	169	360	21,400
July	447	209	305	18,800
August	266	33	77.5	4,770
September	46	29	37.3	2,220
1899.				
October	46	25	36.9	2,270
November	33	25	30.7	1,830
December	29	25	25.9	1,590
The period				5,690
1917.				
June 16–30	1,040	637	783	23,300
July	632	109	311	19,100
August	162	44	75.1	4,620
September	57	23	31.9	1,900
The period				48,900
1917–18.				
October	33	10	17.8	1,100
November	21	4.6	12.3	732
December			5	307
January			5	307
February			5	278
March	19	4.8	8.62	530
April	45	8.4	18.4	1,090
May	273	37	141	8,670
June	700	134	409	24,300
July	262	66	124	7,620
August	111	29	53.7	3,300
September	53	24	34.5	2,050
The year	700		69.4	50,300
1918–19.				
October	50	14	33.0	2,030
November	31	4	15.6	928
December	10	3	6.0	369
January			3	184
February			1	56
March			5	307
April	150	6	33.4	1,990
May	390	32	185	11,400
June	131	53	87.1	5,180
July	57	13	29.7	1,830
August	50	5	16.8	1,030
September	40	6	23.6	1,400
The year	390		36.8	26,700

Monthly discharge of Clear Creek near Buffalo, Wyo., for 1894, 1896–1899, 1917–1919—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919–20.				
October	22	10	14.6	898
November			8	476
December			5	307
January			3	184
February			2	115
March			6	369
April	23	3.2	12.1	720
May	435	30	234	14,400
June	860	225	442	26,300
July	480	77	211	13,000
August	128	38	70.0	4,300
September	61	25	36.9	2,200
The year	860		87.5	63,300
1920–21.				
October	26	13	21.5	1,320
November	37	14	19.6	1,170
December			8	492
January	5	3	4.7	289
February	5	3	4.0	222
March	13	4	7.6	467
April	41	5	19.4	1,150
May	502	14	145	8,920
June	458	93	242	14,400
July	83	29	46.9	2,880
August	53	16	27.0	1,660
September	23	14	18.1	1,080
The year	502	3	47.0	34,000

NOTE.—Monthly means for 1896 to 1899 revised slightly since being published originally.

Combined monthly discharge of Clear Creek and tailrace near Buffalo, Wyo., 1917–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
June 16–30	1,050	649	795	23,700
July	644	121	323	19,900
August	174	56	87.1	5,360
September	69	34	43.3	2,580
The period				51,500
1917–18.				
October	46	22	30.1	1,850
November	34	17	25.1	1,490
December			15	922
January			15	922
February			15	833
March	30	18	21.5	1,320
April	58	21	31.0	1,840
May	236	50	154	9,470
June	713	147	422	25,100
July	274	78	137	8,420
August	123	41	65.7	4,040
September	65	36	46.5	2,770
The year			81.4	59,000

Combined monthly discharge of Clear Creek and tailrace near Buffalo, Wyo., 1917–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October			42.9	2,640
November			23.1	1,370
December			13.0	799
January			8.0	492
February			5.5	305
March			9.0	553
April			43.5	2,590
May			198	12,200
June			95.4	5,680
July			35.7	2,200
August			22.8	1,400
September			29.6	1,760
The year			44.2	32,000
1919–20.				
October			19.6	1,200
November			15	893
December			11	676
January			10	615
February			8	460
March			13	799
April			16.6	988
May			238	14,600
June			446	26,500
July			216	13,300
August			74.5	4,580
September			41.4	2,460
The year			92.6	67,100
1920–21.				
October			27.5	1,690
November			24.1	1,430
December			12.0	738
January			8.7	535
February			8.0	444
March			11.6	713
April			23.9	1,420
May			152	9,350
June			252	15,000
July			54.9	3,380
August			34.0	2,090
September			24.1	1,430
The year			52.8	38,200

CLEAR CREEK AT BUFFALO, WYO.

LOCATION.—In sec. 34, T. 51 N., R. 82 W., at highway bridge at Buffalo, in Johnson County. Nearest tributary, French Creek, enters 2 miles downstream.

DRAINAGE AREA.—130 square miles.

RECORDS AVAILABLE.—March 1, 1903, to November 30, 1904; May 8, 1911, to June 11, 1912.

GAGE.—Vertical staff whose location was the same but whose datum was different in 1911–12 from that of 1903–4.

EXTREMES OF DISCHARGE.—1903–4, 1911–12: Maximum mean daily stage recorded, 2.95 feet (old datum) June 17, 18, 1903 (discharge, 760 second-feet); minimum stage recorded, 1.05 feet (new datum) October 18, 1911 (discharge, 3 second-feet).

DIVERSIONS.—A large part of the flow is diverted for irrigation above the gage.

ACCURACY.—Rating curve used 1903–4 not well defined. Rating curve used 1911–12 fairly well defined. Records 1903–4 fair, and 1911–12 good.

Monthly discharge of Clear Creek at Buffalo, Wyo., for 1903–4, 1911–12.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1903.				
March	80	12	29.9	1,840
April	62	12	34.7	2,060
May	265	46	116	7,130
June	760	225	422	25,100
July	285	62	134	8,240
August	265	46	72.8	4,480
September	126	46	76.9	4,580
The period				53,400
1903–4.				
October	107	62	73.3	4,510
March 16–31	32	11	16.6	527
April	140	17	52.4	3,120
May	646	170	377	23,200
June	706	202	421	25,000
July	546	70	174	10,700
August	116	14	35.6	2,190
September	17	11	13.0	774
October	28	11	16.7	1,030
November	14	11	12.3	732
1911.				
May 8–31	333	55	102	4,860
June	386	15	169	10,100
July	56	5	18.8	1,160
August	22	9	15.7	965
September	12	7	9.3	553
The period				17,600
1911–12.				
October	12	3	8.3	510
November 1–8	15	7	11.6	184
April 5–30	48	15	24.5	1,260
May	340	22	116	7,130
June 1–11	430	265	348	7,590

CLEAR CREEK NEAR ARVADA, WYO.

LOCATION.—In sec. 36, T. 57 N., R. 77 W., at Sorenson's ranch, 1½ miles above mouth of creek and 16 miles north of Arvada, in Sheridan County. No tributary between station and mouth of creek.

DRAINAGE AREA.—1,110 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—July 21, 1915, to April 30, 1919.

GAGE.—Chain gage at right bank one-fourth of a mile below diversion dam at Sorenson's ranch.

EXTREMES OF DISCHARGE.—1915–1918: Maximum stage recorded, 8.4 feet at 5 p. m. June 10, 1918 (discharge, 2,840 second-feet); minimum discharge recorded, 1 second-foot September 1, 4, 6–8, 10, 1916.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 428 second-feet from Clear Creek.

ACCURACY.—Gage read once daily. Rating curve well defined. Records good.

Monthly discharge of Clear Creek near Arvada, Wyo., for 1915–1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915.				
August 8–31	362	24	130	6,196
September	721	85	274	16,300
1915–16.				
October	242	139	174	10,700
November 1–17	150	119	135	4,560
April 14–30	405	199	302	10,200
May	882	336	617	37,900
June	1,380	276	755	44,900
July	487	13	103	6,330
August	78	2	12.5	769
September	28	1	8.6	512
1916–17.				
October	44	16	23.3	1,430
November 1–11	39	34	34.5	753
April 16–30	340	195	255	7,590
May	2,290	195	904	55,600
June	2,620	930	1,620	96,400
July	1,080	42	316	19,400
August	114	15	42.6	2,620
September	77	47	54.5	3,240
1917–18.				
October	136	56	75.7	4,650
November	136	90	106	6,310
March 25–31	1,080	280	515	7,150
April	455	155	322	19,200
May	1,680	360	1,200	73,800
June	2,840	237	1,560	92,800
July	340	16	117	7,190
August	650	55	177	10,900
September	172	61	110	6,550
1919.				
October	214	100	155	9,530
November 1–18	190	75	137	4,890
April	320	24	66.6	3,960

PINEY CREEK AT KEARNEY, WYO.

LOCATION.—In sec. 26, T. 53 N., R. 83 W., at highway bridge 300 yards south of Kearney, Johnson County. No important tributary within several miles.

DRAINAGE AREA.—117 square miles (measured on base map of Wyoming; scale, 1: 500,000).

RECORDS AVAILABLE.—September 6, 1902, to June 30, 1906; May 13, 1911, to July 31, 1917; May 1, 1919, to September 30, 1921. Station maintained by State engineer April 1, 1913, to October 31, 1914.

GAGE.—Chain on downstream side of bridge. Gage used 1902–1906 was at same site but referred to different datum.

EXTREMES OF DISCHARGE.—1902–1906, 1911–1921: Maximum stage recorded, 4.0 feet at 6 a. m. May 24, 1906 (discharge, 1,660 second-feet); minimum stage, 0.98 foot at 7 p. m. August 24, 1921 (discharge, 5 second-feet).

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 293 second-feet from Piney Creek above station.

ACCURACY.—Gage read twice daily, except for period 1902–1906, when it was read once daily at ordinary stages and twice daily during times of greatest fluctuations. Rating curves well defined. Records excellent.

Monthly discharge of Piney Creek at Kearney, Wyo., for 1902–1906, 1911–1917, 1919–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1902–3.				
September 6–30	39	20	24.9	1,240
October 1–25	34	18	21.4	1,060
April 19–30	358	61	108	2,570
May	430	76	228	14,000
June	685	297	488	29,060
July	311	69	152	9,350
August	186	36	66.1	4,060
September	89	38	45.5	2,710
1903–4.				
October	101	54	76.4	4,700
November	89	48	56.9	3,390
December	54	41	44.2	2,720
March 16–31	48	38	39.6	1,260
April	240	43	122	7,260
May	1,140	240	566	34,800
June	905	118	534	31,800
July	310	38	117	7,190
August	38	15	25.2	1,550
September	18	14	15.2	904
1904–5.				
October	38	14	28.2	1,730
November	38	21	25.9	1,540
April	86	29	42.3	2,520
May	540	60	196	12,100
June	1,440	244	510	30,300
July	282	78	143	8,790
August	78	24	41.3	2,540
September	36	28	29.7	1,770
1905–6.				
October	58	24	35.3	2,170
November	52	41	45.8	2,730
April 10–30	154	43	91.8	3,820
May	651	60	322	19,800
June	588	10	191	11,400
1911.				
May 13–31	598	84	204	7,690
June	395	32	138	8,210
July	39	17	24.9	1,530
August	43	9	22	1,350
September	13	6.8	11.2	666
The period				19,400
1911–12.				
October	44	8	17.5	1,080
November 1–8	39	30	32.8	520
March 27–31	30	26	29.2	290
April	114	80	73.5	4,370
May	840	100	330	20,300
June	1,180	182	605	36,000
July	290	30	108	6,640
August	310	30	97.5	6,000
September	74	30	53.1	3,160
1912–13.				
October	110	74	85.4	5,250
April	239	31	98	5,830
May	843	144	379	23,300
June	447	42	189	11,200
July	194	17	46.9	2,880
August	68	18	26.7	1,640
September	22	20	20.1	1,200
1913–14.				
October	25	17	18.3	1,130
April	255	32	92.2	5,490
May	1,260	122	523	32,200
June	977	15	271	16,100
July	68	20	34.8	21,400
August	25	15	18.0	1,110
September	28	15	16.7	994

NOTE.—Records for 1913 and 1914 revised.

Monthly discharge of Piney Creek at Kearney, Wyo., for 1902–1906, 1911–1917, 1919–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1914–15.				
October	20	20	20	1,230
April 24–30	421	91	176	2,440
May	876	112	331	20,400
June	876	208	492	29,300
July	651	25	181	11,100
August	102	16	40.2	2,470
September	144	25	74.8	4,450
1915–16.				
October	48	25	40.1	2,470
November	54	25	50.8	3,020
March 12–31	81	36	53.8	2,130
April	200	45	102	6,070
May	586	173	304	18,700
June	775	200	443	26,400
July	173	19	69.0	4,240
August	44	14	24.7	1,520
September	44	12	17.3	1,030
1916–17.				
October	39	13	21.2	1,300
November 1–12	38	34	34.7	826
April 8–30	95	44	59.2	2,700
May	680	44	275	16,900
June	1,100	332	670	39,900
July	298	32	132	8,120
1919.				
May	430	39	176	10,800
June	85	17	43.4	2,580
July	55	17	34.2	2,100
August	46	15	27.1	1,670
September	41	12	24.9	1,480
The period				18,600
1920.				
April	57	25	36.3	2,230
May	634	70	291	17,900
June	1,070	244	430	25,600
July	294	25	110	6,760
August	63	12	40.9	2,510
September	44	18	26.9	1,600
The period				60,200
1920–21.				
October	55	22	37.1	2,280
November	78	30	43.6	2,590
March 14–31	40	25	31.1	1,110
April	79	35	52.0	3,090
May	607	36	195	12,000
June	688	7	208	12,400
July	52	7	26.9	1,650
August	37	7	16.2	996
September	44	13	28.3	1,680

PINEY CREEK AT UCROSS, WYO.

LOCATION.—In NW. ¼ sec. 18, T. 53 N., R. 80 W., at highway bridge a quarter of a mile from Ucross, Sheridan County.

DRAINAGE AREA.—253 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—May 12, 1917, to September 30, 1921.

GAGE.—Chain attached to upstream side of bridge.

EXTREMES OF DISCHARGE.—1917–1921: Maximum stage from high-water mark, 5 feet on June 11, 1918 (discharge, 1,900 second-feet); minimum stage recorded, 1 foot at 8 p. m. July 30, 1920 (discharge, 1 second-foot).

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 61 second-feet from Piney Creek, between Kearney and Ucross.

ACCURACY.—Gage read twice daily. Rating curves fairly well defined. Records fair.

Monthly discharge of Piney Creek at Ucross, Wyo., for 1917–1919, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
June 8–30	988	406	699	31,900
July	290	4.6	94.8	5,830
August	37	5.8	16.3	1,000
September	20	6.4	13.6	809
The period				39,500
1917–18.				
October 22–31	58	44	55.0	1,090
April 8–30	238	83	150	6,840
May	665	160	424	26,100
June	1,720	87	808	48,100
July	126	17	62.3	3,830
August	102	6	37.6	2,310
September	60	10	32.5	1,930
1919.				
April	220	37	76.1	4,530
May	438	3	186	11,400
June	27	1.4	4.92	293
July	15	1.2	2.15	132
August	19	1.5	4.17	256
September	24	1.2	9.72	578
The period				17,200
1920–21.				
October	53	18	31.0	1,910
November 1–15	35	25	29.9	890
April 19–30	74	32	49.7	2,070
May	420	25	156	9,590
June	370	8	181	10,800
July	44	4	23.0	1,410
August	30	3	13.4	824
September	53	5	28.4	1,690

NOTE.—Discharge for 1920 not computed because of unsatisfactory gage-height record.

IRRIGATION.

PRESENT DEVELOPMENT.

Comparatively little land is irrigated from Powder River itself, although large areas on both sides are suitable for farming. The uncertainty of flow, which in August and September frequently becomes very small, and the great amount of silt carried during high water make Powder River unsuited for irrigation. As the tributary streams have a more reliable flow and carry little silt they are used much more extensively.

Areas covered by completed ditches in Powder River basin, in acres.

[Compiled from Fourteenth Biennial Report of State engineer.]

Stream.	Adjudicated (including territorial rights).	Not adjudicated.	Total.
North Fork of Powder River and tributaries	6,510	71	6,581
Middle Fork of Powder River and tributaries	9,519	553	10,072
South Fork of Powder River and tributaries	3,725	1,263	4,988
Powder River	3,215	5,131	8,346
Crazy Woman Creek and tributaries	50,643	1,260	51,903
Clear Creek and tributaries	59,732	14,394	74,126
Minor tributaries	15,790	2,541	18,331
	149,134	25,213	174,347

The greater part of the 30,000 acres under completed ditches on Powder River and its three headwater forks comprises land near the stream, irrigated by individual or cooperative ditches. The only Carey Act project is that of the Sussex Irrigation Co., whose Sahara ditch diverts water from the Middle Fork just above Willow Creek and irrigates 5,000 acres lying north of the river in T. 43 N., Rs. 78, 79, and 80 W.

Practically all of the 52,000 acres under completed ditches from Crazy Woman Creek, is on the headwaters. Irrigation is carried on by means of individual and cooperative ditches, as there are no large systems.

The waters of Clear Creek and its principal tributaries, French, Rock, and Piney creeks, are used extensively for irrigation. The area under completed ditches comprises 74,000 acres, of which 15,700 acres is in the Prairiedog drainage basin, being irrigated by two canals that divert water from Piney Creek. Though practically all the bottom land along Clear Creek is irrigated, the greater part of the irrigated area lies near Buffalo and comprises considerable bench land.

FUTURE DEVELOPMENT

Little additional land in this basin can be irrigated without storage, for during July and August the diversions use nearly all the water. The Northern Wyoming Land Co. has a project to irrigate 20,000 acres of bench land south of Buffalo in T. 50 N., Rs. 80 and 81 W. Storage is contemplated in a series of small reservoirs.

WATER POWER.

DEVELOPED POWER.

CLEAR CREEK.

The hydroelectric plant of the Buffalo Manufacturing Co. is 4 miles west of Buffalo, in sec. 6, T. 50 N., R. 82 W. A wood-stave pipe of 12 second-feet capacity diverts water from Clear Creek at a low diversion dam 1½ miles upstream and carries it to the power house, in which there are two 60-inch Pelton wheels each rated at 367 horsepower under the operating head of 340 feet. Each wheel is direct connected to a 250-kilowatt Westinghouse 3-phase alternating-current generator of 2,300 volts. One wheel and generator are in active service, and the others are held in reserve. The current is carried to Buffalo by 4½ miles of transmission line of No. 6 wire suspended from cedar poles. The pipe line furnishes the city water supply after passing the power house. The plant is operated 24 hours a day and has no auxiliary power. Additional power is furnished by a steam plant in Buffalo. The water supply is adequate from May to November.

PINEY CREEK.

The Kearney Cooperative Co.'s flour mill at Kearney is operated by water power. A canal 1,800 feet long having a capacity of 50 second-feet diverts water from Piney Creek and carries it to a concrete forebay near the mill. From the forebay a 46-inch corrugated-iron pipe incased in concrete leads 60 feet to a 20-inch Samson turbine having a rated capacity of 47 horsepower under a head of 16 feet. The head is to be increased to 25 feet, which will increase the power to 101 horsepower. The turbine is bevel geared to a horizontal shaft, which is belt connected to the mill machinery. The mill is operated 12 hours a day for six months in the year. No auxiliary steam power is provided, as the water supply is adequate during the entire year.

UNDEVELOPED POWER.

No profile surveys are available for streams in the Powder River basin, but topographic maps cover the mountainous part, on Clear, Piney, and North Piney creeks, where the possible power sites are situated. The following tables were compiled from topographic maps:

Elevations and distances along Clear Creek from 9,000-foot contour crossing on North Fork to mouth of Piney Creek.

Point on stream.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From source.	Point to point.		Total.	Per mile.
Contour crossing	0	.....	9,000	.....	.....
Contour crossing	4.8	4.8	7,500	1,500	313
Mouth of South Fork	9.1	4.3	6,760	740	172
Center sec. 6, T. 50 N., R. 82 W.	16.1	7.0	5,100	1,660	237
Mouth of Rock Creek	23.1	7.0	4,500	600	86
Mouth of Piney Creek	50.2	27.1	4,140	360	13

Elevations and distances along Piney Creek from Cloud Peak Lake to mouth.

Point on stream.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From source.	Point to point.		Total.	Per mile.
Cloud Peak Lake	0	.....	9,730	.....	.....
Mouth of North Fork	7.2	7.2	8,050	1,680	233
Southwest corner sec. 28, T. 53 N., R. 84 W.	9.2	2.0	7,000	1,050	525
NW. ¼ NW. ¼ sec. 24, T. 53 N., R. 84 W.	13.0	3.8	5,500	1,500	395
Mouth of North Piney Creek	16.0	3.0	4,950	550	183
Kearney	20.2	4.2	4,670	280	67
NE. ¼ sec. 28, T. 53 N. R. 82 W.	26.4	6.2	4,430	240	39
Center sec. 8, T. 53 N., R. 81 W.	33.7	7.3	4,220	210	29
Mouth at Ucross	42.1	8.4	4,160	60	7

Elevations and distances along North Piney Creek from source to mouth of South Piney Creek.

Point on stream.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From source.	Point to point.		Total.	Per mile.
Source	0		9,300		
Contour crossing	4.8	4.8	7,500	1,800	375
SW. ¼ sec. 9, T. 53 N., R. 84 W	10.1	5.3	6,500	1,000	189
SE. ¼ sec. 11, T. 53 N., R. 84 W	12.9	2.8	5,200	1,300	465
Mouth of South Piney Creek (Story post office)	16.1	3.2	4,950	250	78

The well-known losses through underground channels in most of the streams that drain the eastern slope of the Big Horn Mountains make it impossible in the absence of run-off records to estimate accurately the undeveloped horsepower.

STORAGE.

A number of excellent large reservoir sites, three of which are partly utilized, have been surveyed by various organizations and described in Government and State reports. From these reports the following table has been compiled. Owing to a lack of records of discharge in the Big Horn Mountains, no estimate of run-off at these sites has been made.

Principal features of reservoir sites in Powder River basin.

Name.	Source of supply.	Location.	Tributary drainage area.	Height of dam.	Crest length.	Maximum area.	Capacity.
			Sq. miles.	*Feet.*	*Feet.*	*Acres.*	*Acre-feet.*
Kearney Lake	North Fork of South Piney Creek.	Sec. 30, T. 52 N., R. 85 W.	17	45	600	146	[a] 3,800
Cloud Peak	South Fork of South Piney Creek.	Sec. 16, T. 51 N., R. 85 W.	12	34	.....	170	[a] 6,800
Piney	....do	Secs. 13 and 24, T. 52 N., R. 85 W.	[b] 31	54	1,050	368	11,000
Elk Lake	Tributary to South Fork of South Piney Creek.	Sec. 15, T. 51 N., R. 85 W.	2.5	15	560	198	2,500
Lake De Smet	Piney and Shell creeks.	Secs. 7, 8, 17, 18, 20, 21, T. 52 N., R. 82 W.	[c] 36	5	.....	1,740	37,400
Red Fork	Red Fork of Powder River.	Secs. 6, 7, 8, T. 43 N., R. 83 W.	.....	135	525	606	31,800
Northern Wyoming Land Co.	Clear Creek	Secs. 9, 15, 16, 21, 22, T. 50 N., R. 81 W.	.....	.....	.....	.....	9,760
Do	....do	Secs. 10, 11, 15, 16, T. 50 N., R. 81 W.	.....	.....	.....	.....	10,700

[a] Present capacity 2,500 acre-feet.
[b] Includes area above Cloud Peak; 19 square miles exclusive of Cloud Peak area.
[c] Practically no dam. Narrow cut through ridge affords outlet.

Kearney Lake, in the Big Horn Mountains, lies at an elevation of 9,150 feet and is utilized as a reservoir by the Prairie Dog Water Co.,

which uses the stored water in its Prairiedog diversion. Its present capacity with a 25-foot dam is about 2,500 acre-feet.

Cloud Peak Lake lies at an elevation of 9,730 feet and is utilized by the Cloud Peak Reservoir Co. The stored water is diverted to Rock Creek by a ditch 2½ miles long. A dam 34 feet high with an outlet permitting a draft of 6 feet below the natural lake level would create a capacity of 6,800 acre-feet. The present height of dam is 19 feet.

The Piney site is an open valley site formed by a natural park 1½ miles long and 1 mile wide, in the channel of the South Fork of South Piney Creek, 6 miles below Cloud Peak Lake, at an elevation of 8,500 feet. A dam 54 feet high at the outlet of the park would create a reservoir of 11,000 acre-feet capacity.

Elk Lake, on a tributary of South Fork of South Piney Creek, lies at an elevation of 9,850 feet.

Lake De Smet, a large lake 10 miles east of the Big Horn Mountains and 10 miles north of Buffalo, at an elevation of 4,530 feet, receives the run-off of Shell Creek but has no surface outlet. The lowest point of the rim surrounding the lake is 30 feet above the water surface. The Leiter estate is developing this lake as a reservoir. An intake ditch of 1,000 second-feet capacity diverts water from Piney Creek at Kearney and carries it 3 miles to Shell Creek, the natural inlet to Lake De Smet. An outlet ditch diverts the water to Piney Creek for use in irrigating land belonging to the Leiter estate near Clearmont. By raising the water surface 23 feet above the outlet a capacity of 37,400 acre-feet has been obtained.

A filing in the State engineer's office shows a reservoir site on Red Fork of Powder River 12 miles west of Kaycee. All available information is given in the tabulation of reservoir sites.

NORTH PLATTE RIVER BASIN, EXCLUSIVE OF THE LARAMIE.

LOCATION AND BOUNDARIES.

The area drained by North Platte River and its tributaries comprises roughly the southeast quarter of Wyoming, a small region in Colorado, which includes North Park and the small area east of it drained by Laramie River, and a narrow wedge-shaped strip in western Nebraska, above the mouth of the South Platte.

The Colorado portion of the area is surrounded by high mountains, which on the south and west form part of the Continental Divide. On the west the mountains known as the Park Range in Colorado are continued in Wyoming as the Sierra Madre, which extends 25 miles north of the Colorado line. From the north end of the Sierra Madre northwestward to the Wind River Mountains, a distance of 120 miles, the western boundary lies in the high plains, which have no pro-

nounced general trend, and is not well defined. The northern boundary, extending from the south end of the Wind River Mountains eastward to the mouth of the North Platte, is the Great Plains, and this is also poorly defined. So small is the general slope of this region that a slight raising of the area drained by the North Platte would cause its waters to flow northward instead of eastward.

The eastern boundary of the Colorado portion of the drainage basin is the Front Range of the Rocky Mountains. About 30 miles north of the Colorado line the boundary becomes the Great Plains and extends at right angles to its former course. As in the plains region generally, the boundary is poorly defined on account of the generally rolling topography.

TOPOGRAPHY.

The topographic features range from the snow-capped peaks of the Continental Divide, attaining elevations of 12,000 feet, to the rolling plains in the eastern part, where the elevation is 4,000 feet and less. In the upper part of the area are the mountain ranges surrounding North Park and their extensions into Wyoming. East of these are the Laramie Mountains, and paralleling the North Platte on the south is another range of mountains reaching an elevation of 9,000 feet and more. These mountainous areas, together with the southern slope of the Wind River Mountains, produce the surface run-off for the streams. The remainder of the drainage basin comprises either intermountain valleys or rolling plains and isolated ranges of low hills, none of which contribute any reliable run-off.

PRECIPITATION.

In the upper portion of the drainage basin, at the summit of the mountains, the mean annual precipitation is as high as 30 inches; in the valley just north of the Colorado line it ranges from 10 to 14 inches; and in the central area, between the Union Pacific Railroad and Casper, meager records indicate a precipitation of 9 inches and less. East of Casper the precipitation increases gradually from 10 to 18 inches near the Nebraska line and remains fairly uniform from that point to the mouth. The crest of the Laramie Mountains and the mountains south of Casper and Douglas receive 20 to 25 inches of precipitation.

FORESTATION.

The forests of the North Platte River basin are found at elevations between 8,000 and 10,500 feet—that is, in the mountainous region in the upper or southern part. Most of the forested areas are in the national forests on the headwaters of the river.

The total area of national forests in the North Platte basin is 1,870 square miles, of which 1,530 square miles are classed as timberland, woodland, and burned-over land. The commercial and protection

stands of timber are estimated as 4,756,000 M feet b. m., or 3,110 M feet b. m. per square mile. The predominant species are lodgepole pine, Engelmann spruce, Douglas fir, and Alpine fir.

On the Laramie Mountains, which stretch from the Colorado line to a point a few miles south of North Platte River, are scattering stands of timber. At the State line there is practically none, but the stand increases in density toward the north.

PRINCIPAL STREAMS.

NORTH PLATTE RIVER.

North Platte River has its source in a network of clear, rapid streams which rise in the mountain walls of North Park.[20] The two principal forks, North Fork and Roaring Fork, unite in sec. 29, T. 9 N., R. 80 W., and from that point the North Platte flows across the level floor of the park, receiving several more mountain tributaries, the chief of which are Michigan and Canadian rivers. Near the Wyoming line the mountains that form the eastern and western boundaries of the park approach each other, leaving a narrow canyon through which the North Platte flows into Wyoming, changing its course to northwest and flowing through a broad valley as far as Fort Steele. North of this point the valley narrows until it gives way to the canyon which the river has cut through the Seminoe Mountains. Below these mountains the North Platte continues its course to Casper, where it turns abruptly and flows east and southeast to its junction with the South Platte in Nebraska. Below the mouth of the Sweetwater the North Platte again flows in a canyon, which gradually gives way to a narrow valley bordered by high bluffs. These bluffs continue nearly to the Nebraska line, where they gradually recede from the river. In Nebraska the valley is 10 to 15 miles wide and the flood plain of the river 1 to 4 miles wide.

The river receives numerous mountains tributaries that rise in the Sierra Madre and Medicine Bow Range; the largest are Encampment and Medicine Bow rivers and Douglas, Big, French, Brush, Spring, and Jack creeks. Below these, in the central part of the State, the river is joined by one of its chief tributaries, Sweetwater River. From Sweetwater River to the mouth Laramie River is the only important tributary, and this contributes little water to the North Platte, as it is used extensively for irrigation. For this reason the Laramie is not described in this report like the other tributaries but is treated separately. (See pp. 202–242.)

[20] Beekly, A. L., Geology and coal resources of North Park, Colo.: U. S. Geol. Survey Bull. 596, p. 16, 1915.

DOUGLAS CREEK.

Douglas Creek drains an area in the Medicine Bow Mountains just north of the Colorado line. It rises in sec. 18, T. 15 N., R. 79 W., at an elevation of 10,100 feet. It flows southeastward 6 miles, turns abruptly, follows a southerly course for 11 miles, again turns and flows northwestward 10 miles, joining the North Platte in the canyon in sec. 6, T. 13 N., R. 80 W. Throughout its course it is a typical mountain stream and its fall is heavy. Below Keystone it flows in a canyon most of the way. The principal tributaries are Bear, Hay, Horse, Keystone, Little Beaver, Muddy, Lake, Beaver, and Devils Gate creeks.

The entire drainage basin is within the Medicine Bow Mountains, occupying the central plateau region, where elevations range from 9,000 to 10,000 feet and the topography is comparatively level. The lower end of the basin boundary is more rugged and slopes westward to the North Platte.

On account of the high altitude most of the precipitation occurs as snow.

BIG CREEK.

The area drained by Big Creek lies in the Park Range in Colorado and its extension in Wyoming. Big Creek rises in Routt County, Colo., near the crest of the Continental Divide, at an elevation of 11,000 feet, just west of North Park, and flows northeast. Five miles below its source and 9,010 feet above sea level it flows through two lakes, known as the Big Creek Lakes, whose combined area is 1 square mile. Big Creek joins the North Platte 23 miles below the lakes. It receives a number of small tributaries, the largest of which are Beaver and Spring creeks.

FRENCH CREEK.

French Creek drains an area in the Medicine Bow Mountains, just north of the Douglas Creek basin. It is formed by the junction of North and South forks, in sec. 34, T. 15 N., R. 81 W., flows southwestward 4 miles, and joins the North Platte about in sec. 7, T. 14 N., R. 81 W. The forks rise in adjacent areas in the highest part of the Medicine Bow Mountains. South Fork rises in a chain of lakes, of which Lake Marie is the largest, the elevations of these lakes exceeding 10,500 feet. Below Lake Marie the South Fork follows a southwesterly course for 13 miles to the forks, flowing through a narrow valley, which becomes almost a canyon just above the junction. North Fork rises in two tiny lakes at an elevation of 10,400 feet, in sec. 26, T. 16 N., R. 80 W., and flows southwestward to the forks 12 miles distant. Each fork receives a number of small tributaries.

The greater part of the drainage area lies in the central plateau region of the Medicine Bow Mountains, where elevations range from 9,000 to 10,500 feet, except the extreme upper tip of the basin, where at one point the mountains rise to 12,000 feet. Along the South Fork and the lower part of the North Fork the streams flow in steep-sided valleys cut 500 to 1,000 feet below the general level of the plateau.

The precipitation increases from 16 inches at the mouth to 30 inches at the extreme upper end of the basin. The average precipitation for the entire area is about 22 inches.

BRUSH CREEK.

Brush Creek drains an area lying north of the French Creek basin, in the Medicine Bow Mountains. It is formed by the junction of North and South Brush creeks, which rise near each other in the northeastern part of T. 16 N., R. 80 W., and unite in about sec. 18, T. 16 N., R. 81 W. Below the junction Brush Creek flows southwestward 9 miles and joins the North Platte near the center of T. 15 N., R. 82 W. Both North and South Brush creeks receive a number of short mountain tributaries, but none enter below the junction.

Elevations in the basin range from 11,520 feet at the extreme upper end to approximately 7,200 feet at the mouth. Between the two forks, which together form almost a complete circle above their junction, the surface is dome shaped, sloping in every direction to the streams from the central elevation of 10,500 feet. The drainage area below the forks is in the broad valley of the North Platte, the topography of which is comparatively level.

The precipitation increases from 12 inches or less in the valley to a maximum of 30 inches at the extreme upper end of the basin; the average for the area above the forks is about 22 inches.

ENCAMPMENT RIVER.

The area drained by Encampment River lies in the Sierra Madre, its upper portion being in Colorado. The river rises near the crest of the Continental Divide on the eastern slope of Buck Mountain, at an elevation of 10,500 feet, and flows northward 40 miles. It joins the North Platte in or near sec. 34, T. 16 N., R. 83 W., about 12 miles southeast of Saratoga. Its tributaries are numerous; the largest are East, West, and North forks and Soldier and Miner creeks.

Although the basin is in the Sierra Madre, the topography is not rugged, as the slopes are gentle and the mountain tops rounded. The general elevation of the basin increases gradually from 7,320 feet at Encampment to 10,000 feet on the divides between the tributaries. In its upper course the river flows through a narrow valley that becomes narrower until a short distance above Encampment it almost disappears, the river flowing in a canyon. At Encampment the river

debouches upon the comparatively level plain of the North Platte Valley, across which it flows to its junction with the North Platte.

Precipitation in the Encampment River basin increases from 11 inches in the valley of the North Platte to 25 inches in the mountains.

COW CREEK.

The area drained by Cow Creek lies between that of Encampment River on the north and Spring Creek on the south. Cow Creek rises in the Sierra Madre on the eastern edge of T. 14 N., R. 86 W., flows northeastward and joins the North Platte midway between Saratoga and Encampment.

SPRING CREEK.

Spring Creek drains an area on the northeastern slope of the Sierra Madre west of North Platte River. It is formed by North Spring and South Spring creeks, which rise within a short distance of each other in the northern part of T. 14 N., R. 86 W., at an altitude of 10,500 feet. Both flow northeastward and join in or near sec. 31, T. 17 N., R. 85 W. From this junction Spring Creek flows northeastward 5 miles and enters the North Platte a short distance above Saratoga. In the upper part of the basin there are a few tributaries, but none of importance after the creeks leave the mountains.

The upper quarter of the drainage basin lies within the Sierra Madre, where the topography is comparatively regular, as the mountains have rounded tops and gentle slopes. Northeast of the mountains the creeks flow across the broad, generally level valley of the North Platte, where altitudes range between 7,000 and 8,000 feet.

Precipitation in the basin increases from 12 inches at the mouth to 14 inches at the base of the mountains and to approximately 25 inches at the upper end of the basin.

JACK CREEK.

The area drained by Jack Creek lies immediately north of the Spring Creek basin and is chiefly included in the broad valley of the North Platte, with the exception of the upper portion, which lies on the northern slope of the Sierra Madre. Jack Creek rises in sec. 8, T. 14 N., R. 86 W., at an altitude of 10,500 feet, within a mile of the source of North Spring Creek. It flows northwestward 8 miles, then northeastward 20 miles, and joins the North Platte about 6 miles below Saratoga. North Jack Creek, the only important tributary, enters about 15 miles above the mouth.

The greater part of the area is rolling, and the creek flows in a shallow valley. Within the mountains the topography is more rugged but not markedly so, as the Sierra Madre is characterized by rounded tops and gentle slopes.

The precipitation over three-fourths of the basin is less than 14 inches. It increases from about 11 inches at the mouth to about 25 inches in the upper part of the basin.

PASS CREEK.

Pass Creek drains an area that lies east of North Platte River and south of the Union Pacific Railroad. It rises at the northern edge of the Medicine Bow Mountains at an elevation of 9,300 feet and flows northwestward for 30 miles; then turning abruptly it flows northward for 10 miles, and finally swings westward, entering North Platte River a few miles southwest of Walcott. After leaving the mountains Pass Creek receives no large tributaries.

MEDICINE BOW RIVER.

Medicine Bow River, one of the chief tributaries of the North Platte, drains an area lying east of the river and west of the Laramie River basin. It rises in the Medicine Bow Mountains, and its headwaters drain an area northwest of the Snowy Range, containing many tiny lakes, at an altitude of 10,000 feet. Medicine Bow River flows north for 25 miles, east for 15 miles, north for 20 miles, and finally northwest for 40 miles, joining the North Platte near the center of T. 24 N., R. 84 W. Its chief tributaries are Rock Creek, which rises in the Medicine Bow Mountains and drains an area adjacent to the Medicine Bow on the east, and Little Medicine Bow River, which drains a plains area northeast of Medicine Bow River.

With the exception of the headwater region of Medicine Bow River and Rock Creek, the drainage basin is wholly in the Great Plains, where the topography is rolling and the altitudes range between 7,000 and 8,000 feet. The streams flow in shallow valleys with gently sloping sides.

SWEETWATER RIVER.

Sweetwater River, one of the chief tributaries of the North Platte, drains a long and comparatively narrow strip in the central part of the State, bounded on the north by the Rattlesnake Mountains and on the south by the Sweetwater Hills and Seminoe Mountains, which form one continuous range. The river is formed by the junction of its East and West forks, which rise on the southern slope of the Wind River Mountains at altitudes between 9,000 and 10,000 feet. The forks unite in the southern part of T. 29 N., R. 102 W., and from that point Sweetwater River follows a course toward the east, entering the North Platte in the Pathfinder reservoir.

The upper course of the river is in canyons, which continue for a few miles after the river reaches the plains. Near the line between

Tps. 28 and 29 N. the river cuts through the southeastern termination of the foothill region, flowing through Little Sweetwater Canyon, with a heavy fall. East of this canyon the Sweetwater pursues a somewhat tortuous course for 20 miles, through a broad valley bordered on both sides by bluffs. At the lower end of the valley the river flows through a small canyon having vertical walls about 120 feet high. Beyond this canyon it enters a comparatively wide valley bordered on the north by the Granite Hills and finally crosses these hills near Split Rock post office in a narrow gorge, 80 feet wide at the base and 400 feet deep, known as Devils Gate. Beyond this point the river flows through a broad valley bordered by low bluffs, until it enters the Pathfinder reservoir, which extends upstream to the west edge of T. 29 N., R. 85 W.

In its upper course Sweetwater River has a number of mountain tributaries, but after reaching the plains practically no perennial streams enter it.

The upper part of the drainage basin lies in the south end of the Wind River Mountains and the adjacent foothill region. East of the foothills is the Sweetwater Plateau, which has a gradual slope southward toward Sweetwater River. On the northern edge of the plateau the slopes are steeper.

The even slope of the plateau is broken by a series of more or less isolated granitic hills, which parallel the river on the north for a distance of 15 miles and finally cross to the opposite side at Devils Gate and connect with the Seminoe Mountains. The topography is very rugged, and the granitic hills, rising abruptly from a very gentle slope, resemble rocky islands projecting above the level of the sea. The plateau finally gives way to the Rattlesnake Hills, a low isolated narrow mountain chain about 40 miles long, extending from Deer Creek near Ervay post office southward nearly to Sweetwater River. The highest elevation in this range is 8,200 feet.

South of the river and beyond the foothill region is a series of prominent isolated bluffs that form the western terminus of the Sweetwater Hills. East of these bluffs the hills present a uniform appearance, which gradually becomes more rugged. The general elevation of the hills is 7,500 feet. Creeks have cut deeply into the range, forming convenient low passes. At Whisky Gap, south of Split Rock post office, Muddy Creek cuts through the mountains. East of the gap are the Seminoe Mountains, which form a continuation of the Sweetwater Hills. From the summit of the hills a long, continuous series of ridges slope gently toward the river.

The slope of much of the valley, especially north of the river and east of Devils Gate, is so gentle that drainage is deficient and large areas of alkali flats abound. In the southeast corner of the basin

is a large area of shifting sand dunes which reach part way up the slopes of the Seminoe Mountains.

Over the greater part of the drainage basin the precipitation is too small to produce perennial surface run-off.

MINOR STREAMS ENTERING THE PATHFINDER RESERVOIR.

Several small streams rise in the surrounding hills and enter the Pathfinder reservoir, which is at the junction of North Platte and Sweetwater rivers. Dry and Horse creeks enter from the north, Canyon and Sage creeks from the east, and Deweese and Sand creeks from the west. The rainfall in this region is so small that most of the streams flow only during the spring and after the infrequent heavy rains.

HORSE CREEK.

Horse Creek drains an area in the southeast corner of the State. It rises in the Laramie Mountains about 10 miles east of Laramie, and flows east nearly to the Nebraska line, turns abruptly and flows north for 25 miles, then turns again and flows east, joining the North Platte just east of the Nebraska line. After leaving the mountains Horse Creek receives only one tributary, Bear Creek, which joins it a few miles below Lagrange.

As the basin lies chiefly on the Great Plains its topography is relatively smooth, except in the extreme western part, on the eastern slope of the Laramie Mountains, which is cut by numerous canyons. East of the mountains there are isolated mountains, notably Bear Creek Mountain and Sixty-six Mountain, the latter just north of Lagrange.

The mean annual precipitation decreases from approximately 25 inches at the crest of the Laramie Mountains to 14 inches near Meadow post office, and then gradually increases to 18 inches a few miles to the east. In the lower part of the basin the precipitation averages 18 inches.

MINOR STREAMS ENTERING THE NORTH PLATTE.

Between the Pathfinder reservoir and the point of diversion at Whalen the United States Reclamation Service maintains gaging stations on most of the streams that enter the North Platte from the south. The boundary of the North Platte basin lies so close to the river on the north that no large tributaries enter it from that side.

The southern tributaries rise in the northern extensions of the Laramie Mountains, which reach altitudes of more than 9,000 feet. These streams are extensively used for irrigation, and the records of stream flow in them represent chiefly the return seepage water.

MEASURED DRAINAGE AREAS.

Measured drainage areas in North Platte River basin, in square miles.

North Platte River and tributaries.

Stream.	Drainage area above—	Area.
North Platte River	Gaging station in sec. 11, T. 11 N., R. 80 W	1,440
Do	Saratoga	2,880
Do	Medicine Bow River	4,680
Do	Gaging station in sec. 27, T. 26 N., R. 84 W	7,410
Do	Gaging station at outlet of Pathfinder reservoir	10,700
Do	Gaging station in sec. 11, T. 26 N., R. 65 W	16,300
Do	Nebraska line	22,100
Do	Mouth	30,500
Beaver Creek	do	64
Cow Creek	do	70
Cedar Creek	do	77
Sage Creek	do	260
Pass Creek	do	281
Bates Creek	Stinking Creek	244
Do	Mouth	383
Stinking Creek	do	125
Poison Spider Creek	do	257
Casper Creek	do	589
Muddy Creek	do	122
Smith Creek	do	63
Deer Creek	do	63
Boxelder Creek	do	193
La Prele Creek	do	227
Wagon Hound Creek	do	145
Labonte Creek	do	270
Muddy Creek	do	229
Willow Creek	do	88
Horseshoe Creek	do	203
Cottonwood Creek	do	150
Broom Creek	do	105
Rawhide Creek	do	567

Big Creek.

Big Creek	Outlet of Big Creek lakes	11
Do	Colorado line	72
Do	Gaging station in sec. 32, T. 13 N., R. 81 W	123
Do	Mouth	198

Douglas Creek and tributaries.

Douglas Creek	Mouth of Bear Creek	10
Do	Sec. 16, T. 14 N., R. 79 W	26
Do	Mouth of Muddy Creek	39
Do	Mouth of Beaver Creek	80
Do	Devils Gate Creek	135
Do	Mouth	157
Bear Creek	do	6
Muddy Creek	do	10
Beaver Creek	do	42
Devils Gate Creek	do	11

French Creek and chief tributary.

French Creek	Mouth of North Fork	23
Do	Mouth	62
North Fork of French Creek	do	24

Brush Creek and tributaries.

Brush Creek	Gaging station in sec. 3, T. 15 N., R. 80 W	98
Do	Mouth	101
North Brush Creek	Forks	30
South Brush Creek	do	28

Measured drainage areas in North Platte River basin, in square miles—Continued.

Encampment River and tributaries.

Stream.	Drainage area above—	Area.
Encampment River	Colorado line	72
Do	Mouth of West Fork	84
Do	Mouth of Soldier Creek	140
Do	Mouth of North Fork	177
Do	Gaging station at Encampment	219
Do	Mouth	271
West Fork	do	16
Soldier Creek	do	10
North Fork	do	31

Spring Creek and tributaries.

North Spring Creek	Gaging station in sec. 19, T. 16 N., R. 85 W	26
Do	South Spring Creek	77
Do	Mouth	154
South Spring Creek	do	72

Jack Creek and chief tributary.

Jack Creek	Sec. 12, T. 15 N., R. 87 W	10
Do	Gaging station in sec. 36, T. 17 N., R. 86 W	32
Do	Mouth	133
North Jack Creek	do	56

Medicine Bow River and tributaries.

Medicine Bow River	Gaging station in sec. 7, T. 20 N., R. 79 W	178
Do	Rock Creek	467
Do	Mouth	2,480
Rock Creek	Gaging station at Arlington	70
Do	Mouth	525
Deep Creek	Gaging station in sec. 16, T. 17 N., R. 79 W	3.7
Little Medicine Bow River	Muddy Creek	761
Do	Mouth	1,030
Sheep Creek	do	207
Muddy Creek	Gaging station in sec. 14, T. 26 N., R. 80 W., near Shirley	67
Do	Mouth	231

Sweetwater River and tributaries.

Sweetwater River	Willow Creek	302
Do	Sulphur Creek	534
Do	Gaging station in sec. 17, T. 29 N., R. 86 W., near Alcova	2,270
Do	Entrance to Pathfinder reservoir	2,320
West Fork	Mouth in sec. 34, T. 29 N., R 102 W	56
East Fork	Mouth in sec. 34, T. 29 N., R. 102 W	27
Fish Creek	Mouth	32
Willow Creek	do	51
Rock Creek	do	52
Sulphur Creek	do	250
Longs Creek	do	94
Sage Hen Creek	do	246
Muddy Creek	do	135

Minor streams entering the Pathfinder reservoir.

Sage Creek	Gaging station above Pathfinder	182
Do	Mouth	191
North Fork of Sage Creek	do	98
Dewease Creek	do	41
Sand Creek	do	70
Dry Creek	do	154
Horse Creek	do	119
Fish Creek	do	42
Canyon Creek	do	54

Measured drainage areas in North Platte River basin, in square miles—Continued.

Horse Creek and tributaries.

Stream.	Drainage area above—	Area.
Horse Creek	Gaging station in sec. 34, T. 20 N., R. 61 W., near Lagrange	683
Do	Mouth	1,700
Bear Creek	Little Bear Creek	186
Do	Mouth	550
Little Bear Creek	do	115

GAGING-STATION RECORDS.

NORTH PLATTE RIVER.

NORTH PLATTE RIVER NEAR NORTHGATE, COLO.

[During 1904 known as North Platte River near Pinkhampton, Colo.]

LOCATION.—In sec. 11, T. 11 N., R. 80 W., at highway bridge on interstate highway 6 miles south of Colorado-Wyoming line and 6 miles northwest of Northgate, Jackson County. Three small tributaries, Camp, Threemile, and Sixmile creeks, enter the North Platte between station and State line. These have very little flow except spring run-off.

DRAINAGE AREA.—1,440 square miles (measured on base map of Colorado; scale, 1:500,000).

RECORDS AVAILABLE.—May 11 to November 9, 1904; May 23, 1915, to September 30, 1921.

GAGE.—Gurley water-stage recorder installed April 8, 1918, referred to chain gage on downstream side of bridge and used since May 13, 1916; original gage, vertical staff on middle pier, referred to same datum. Gage used in 1904 referred to different datum and somewhat different location.

EXTREMES OF DISCHARGE.—1904, 1915–1921: Maximum stage recorded, 6.2 feet at 4 a. m. June 17, 1921 (discharge, 6,640 second-feet); minimum discharge occurs during winter.

DIVERSIONS.—There are court decrees for diversion of 98 second-feet from North Platte River and 3,310 second-feet from tributaries in Colorado. (For diversions out of basin see transmountain diversion on pp. 193–194.)

ACCURACY.—Rating curves well defined. Gage read twice daily until April 8, 1918, when water-stage recorder was installed. Records good except during winter, for which they are fair.

Monthly discharge of North Platte River near Northgate, Colo., for 1904, 1915–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1904.				
May 11–13	2,540	412	1,150	47,900
June	2,350	780	1,550	92,200
July	995	310	501	30,800
August	359	187	231	14,200
September	265	100	141	8,390
October	154	100	133	8,180
November 1–9	120	100	102	1,820

Monthly discharge of North Platte River near Northgate, Colo., for 1904, 1915–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915.				
May 23–31			428	7,640
June	1,260	635	907	54,000
July	710	148	368	22,600
August	290	112	183	11,300
September	284	107	166	9,880
The period				105,000
1915–16.				
October	326	164	205	12,600
November			210	12,500
December			187	11,500
January			142	8,730
February			181	10,400
March			460	28,300
April			630	37,500
May	1,980	805	1,200	73,800
June	1,980	1,100	1,450	86,300
July	1,040	381	662	40,700
August	898	293	563	34,600
September	532	241	307	18,300
The year	1,980		518	375,000
1916–17.				
October	462	260	335	20,600
November			214	12,700
December			184	11,300
January			172	10,600
February			168	9,330
March			208	12,800
April			872	51,900
May	4,840	1,050	2,390	147,000
June	4,500	1,670	3,190	190,000
July	3,590	890	1,950	120,000
August	875	226	458	28,200
September	275	162	204	12,100
The year	4,840		867	627,000
1917–18.				
October			231	14,200
November			248	14,800
December			210	12,900
January			184	11,300
February			177	9,830
March			386	23,700
April			800	47,600
May	2,100	790	1,410	86,700
June	4,700	1,200	2,840	169,000
July	2,500	312	703	43,200
August	312	130	174	10,700
September	220	130	180	10,700
The year	4,700		629	455,000
1918–19.				
October			305	18,800
November			250	14,900
December			182	11,200
January			156	9,590
February			154	8,550
March			263	16,200
April			658	39,200
May	1,570	500	804	49,400
June	1,340	216	502	29,900
July	204	99	138	8,480
August	315	76	150	9,220
September	123	70	94	5,590
The year	1,570	70	305	221,000

Monthly discharge of North Platte River near Northgate, Colo., for 1904, 1915–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919–20.				
October	224	70	154	9,470
November			171	10,200
December			170	10,500
January			160	9,840
February			171	9,840
March			191	11,700
April			360	21,400
May			2,190	135,000
June	3,710	1,860	2,750	164,000
July	1,990	544	982	60,400
August	565	325	439	27,000
September	325	150	245	14,600
The year	3,710	70	668	484,000
1920–21.				
October	265	180	230	14,100
November			236	14,000
December			167	10,300
January			183	11,300
February			197	10,900
March			422	25,900
April			440	26,200
May	2,650	1,120	1,650	101,000
June	6,260	1,300	3,250	193,000
July	1,190	565	904	55,600
August	650	360	512	31,500
September	458	162	254	15,100
The year	6,260		703	509,000

NOTE.—Winter records estimated.

NORTH PLATTE RIVER AT SARATOGA, WYO.

LOCATION.—At highway bridge at Saratoga, Carbon County. Nearest tributary, Spring Creek, enters 2 miles above.

DRAINAGE AREA.—2,880 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—June 9, 1903, to October 31, 1906; April 1, 1909, to December 5, 1909; April 25, 1911, to September 30, 1921. State engineer maintained station at this point during 1913 and 1914.

GAGE.—Chain gage on upstream side of bridge. Original gage read prior to 1911 was vertical staff 100 yards below bridge. No determined relation between gages.

EXTREMES OF DISCHARGE.—1903–1906, 1909, 1911–1921: Maximum stage from high-water mark, 11.06 feet on June 8, 1909 (discharge, about 18,000 second-feet); minimum stage recorded, 3.45 feet at 8.30 a. m. October 1, 1919 (discharge, 130 second-feet).

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 83 second-feet from the North Platte between Saratoga and State line.

ACCURACY.—Gage read twice daily. Rating curves well defined except for 1903–1905, for which they are fairly well defined. Records excellent except during 1903–1905, for which they are good, and during ice periods, for which they are fair.

Monthly discharge of North Platte River at Saratoga, Wyo., for 1903–1906, 1909, 1911–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1903.				
June 9–30	8,180	3,540	6,220	271,000
July	3,040	560	1,270	78,100
August	580	382	446	27,400
September	745	365	592	35,200
The period				412,000
1903–4.				
October	715	580	661	40,600
November	630	435	567	33,700
December	560	452	524	32,200
January	378	260	322	19,800
February			300	17,300
March	835	439	588	36,200
April	2,600	460	1,480	88,100
May	8,600	2,210	4,490	276,000
June	7,040	2,710	5,390	321,000
July	2,670	603	1,340	82,400
August	802	360	499	30,700
September	585	231	332	19,800
The year	8,600		1,370	998,000
1904–5.				
October	484	305	375	23,100
November	315	195	259	15,400
December	268	171	219	13,500
January			200	12,300
February			250	13,900
March	549	311	425	26,100
April	1,780	485	951	56,600
May	6,330	1,450	3,330	205,000
June	10,700	3,390	7,020	418,000
July	3,340	637	1,400	86,100
August	802	215	430	26,400
September	344	180	226	13,500
The year	10,700		1,260	910,000
1905–6.				
October	367	243	299	18,400
November	450	227	334	19,900
December			275	16,900
January			250	15,400
February			250	13,900
March			400	24,600
April	3,190	855	1,670	99,400
May	9,140	1,530	4,740	291,000
June	8,960	2,900	5,670	337,000
July	3,520	702	2,000	123,000
August	750	355	542	33,300
September	750	311	499	29,700
The year			1,420	1,020,000
1909.				
April	4,740	450	1,310	78,000
May	8,500	2,250	5,860	360,000
June	16,200	7,210	12,900	768,000
July	11,200	1,530	5,190	319,000
August	2,060	855	1,420	87,300
September	1,870	565	1,010	60,100
The period				1,670,000
October	565	415	511	31,400
November	525	328	400	23,800

Monthly discharge of North Platte River at Saratoga, Wyo., for 1903–1906, 1909, 1911–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1910–11.				
October			500	30,700
November			450	26,800
December			300	18,400
January			250	15,400
February			300	16,700
March			400	24,600
April	2,420		1,500	89,300
May	5,040	1,630	3,810	234,000
June	7,490	1,720	5,370	320,000
July	2,420	494	1,270	78,100
August	478	200	302	18,600
September	346	164	209	12,400
The year	7,490		1,220	885,000
1911–12.				
October	1,320	238	507	31,200
November	340	178	306	18,200
December			250	15,400
January			225	13,800
February			250	14,400
March	675		371	22,800
April	1,920	593	1,160	69,000
May	9,500	1,080	4,070	250,000
June	12,600	4,220	8,350	497,000
July	7,300	1,700	3,190	196,000
August	2,250	483	882	54,200
September	866	405	606	36,100
The year	12,600		1,680	1,220,000
1912–13.				
October	765	582	684	42,100
November			450	26,800
December			400	24,600
January			350	21,500
February			350	19,400
March			500	30,700
April	4,600	1,430	2,690	160,000
May	7,550	2,800	4,140	255,000
June	6,120	1,090	3,670	218,000
July	1,340	354	653	40,200
August	530	135	282	17,300
September	360	185	261	15,500
The year	7,550		1,200	871,000
1913–14.				
October	626	300	439	27,000
November			400	23,800
December			350	21,500
January			300	18,400
February			300	16,700
March			450	27,700
April	4,550	851	2,220	132,000
May	10,500	2,270	6,250	384,000
June	12,500	2,350	7,090	422,000
July	2,530	744	1,400	86,100
August	1,060	306	484	29,800
September	411	238	300	17,900
The year	12,500		1,670	1,210,000
1914–15.				
October	755	290	558	34,300
November			337	20,100
December			300	18,400
January			250	15,400
February			250	13,900
March			400	24,600
April	2,360	520	1,500	89,300
May	3,480	1,060	2,020	124,000
June	4,640	2,180	3,250	193,000
July	1,930	281	780	48,000
August	395	245	309	19,000
September	520	206	317	18,900
The year	4,640		855	619,000

NOTE.—Records for 1914 revised.

Monthly discharge of North Platte River at Saratoga, Wyo., for 1903–1906, 1909, 1911–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915–16.				
October	555	395	462	28,400
November	488	242	382	22,700
December	419	238	328	20,200
January	285	192	241	14,800
February	350	300	317	18,200
March	2,890	300	1,000	61,500
April	3,750	470	1,500	89,300
May	5,790	2,220	3,570	220,000
June	5,790	2,690	4,420	263,000
July	2,500	575	1,200	73,800
August	1,080	356	728	44,800
September	690	410	515	30,600
The year	5,790	192	1,220	887,000
1916–17.				
October	1,120	471	683	42,000
November	536	272	389	23,100
December	362	278	328	20,200
January	359	262	302	18,600
February	317	278	295	16,400
March	738	298	378	23,200
April	4,680	471	2,180	130,000
May	9,650	1,780	5,060	311,000
June	13,800	5,650	10,500	625,000
July	10,700	2,200	4,950	304,000
August	2,030	536	949	58,400
September	536	393	474	28,200
The year	13,800	262	2,210	1,600,000
1917–18.				
October	471	317	420	25,800
November	609	317	458	27,300
December	504	298	376	23,100
January	.....	.....	323	19,900
February	.....	.....	311	17,300
March	1,700	317	772	47,500
April	2,120	609	1,290	76,800
May	5,900	1,180	4,180	257,000
June	11,200	3,340	7,650	455,000
July	5,160	609	1,560	95,900
August	609	262	423	26,000
September	504	262	362	21,500
The year	11,200	.....	1,510	1,090,000
1918–19.				
October	860	450	599	36,800
November	670	255	472	28,100
December	450	215	318	19,600
January	275	215	265	16,300
February	295	215	261	14,500
March	1,930	275	496	30,500
April	2,940	590	1,570	93,400
May	6,150	2,110	3,560	219,000
June	4,450	555	1,910	114,000
July	576	154	272	16,700
August	396	139	223	13,700
September	223	145	163	9,700
The year	6,150	139	845	612,000
1919–20.				
October	326	151	272	16,700
November	380	160	290	17,360
December	.....	.....	288	17,700
January	304	227	271	16,700
February	365	175	290	16,700
March	450	287	341	21,000
April	1,440	340	720	42,800
May	11,300	1,760	6,850	421,000
June	11,300	5,000	8,360	497,000
July	5,000	810	1,890	116,000
August	915	420	637	39,200
September	485	295	393	23,400
The year	11,300	151	1,740	1,250,000

Monthly discharge of North Platte River at Saratoga, Wyo., for 1903–1906, 1909, 1911–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1920–21.				
October	520	295	417	25,600
November	555	255	429	25,500
December	.....	.....	283	17,400
January	.....	.....	322	19,800
February	.....	.....	345	19,200
March	1,840	450	879	54,000
April	1,220	555	956	56,900
May	11,900	970	4,910	302,000
June	14,900	3,560	10,200	607,000
July	3,560	1,300	2,250	138,000
August	1,520	625	969	59,600
September	770	300	470	28,000
The year	14,900	.....	1,870	1,350,000

NORTH PLATTE RIVER ABOVE PATHFINDER, WYO.

LOCATION.—In sec. 27, T. 26 N., R. 84 W., 900 feet below mouth of Lost Creek and three-quarters of a mile below mouth of Black Canyon, in Carbon County. Backwater from Pathfinder reservoir reaches within 2½ miles of station.

DRAINAGE AREA.—7,410 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—October 7, 1913, to September 30, 1921.

GAGE.—Friez water-stage register at right bank 900 feet below Lost Creek.

EXTREMES OF DISCHARGE.—1914–1921: Maximum stage during period, 6.2 feet at 2 p. m. June 26, 1917 (discharge, 18,800 second-feet); minimum stage, 0.38 foot at midnight August 30, 1919 (discharge, 134 second-feet).

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 94 second-feet from North Platte River between Saratoga and the station above Pathfinder.

ACCURACY.—Gage heights from continuous record. Rating curves well defined below 12,000 second-feet. Records excellent, except during winter, for which they are fair.

Monthly discharge of North Platte River above Pathfinder, Wyo., for 1913–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913–14.				
October	.....	519	623	38,300
November	693	418	593	35,300
December	.....	.....	455	28,000
January	.....	.....	390	24,000
February	.....	.....	390	21,700
March	1,240	.....	800	49,200
April	4,530	1,310	2,660	158,000
May	13,000	2,740	6,840	421,000
June	15,900	2,440	8,410	500,000
July	2,220	998	1,500	92,200
August	1,650	392	742	45,600
September	519	262	377	22,400
The year	15,900	.....	1,990	1,440,000

NOTE.—Records for May and June, 1914, revised.

Monthly discharge of North Platte River above Pathfinder, Wyo., for 1913–1921—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1914–15.				
October	881	348	694	42,700
November	665	205	431	25,600
December	.....	.....	390	24,000
January	.....	.....	325	20,000
February	.....	.....	325	18,000
March	740	.....	465	28,600
April	2,670	740	2,020	120,000
May	3,700	1,590	2,580	159,000
June	6,020	2,690	3,980	237,000
July	2,340	466	1,070	65,800
August	1,700	344	669	41,100
September	1,520	275	691	41,100
The year	6,020	.....	1,140	823,000
1915–16.				
October	820	501	598	36,800
November	693	265	485	28,900
December	622	.....	470	28,900
January	.....	.....	315	19,400
February	.....	.....	415	23,900
March	.....	.....	1,250	76,900
April	4,110	1,080	2,010	120,000
May	6,060	2,620	4,030	248,000
June	6,230	2,600	4,800	286,000
July	2,560	770	1,400	86,100
August	1,600	438	962	59,200
September	954	431	609	36,200
The year	6,230	.....	1,450	1,050,000
1916–17.				
October	1,250	550	883	54,300
November	864	.....	435	25,900
December	.....	.....	400	24,600
January	.....	.....	390	24,000
February	.....	.....	380	21,100
March	.....	.....	800	49,200
April	9,800	1,320	5,110	304,000
May	12,700	2,690	6,850	421,000
June	18,300	8,360	14,100	839,000
July	15,600	2,420	6,800	418,000
August	2,400	770	1,240	76,200
September	800	495	626	37,200
The year	18,300	.....	3,160	2,290,000
1917–18.				
October	606	342	467	28,700
November	614	388	523	31,100
December	.....	.....	450	27,700
January	.....	.....	420	25,800
February	.....	.....	400	22,200
March	2,580	.....	1,150	70,700
April	2,840	1,290	1,810	108,000
May	6,730	1,560	4,710	290,000
June	15,000	4,070	10,000	595,000
July	3,420	908	1,850	114,000
August	831	275	473	29,100
September	639	275	435	25,900
The year	15,000	.....	1,890	1,370,000
1918–19.				
October	1,050	543	698	42,900
November	750	292	531	31,600
December	.....	.....	415	25,500
January	.....	.....	345	21,200
February	.....	.....	340	18,900
March	.....	.....	635	39,000
April	3,930	1,130	2,290	136,000
May	7,870	2,800	4,430	272,200
June	7,400	820	2,650	158,000
July	750	133	375	23,100
August	831	136	324	19,900
September	269	144	179	10,700
The year	7,870	.....	1,100	799,000

Monthly discharge of North Platte River above Pathfinder, Wyo., for 1913–1921—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919–20.				
October	473	224	366	22,500
November	614	215	443	26,400
December	.....	.....	375	23,100
January	.....	.....	350	21,500
February	.....	.....	380	21,900
March	.....	.....	755	46,400
April	4,770	589	1,720	102,000
May	13,800	1,410	8,630	531,000
June	14,400	6,520	11,000	655,000
July	6,520	1,120	2,580	159,000
August	1,060	621	851	52,300
September	754	348	509	30,300
The year	14,400	.....	2,330	1,690,000
1920–21.				
October	700	445	549	33,800
November	880	450	635	37,800
December	.....	.....	435	26,700
January	.....	.....	420	25,800
February	.....	.....	450	25,000
March	.....	.....	1,120	68,900
April	1,620	820	1,260	75,000
May	13,300	1,400	6,000	369,000
June	17,500	4,830	12,500	744,000
July	4,380	1,560	2,520	155,000
August	1,990	696	1,130	69,500
September	678	310	480	28,600
The year	17,500	.....	2,290	1,660,000

NOTE.—Winter records estimated

NORTH PLATTE RIVER AT PATHFINDER, WYO.

LOCATION.—In sec. 24, T. 29 N., R. 84 W., a quarter of a mile below Pathfinder dam and one-third of a mile below old post office of Pathfinder, in Natrona County. Nearest tributary, Canyon Creek, enters in the reservoir 2 miles above.

DRAINAGE AREA.—10,700 square miles.

RECORDS AVAILABLE.—April 1, 1904, to September 30, 1921. From April 1, 1904, to May 9, 1905, records were taken at Alcova, where flow is practically the same as at Pathfinder.

GAGE.—Chain at left bank a quarter of a mile below Pathfinder dam.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 448 second-feet from tributaries entering the North Platte between the station above Pathfinder and this station. Near Whalen, 150 miles below, the water from Pathfinder reservoir is diverted by the Interstate canal and used to irrigate land in Nebraska and Wyoming.

REGULATION.—Prior to 1909 records represent natural flow of river, but since June, 1909, water has been stored in Pathfinder reservoir (capacity, 1,070,000 acre-feet) and released as needed. It is carried down the river 150 miles to Whalen, where it is diverted for irrigation.

COOPERATION.—Records furnished by United States Reclamation Service.

105707—23—WSP 469——10

Monthly discharge of North Platte River at Pathfinder, Wyo., for 1904–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1904.				
April	2,960	747	1,730	103,000
May	11,400	3,210	5,900	363,000
June	8,400	3,480	6,760	402,000
July	3,520	695	1,810	111,000
August	816	440	582	35,800
September	1,300	210	389	23,200
The period				1,040,000
1904–5.				
October	647	361	482	29,600
November 1–19	465	110	307	11,600
April	2,670	795	1,400	83,300
May	8,010	2,020	4,270	263,000
June	12,800	4,500	8,800	524,000
July	4,050	953	1,800	111,000
August	1,110	218	597	36,700
September	444	168	249	14,800
1905–6.				
October	469	260	349	21,500
November 1–28	556	245	413	22,900
April	4,820	1,790	3,030	180,000
May	12,000	2,350	6,180	380,000
June	11,000	3,180	7,390	440,000
July	3,250	913	2,260	139,000
August	933	434	666	41,000
September	1,020	397	664	39,500
1906–7.				
October	1,050	305	575	35,400
November 1–17	1,020	685	873	29,400
March	7,240	685	1,890	116,000
April	4,500	1,380	2,440	145,000
May	10,800	2,000	5,070	312,000
June	12,100	6,840	10,300	613,000
July	9,920	2,850	6,010	370,000
August	2,550	836	1,380	84,800
September	868	346	587	34,900
1907–8.				
October	786	557	669	41,100
November	628	283	440	26,200
December	454	157	315	19,400
January	.....	.....	292	18,000
February	.....	.....	348	20,000
March	11,000	469	759	46,700
April	2,660	774	1,620	96,400
May	4,190	1,500	2,370	146,000
June	6,250	1,630	4,590	273,000
July	3,700	836	2,030	125,000
August	2,200	774	1,210	74,400
September	744	397	544	32,400
The year	6,250	.....	1,270	919,000
1908–9.				
October	836	494	645	39,700
November	868	313	536	31,900
December	.....	.....	400	24,600
January	.....	.....	400	24,600
February	505	395	462	25,700
March	1,490	505	938	57,700
April	1,790	1,310	1,480	88,100
May	7,130	1,840	5,920	364,000
June	8,560	7,240	8,010	477,000
July	8,670	8,230	8,480	521,000
August	8,120	2,590	6,390	393,000
September	5,840	2,590	3,100	184,000
The year	8,670	.....	3,060	2,230,000

Monthly discharge of North Platte River at Pathfinder, Wyo., for 1904–1921—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1909–10.				
October	5,640	498	2,670	164,000
November	970	370	697	41,500
December	742	427	522	32,100
January	448	350	423	26,000
February	433	330	367	20,400
March	2,520	388	1,760	108,000
April	2,580	525	1,130	67,200
May	1,000	790	885	54,400
June	3,330	1,520	2,400	143,000
July	2,420	1,920	2,100	129,000
August	2,030	1,870	1,940	119,000
September	2,030	460	1,750	104,000
The year	5,640	330	1,390	1,010,000
1910–11.				
October	1,520	185	476	29,300
November	615	260	428	25,500
December	1,340	276	399	24,500
January	760	259	430	26,400
February	915	300	626	34,800
March	3,940	438	1,090	66,800
April	2,430	661	1,770	105,000
May	2,500	661	1,480	91,100
June	4,640	615	3,170	188,000
July	3,890	3,070	3,330	205,000
August	3,070	2,140	2,760	170,000
September	2,880	438	2,220	132,000
The year	4,640	185	1,520	1,100,000
1911–12.				
October	1,520	188	809	49,700
November	661	237	534	31,800
December	417	243	339	20,800
January	665	187	301	18,500
February	785	2	89	5,120
March	25	3	4	246
April	150	5	10	595
May	1,610	5	442	27,200
June	4,220	2,030	3,710	221,000
July	6,800	3,250	5,800	357,000
August	6,750	6,140	6,470	398,000
September	6,090	5,310	5,720	340,000
The year	6,800	2	2,030	1,470,000
1912–13.				
October	7,240	4,140	5,310	326,000
November	5,270	459	1,680	100,000
December	626	313	474	29,100
January	396	310	339	20,800
February	340	2	80.8	4,490
March	3	3	3.0	184
April	1,810	3	99.3	5,910
May	3,040	950	2,050	126,000
June	3,820	2,860	3,400	202,000
July	3,520	2,700	3,040	187,000
August	3,070	2,340	2,830	174,000
September	3,140	760	2,270	135,000
The year	7,240	2	1,810	1,310,000
1913–14.				
October	760	4	303	18,600
November	5	4	4.8	286
December	5	5	5	307
January	5	5	5	307
February	5	5	5	278
March	5	5	5	307
April	5	5	5	298
May	4,180	5	2,740	168,000
June	5,150	3,680	4,380	261,000
July	5,620	3,650	4,610	283,000
August	5,520	4,250	4,880	300,000
September	5,380	4,250	4,700	280,000
The year	5,620	4	1,810	1,310,000

Monthly discharge of North Platte River at Pathfinder, Wyo., for 1904–1921—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1914–15.				
October	4,560	985	1,880	116,000
November	980	5	136	8,090
December	5	5	5	307
January	5	5	5	307
February	10	10	10	555
March	10	10	10	615
April	1,970	10	698	41,500
May	2,500	5	1,020	62,700
June	4,020	1,880	2,830	168,000
July	5,020	3,500	4,220	259,000
August	3,520	2,000	3,050	188,000
September	2,050	5	1,680	100,000
The year	5,020	5	1,300	945,000
1915–16.				
October	90	5	7.7	474
November	5	5	5	298
December	5	5	5	307
January	10	10	10	615
February	10	10	10	575
March	150	10	14.5	892
April	1,000	10	165	9,820
May	4,560	1,000	3,380	208,000
June	5,640	3,330	4,610	274,000
July	5,720	3,910	5,000	307,000
August	4,860	2,060	3,870	238,000
September	2,970	750	1,950	116,000
The year	5,720	5	1,590	1,160,000
1916–17.				
October	1,290	5	5	21,500
November	5	5	5	298
December	5	5	5	307
January	5	5	5	307
February	5	5	5	278
March	5	5	5	307
April	1,020	5	230	13,700
May	4,120	10	1,340	82,400
June	18,900	5,350	13,500	803,000
July	17,400	4,540	9,040	556,000
August	5,730	4,060	4,500	277,000
September	5,140	2,140	4,010	239,000
The year	18,900	5	2,750	1,990,000
1917–18.				
October	2,140	5	758	46,600
November	5	5	5	298
December	5	5	5	307
January	5	5	5	307
February	5	5	5	278
March	510	5	32	1,970
April	2,470	10	1,100	65,500
May	4,920	800	4,510	277,000
June	11,500	4,880	6,750	402,000
July	6,110	4,160	5,090	313,000
August	4,640	2,820	3,840	236,000
September	3,330	1,500	2,610	155,000
The year	11,500	5	2,070	1,500,000
1918–19.				
October	1,500	25	541	33,300
November	25	25	25.0	1,490
December	25	15	19.5	1,200
January	15	15	15.0	922
February	15	15	15.0	833
March	15	15	15.0	922
April	1,080	15	82.7	4,920
May	5,120	1,480	2,990	184,000
June	5,760	4,500	5,220	311,000
July	4,580	3,580	3,960	243,000
August	4,000	2,900	3,450	212,000
September	3,160	1,500	2,070	123,000
The year	5,760	15	1,540	1,120,000

Monthly discharge of North Platte River at Pathfinder, Wyo., for 1904–1921—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919–20.				
October	2,000	15	1,420	87,300
November	15	15	15.0	893
December	15	15	15.0	922
January	15	15	15.0	922
February	15	15	15.0	863
March	15	15	15.0	922
April	15	15	15.0	893
May	5,410	15	684	42,100
June	12,300	5,450	8,960	533,000
July	6,540	4,210	5,340	328,000
August	4,250	3,610	3,970	244,000
September	3,610	490	2,260	134,000
The year	12,300	15	1,890	1,370,000
1920–21.				
October	1,500	15	965	59,300
November	15	15	15	893
December	15	15	15	922
January	140	15	83.4	5,130
February	120	120	120	6,660
March	165	100	113	6,950
April	3,200	20	1,460	86,900
May	2,270	2,000	2,230	137,000
June	16,800	1,940	11,800	702,000
July	6,040	5,290	5,570	342,000
August	5,470	3,290	4,340	267,000
September	3,960	20	2,970	177,000
The year	16,800	15	2,480	1,790,000

NORTH PLATTE RIVER NEAR CASPER, WYO.

LOCATION.—In sec. 31, T. 32 N., R. 81 W., at highway bridge at Speas ranch, half a mile below Bessemer Canyon, in Natrona County. Nearest tributary, Bates Creek, enters 3 miles upstream.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 9, 1917, to September 30, 1919.

GAGE.—Vertical staff.

CHANNEL AND CONTROL.—Channel apparently permanent; control below bridge.

COOPERATION.—Complete records furnished by United States Reclamation Service.

Monthly discharge of North Platte River near Casper, Wyo., for 1917–1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
April 9–30	1,300	375	704	30,700
May	4,210	500	1,610	99,000
June	19,200	5,380	13,700	815,000
July	17,300	4,310	9,200	566,000
August	5,430	3,920	4,400	271,000
September	4,870	2,390	3,910	233,000
The period				2,010,000
1918.				
April	2,670	310	1,160	69,000
May	5,190	620	4,580	282,000
June	10,800	4,340	6,730	400,000
July	6,760	4,960	5,560	342,000
August	6,330	2,860	4,030	248,000
September	3,430	1,300	2,560	152,000
The period				1,490,000
1919.				
May	4,830	970	2,550	157,000
June	5,530	4,190	5,040	300,000
July	4,710	3,240	3,820	235,000
August	3,860	2,800	3,300	203,000
September	2,870	1,440	2,000	119,000
The period				1,010,000

NORTH PLATTE RIVER AT DOUGLAS, WYO.

LOCATION.—In sec. 9, T. 32 N., R. 71 W., at highway bridge in Douglas, Converse County. Nearest tributary, La Prele Creek, enters 10 miles upstream.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 1, 1891, to September 30, 1894; April 1 to September 30, 1919.

GAGE.—Vertical staff. During 1919 gage located at highway bridge 1½ miles below Douglas.

EXTREMES OF DISCHARGE.—1891–1894, 1919: Maximum mean daily discharge, 15,700 second-feet on June 16, 1893; minimum discharge occurs during winter.

ACCURACY.—Facts regarding the method of obtaining the older data are not available. No statement regarding accuracy.

COOPERATION.—Records for 1919 furnished by United States Reclamation Service.

Monthly discharge of North Platte River at Douglas, Wyo., for 1891–1894, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1891.				
May	8,600	5,040	7,210	443,000
June	10,100	5,710	7,670	456,000
July	5,270	960	2,580	159,000
August	1,070	765	879	54,000
September	790	640	724	43,100
The period				1,160,000
1891–92.				
October	790	710	725	44,600
November	920	665	823	49,000
June 20–30	14,800	9,820	12,400	271,000
July	10,400	1,480	4,920	303,000
August	1,340	790	967	59,500
September	815	640	702	41,800
1892–93.				
October 1–20	665	620	643	25,200
June	15,700	6,600	10,600	631,000
July	6,600	1,000	2,690	165,000
August	1,000	815	880	54,100
September	815	665	733	43,700
1893–94.				
October 1–20	815	690	756	30,000
May	11,700	4,600	8,660	532,000
June	13,200	4,380	8,670	516,000
July	4,380	1,000	2,620	161,000
August	1,000	790	880	54,100
September	850	765	792	47,100
1919.				
April	1,110	280	481	28,600
May	4,230	1,200	2,710	167,000
June	5,040	3,700	4,650	277,000
July	4,080	3,320	3,810	234,000
August	4,230	3,180	3,650	224,000
September	3,180	1,490	2,290	136,000
The period				1,070,000

NORTH PLATTE RIVER AT ORIN JUNCTION, WYO.

LOCATION.—In sec. 13, T. 31 N., R. 70 W., at railroad bridge at Orin Junction. Nearest tributary, LaBonte Creek, enters 8 miles upstream.

DRAINAGE AREA.—14,800 square miles.

RECORDS AVAILABLE.—January 1, 1895, to November 30, 1899.

GAGE.—Vertical staff fastened to center pier of railroad bridge; read by P. J. Burns.

EXTREMES OF DISCHARGE.—1895–1899: Maximum mean daily gage height recorded, 7.15 feet June 24, 1899 (discharge, 23,000 second-feet); minimum stage recorded, 0.90 foot September 11–14, 1899 (discharge, 170 second-feet).

ACCURACY.—Gage read once daily. Rating curves fairly well defined. Records fair.

Monthly discharge of North Platte River at Orin Junction, Wyo., for 1895–1899.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1895.				
April	8,940	1,040	3,360	200,000
May	9,240	4,650	6,320	389,000
June	11,000	4,240	6,730	400,000
July	4,400	1,380	2,350	144,000
August	1,990	647	1,050	64,600
September	695	425	549	32,700
The period				1,230,000
1895–96.				
October	695	608	658	40,500
November 1–18	695	608	673	24,000
April 13–30	6,150	1,990	3,220	115,000
May	9,150	2,660	5,130	315,000
June	12,300	1,630	5,090	303,000
July	1,840	950	1,330	81,800
August	1,460	775	1,010	62,100
September	1,110	850	978	58,200
1896–97.				
October	1,080	950	973	59,800
April	13,000	1,410	5,040	300,000
May	19,200	9,520	13,900	855,000
June	18,200	3,400	8,990	535,000
July	3,200	950	1,830	113,000
August	1,900	650	1,020	62,700
September	650	500	574	34,200
1898.				
April	3,900	700	1,860	111,000
May	15,600	2,550	5,550	341,000
June	7,880	3,900	6,060	361,000
July	3,510	700	1,280	78,700
August	825	430	583	35,800
September	550	370	399	23,700
The period				951,000
1898–99.				
October	675	575	612	37,600
November	725	650	685	40,800
April 7–30	13,400	1,830	7,640	364,000
May	17,100	3,110	10,500	646,000
June	23,000	13,700	17,700	1,050,000
July	17,800	2,400	9,230	568,000
August	2,400	240	1,150	70,700
September	720	170	334	19,900
1899.				
October	895	205	493	30,300
November	680	415	492	29,300

NORTH PLATTE RIVER AT McKINLEY, WYO.

LOCATION.—About in sec. 21, T. 31 N., R. 69 W., at highway bridge at McKinley, in Converse County. Nearest tributary, Elkhorn Creek, enters several miles below.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 1, 1917, to September 30, 1918.

GAGE.—Vertical staff.

COOPERATION.—Complete records furnished by United States Reclamation Service.

Monthly discharge of North Platte River at McKinley, Wyo., for 1917–18.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
April	2,810	1,290	1,860	111,000
May	6,880	2,040	3,980	245,000
June	20,300	7,200	14,400	857,000
July	19,200	5,010	9,970	613,000
August	5,540	4,050	4,530	279,000
September	4,820	3,350	4,150	247,000
The period				2,350,000
1918.				
April	5,720	800	2,250	134,000
May	7,320	5,370	6,550	403,000
June	10,600	5,550	7,010	417,000
July	6,780	5,300	5,900	363,000
August	6,240	3,230	4,000	246,000
September	3,460	1,400	2,600	155,000
The period				1,720,000

NORTH PLATTE RIVER AT GUERNSEY, WYO.

LOCATION.—In sec. 35, T. 27 N., R. 66 W., at highway bridge three-quarters of a mile west of Guernsey, Platte County, 6 miles above Whalen diversion dam of United States Reclamation Service. No important tributary between the two points. From 1902 to 1908 the gage was at railroad bridge 300 feet upstream.

DRAINAGE AREA.—16,200 square miles.

RECORDS AVAILABLE.—June 14, 1900, to November 17, 1908; March 30 to October 31, 1912.

GAGE.—Vertical staff gage was originally at highway bridge, but in 1902 it was moved to railroad bridge 300 feet upstream and placed 1.0 foot lower in the water; on June 13, 1908, the datum was lowered 1.0 foot. When the station was reestablished in 1912, the gage was located at the highway bridge 0.24 foot lower than that of the original gage.

EXTREMES OF DISCHARGE.—1900–1908, 1912: Maximum stage from high-water marks, 11.5 feet (old datum) June 2 or 3, 1908 (discharge estimated at 30,000 second-feet); minimum stage recorded, 1.0 foot September 28–30, 1901 (discharge, 80 second-feet).

DIVERSIONS.—Only a few minor diversions for irrigation are between this station and that at Whalen.

ACCURACY.—Gage read twice daily. Rating curves fairly well defined below 14,000 second-feet. Records good below 14,000 second-feet; fair above.

Monthly discharge of North Platte River at Guernsey, Wyo., for 1900–1908, 1912.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1900.				
June 14–30	9,790	3,950	6,400	216,000
July	3,590	1,060	1,800	111,000
August	780	310	482	29,600
September 1–15	310	280	290	8,630
The period				365,000
1901.				
April	10,400	682	2,060	123,000
May	13,200	5,930	8,590	528,000
June	13,900	5,400	9,160	545,000
July	5,530	1,070	1,900	117,000
August	1,070	420	706	43,400
September	420	80	316	18,800
The period				1,380,000
1902.				
April	3,780	740	1,880	112,000
May	8,160	3,280	5,550	341,000
June	7,900	2,780	6,130	365,000
July	2,340	780	1,300	79,900
August	625	220	400	24,600
September	430	175	196	11,700
The period			2,580	934,000
1902–3.				
October	490	430	436	26,800
November	555	490	516	30,700
December 1–15			537	16,000
February	1,010	795	898	49,900
March	2,380	1,010	1,460	89,800
April	4,360	1,500	2,710	161,000
May	6,910	3,300	4,670	287,000
June	11,600	3,920	8,490	505,000
July	6,440	1,120	2,630	162,000
August	1,120	435	635	39,000
September	1,010	333	666	39,600
1903–4.				
October	1,120	795	982	60,400
November 1–23	795	600	750	34,200
March	2,080	940	1,190	73,200
April	2,790	940	1,710	102,000
May	11,300	2,460	6,080	374,000
June	11,600	5,700	9,320	555,000
July	5,060	940	2,800	172,000
August	940	585	715	44,000
September	940	320	488	29,000
1904–5.				
October	2,150	355	652	40,100
November	630	355	503	29,900
December 1–10	630	404	498	9,880
April	5,620	1,090	2,540	151,000
May	11,000	4,300	6,740	414,000
June	13,900	6,900	10,600	631,000
July	10,700	1,520	3,290	202,000
August	2,270	501	1,040	64,000
September	552	295	382	22,700
1905–6.				
October	515	295	435	26,700
November	675	515	559	33,300
April	6,840	2,340	4,140	246,000
May	11,400	3,960	6,580	405,000
June	11,700	5,410	8,990	535,000
July	5,060	1,510	3,510	216,000
August	2,010	630	1,350	83,000
September	1,220	440	672	40,000
1906–7.				
October	960	530	629	38,700
November	1,820	530	1,270	75,600
March 5–31	8,250	1,020	2,720	146,000
April	6,030	2,750	3,650	217,000
May	13,000	2,640	6,430	395,000
June	15,600	11,600	13,300	791,000
July	11,600	3,500	7,510	462,000
August	3,700	1,080	1,850	114,000
September	1,080	800	994	59,100

Monthly discharge of North Platte River at Guernsey, Wyo., for 1900–1908, 1912—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1907–8.				
October	1,080	850	981	60,300
November 1–16	1,400	850	1,100	34,900
March	1,390	730	1,090	67,000
April	4,060	980	1,960	117,000
May	17,000	2,440	4,690	288,000
June	30,000	3,650	10,500	625,000
July	3,650	1,110	2,240	138,000
August	1,530	840	1,150	70,700
September	940	500	584	34,800
1908.				
October	740	500	614	37,800
November 1–17	740	540	669	22,600
1912.				
April	3,840	1,340	1,910	114,000
May	5,030	1,540	3,170	195,000
June	4,840	2,520	4,050	241,000
July	8,000	3,840	5,650	347,000
August	7,040	6,100	6,520	401,000
September	6,960	5,700	6,090	362,000
The period				1,660,000
October	6,680	4,770	5,690	350,000

NORTH PLATTE RIVER ABOVE AND BELOW WHALEN, WYO.

LOCATION.—In sec. 11, T. 26 N., R. 65 W., at diversion dam at Whalen, Goshen County. Nearest important tributary is Cottonwood Canyon Creek, an intermittent stream which enters 1½ miles below.

DRAINAGE AREA.—16,300 square miles.

RECORDS AVAILABLE.—May 1, 1909, to September 30, 1921. The records above Whalen represent the discharge above the dam, which is an overfall weir, and those below Whalen, the water passing over the weir—the difference representing the amount diverted by the Interstate and Fort Laramie canals.

GAGE.—To determine the flow over the weir a vertical staff is used, its zero being at the weir crest. The discharge is then computed by a weir formula. There are also four sluice gates in the dam, through which the discharge is computed. In the river, 75 feet downstream from the crest gage, is a second gage, with zero 10 feet below that of the weir gage. The second gage is only used in computing the discharge through the gates when the openings are submerged. The discharge through the headgates of the canals is computed from the gate openings. A vertical staff located in the canals below the headgates is used in computing the discharge when the headgate openings are submerged.

EXTREMES OF DISCHARGE.—1909–1921: Maximum mean daily discharge of 21,000 second-feet occurred on June 28 and 29, 1917; minimum mean daily discharge of 30 second-feet occurred February 29, 1919.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions from North Platte River of 432 second-feet between Pathfinder and Whalen, exclusive of the diversion by the United States Reclamation Service. Between Whalen and the State line, adjudicated diversions of 429 second-feet.

REGULATION.—The discharge represents chiefly the effect of Pathfinder reservoir, which stores water for use in the Interstate and Fort Laramie canals.

COOPERATION.—Records furnished by United States Reclamation Service.

Monthly discharge of North Platte River above Whalen, Wyo., for 1909–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1909.				
May	11,600	2,590	6,620	407,000
June	20,200	8,000	10,900	649,000
July	8,200	7,180	7,700	473,000
August	7,970	3,250	6,280	386,000
September	3,270	2,730	3,010	179,000
The period				2,090,000
1909–10.				
October	5,560	1,130	3,450	212,000
November	1,320	458	1,000	59,500
December	1,220	125	763	46,900
January	850	590	653	40,200
February	669	531	616	34,200
March	3,110	740	2,170	133,000
April	3,190	1,520	2,210	132,000
May	1,410	1,040	1,210	74,400
June	2,610	970	2,020	120,000
July	2,590	1,630	2,020	124,000
August	1,900	1,660	1,750	108,000
September	1,960	1,530	1,690	101,000
The year	5,560	125	1,630	1,190,000
1910–11.				
October	1,860	418	836	51,400
November	765	418	665	39,600
December	906	234	411	25,200
January	1,300	160	617	37,900
February	1,920	157	839	46,600
March	3,480	601	1,250	76,900
April	2,740	771	1,700	101,000
May	2,870	1,260	1,910	117,000
June	5,870	1,630	3,220	192,000
July	3,680	1,770	3,250	200,000
August	3,240	2,180	2,750	169,000
September	2,920	1,960	2,250	134,000
The year	5,870	157	1,640	1,190,000
1911–12.				
October	2,000	781	1,060	65,200
November	1,090	230	647	38,500
December	648	239	471	29,000
January	601	291	383	23,600
February	689	204	411	23,600
March	2,760	132	410	25,200
April	4,050	942	1,520	90,400
May	5,500	1,460	2,990	184,000
June	5,090	1,870	3,680	219,000
July	8,440	3,450	5,250	323,000
August	6,970	5,540	6,200	381,000
September	7,060	5,450	5,740	342,000
The year	7,060	132	2,400	1,740,000
1912–13.				
October	6,890	4,600	5,630	346,000
November	6,130	939	2,610	155,000
December	1,020	269	675	41,500
January	863	332	632	38,900
February	570	370	446	24,800
March	900	350	540	33,200
April	2,290	943	1,520	90,400
May	3,160	1,290	2,230	137,000
June	3,720	2,340	3,270	195,000
July	3,550	2,320	2,950	181,000
August	2,990	2,100	2,660	164,000
September	3,160	1,340	2,350	140,000
The year	6,890	269	2,130	1,550,000

Monthly discharge of North Platte River above Whalen, Wyo., for 1909–1921—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913–14.				
October	1,080	301	.676	41,600
November	308	165	255	15,200
December	275	175	208	12,800
January	230	190	214	13,200
February	270	160	204	11,300
March	565	255	416	25,600
April	2,270	370	1,150	68,400
May	4,810	1,850	3,700	228,000
June	4,520	3,670	4,140	246,000
July	5,060	3,620	4,360	268,000
August	5,280	4,200	4,650	286,000
September	5,120	4,240	4,620	275,000
The year	5,280	160	2,060	1,490,000
1914–15.				
October	4,580	1,320	2,490	153,000
November	1,340	277	684	40,700
December	185	65	116	7,130
January	107	93	99.1	6,090
February	210	86	128	7,110
March	423	140	258	15,900
April	3,400	360	1,280	76,200
May	3,550	1,020	2,140	132,000
June	6,730	892	3,650	217,000
July	4,750	3,440	4,160	256,000
August	4,730	2,650	3,340	205,000
September	6,410	1,820	2,990	178,000
The year	6,730	65	1,790	1,290,000
1915–16.				
October	2,560	497	792	48,700
November	545	150	412	24,500
December	565	61	268	16,500
January	209	99	141	8,670
February	756	98	304	17,500
March	884	150	453	27,900
April	1,780	658	1,180	70,200
May	5,140	1,910	3,670	226,000
June	5,130	3,690	4,320	257,000
July	5,580	4,240	4,800	295,000
August	4,720	3,240	3,990	245,000
September	2,840	1,670	2,080	124,000
The year	5,580	61	1,870	1,360,000
1916–17.				
October	2,060	280	1,000	61,500
November	405	80	226	13,400
December	290	140	195	12,000
January	190	140	171	10,500
February	450	160	217	12,100
March	1,580	500	679	41,800
April	3,030	400	1,370	81,500
May	7,760	2,160	4,610	283,000
June	21,000	8,800	15,400	916,000
July	19,700	4,810	9,900	609,000
August	5,540	4,160	4,560	280,000
September	5,460	2,900	4,270	254,000
The year	21,000	80	3,560	2,570,000
1917–18.				
October	3,460	571	1,730	106,000
November	661	340	454	27,000
December	402	122	240	14,800
January	348	100	166	10,200
February	170	100	140	7,780
March	480	120	302	18,600
April	3,620	493	1,780	106,000
May	8,120	3,230	6,480	398,000
June	11,800	5,540	7,480	445,000
July	7,000	5,590	6,250	384,000
August	5,640	3,760	4,800	295,000
September	4,370	2,040	3,570	212,000
The year	11,800	100	2,800	2,020,000

Monthly discharge of North Platte River above Whalen, Wyo., for 1909–1921—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	2,090	500	1,080	66,400
November	500	350	403	24,000
December	350	200	253	15,600
January	300	200	223	13,700
February	370	200	291	16,200
March	200	175	192	11,800
April	1,150	175	473	28,100
May	4,730	936	2,670	164,000
June	6,730	4,060	5,130	305,000
July	5,800	3,500	4,000	246,000
August	4,630	2,950	3,580	220,000
September	3,130	1,340	2,040	121,000
The year	6,730	175	1,700	1,230,000
1919–20.				
October	2,010	960	1,500	92,200
November	1,010	40	230	13,700
December	170	75	99.5	6,120
January	200	85	128	7,870
February	225	30	145	8,340
March	1,960	50	612	37,600
April	1,980	165	915	54,400
May	11,200	1,900	5,430	334,000
June	11,200	6,690	8,750	521,000
July	7,330	4,360	5,810	357,000
August	4,660	3,580	4,230	260,000
September	4,100	1,310	2,890	172,000
The year	11,200	30	2,570	1,860,000
1920–21.				
October	2,250	261	1,710	105,000
November	522	79	274	16,300
December	312	60	185	11,400
January	325	176	239	14,700
February	1,700	206	486	27,000
March	455	275	391	24,000
April	3,720	188	1,480	88,100
May	6,030	2,850	3,410	210,000
June	17,500	3,060	11,200	666,000
July	6,950	5,260	5,710	351,000
August	5,330	3,360	4,360	268,000
September	3,600	2,430	2,920	174,000
The year	17,500	60	2,700	1,960,000

NOTE.—Quantities changed slightly to conform to rules of computation of U. S. Geol. Survey.

Monthly discharge of North Platte River below Whalen, Wyo., for 1909–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1909.				
May	11,200	2,480	6,290	387,000
June	19,900	7,190	10,600	631,000
July	7,810	6,010	6,740	414,000
August	6,790	2,100	5,130	315,000
September	2,230	1,740	2,040	121,000
The period	.....	.....	.....	1,870,000
1909–10.				
October	5,480	1,130	3,320	204,400
November	1,320	458	1,000	59,500
December	1,220	125	763	46,900
January	850	590	653	40,200
February	669	531	616	34,200
March	3,110	740	2,170	133,000
April	2,770	1,050	2,020	120,000
May	945	307	618	38,000
June	1,970	256	1,020	60,700
July	2,170	598	1,020	62,700
August	700	460	560	34,400
September	835	330	510	30,300
The year	5,480	125	1,190	864,000

Monthly discharge of North Platte River below Whalen, Wyo., for 1909–1921—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimu m.	Mean.	
1910–11.				
October	1,860	0	743	45,700
November	765	418	665	39,600
December	906	234	411	25,300
January	1,300	160	617	37,900
February	1,920	157	839	46,600
March	3,480	422	1,220	75,000
April	1,890	310	800	47,600
May	2,470	550	1,200	73,800
June	4,580	952	2,040	121,000
July	3,580	1,600	2,360	145,000
August	2,480	952	1,520	93,500
September	2,370	780	1,230	73,200
The year	4,580	0	1,140	824,000
1911–12.				
October	1,800	684	1,010	62,100
November	1,090	230	647	38,500
December	648	239	471	29,000
January	601	291	383	23,600
February	689	204	411	23,600
March	2,760	132	410	25,200
April	4,050	942	1,520	90,400
May	4,980	715	2,510	154,000
June	3,780	655	2,430	145,000
July	7,210	2,140	4,150	255,000
August	6,600	4,750	5,720	352,000
September	6,290	4,600	5,120	305,000
The year	6,600	132	2,070	1,500,000
1912–13.				
October	6,890	4,600	5,630	346,000
November	6,130	939	2,610	155,000
December	1,020	269	675	41,500
January	863	332	632	38,900
February	570	370	446	24,800
March	900	350	540	33,200
April	2,060	680	1,520	90,400
May	2,710	590	1,640	101,000
June	2,460	1,330	2,140	127,000
July	3,340	1,050	1,940	119,000
August	1,960	985	1,540	94,700
September	2,500	430	1,450	86,300
The year	6,890	269	1,730	1,260,000
1913–14.				
October	1,080	301	676	41,600
November	308	165	255	15,200
December	275	175	208	12,800
January	230	190	214	13,200
February	270	160	204	11,300
March	565	255	416	25,600
April	2,270	370	1,150	68,400
May	3,720	1,040	2,920	180,000
June	3,120	2,290	2,750	164,000
July	3,670	2,200	2,950	181,000
August	3,900	2,780	3,240	199,000
September	3,790	3,040	3,470	206,000
The year	3,900	160	1,540	1,120,000
1914–15.				
October	4,580	1,320	2,490	153,000
November	1,340	277	684	40,700
December	185	65	116	7,130
January	107	93	99.1	6,090
February	210	86	128	7,110
March	428	140	258	15,900
April	3,100	362	1,130	67,200
May	3,110	520	1,610	99,000
June	6,100	462	2,730	162,000
July	4,250	2,190	2,860	176,000
August	3,410	1,560	2,180	134,000
September	5,790	920	2,220	132,000
The year	6,100	65	1,380	1,000,000

Monthly discharge of North Platte River below Whalen, Wyo., for 1909–1921—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915–16.				
October	2,560	497	792	48,700
November	545	150	412	24,500
December	565	61	268	16,500
January	209	99	141	8,670
February	756	98	304	16,900
March	884	150	453	27,900
April	1,690	658	1,090	64,900
May	4,100	1,200	2,580	159,000
June	4,010	2,410	3,040	181,000
July	4,610	2,960	3,540	218,000
August	3,180	1,890	2,520	155,000
September	1,630	530	950	56,500
The year	4,610	61	1,340	978,000
1916–17.				
October	1,610	0	884	54,400
November	405	80	226	13,400
December	290	140	195	12,000
January	190	140	171	10,500
February	450	160	217	12,100
March	1,580	500	679	41,800
April	2,490	400	1,220	72,600
May	6,900	1,410	3,750	231,000
June	19,500	7,940	14,400	857,000
July	18,200	3,210	8,330	512,000
August	3,850	2,530	2,950	181,000
September	4,070	1,960	2,880	171,000
The year	19,500	0	3,000	2,170,000
1917–18.				
October	2,720	571	1,399	85,500
November	661	340	454	27,000
December	420	122	240	14,800
January	348	100	166	10,200
February	170	100	140	7,780
March	480	120	302	18,600
April	2,810	175	1,280	76,200
May	7,230	2,220	5,380	331,000
June	10,000	3,890	5,860	349,000
July	5,000	3,800	4,290	264,000
August	3,750	1,930	2,990	184,000
September	3,030	1,340	2,310	137,000
The year	10,000	100	2,080	1,510,000
1918–19.				
October	1,440	300	641	39,400
November	500	350	403	24,000
December	350	200	253	15,600
January	300	200	223	13,700
February	370	200	291	16,200
March	200	175	192	11,800
April	1,150	175	420	25,000
May	2,940	545	1,590	97,800
June	4,800	2,180	3,210	191,000
July	3,910	1,520	2,020	124,000
August	2,740	1,070	1,690	104,000
September	1,330	320	698	41,500
The year	4,800	175	973	704,000
1919–20.				
October	1,440	425	604	37,100
November	1,010	35	205	12,200
December	150	55	79.5	4,890
January	180	65	108	6,640
February	205	20	125	7,190
March	1,940	35	592	36,400
April	1,960	145	895	53,300
May	11,200	1,880	5,140	316,000
June	10,800	5,560	7,330	436,000
July	5,740	2,370	3,900	240,000
August	2,880	1,790	2,430	149,000
September	2,460	615	1,550	92,200
The year	11,200	20	1,920	1,390,000

Monthly discharge of North Platte River below Whalen, Wyo., for 1909–1921—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1920–21.				
October	1,370	231	951	58,500
November	492	79	245	14,600
December	282	50	156	9,590
January	295	146	209	12,900
February	1,670	176	457	25,400
March	425	245	361	22,200
April	2,740	133	1,090	64,900
May	4,950	1,770	2,330	143,000
June	17,400	2,230	10,500	625,000
July	5,870	3,290	3,690	227,000
August	3,750	1,450	2,520	155,000
September	1,950	835	1,380	82,100
The year	17,400	50	1,990	1,440,000

DOUGLAS CREEK.

DOUGLAS CREEK NEAR KEYSTONE, WYO.

LOCATION.—In sec. 16, T. 14 N., R. 79 W., 900 feet above highway bridge and 1 mile above old mining camp of Keystone, in Albany County, 600 feet below proposed diversion dam site of Bell Supply canal No. 2. Nearest tributary, Keystone Creek, enters three-fourths of a mile below.

DRAINAGE AREA.—28 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 25 to October 12, 1912; June 18, 1914, to November 12, 1916.

GAGE.—Bristol water-stage recorder, on left bank 900 feet above highway bridge on road from Keystone to Holmes. Gage was originally located 60 feet farther downstream, but a new gage was installed at present location May 23, 1915. Although referred to same datum the gage-height readings are now higher, owing to the slope of the creek.

EXTREMES OF DISCHARGE.—1912, 1914–1916: Maximum stage recorded, 4.19 feet June 1, 1914 (discharge approximately 650 second-feet); minimum discharge occurs during winter when records are discontinued.

DIVERSIONS.—No diversion above station.

ACCURACY.—Gage read once every two days during 1912, and once daily from June 18, 1914, to May 23, 1915, after which gage heights were obtained from continuous record. Rating curve poorly defined in 1912, after which time it was fairly well defined below 250 second-feet. Records are good except for 1912, when they range from poor to fair.

Monthly discharge of Douglas Creek near Keystone, Wyo., for 1912, 1914–1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1912.				
July 25–31	43	24	31.0	430
August	31	7	14.9	916
September	27	7	13.1	780
The period				2,130
October 1–12	13	9	11.2	267

Monthly discharge of Douglas Creek near Keystone, Wyo., for 1912, 1914–1916—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1914.				
June 18–30	202	51	112	2,890
July	84	14	28.0	1,720
August	19	8	12.0	738
September	17	5	7.4	440
The period				5,790
1914–15.				
October	16	6	10.2	627
November 1–20	5		3.63	144
April 20–30	21	10	13.7	299
May	198	2	63.5	3,900
June	240	48	118	7,020
July	32	6	14.9	916
August	10	3	4.58	282
September	12	3	5.70	339
1915–16.				
October	14	4.2	7.35	452
November 1–13	11	2.7	5.04	130
April 23–30	24	4.2	13.3	211
May	231	22	121	7,440
June	241	33	148	8,810
July	32	9.5	17.5	1,080
August	20	7	11.7	719
September	14	3.8	7.32	436
October	14	1.0	7.23	445
November 1–12	6.2	3.4	5.01	119

BIG CREEK.

BIG CREEK NEAR BIG CREEK, WYO.

LOCATION.—In sec. 32, T. 13 N., R. 81 W., at Big Creek ranger station 2 miles west of Big Creek post office, Carbon County. No important tributary within several miles.

DRAINAGE AREA.—123 square miles (measured on base maps of Wyoming and Colorado; scale, 1:500,000).

RECORDS AVAILABLE.—May 2, 1913, to September 30, 1921. State engineer maintained station during 1913 and 1914.

GAGE.—Stevens eight-day recording gage installed May 13, 1918, and referred to vertical staff on left bank 50 feet from ranger station. Prior to April 29, 1915, staff gage was placed 1 foot farther out in stream and gave reading slightly different, although referred to same datum.

EXTREMES OF DISCHARGE.—1913–1921: Maximum discharge, 1,300 second-feet on June 23, 1917, from comparison of discharge of Encampment River at Encampment; minimum discharge probably occurs during winter.

DIVERSIONS.—Prior to July 1, 1921, no adjudicated diversions from Big Creek above station in Wyoming, but below adjudicated diversions amounted to 100 second-feet. In Colorado, the Independence ditch diverts approximately 80 second-feet from Big Lake to the North Platte drainage basin, usually from June 10 to July 10 each year.

ACCURACY.—Gage read twice daily during 1913–14. During 1915–1917 gage was usually read twice daily, but there were many days when it was read only once. From 1918 to 1921 gage heights from water-stage recorder, the operation of which was frequently interrupted owing to absence of observer. Rating curves well defined. Records good except during 1921, for which they are fair.

Monthly discharge of Big Creek near Big Creek, Wyo., for 1913–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913.				
May 2–31	695	14	294	17,500
June	650	120	268	15,900
July	145	34	72.8	4,480
August	34	25	26.4	1,620
September	25	20	22.8	1,360
The period				40,900
1914.				
April 6–30	240	34	99.8	4,950
May	695	75	345	21,200
June	875	175	490	29,200
July	240	75	115	7,070
August	95	34	52.1	3,200
September	43	34	34.6	2,060
The period				67,700
1914–15.				
October	55	34	41.6	2,560
April 15–30	113	44	57.1	1,810
May	184	42	100	6,150
June	330	96	201	12,000
July	197	45	74.0	4,550
August	67	20	38.8	2,390
September	74	11	32.0	1,900
1915–16.				
October	45	20	36.1	2,220
November 1–10	32	18	23.7	470
April	234	41	100	5,950
May	411	150	269	16,500
June	578	167	446	26,500
July	332	78	167	10,300
August	111	41	64.1	3,940
September	44	20	32.0	1,900
1916–17.				
October	60	33	45.5	2,800
November 1–7	34	30	31.7	440
May	545	48	257	15,800
June	1,300	400	781	46,500
July	985	171	476	29,300
August	164	50	87.8	5,400
September			40	2,380
1917–18.				
May 13–31	427	147	332	12,500
June	1,060	242	643	38,300
July	226	63	122	7,500
August	60	30	40.4	2,480
September	50	23	33.3	1,980
The period				62,800
1918–19.				
October	61	24	34.9	2,150
April 16–30	175	26	91.1	2,710
May	431	88	221	13,600
June	295	86	165	9,820
July	120	20	49.3	3,030
August	135	17	38.0	2,340
September	36	11	20.1	1,200
1919–20.				
October	25	16	19.0	1,170
May 9–31	700	189	388	17,700
June	795	441	631	37,500
July	429	110	207	12,700
August	133	51	70.7	4,350
September	66	27	40.8	2,430
1920–21.				
October 1–5	37	33	35.0	350
March 14–31	64	31	45.1	1,610
April	98	39	66.3	3,950
May	570	104	278	17,100
June	1,060	285	679	40,400
July	263	92	161	9,900
August	122	67	82.8	5,090
September	75	25	40.7	2,420

NOTE.—Records for 1914 revised.

FRENCH CREEK.

FRENCH CREEK NEAR FRENCH, WYO.

LOCATION.—In sec. 5, T. 14 N., R. 81 W., at Jenkins ranch, 2½ miles southeast of French, in Carbon County. No tributary between station and mouth, 2 miles below.

DRAINAGE AREA.—60 square miles (measured on topographic map).

RECORDS AVAILABLE.—April 30, 1911, to September 30, 1921. State engineer maintained station during 1913 and 1914.

GAGE.—Vertical staff at left abutment of highway bridge, used since June 2, 1920. Original gage, 1 mile upstream, read until April 10, 1918, when it was moved to a point 480 feet downstream from present site.

EXTREMES OF DISCHARGE.—1911–1921: Maximum stage recorded, 5.0 feet at 7 p. m. June 13, 1918 (discharge, 1,350 second-feet); minimum stage recorded, 1.18 feet (old gage) April 1, 1915 (discharge, 6 second-feet).

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 4.7 second-feet from French Creek; part above station not known.

ACCURACY.—Gage read twice daily. Rating curve fairly well defined. Records good.

Monthly discharge of French Creek near French, Wyo., for 1911–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
May	520	38	256	15,700
June	898	225	552	32,800
July 1–15	225	83	135	4,020
The period				52,500
1912.				
April	34	9	19.7	1,170
May	482	26	196	12,100
June	875	370	653	38,900
July	815	155	366	22,500
August	215	49	95.4	5,870
September	59	34	42.8	2,550
The period				83,100
1912–13.				
October	54	31	37.4	2,300
April	120	15	43.7	2,600
May	544	68	211	13,000
June	522	140	281	16,700
July	128	45	79.5	4,890
August	54	23	33.2	2,040
September	30	18	22.8	1,360
1914.				
April	81	31	47.4	2,820
May	827	54	337	20,700
June	1,140	308	646	38,400
July	295	74	170	10,500
August	90	22	37.7	2,320
September	22	10	16.0	952
The period				75,700
1914–15.				
October	22	10	14.3	879
April	184	6	47.5	2,830
May	304	58	171	10,500
June	454	181	315	18,700
July	251	48	110	6,760
August	46	21	34.8	2,140
September	61	18	29.1	1,730

NOTE.—Records for 1913 and 1914 revised.

Monthly discharge of French Creek near French, Wyo., for 1911–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915–16.				
October	36	20	27.9	1,720
November	26	20	22.2	1,320
March 12–31	24	17	19.8	787
April	145	14	42.3	2,520
May	338	83	185	11,400
June	384	181	303	18,000
July	175	46	83.7	5,150
August	89	24	35.8	2,200
September	35	17	20.7	1,230
1916–17.				
October	37	17	23.7	1,460
November 1–11	20	17	18.0	393
March 16–31	18	11	14.9	473
April	40	14	22.3	1,330
May	185	23	96.3	5,920
June	1,040	131	550	32,700
July	755	139	342	21,000
August	115	42	68.8	4,230
September	42	27	33.6	2,000
1918.				
April 10–30	34	18	26.0	1,080
May	312	33	144	8,850
June	1,230	246	669	39,800
July 1–13	262	186	237	6,110
September 17–30	32	25	26.6	739
1919.				
April	89	15	35.5	2,110
May	658	80	262	16,100
June	330	102	235	14,000
July	114	40	63.9	3,930
1920.				
April	29	17	22.8	1,360
May	655	22	208	12,800
June	980	409	597	35,500
July	395	56	171	10,500
August	130	38	62.9	3,870
September	56	19	29.9	1,780
The period				65,800
1920–21.				
October	47	19	26.8	1,650
November	47	38	38.3	2,280
March 13–31	47	19	30.9	1,160
April	38	27	36.1	2,150
May	1,030	47	296	18,200
June	1,480	314	905	53,900
July	319	38	147	9,040
August	85	37	50.4	3,100
September	40	28	31.9	1,900

BRUSH CREEK.

BRUSH CREEK NEAR SARATOGA, WYO.

LOCATION.—In sec. 8, T. 15 N., R. 82 W., at highway bridge half a mile above mouth of creek and 14 miles southeast of Saratoga. No tributary below station and none for several miles above.

DRAINAGE AREA.—98 square miles (measured on base map of Wyoming; scale, 1: 500,000).

RECORDS AVAILABLE.—April 28, 1911, to November 30, 1915. State engineer maintained station during 1913 and 1914.

GAGE.—Chain gage on downstream side of bridge; read by W. E. Tilton.

EXTREMES OF DISCHARGE.—1911–1915. Maximum stage recorded, 5.5 feet June 9, 1912 (discharge, 2,120 second-feet); minimum stage recorded, 0.85 foot August 23, 1913 (discharge, 1.0 second-foot).

DIVERSIONS.—Prior to July 1, 1912, there were adjudicated diversions from Brush Creek amounting to 87 second-feet.

ACCURACY.—Gage read once daily. Rating curves well defined. Records fair.

Monthly discharge of Brush Creek near Saratoga, Wyo., for 1911–1915.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
May	690	88	309	19,000
June	1,140	29	533	31,700
July	35	5	17.6	1,080
August	14	3	7.0	430
September	13	4	7.0	417
The period				53,100
1911–12.				
October	96	14	33.8	2,080
June 7–30	2,120	307	1,060	50,500
July	862	70	257	15,800
August	124	14	35.4	2,180
September	54	12	30.3	1,860
1912–13.				
October	80	37	56.6	3,480
June	980	72	273	16,200
July	116	8	34.6	2,130
August	32	1	6.1	375
September	24	2	7.7	458
1914.				
April	148	38	81.2	4,830
May	1,530	94	621	38,200
June	1,760	148	706	42,000
July	128	4	51.9	3,190
August	8	1.5	3.18	196
September	38	2	11.4	678
The period				89,100
1915.				
May	460	127	228	14,000
June	700	167	358	21,300
July	240	10	48.5	2,980
August	18	10	13.1	806
September	34	10	18.2	1,080
October	43	30	35.4	2,180
November	30	24	27.3	1,620
The period				44,000

NOTE.—Records for 1914 revised.

ENCAMPMENT RIVER.

ENCAMPMENT RIVER AT ENCAMPMENT, WYO.

LOCATION.—In sec. 6, T. 14 N., R. 83 W., at lower end of smelter grounds at Encampment, Carbon County. Nearest tributary, North Fork, enters 1 mile above.

DRAINAGE AREA.—219 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—May 16 to September 30, 1900; May 1, 1911, to September 30, 1921. State engineer maintained station during 1913 and 1914.

GAGE.—Chain on left bank at tailing flume which crosses the river. Prior to June 6, 1912, gage was 175 feet farther downstream, and although referred to same datum, read about 1 foot lower, owing to the slope of the river. In 1900 gage was 1 mile downstream, at Peryam's ranch, near Riverside.

EXTREMES OF DISCHARGE.—1900, 1911–1921: Maximum stage recorded, 3.20 feet (lower station) May 29, 1900 (discharge, 4,680 second-feet); minimum stage recorded, 3.40 (feet present datum) July 24, 1919 (discharge, 3 second-feet).

DIVERSIONS.—Three large irrigation ditches divert water at a point 1 mile above station. Water is also diverted below station. Prior to July 1, 1921, there were adjudicated diversions from Encampment River amounting to 78 second-feet.

ACCURACY.—Gage read twice daily. Rating curves well defined except in 1900, 1911–1914, for which they were only fairly well defined. Records good except during winter, for which they are fair.

Monthly discharge of Encampment River at Encampment, Wyo., for 1900, 1911–1914.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1900.				
May 16–31	4,680	1,640	2,930	9,300
June	3,640	630	1,760	105,000
July	570	40	153	9,410
August	130	25	84.2	5,180
September	195	10	63.5	3,780
The period	.....	.....	.....	133,000
1911.				
May	2,030	289	1,220	75,000
June	2,460	457	1,420	84,500
July	432	72	209	12,900
August	114	62	96.5	5,930
September	375	91	131	7,800
The period	.....	.....	.....	186,000
1911–12.				
October	440	74	140	8,610
November	98	.....	70	4,170
December	.....	.....	55	3,380
January	.....	.....	50	3,070
February	.....	.....	45	2,590
March	.....	.....	45	2,770
April	180	.....	125	7,440
May	3,330	180	1,160	71,300
June	4,310	865	2,130	127,000
July	1,040	259	407	25,000
August	229	35	116	7,130
September	229	22	125	7,440
The year	4,310	.....	373	270,000
1912–13.				
October	129	20	89.6	5,510
November	.....	.....	60	3,570
December	.....	.....	50	3,070
January	.....	.....	45	2,770
February	.....	.....	40	2,220
March	.....	.....	45	2,770
April	805	50	334	19,900
May	2,110	770	1,460	89,800
June	1,660	255	742	44,200
July	255	37	85.9	5,280
August	42	37	40.4	2,480
September	42	37	39.0	2,320
The year	2,110	.....	254	184,000
1913–14.				
October	50	37	38.7	2,380
November	.....	.....	35	2,080
December	.....	.....	35	2,150
January	.....	.....	30	1,840
February	.....	.....	35	1,940
March	86	.....	50	3,070
April	425	36	191	11,400
May	2,930	348	1,600	98,400
June	3,220	492	1,560	92,800
July	508	47	214	13,200
August	146	31	40.2	2,470
September	59	31	36.2	2,150
The year	3,220	.....	323	234,000
1914–15.				
October	131	34	70.9	4,360
November	.....	.....	60	3,570
December	.....	.....	50	3,070
January	.....	.....	45	2,770
February	.....	.....	40	2,460
March	.....	.....	45	2,770
April	840	51	257	15,300
May	1,310	272	685	42,100
June	1,660	398	872	51,900
July	375	33	119	7,320
August	54	30	36.5	2,240
September	146	34	55.0	3,270
The year	1,660	.....	194	141,000

NOTE.—Records for 1913 and 1914 revised.

Monthly discharge of Encampment River at Encampment, Wyo., for 1900, 1911–1921— Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915–16.				
October	87	41	61.3	3,770
November	52	41	45.0	2,680
December			40	2,460
January			35	2,150
February			35	2,010
March			50	3,070
April	1,010	80	383	22,800
May	1,910	610	1,300	79,900
June	2,040	920	1,630	97,000
July	805	58	225	13,800
August	220	48	98.2	6,040
September	138	40	70.9	4,220
The period	2,040		331	240,000
1916–17.				
October	580	72	182	11,200
November	123		58	3,450
December			40	2,460
January			40	2,460
February			35	1,940
March			45	2,770
April	290		135	8,030
May	1,200	133	545	33,500
June	4,340	805	2,620	156,000
July	1,860	375	1,010	62,100
August	296	72	129	7,930
September	82	47	61.7	3,670
The year	4,340		408	296,000
1917–18.				
October	93	45	70.4	4,330
November	104	75	90.0	5,360
December			60	3,690
January			50	3,070
February			40	2,220
March			50	3,070
April			220	13,100
May			900	55,300
June	2,600	1,500	1,720	102,000
July	428	56	210	12,900
August	53	16	25.6	1,570
September	135	25	47.4	2,820
The year	2,600		289	209,000
1918–19.				
October	340	50	96.5	5,930
November	88		75	4,460
December			50	3,070
January			40	2,460
February			35	1,940
March			40	2,460
April	695		254	15,100
May	1,970	758	1,340	82,400
June	1,020	168	595	35,400
July	158	3	52.7	3,240
August	69	19	29.5	1,810
September	68	24	41.2	2,450
The year	1,970		222	161,000
1919–20.				
October	58	39	50.2	3,090
November			50	2,980
December			40	2,460
January			40	2,460
February			35	2,010
March			40	2,460
April			200	11,900
May	2,890		1,230	75,600
June	2,960	1,020	1,980	118,000
July	980	79	351	21,600
August	130	36	59.9	3,680
September	100	30	53.8	3,200
The year	2,960		344	249,000

Monthly discharge of Encampment River at Encampment, Wyo., for 1900, 1911–1921— Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1920–21.				
October	78	20	52.1	3,200
November			50	2,980
December			40	2,460
January			40	2,460
February			40	2,220
March			55	3,380
April	177	42	125	7,740
May	4,260	162	1,500	92,200
June	3,660	1,020	2,260	134,000
July	940	91	333	20,500
August	165	24	674	41,400
September	41	25	33.7	2,010
The year	4,260		435	315,000

NOTE.—Winter records estimated.

COW CREEK.

COW CREEK NEAR SARATOGA, WYO.

LOCATION.—In sec. 36., T. 16 N., R. 84 W., at highway bridge 9 miles south of Saratoga. No tributaries between station and mouth, 4 miles below. Calf Creek enters 2 miles above.

DRAINAGE AREA.—60 square miles (measured on base map of Wyoming; scale, 1: 500,000).

RECORDS AVAILABLE.—May 1, 1911, to October 31, 1912.

GAGE.—Vertical staff; read by Margaret Sullivan.

EXTREMES OF DISCHARGE.—1911–12: Maximum stage recorded, 3.9 feet at 5 p. m. June 5, 1912 (discharge, 290 second-feet); minimum stage recorded, 1.9 feet August 14 and 15, 1912 (discharge, 0.5 second-foot).

DIVERSIONS.—Prior to July 1, 1912, there were adjudicated diversions from Cow Creek amounting to 84 second-feet and from its tributaries adjudicated diversions amounting to 27 second-feet, nearly all above the station.

ACCURACY.—Gage read twice daily. Rating curve fairly well defined. Records good.

Monthly discharge of Cow Creek near Saratoga, Wyo., for 1911–12.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
May	152	25	97.0	5,960
June	218	44	136	8,090
July	44	2	8.5	523
August	5	2	2.5	154
September	5	2	2.5	149
The period				14,900
1911–12.				
October	25	8	10.5	646
April	15	2	7.6	452
May	221	6	78.7	4,840
June	282	74	160	9,520
July	82	5	23.7	1,460
August	48	.5	9.4	578
September	23	1.2	7.2	428
October	31	10	21.0	1,290

SPRING CREEK.

SPRING CREEK NEAR SARATOGA, WYO.

LOCATION.—About sec. 23, T. 17, N. R. 84 W., at highway bridge 2 miles south of Saratoga. No tributary between station and mouth, three-fourths of a mile below.

DRAINAGE AREA.—152 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—May 1, 1911, to October 31, 1912.

GAGE.—Vertical staff; read by Vada M. Lyons.

EXTREMES OF DISCHARGE.—1911–12: Maximum stage recorded, 4.1 feet on June 9, 1912 (discharge, 685 second-feet); minimum flow occurred August 8–11, September 3–12, 1911, when creek was dry.

DIVERSIONS.—Prior to July 1, 1912, adjudicated diversions of 5 second-feet from Spring Creek, 85 second-feet from North Spring Creek, and 104 second-feet from South Spring Creek. These diversions are all above the station.

ACCURACY.—Gage read twice daily. Rating curve fairly well defined. Records fair to good.

Monthly discharge of Spring Creek near Saratoga, Wyo., for 1911–12.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
May	191	35	124	7,620
June	368	62	214	12,700
July	70	6	16.2	996
August	9	0	4.7	289
September	13	0	6.2	369
The period				22,000
1911–12.				
October	52	21	23.6	1,450
February			15.0	863
March			20.0	1,230
April	60	16	32.2	1,920
May	510	32	153	9,410
June	685	159	418	24,900
July	187	12	48.9	3,010
August	32	3	12.0	738
September	43	5	24.4	1,450
October	49	26	34.6	2,130

NOTE.—Records for April, 1921, revised.

NORTH SPRING CREEK NEAR SARATOGA, WYO.

LOCATION.—In sec. 19, T. 16 N., R. 85 W., at Boock's ranch, 14 miles southwest of Saratoga, in Carbon County. Nearest tributary, Methodist Creek, enters a few miles below.

DRAINAGE AREA.—26 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—August 23, 1913, to July 3, 1915.

GAGE.—Vertical staff at left bank, just above footbridge at Boock's ranch; read by Fred W. Boock.

EXTREMES OF DISCHARGE.—1913–1915: Maximum stage, 3.1 feet on afternoon of June 4, and morning of June 5, 1914 (discharge, 370 second-feet); minimum stage recorded, 0.45 foot October 1–5, 15–19, 1913 (discharge, 2 second-feet).

DIVERSIONS.—Prior to July 1, 1914, there were adjudicated diversions of 80 second-feet from North Spring Creek. It is not known which of these diversions are above the station.

ACCURACY.—Gage read twice daily. Rating curve fairly well defined. Records poor to fair on account of uncertainty in gage-height records.

Monthly discharge of North Spring Creek near Saratoga, Wyo., for 1913–1915.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913.				
August 23–31	12	9	9.8	175
September	16	2	8.4	500
1913–14.				
October	8	2	3.9	240
April 21–30	42	25	35.5	704
May	275	25	125	7,690
June	358	68	174	10,400
July	68	17	34.0	2,090
August	17	6	8.3	510
September	11	6	7.3	434
1914–15.				
October	17	6	9.3	572
May	108	42	80.6	4,960
June	108	48	88.3	5,250

JACK CREEK.

JACK CREEK AT MATHESON'S RANCH, NEAR SARATOGA, WYO.

LOCATION.—About sec. 36, T. 17 N., R. 86 W., at Matheson's ranch, 14 miles southwest of Saratoga, Carbon County. Nearest tributary, North Jack Creek, enters some distance below.

DRAINAGE AREA.—32 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—August 23, 1913, to October 31, 1917; April 20, 1919, to September 30, 1921.

GAGE.—Vertical staff at left abutment of wagon bridge 1,000 feet below ranch house. Gage originally 200 feet above present site; moved 800 feet farther upstream August 15, 1915, and read until June 13, 1917. No determined relation between readings on various gages.

EXTREMES OF DISCHARGE.—1913–1917, 1919–1921: Maximum stage recorded, approximately 4.3 feet June 11, 1917 (discharge, 260 second-feet); minimum discharge, creek dry from August 18 to 23, 1919.

DIVERSIONS.—Prior to July 1, 1921, there were adjudicated diversions of 102 second-feet from Jack Creek; practically all below station.

ACCURACY.—Gage read twice daily. Rating curves well defined. Records good.

Monthly discharge of Jack Creek at Matheson's ranch, near Saratoga, Wyo., for 1913–1917, 1919–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913.				
August 23–31	5	2	3.11	56
September	6	4	4.70	280
1913–14.				
October	13	5	8.52	524
November 1–21	11	5	8.05	335
April 20–30	58	33	42.8	935
May	180	39	113	6,950
June	190	45	103	6,130
July	48	8	24.1	1,480
August	11	4	6.23	383
September	8	4	5.27	341

Monthly discharge of Jack Creek at Matheson's ranch, near Saratoga, Wyo., for 1913–1917, 1919–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1914–15.				
October 1–22	10	4	6.9	424
May	85	28	49.5	3,040
June	130	40	63.1	3,750
July	40	10	19.9	1,220
August 15–31	1.4	2.0	6.1	375
September	9.8	1.0	3.88	231
1915–16.				
October	11	3	7.2	443
November 1–12	9	6	7.1	169
March 26–31	12	8	9.7	115
April	47	6	16.3	970
May	181	14	64.8	3,980
June	102	40	75.9	4,520
July	44	7	19.0	1,170
August	22	6	9.0	553
September	9	6	7.0	417
1916–17.				
October	17	7	10.9	670
November	10	6	6.9	411
April	60	10	24.8	1,480
May	196	9	91.6	5,630
June	260	91	202	12,000
July	190	23	85.4	5,250
August	33	8	13.6	836
September			6.6	393
1919.				
April 20–30	59	23	48.5	1,060
May	97	42	59.2	3,640
June	52	36	45.1	2,680
July	33	2	9.5	584
August	6	0	2.2	135
September	9	2	3.2	190
The period				8,290
1919–20.				
October	10	4	7.2	443
April 24–30	16	6	11.7	162
May	293	24	128	7,870
June	184	59	136	8,090
July	54	8	22.4	1,380
August	14	10	10.6	652
September	10	3	5.4	321
1920–21.				
October 10–16	10	8	9.0	126
May 14–31	250	59	158	5,640
June	250	75	169	10,100
July	62	12	31.4	1,930
August	27	6	9.9	609
September	7	5	5.8	345

JACK CREEK AT BLYDENBURGH'S RANCH, NEAR SARATOGA, WYO.

LOCATION.—In sec. 8, T. 17 N., R. 84 W., at highway bridge 6 miles northwest of Saratoga.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 10, 1912, to October 31, 1914. Station maintained by State engineer during 1913 and 1914.

GAGE.—Vertical staff.

EXTREMES OF DISCHARGE.—1912–1914: Maximum stage recorded, 3.6 feet at 5 p. m. June 10, 1912 (discharge, 735 second-feet); minimum stage recorded, 0.7 foot August 23 to September 3, 1913, when there was no flow.

ACCURACY.—Gage read twice daily. Rating curve well defined. Records excellent.

Monthly discharge of Jack Creek at Blydenburgh's ranch near Saratoga, Wyo., for 1912–1914.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1912.				
June 10–30	735	86	213	8,870
July	93	10	37.8	2,320
August	24	6	9.5	584
September	25	6	11.6	713
The period				12,500
1912–13.				
October	41	10	16.9	1,040
May	160	73	110	6,760
June	83	9	34.1	2,030
July	8.0	2.5	4.15	255
August	2.5	0	1.30	80
September	1.5	0	1.07	64
1913–14.				
October	9.4	1.5	5.36	330
April 19–30	230	60	120	2,860
May	539	83	272	16,700
June	555	25	148	8,810
July	27	3.0	9.97	613
August	10	2.0	3.31	204
September	2.5	1.0	1.92	114
1914.				
October	12.4	1.0	6.07	373

NOTE.—Records for 1913 and 1914 revised.

JACK CREEK NEAR SARATOGA, WYO.

LOCATION.—In sec. 28, T. 18 N., R. 84 W., at Burdick's ranch, 5 miles northwest of Saratoga. No tributary between the station and mouth, 1 mile below.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 26, 1911, to July 31, 1912.

GAGE.—Vertical staff.

EXTREMES OF DISCHARGE.—1911–12: Maximum stage recorded, 3.65 feet at 6.30 p. m. May 31, 1912 (discharge, 318 second-feet); minimum stage recorded, 0.55 foot August 3–10, 1911 (discharge, 0.2 second-foot).

DIVERSIONS.—Prior to July 1, 1912, there were adjudicated diversions from Jack Creek of 92 second-feet. These diversions are all above the station.

ACCURACY.—Gage read once daily except during high water, when it was read twice daily. Rating curve well defined. Records good except during winter, for which they are fair.

Monthly discharge of Jack Creek near Saratoga, Wyo., for 1911–1912.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
April 26–30			46.4	460
May	111	41	63.0	3,870
June	149	4.6	52.1	3,100
July	6.4	.5	2.0	123
August	1.2	.2	.48	30
September	4.0	.5	.98	58
The period				7,640
1911–12.				
October	34	5.5	10.9	670
November			8.0	476
December			6.0	369
January			8.0	492
February			7.0	403
March			14.0	861
April 6–30	58	27	41.4	2,050
May	291	45	163	10,000
June	291	49	167	9,940
July	58	2	15	922

PASS CREEK.

PASS CREEK NEAR WALCOTT, WYO.

LOCATION.—About sec. 15, T. 20 N., R. 84 W., at Crone's ranch, 4 miles south of Walcott. No important tributary between station and mouth, several miles below.

DRAINAGE AREA.—278 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—May 1 to October 4, 1911.

GAGE.—Vertical staff; read by A. Crone.

DIVERSIONS.—Prior to July 1, 1912, adjudicated diversions from Pass Creek amounting to 155 second-feet, and from tributaries, adjudicated diversions amounting to 33 second-feet. Probably, the greater part of the diversions are above station.

ACCURACY.—Gage read twice daily. Rating curve fairly well defined. Records good except for periods interpolated, for which they are approximate.

Monthly discharge of Pass Creek near Walcott, Wyo., for 1911.

Month	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
May	34	20	26.1	1,600
June	241	2.5	44.6	2,650
July	1.0	0	.15	9.2
August			0	0
September			0	0
The period				4,260

MEDICINE BOW RIVER BASIN.

MEDICINE BOW RIVER NEAR MEDICINE BOW, WYO.

LOCATION.—In sec. 7, T. 20 N., R. 79 W., at private bridge at Johnson's ranch, 14 miles southwest of Medicine Bow, Carbon County. Nearest tributary, Wagonhound Creek, enters 3 miles below.

DRAINAGE AREA.—178 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—June 4, 1911, to November 3, 1917; May 1, 1919, to September 30, 1921. State engineer maintained station during 1913 and 1914.

GAGE.—Vertical staff at downstream side of left abutment. Gage used during 1911 and 1912 was 600 feet upstream and referred to different datum.

EXTREMES OF DISCHARGE.—1911–1917, 1919–1921: Maximum stage recorded, 5.4 feet at 7.30 a. m. June 23, 1917 (discharge, 2,810 second-feet); no flow in 1911, 1915, 1916, and 1919.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 208 second-feet from Medicine Bow River above station and 73 second-feet below.

ACCURACY.—Gage read twice daily. Rating curve well defined below 1,300 second-feet. Records good.

Monthly discharge of Medicine Bow River near Medicine Bow, Wyo., for 1911–1917, 1919–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
June 4–30	1,200	145	651	34,900
July	145	7.5	41.8	2,570
August	5.0	0	1.84	113
September	36	0	8.15	485
The period				38,100
1911–12.				
October	95	10	35.1	2,160
April 7–30	419	158	246	11,700
May	875	218	487	29,900
June	1,260	744	1,030	61,300
July	1,260	49	473	29,100
August	285	10	61.5	3,780
September	64	14	39.8	2,370
1912–13.				
October	56	34	46.8	2,880
November	56	30	42.3	2,520
April 16–30	506	240	321	9,550
May	1,390	200	482	29,600
June	1,250	136	417	24,800
July	110	2	13.1	806
August	10	0	2.4	148
September	28	0	14.3	851
1913–14.				
October	54	18	30.3	1,860
April 11–30	140	48	104	4,130
May	1,520	105	440	27,100
June	2,270	95	674	40,100
July	95	17	39.1	2,400
August	105	13	24.7	1,520
September	13	8	11.7	696
1914–15.				
October	19	10	15.7	965
May	379	89	193	11,900
June	716	227	382	22,700
July	205	.4	40.4	2,480
August	150	1.6	8.68	5,340
September	100	2	22.5	1,340
1915–16.				
October	55	21	32.0	1,970
November 1–14	32	28	28.3	786
April	136	43	76.8	4,570
May	423	85	199	12,200
June	688	150	349	20,800
July	136	0	23.0	1,410
August	32	2	11.7	719
September	19	3	5.2	311
1916–17.				
October	35	3	19.3	1,190
November 1–11	35	21	26.4	576
April 15–30	146	51	91.4	2,900
May	355	54	195	12,000
June	2,810	241	1,010	60,100
July	922	72	338	20,800
August	51	10	23.5	1,440
September	14	5	8.3	494
1917.				
October	20	2.8	12.4	762
1919.				
May	1,180	125	430	26,400
June	424	15	187	11,100
July	14	1	7.0	430
August	46	0	8.1	498
September	16	0	5.0	298
The period				38,700

Monthly discharge of Medicine Bow River near Medicine Bow, Wyo., for 1911–1917, 1919–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919–20.				
October	39	8	19.9	1,220
November	53	23	30.8	1,830
March 21–31	62	47	53.5	1,170
April	142	34	69.8	4,150
May	1,290	79	461	28,300
June	1,840	430	953	56,700
July	430	18	93.3	5,740
August	46	13	24.5	1,510
September	27	3	13.3	791
1920–21.				
October	40	14	26.2	1,610
November	50	34	43.2	2,570
March 13–31	125	37	64.3	2,420
April	120	44	75.8	4,510
May	1,420	160	494	30,400
June	1,540	162	864	51,400
July	148	20	55.3	3,400
August	45	11	24.0	1,480
September	11	4	7.6	452

NOTE.—Records for 1913 and 1914 revised. Records for April, 1916, have been slightly revised since being published originally.

MEDICINE BOW RIVER AT MEDICINE BOW, WYO.

LOCATION.—In sec. 15, T. 22 N., R. 78 W., at Union Pacific Railroad pump house half a mile southeast of railroad station at Medicine Bow.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 8 to October 5, 1901.

GAGE.—Vertical staff.

DIVERSIONS.—No data.

ACCURACY.—Gage probably read twice daily. Rating curve fairly well defined. Records fair.

Monthly discharge of Medicine Bow River at Medicine Bow, Wyo., for 1901.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 8–31	1,920	191	940	44,700
June	1,630	350	976	58,100
July	272	45	95.8	5,890
August	45	6	17.2	1,060
September	17	8	15.6	928
October 1–5	10	10	10.0	.....
The period	.....	.....	.....	111,100

ROCK CREEK NEAR ARLINGTON, WYO.

LOCATION.—In sec. 25, T. 19 N., R. 79 W., at highway bridge 1½ miles above Arlington, in Carbon County. Nearest tributary, Overland Creek, enters half a mile above. Prior to January 12, 1916, station was at Arlington, 1½ miles downstream. Flow at two points practically the same.

DRAINAGE AREA.—70 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—April 22, 1911, to September 30, 1918.

GAGE.—Bristol water-stage recorder, at left bank just below bridge.

EXTREMES OF DISCHARGE.—1911–1918: Maximum stage recorded, 3.9 feet on June 7, 1911 (discharge, 1,450 second-feet). Minimum discharge, 1 second-feet on January 5–6, based on discharge measurements and temperature records.

DIVERSIONS.—Prior to December 31, 1916, adjudicated permits for diversions of about 4 second-feet from Rock Creek above and 209 second-feet below the station.

COOPERATION.—Field data furnished by Rock Creek Conservation Co. Check measurements have been made by the United States Geological Survey.

ACCURACY.—Gage read once daily from April 22, 1911, to July 11, 1912, after which time the gage heights were obtained from continuous record. Rating curves are fairly well defined but are applied indirectly because of shifting control. Records fair to good.

Monthly discharge of Rock Creek near Arlington, Wyo., for 1911–1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
April 22–30	89	24	52.0	928
May	620	57	282	17,300
June	1,450	175	643	38,300
July	195	44	88.9	5,470
August	57	24	38.9	2,390
September	44	17	23.8	1,420
The period				65,800
1911–12.				
October	64	24	43.5	2,670
April	46	10	19.0	1,130
May	630	10	146	9,000
June	1,190	300	866	51,500
July	810	112	380	23,400
August	185	37	88.2	5,420
September	61	31	44.1	2,620
1912–13.				
October	85	11	41.4	2,550
November	63	20	32.6	1,940
December			30	1,840
March 19–31	12	6	8.5	219
April	100	6	21.6	1,290
May	800	92	306	18,800
June	680	155	407	24,200
July	142	40	77.3	4,750
August	67	10	27.7	1,700
September	21	9	13.3	791
1913–14.				
October	23	8	14.3	879
November	18	11	13.7	815
December			13	799
January			13	799
February			13	722
March			11	676
April	34	9	23.2	1,380
May	1,080	18	344	21,200
June	1,160	165	642	38,200
July	155	50	88.8	5,460
August	64	26	34.8	2,140
September	34	18	21.2	1,260
The year	1,160		103	74,300
1914–15.				
October	26	15	21.2	1,300
November	18	4	10.9	649
December	8	2	3.6	220
January	18	1	7.2	442
February	26	7	15.8	878
March	18	8	13.5	830
April	173	10	37.3	2,220
May	479	51	250	15,400
June	779	230	424	25,200
July	219	24	69.7	4,290
August	29	12	16.9	1,040
September	24	11	16.3	970
The year	779	1	73.8	53,400

Monthly discharge of Rock Creek near Arlington, Wyo., for 1911–1918—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915–16.				
October	31	15	23.4	1,440
November	35	14	20.7	1,230
December	27	15	19.4	1,190
January	20	6	9.77	601
February	14	10	11.0	633
March	41	9	22.0	1,350
April	63	12	28.1	1,670
May	347	67	170	10,500
June	566	259	424	25,200
July	250	34	99.5	6,120
August	40	19	28.1	1,730
September	21	10	17.3	1,030
The year	566	6	72.5	52,700
1916–17.				
October	31	18	22.4	1,380
November	25	14	19.0	1,130
December	25	6	14.3	879
January	16	4	9.7	596
February	13	8	11.2	622
March	25	6	11.3	695
April	35	16	20.8	1,240
May	82	12	40.5	2,490
June	1,000	67	501	29,800
July	509	106	273	16,800
August	92	14	34.7	2,130
September	35	13	19.7	1,170
The year	1,000	4	81.4	58,900
1917–18.				
October	35	19	28.9	1,780
November	33	24	28.5	1,700
December	35	25	31.5	1,940
January	32	20	25.5	1,570
February	30	20	25.0	1,390
March	38	26	33.2	2,040
April	49	30	41.2	2,450
May	485	44	236	14,500
June	1,240	133	733	43,600
July	222	36	114	7,010
August	46	16	26.1	1,600
September	43	16	21.2	1,260
The year	1,240	16	112	80,800

ROCK CREEK NEAR ROCK RIVER, WYO.

LOCATION.—In sec. 7, T. 20 N., R. 76 W., at Phelan's ranch, 1 mile southeast of Rock River. No important tributary between station and mouth, several miles below.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 1, 1911, to November 17, 1912.

GAGE.—Vertical staff. In July, 1912, a recording gage referred to same datum was installed by Rock Creek Conservation Co.

EXTREMES OF DISCHARGE.—1911–12: Maximum stage recorded, 4.2 feet at 11 a. m. June 4, 1912 (discharge, 1,350 second-feet); no flow July 26–29, and August 29 to September 25, 1911.

DIVERSIONS.—Prior to July 1, 1912, adjudicated diversions from Rock Creek amounted to 232 second-feet; and from tributaries, adjudicated diversions amounted to 73 second-feet, nearly all above the station.

COOPERATION.—Field data furnished by Rock Creek Conservation Co. Check measurements made by United States Geological Survey.

ACCURACY.—Gage read once daily to July 27, 1912, after which time the gage heights were obtained from continuous record. Rating curve fairly well defined. Records fair.

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Monthly discharge of Rock Creek near Rock River, Wyo., for 1911–12.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
April	37	1	8.9	530
May	360	3	110	6,760
June	900	120	457	27,200
July	110	4	43.2	2,660
August	25	0	11.6	713
September	7	0	.7	42
The period				37,900
1911–12.				
October	25	7	11.8	726
January			10	615
February			8	460
March			14	861
April 14–30	125	85	107	3,610
May	325	70	145	8,920
June	1,220	260	670	39,900
July	485	25	137	8,420
August	64	4	20.9	1,290
September	64	1	27.1	1,610
October	56	26	41.9	2,580
November 1–17	37	22	34.5	1,160

DEEP CREEK NEAR ARLINGTON, WYO.

LOCATION.—In sec. 16, T. 17 N., R. 79 W., at outlet of Sand Lake, 12 miles southwest of Arlington, Carbon County, at an elevation of 10,000 feet. No tributary within several miles.

DRAINAGE AREA.—3.7 square miles (measured on topographic map).

RECORDS AVAILABLE.—September 6, 1914, to September 30, 1918.

GAGE.—Bristol water-stage recorder at left bank just below outlet of lake. Prior to October 1, 1915, gage was 160 feet upstream, and referred to different datum.

DIVERSIONS.—No diversions above.

REGULATION.—Flow regulated naturally by Sand Lake, which has an area of about 95 acres.

ACCURACY.—Operation of water-stage recorder fairly satisfactory. Rating curves fairly well defined. Records fair.

COOPERATION.—Field data furnished by Rock Creek Conservation Co.

Monthly discharge of Deep Creek near Arlington, Wyo., for 1915, 1917–18.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1914–15.				
September 6–30	1.0	0.5	0.73	36.2
October	2.8	.7	1.56	95.9
November	1.2	.4	.79	47.0
December			.3	18.4
January			.4	24.6
February	1.2	.6	.65	36.1
March	.7	.5	.61	37.5
April	10.0	.4	3.17	189
May 20–31	21	10	15.5	369
June	75	14	41.0	2,440
July	26	3.3	8.84	544
August	2.8	1.0	1.71	105
September	1.2	1.0	1.02	61

Monthly discharge of Deep Creek near Arlington, Wyo., for 1915, 1917–18—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915–16.				
October	2.0	1.1	1.4	86
November	4.0	1.1	2.1	125
December	1.5	.8	1.1	67
January			.8	49
February			.9	52
March			.7	43
April	1.8	.8	1.0	60
May	28	3	8.2	504
June	46	26	34.9	2,080
July	24	4.5	11.4	701
August	5	1.6	2.5	154
September	2.5	1.3	1.6	95
The year	46		5.52	4,020
1916–17.				
October	2.3	.7	1.32	81.2
November	1.0	.4	.71	42.2
December	.4	.3	.30	18.4
January			.30	18.4
February	.6	.4	.48	26.7
March	.5	.2	.32	19.7
April	1.5	.3	.65	38.7
May	1.4	.6	.99	60.9
June	100	1.1	40.7	2,420
July	90	10	42.5	2,610
August	11	.3	2.41	148
September	.6	.2	.37	22.0
The year	100	.2	7.62	5,510
1917–18.				
October	.9	.2	.65	40.0
November	.4	.2	.23	13.7
December	.4	.3	.31	19.1
January	.4	.2	.30	18.4
February	1.0	.2	.39	21.7
March	.6	.3	.36	22.1
April	.5	.2	.36	21.0
May			10	615
June	68	1.8	24.8	1,480
July	32	1.0	11.3	695
August	1.2	.2	.70	43.0
September	1.2	.5	.72	43.0
The year	68	.2	4.17	3,030

MUDDY CREEK NEAR SHIRLEY, WYO.

LOCATION.—In sec. 14, T. 26 N., R. 80 W., at highway bridge near Point of Rocks, 6 miles east of Shirley, in Carbon County. Nearest tributary enters 4 miles above.

DRAINAGE AREA.—67 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—May 6, 1915, to April 15, 1917.

GAGE.—Vertical staff at downstream side of left abutment of bridge; read by Dave Wray.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 3.2 second-feet from Muddy Creek above station and 4.8 second-feet below.

ACCURACY.—Stage-discharge relation not permanent. Rating curve not well defined. Gage read twice daily, and oftener during high water. Records good.

The only flow recorded for the period from October 1, 1916, to April 15, 1917, was as follows:

Date.	Second-feet.	Date.	Second-feet.	Date.	Second-feet.
April 8	15.0	April 11	64.4	April 14	27.3
9	122	12	45.8	15	21.8
10	109	13	53.7		

The total flow during the period was 911 acre-feet.

Monthly discharge of Muddy Creek near Shirley, Wyo., for 1915–16.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915.				
May 6–13	55	0	5.47	282
June	21	0	3.12	186
July	46	0	1.98	122
August	330	0	23.2	1,430
September	122	.7	13.3	791
The period				2,810
1915–16.				
October	5	3	3.87	238
November 1–20	4	.9	2.79	111
March 19–31	103	8	34.9	900
April	24	5	13.5	803
May	28	10	16.5	1,010
June	22	.3	5.02	299
July	.3	.3	.30	18
August	42	.3	2.98	183
September	15	.3	1.14	68

NOTE.—Run-off began March 12, 1916, and reached maximum stage before observer began readings.

SWEETWATER RIVER.

SWEETWATER RIVER NEAR SPLITROCK, WYO.

LOCATION.—About sec. 34, T. 29 N., R. 87 W., at Sun's ranch, a quarter of a mile above Devils Gate and 15 miles east of Splitrock, in Natrona County.

DRAINAGE AREA.—2,180 square miles.

RECORDS AVAILABLE.—October 1, 1902, to December 15, 1903.

GAGE.—Vertical staff; read by Tom Sun, jr.

DIVERSIONS.—Prior to July 1, 1903, adjudicated diversions of 101 second-feet from Sweetwater River above station.

ACCURACY.—Gage read twice daily. Rating curve fairly well defined. Records good.

Monthly discharge of Sweetwater River near Splitrock, Wyo., for 1902–3.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1902–3.				
October	20	14	16.8	1,030
November	25	14	19.0	1,130
March 18–31	67	38	48.5	1,350
April	187	67	110	6,550
May	213	99	140	8,610
June	400	128	287	17,100
July	128	19	49.0	3,010
August	54	14	16.7	1,030
September	22	12	14.6	8,690
1903.				
October	48	22	36.8	2,260
November	48	43	44.3	2,640
December 1–15	43	43	43.0	1,280

SWEETWATER RIVER NEAR ALCOVA, WYO.

LOCATION.—In sec. 17, T. 29 N., R. 86 W., at Schoonmaker's ranch, 27 miles west of Alcova, in Natrona County. Backwater from Pathfinder reservoir reaches a point 5 miles below. Nearest tributary, Dry Creek, enters 6 miles below.

DRAINAGE AREA.—2,270 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—August 28, 1913, to September 30, 1921.

GAGE.—Vertical staff on left bank at old bridge abutment 200 feet above footbridge.

EXTREMES OF DISCHARGE.—1913–1921: Maximum mean daily stage recorded, 4.55 feet on May 6, 1920 (discharge, 1,610 second-feet); minimum stage recorded, 0.16 foot August 23, 1919 (discharge, 2 second-feet).

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 170 second-feet from Sweetwater River above the station. The original diversions below have been destroyed by Pathfinder reservoir.

COOPERATION.—Beginning April 1, 1917, complete records furnished by United States Reclamation Service.

Monthly discharge of Sweetwater River near Alcova, Wyo., for 1913–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913.				
September	46	25	28.6	1,700
1913–14.				
October	62	54	54.5	3,350
November	54	52	53.9	3,210
April	795	191	370	22,000
May	830	360	542	33,300
June	790	140	398	23,700
July	136	38	64.4	3,960
August	57	25	38.9	2,390
September	39	12	22.8	1,360
1914–15.				
October	57	32	48.9	3,010
November 1–14	57	51	52.4	1,460
March 19–31	78	35	55.5	1,430
April	257	64	136	8,090
May	146	70	95.6	5,880
June	352	99	176	10,500
July	102	45	72.0	4,430
August	75	43	52.5	3,230
September	90	54	70.5	4,200
1915–16.				
October	95	80	86.6	5,320
November 1–19	82	78	79.9	3,010
March 12–31	732	105	290	11,500
April	775	172	432	25,700
May	960	347	603	37,100
June	485	166	381	22,700
July	160	65	96.6	5,940
August	59	55	57.1	3,510
September	51	38	43.4	2,580
1916–17.				
April	882	65	357	21,200
May	1,350	238	743	45,700
June	1,350	843	1,120	66,600
July	1,030	91	362	22,300
August	90	63	74.2	4,560
September	67	53	59.6	3,550
The period				164,000

Monthly discharge of Sweetwater River near Alcova, Wyo., for 1913–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917–18.				
October	92	53	57.3	3,520
November	79	54	61.9	3,680
December 1–8	60	42	53.9	855
March 10–31	148	83	97.5	4,250
April	564	88	246	14,600
May	522	216	353	21,700
June	465	152	337	20,100
July	130	45	69.2	4,250
August	43	20	28.4	1,750
September	45	20	34.6	2,060
1918–19.				
October 1–12	48	43	46.7	1,110
March 16–31	105	77	85.1	2,700
April	288	80	171	10,200
May	236	94	129	7,930
June	147	16	58.9	3,500
July	21	2	5.9	363
August	8	2	2.6	160
September	18	2	8.0	476
1920.				
April	1,580	95	545	32,400
May	1,610	323	1,080	66,400
June	1,160	248	674	40,100
July	212	33	83.8	5,150
August	50	31	40.1	2,470
September	42	25	31.8	1,890
The period				148,000
1921.				
April	368	120	252	15,000
May	1,040	210	693	42,600
June	1,300	224	979	58,300
July	183	64	110	6,760
August	78	26	53.5	3,290
September	63	26	44.4	2,640
The period				129,000

MINOR STREAMS ENTERING PATHFINDER RESERVOIR.

SAGE CREEK ABOVE PATHFINDER, WYO.

LOCATION.—In sec. 3, T. 26 N., R. 84 W., at footbridge at Vivion's ranch, 25 miles above Pathfinder dam. No tributary between station and mouth, 2 miles below.

DRAINAGE AREA.—182 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—March 20, 1915, to September 30, 1921.

GAGE.—Vertical staff 5 feet above footbridge at left bank.

EXTREMES OF DISCHARGE.—1915–1921: Maximum stage recorded, 6.5 feet from high-water mark of April 9, 1920 (discharge, about 1,080 second-feet); minimum discharge, no flow July 6 to 8, 1921.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 15 second-feet from Sage Creek and 29 second-feet from tributaries, all above station.

ACCURACY.—Gage read twice daily. Rating curve well defined. Records good.

Monthly discharge of Sage Creek above Pathfinder, Wyo., for 1915–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1914–15.				
March 20–31	6.6	2.8	4.67	111
April	28	6.0	16.5	982
May	44	3.7	10.5	646
June	48	.6	10.1	601
July	2.7	.5	.82	50.4
August	56	.6	5.35	329
September	36	.7	10.2	607
The period				3,310
1915–16.				
October	9.8	7.2	8.54	525
November 1–27	12	6.9	8.24	441
March 5–31	98	17	51.1	2,740
April	77	16	43.0	2,560
May	78	22	48.2	2,960
June	21	.8	4.65	277
July	1.0	.5	.63	37.7
August	1.0	.6	.81	49.8
September	2.3	.9	1.42	84.5
1916–17.				
October	9.0	1.1	4.87	299
November 1–25	10	6.3	8.40	417
March 25–31	92	22	40.7	565
April	246	11	93.9	5,590
May	236	31	114	7,010
June	156	8.4	74.6	4,440
July	3.8	.7	1.58	97
August	1.0	.8	.85	52
September	3.0	1.0	2.52	150
1917–18.				
October	12	1.8	5.9	363
November	14	10	12.3	732
March 9–31	76	11	31.5	1,440
April	100	21	44.6	2,650
May	92	40	66.2	4,070
June	42	.8	13.4	797
July	1.8	.7	.86	53
August	1.9	.8	1.09	67
September	3.8	1.0	2.14	127
1918–19.				
October	9.0	3.6	4.41	271
November 1–22	12	9.0	10.4	454
March 16–31	22	8	12.3	390
April	40	7	23.7	1,410
May	23	.1	6.04	371
June	.6	.2	.36	21.4
July	.4	.1	.25	15.4
August	1.0	.0	.17	10.5
September	.6	.1	.42	25.0
1919–20.				
October 1–9	3.0	.3	1.73	30.9
November 1–11	6.9	4.5	5.52	120
March 14–31	100	16	30.7	1,100
April	550	11	91.7	5,460
May	248	92	133	8,180
June	69	1.3	27.4	1,630
July	1.3	.2	.72	44.3
August	1.2	.3	.86	52.9
September	.9	.4	.50	29.8
1920–21.				
October	4.8	1.1	2.06	127
November	11	4.2	7.41	440
March 18–31	49	11	22.5	625
April	37	7.3	17.5	1,040
May	84	13	44.5	2,740
June	32	.4	12.9	768
July	77	.0	5.03	309
August	30	.1	4.14	255
September	1.7	1.0	1.44	86

DEWEESE CREEK NEAR ALCOVA, WYO.

LOCATION.—In sec. 18, T. 27 N., R. 84 W., at Weaver's ranch, near entrance of creek into Pathfinder reservoir, in Carbon County.

DRAINAGE AREA.—41 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—March 4, 1917, to September 30, 1921.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 4.4 second-feet from Deweese Creek above station.

COOPERATION.—Complete records furnished by United States Reclamation Service.

Monthly discharge of Deweese Creek near Alcova, Wyo., for 1917–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
March 4–11	14	0.2	2.93	163
April	14	1.0	7.38	439
May	30	1.5	10.8	664
June	38	14	24.7	1,470
July	14	.1	2.85	175
August	.6	.2	.50	30.7
September	.6	.4	.55	32.7
The period				2,970
1918.				
April	14	1	7.8	464
May	6	1	3.3	203
June	14	1	3.8	226
July	26	1	5.2	320
August	14	1	4.5	277
September	1	1	1.0	60
The period				1,550
1919.				
April	2.7	.2	1.87	111
May	4.6	.2	1.92	118
June	.2	.2	.20	12
July	.2	.1	.11	7
August	.1	.1	.10	6
September	.1	.1	.10	6
The period				260
1920.				
April	26	.1	12.1	720
May	38	8.4	20.2	1,240
June	38	2.7	21.5	1,280
July	2.7	.1	1.94	119
August	.1	.1	.10	6
September	.1	.1	.10	6
The period				3,370
1921.				
April	20	7	14.1	839
May	19	14	14.8	910
June	26	14	15.6	928
July	14	1	5.9	363
August	1	1	1.0	61
September	1	1	1.0	60
The period				3,160

SAND CREEK NEAR ALCOVA, WYO.

LOCATION.—About sec. 25, T. 28 N., R. 85 W., at Weaver's ranch, 20 miles southwest of Alcova, Carbon County. No tributary between station and Pathfinder reservoir, flow line of which is half a mile below.

DRAINAGE AREA.—70 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—March 23, 1915, to September 30, 1921.
GAGE.—Vertical staff.
DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 28 second-feet from Sand Creek, all above station.
COOPERATION.—Complete records furnished by United States Reclamation Service.

Monthly discharge of Sand Creek near Alcova, Wyo., for 1915–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915.				
April	15.2	0.1	4.16	248
May	31.7	0	2.72	167
June	12.0	0	2.37	141
July	2.2	0	.19	11.7
August	5.5	0	.72	44.3
September	12.0	0	7.40	440
The period				1,050
1916.				
April 3–30	24.8	5.2	14.3	851
May	24.8	.7	6.97	429
June	10.2	0	3.88	231
July	.5	0	.39	2.4
August	0	0	0	0
September 1–9	0	0	0	0
The period				1,510
1917.				
April 8–30	22	5.4	11.2	511
May	27	0	12.7	781
June	30	2.5	19.8	1,180
July	.9	0	.11	6.8
August	.3	.1	.16	9.8
September	.5	.3	.47	28.0
The period				2,520
1918.				
April	11	2	3.6	214
May	6	0	4.5	277
June	21	0	4.3	256
July	4	2	2.5	154
August	16	2	3.4	209
September	2	2	2.0	119
The period				1,230
1919.				
April	11.4	3.7	5.32	317
May	6.6	0	2.13	131
June	0	0	0	0
July	0	0	0	0
August	0	0	0	0
September	0	0	0	0
The period				448
1920.				
April	59	1.0	7.53	448
May	12	1.0	2.95	181
June	4.9	.1	3.25	193
July	.2	.1	.10	6
August	1.3	.1	.94	58
September	.2	.2	.20	12
The period				898
1921.				
April	12	4	5.9	351
May	12	5	11.1	682
June	12	7	11.2	666
July	7	0	3.8	234
August	0	0	0	0
September	1	0	.9	54
The period				1,990

CANYON CREEK NEAR ALCOVA, WYO.

LOCATION.—About sec. 2, T. 28 N., R. 84 W., at Irvine's ranch, 12 miles southwest of Alcova, in Carbon County. No tributary between station and Pathfinder reservoir, flow line of which is 1 mile below.

DRAINAGE AREA.—54 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—April 1, 1915, to September 30, 1921.

GAGE.—Vertical staff.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 4 second-feet from Canyon Creek and 15 second-feet from tributaries entering above.

COOPERATION.—Complete records furnished by United States Reclamation Service.

Monthly discharge of Canyon Creek near Alcova, Wyo., for 1915–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915.				
April	10.4	1.2	4.36	259
May	5.1	0	1.67	103
June	22.6	.3	5.03	299
July	3.5	0	.22	13.5
August	25.1	0	1.66	102
September	127	.7	8.66	515
The period				1,290
1916.				
March 5–31	62	5.7	18.6	996
April	15.7	7.0	9.75	580
May	10.9	1.2	4.41	271
June	.6	0	.14	8.3
July	0	0	0	0
August	1.1	0	.11	6.8
September	2.2	.5	1.26	75
The period				1,940
1917.				
March	52	3.0	7.44	457
April	77	8.0	29.4	1,750
May	40	6.1	17.1	1,050
June	29	.1	6.95	414
July	.3	0	.19	11.7
August	.3	0	.15	9.2
September	.5	.1	.38	22.6
The period				3,710
1917–18.				
October 1–21	2	.4	.69	28.7
April	26	5	12.7	756
May	20	1	10.7	658
June	130	1	9.4	559
July	28	1	4.0	246
August	1	0	.5	30.7
September	3	0	1.0	59.5
1919.				
April	9.4	3.1	6.27	373
May	5.1	.1	1.85	114
June	7.7	0	.54	32
July	1.1	0	.18	11
August	0	0	0	0
September	1.5	0	.20	12
The period				542
1920.				
April	236	7.2	72.5	4,310
May	286	5.9	67.2	4,130
June	7.2	.4	3.04	181
July	3.2	0	1.92	118
August	2.9	0	.54	33
September	3.4	2.4	2.68	159
The period				8,930

Monthly discharge of Canyon Creek near Alcova, Wyo., for 1915–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1921.				
April	11	4	7.0	417
May	11	1	4.1	252
June	4	1	1.2	71
July	1	0	.9	55
August	2	1	1.1	68
September	1	1	1.0	60
The period				923

HORSE CREEK NEAR ALCOVA, WYO.

LOCATION.—About sec. 22, T. 30 N., R. 85 W., at highway bridge near Bothwell's ranch, 16 miles west of Alcova, Natrona County. No tributary between station and Pathfinder reservoir, flow line of which is half a mile below.

DRAINAGE AREA.—119 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—March 23, 1915, to September 30, 1921.

GAGE.—Vertical staff at right bank at lower side of bridge.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 11 second-feet from Horse Creek, all above station.

COOPERATION.—Complete records furnished by United States Reclamation Service.

Monthly discharge of Horse Creek near Alcova, Wyo., for 1915–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915.				
March 23–31	10.8	4.1	7.04	126
April	10.2	1.7	3.32	198
May	6.6	.6	1.76	108
June	7.8	.6	2.28	136
July	1.1	.6	.82	50.4
August	32.7	.9	7.62	469
September	31.8	1.1	8.82	525
The period				1,610
1916.				
March 18–31	66.1	3.9	30.2	839
April	13.6	.4	3.53	210
May	1.7	.4	.84	51.6
June	1.7	.4	.72	42.8
The period				1,140
1917.				
March 21–31	119	10	36.9	805
April	62	.7	13.7	815
May	7	.2	.72	44.3
June	.4	.3	.31	18.4
July	.6	.4	.49	30.1
August	.7	.6	.64	39.4
September	.7	.7	.70	41.7
The period				1,790
1917–18.				
October 1–27	.8	.7	.8	43
April	62	1	15.3	910
May	2	1	1.0	61
June	32	1	3.0	179
July	1	1	1.0	61
August	1	1	1.0	61
September	2	1	1.5	89

Monthly discharge of Horse Creek near Alcova, Wyo., for 1915–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
April	13.6	2.2	5.46	325
May	2.2	1.0	1.19	73
June	1	1	1.0	60
July	1	1	1.0	61
August	1	1	1.0	61
September	1	1	1.0	60
The period				640
1920.				
April	60	7.1	23.4	1,400
May	60	4.6	24.6	1,510
June	4.6	3.0	4.05	241
July	2.5	2.0	2.08	128
August	3	2	2.4	148
September	3	3	3.0	179
The period				3,610
1921.				
April	3	2	2.4	143
May	4	2	2.9	178
June	30	4	6.3	375
July	3	3	3.0	184
August	3	3	3.0	184
September	3	3	3.0	179
The period				1,240

HORSE CREEK.

HORSE CREEK NEAR LAGRANGE, WYO.

LOCATION.—In SW. ¼ SW. ¼ sec. 34, T. 20 N., R. 61 W., 2 miles southeast of Wye-Cross ranch and 1½ miles northwest of Lagrange, in Goshen County. Nearest tributary, Bear Creek, enters 2 miles below.

DRAINAGE AREA.—683 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—November 1, 1915, to March 31, 1920.

GAGE.—Gurley water-stage recorder on left bank 200 yards below Sherrod's ranch house.

EXTREMES OF DISCHARGE.—1916–1920: Maximum stage recorded, 3.3 feet at 9 p. m. June 22, 1918 (discharge, 366 second-feet); minimum stage, 0.75 foot at 10.30 p. m. July 12, 1916 (discharge, 5.5 second-feet).

DIVERSIONS.—Prior to July 1, 1919, adjudicated permits for diversions of 1,176 second-feet from Horse Creek above station and 84 second-feet below.

ACCURACY.—Gage heights from continuous record. Rating curves well defined. Records excellent except for periods affected by ice, for which they are fair.

Monthly discharge of Horse Creek near Lagrange, Wyo., for 1916–1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915–16.				
November	64	40	51.2	3,050
December	64	27	49.9	3,070
January	59	32	43.0	2,640
February	85	32	59.3	3,410
March	70	51	57.6	3,540
April	48	9	25.9	1,540
May	13	9	10.7	658
June	10	7	8.6	512
July	11	6	7.1	438
August	14	8	10.9	670
September	15	10	13.7	816
The period	85	6	30.6	20,300

Monthly discharge of Horse Creek near Lagrange, Wyo., for 1916–1920—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916–17.				
October	24	9	17.6	1,080
November	37	14	25.0	1,490
December	37	23	30.0	1,840
January	35	20	28.4	1,750
February	77	22	43.3	2,400
March	80	28	56.3	3,460
April	59	14	27.5	1,640
May	320	12	78.2	4,810
June	332	17	127	7,560
July	39	13	21.3	1,310
August	41	9	22.0	1,350
September	57	34	40.6	2,420
The year	332	9	42.9	31,100
1917–18.				
October	46	37	41.1	2,530
November	44	11	20.6	1,230
December	25	9	15.4	947
January	25	11	19.5	1,200
February	92	25	56.2	3,120
March	81	47	64.1	3,940
April	58	38	47.7	2,840
May	35	11	21.0	1,290
June	114	11	30.4	1,810
July	73	14	30.3	1,860
August	60	20	39.3	2,420
September	58	38	45.2	2,690
The year	114	9	35.7	25,900
1918–19.				
October	50	44	46.8	2,880
November	56	20	44.2	2,630
December 1–14	57	35	48.0	1,330
February	58	25	43.3	2,400
March	58	29	49.7	3,060
April	64	38	52.5	3,120
May	34	7	12.9	793
June 1–14	12	10	10.7	297
1919–20.				
November 1–10	23	.7	11.8	234
January	62	30	48.0	2,950
February	55	29	43.2	2,480
March	64	40	48.3	2,970

MINOR STREAMS ENTERING THE NORTH PLATTE.

BATES CREEK NEAR CASPER, WYO.

LOCATION.—About sec. 12, T. 31 N., R. 82 W., near mouth of creek and 17 miles southwest of Casper, Natrona County.

DRAINAGE AREA.—383 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—April 10, 1916, to September 30, 1921.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 74 second-feet from Bates Creek and 26 second-feet from tributaries, all above station.

COOPERATION.—Complete records furnished by United States Reclamation Service.

Monthly discharge of Bates Creek near Casper, Wyo., for the years 1916–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916.				
April 10–30	135	49	75.7	3,150
May	42	0	5.21	320
June	0	0	0	0
July	300	0	10.3	633
August	38	.5	5.13	315
September	9	.5	.82	48.8
The period	300	0	13.0	4,470
1917.				
April	371	8	118	7,020
May	181	24	114	7,010
June	114	.3	38.7	2,300
July	4	.2	.53	32.6
August	.3	.0	.11	6.8
The period				16,400
1918.				
April 16–30	113	40	67.4	2,010
May	340	0	111	6,820
June	4	0	.6	36
July	113	1	10.5	646
August	1	1	1.0	61
September	1	1	1.0	60
The period				9,630
1919.				
April	319	9	53.8	3,200
May	50	0	5.3	326
June	0	0	0	0
July	0	0	0	0
August	0	0	0	0
September	0	0	0	0
The period				3,530
1920.				
April	425	3	171	10,200
May	1,730	165	598	36,800
June	165	1	33.9	2,020
July	26	0	2.6	160
August	0	0	0	0
September	0	0	0	0
The period				49,200
1921.				
April	74	2	16.7	994
May	200	0	46.3	2,850
June	425	0	16.9	1,010
July	83	0	3.6	221
August	0	0	0	0
September	0	0	0	0
The period				5,080

DEER CREEK AT GLENROCK, WYO.

LOCATION.—In sec. 4, T. 33 N., R. 75 W., near mouth of creek at Glenrock, in Converse County.

DRAINAGE AREA.—63 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—April 11, 1916, to May 11, 1921.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 49 second-feet from Deer Creek and 45 second-feet from tributaries, all above station.

COOPERATION.—Complete records furnished by United States Reclamation Service.

Monthly discharge of Deer Creek at Glenrock, Wyo., for 1916–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916.				
April 11–30	439	280	379	15,000
May	436	147	253	15,600
June	140	.5	32.8	1,950
July	132	.3	5.74	353
August	.2	.2	.20	12.3
September	.3	.2	20	11.9
The period	439	.2	95.9	32,900
1917.				
April	1,110	205	535	31,800
May	1,350	166	625	38,400
June	603	80	259	15,400
July	73	3	18.7	1,150
August	3	2	2.5	152
September	5	4	4.7	278
The period				87,200
1918.				
April 14–30	1,050	67	336	11,300
May 1–11	1,270	350	854	18,600
1919.				
April	540	6	201	12,000
May	323	98	201	12,400
June	104	1	42.9	2,550
July	0	0	0	0
August	2	0	.52	32
September	5	2	3.5	208
The period				27,200
1920.				
April	488	4	97.1	5,780
May	2,030	77	1,100	67,600
June	127	1	35.4	2,110
July	44	1	9.7	596
August	4	1	1.7	105
September	10	3	4.5	268
The period				76,500
1921.				
April	314	44	164	9,760
May	480	12	258	15,900
June	205	8	65.3	3,890
July	3	1	1.1	68
August	1	1	1.0	61
September	1	1	1.0	60
The period				29,700

BOXELDER CREEK NEAR CAREYHURST, WYO.

LOCATION.—About sec. 7, T. 33 N., R. 73 W., near mouth of creek, 1½ miles east of Careyhurst, Converse County.

DRAINAGE AREA.—193 square miles (measured on base map of Wyoming; scale, 1: 500,000).

RECORDS AVAILABLE.—May 17 to October 31, 1911; April 9, 1916, to September 30, 1921.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 80 second-feet from Boxelder Creek and 52 second-feet from tributaries, all above station.

COOPERATION.—Beginning in 1916, complete records furnished by United States Reclamation Service.

Monthly discharge of Boxelder Creek near Careyhurst, Wyo., for 1911, 1916–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
May 17–31	105	54	75.5	2,250
June	126	1.5	38.6	2,300
July	20	0	1.84	113
August	1.5	0	.07	4
September	.0	0	.0	0
The period				4,670
October	20	0	7.92	487
1916.				
April 9–30	237	124	191	8,330
May	222	70	155	9,530
June	70	4.5	16.1	958
July	4.5	4.5	4.5	277
August	4.5	4.5	4.5	277
September	4.5	4.5	4.5	268
The period	237	4.5	56.5	19,600
1917.				
April	423	21	104	6,190
May	1,150	107	545	33,500
June	870	29	365	21,700
July	25	4	9.6	590
August	4	3	3.5	215
September	4	3	3.4	202
The period				62,400
1918.				
April	285	64	123	7,320
May	807	161	414	25,500
June	258	4	74.5	4,430
July	4	4	4.0	246
August	4	4	4.0	246
September	4	4	4.0	238
The period				38,000
1919.				
April	248	9	75.9	4,520
May	119	4	34.4	2,120
June	4	4	4.0	238
July	4	4	4.0	246
August	4	4	4.0	246
September	4	4	4.0	238
The period				7,610
1920.				
April	282	4	76.9	4,580
May	1,420	102	759	46,700
June	477	12	143	8,510
July	12	4	4.8	295
August	4	4	4.0	246
September	4	4	4.0	238
The period				60,600
1921.				
April	111	23	52.4	3,120
May	397	111	265	16,300
June	297	5	42.0	2,500
July	111	5	14.2	873
August	9	5	5.4	332
September	5	5	5.0	298
The period				23,400

LA PRELE CREEK NEAR DOUGLAS, WYO.

LOCATION.—In sec. 6, T. 31 N., R. 73 W., just above high-water line of La Prele reservoir, 16 miles southwest of Douglas, Converse County. Nearest tributary, an unnamed stream 1 mile above.

DRAINAGE AREA.—136 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—August 25, 1919, to September 30, 1921.

GAGE.—Gurley water-stage recorder on right bank.

EXTREMES OF DISCHARGE.—1920–1921: Maximum stage from high-water mark of May 11, 1920, 11.4 feet (discharge, 1,220 second-feet); minimum stage, 3.29 feet on October 2, 1919 (discharge, 0.4 second-foot).

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 42 second-feet from La Prele Creek above station and 51 second-feet from tributaries above. Below station, diversions of 36 second-feet from creek.

ACCURACY.—Gage heights from continuous record. Rating curves fairly well defined. Records good except during winter, for which they are fair.

Monthly discharge of La Prele Creek near Douglas, Wyo., for 1919–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
August 25–31	0.5	0.3	0.37	5
September	.5	.3	.42	25
1919–20.				
October	5.0	.4	1.81	111
November	6.7	2.0	5.25	312
December	8	1	2.90	178
January	10	2	5.74	353
February	15	1.1	6.63	381
March	18	1.0	10.3	633
April	134	11	69.4	4,130
May	900	205	511	31,400
June	312	10	75.9	4,520
July	17	6	10.5	646
August	8	2.6	4.54	279
September	6	3.4	4.63	276
The year	900	.4	59.5	43,200
1920–21.				
October	9.7	3.9	5.83	358
November	10.0	7.0	8.48	505
December	.....	.....	8.1	498
January	.....	.....	12.3	756
February	.....	.....	11.8	655
March	38	9.0	16.2	996
April	134	17	40.3	2,400
May	355	114	167	10,300
June	114	19	46.3	2,760
July	26	3.4	9.53	586
August	12	2.0	4.60	283
September	2.9	1.4	2.02	120
The year	355	1.4	27.9	20,200

LA PRELE CREEK NEAR FETTERMAN, WYO.

LOCATION.—About sec. 9, T. 33 N., R. 72 W., near mouth of creek 4 miles from Fetterman, in Converse County.

DRAINAGE AREA.—227 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—April 23 to August 5, 1916; April 1 to September 30, 1918.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 73 second-feet from La Prele Creek, all above station.

COOPERATION.—Complete records furnished by United States Reclamation Service.

Monthly discharge of La Prele Creek near Fetterman, Wyo., for 1916 and 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916.				
April 23-30	62	25	38.1	605
May	118	62	101	6,210
June	71	5.0	12.9	768
July	25	3.7	6.65	409
August 1-5	3.7	3.0	3.26	32.3
The period	118	3.0	38.4	8,020
1918.				
April	54	8	19.3	1,150
May	437	70	197	12,100
June	122	4	27.6	1,640
July	18	6	8.7	535
August	6	2	3.4	209
September	6	2	3.5	208
The period				15,800

WAGON HOUND CREEK NEAR LABONTE, WYO.

LOCATION.—About sec. 16, T. 31 N., R. 71 W., near mouth of creek at Eastman's ranch, 3 miles east of Labonte, Converse County.

DRAINAGE AREA.—145 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—April 11, 1916, to September 30, 1921.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 25 second-feet from Wagon Hound Creek and 12 second-feet from tributaries, all above station.

COOPERATION.—Complete records furnished by United States Reclamation Service.

Monthly discharge of Wagon Hound Creek near Labonte, Wyo., for 1916–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916.				
April	99.5	8.5	58.7	2,330
May	40.0	.2	5.76	354
June	5.5	1.0	1.28	76.2
July	69.0	1.0	3.90	240
August	5.5	1.0	1.15	70.7
September	1.0	.2	.23	13.7
The period	99.5	.2	8.99	3,080
1917.				
April 17-30	165	48	109	3,020
May	342	92	197	12,100
June	221	3	64.2	3,820
July	3	1	1.45	89
August	.2	.2	.20	12.3
September	.2	.2	.20	11.9
The period				19,100
1918.				
April	141	28	64.1	3,810
May	87	0	36.6	2,250
June	96	0	4.4	262
July	96	0	4.5	277
August	141	0	5.6	344
The period				6,940

Monthly discharge of Wagon Hound Creek near Labonte, Wyo., for 1916–1921—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
April	122	5	36.7	2,180
May	20	0	1.77	109
June	2	0	37	22
July	29	0	.94	58
August	1	0	.03	2
September	0	0	0	0
The period				2,370
1920.				
April	359	5	108	6,430
May	907	19	462	28,400
June	311	1	22.4	1,330
July	5	1	3.1	191
August	138	1	10.3	633
September	1	1	1.0	60
The period				37,000
1921.				
April	72	1	13.8	821
May	367	5	44.3	2,720
June	97	7	27.2	1,620
July	79	1	4.4	271
August	1	1	1.0	61
September	1	1	1.0	60
The period				5,550

LABONTE CREEK NEAR LABONTE, WYO.

LOCATION.—About sec. 15, T. 31 N., R. 71 W., at Soden's ranch near mouth of creek, 2 miles east of Labonte, in Converse County.

DRAINAGE AREA.—270 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—April 12, 1916, to September 30, 1921.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 43 second-feet from Labonte Creek and 16 second-feet from tributaries, all above station.

COOPERATION.—Complete records furnished by United States Reclamation Service.

Monthly discharge of Labonte Creek near Labonte, Wyo., for 1916–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916.				
April	343	269	309	11,600
May	257	68	152	9,350
June	61	1.6	22.8	1,360
July	4.0	1.5	1.59	97.8
August	1.5	1.0	1.35	83.0
September	.8	.3	.54	32.1
The period	343	.3	66.2	22,500
1917.				
April 6–30	635	37	239	11,900
May	1,750	242	805	49,500
June	1,120	36	425	25,300
July	29	0	6.1	375
August	1	0	.3	18.4
September	1	0	.3	17.9
The period				87,100

Monthly discharge of Labonte Creek near Labonte, Wyo., for 1916–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918.				
April	595	195	342	20,400
May	697	113	391	24,000
June	122	10	43.6	2,590
July	130	5	22.6	1,390
August	75	0	3.4	209
September	2	0	1.0	60
The period				48,700
1919.				
April	381	30	162	9,640
May	226	2	64	3,960
June	683	1	30.4	1,810
July	309	1	18.9	1,160
August	28	1	5.1	314
September	1	1	1.0	60
The period				16,900
1920.				
April	355	20	161	9,580
May	2,500	355	1,070	65,800
June	315	45	113	6,720
July	103	45	58.4	3,590
August	70	55	58.9	3,620
September	70	5	15.0	893
The period				90,200
1921.				
April	305	37	123	7,320
May	411	124	233	14,300
June	124	31	81.0	4,820
July	51	12	18.5	1,140
August	14	3	9.0	553
September	9	9	9.0	536
The period				28,700

HORSESHOE CREEK NEAR GLENDO, WYO.

LOCATION.—About sec. 26, T. 29 N., R. 68 W., at Hauf's ranch, near mouth of creek 4 miles southeast of Glendo, in Platte County.

DRAINAGE AREA.—203 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—April 16, 1916, to September 30, 1919; April 1 to September 30, 1921.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 86 second-feet from Horseshoe Creek and 6 second-feet from tributaries, all above station.

COOPERATION.—Complete records furnished by United States Reclamation Service.

Monthly discharge of Horseshoe Creek near Glendo, Wyo., for 1916–1919, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916.				
April 16–30	134	113	122	3,630
May	102	19	28.9	1,780
June	19	3.0	5.85	348
July	3.0	2.5	2.65	163
August	2.5	2.4	2.43	149

Monthly discharge of Horseshoe Creek near Glendo, Wyo., for 1916–1919, 1921—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
April	232	24	118	7,020
May	1,040	123	455	28,000
June	943	45	356	21,200
July	45	12	23.1	1,420
August	9	2	4.5	277
September	2	2	2.0	119
The period				58,000
1918.				
April	200	27	127	7,560
May	257	82	174	10,700
June	290	2	86.9	5,170
July	2	0	.5	31
August	0	0	0	0
September	0	0	0	0
The period				23,500
1919.				
April	161	5	99.1	5,900
May	122	14	56.9	3,500
June	12	0	1.8	107
July	141	0	6.0	369
August	0	0	0	0
September	0	0	0	0
The period				9,880
1921.				
April	97	7	42.8	2,550
May	230	41	107	6,580
June	740	35	125	7,440
July	41	1	7.2	443
August	1	1	1.0	61
September	1	1	1.0	60
The period				17,100

COTTONWOOD CREEK NEAR WENDOVER, WYO.

LOCATION.—About sec. 16, T. 27 N., R. 67 W., near mouth of creek, 1½ miles south of Wendover, in Platte County.

DRAINAGE AREA.—150 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—April 19, 1916, to September 30, 1921.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 32 second-feet from Cottonwood Creek and 4 second-feet from tributaries, all above station.

COOPERATION.—Complete records furnished by United States Reclamation Service.

Monthly discharge of Cottonwood Creek near Wendover, Wyo., for 1916–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916.				
April 19–30	23.8	4.6	13.8	328
May	11.7	3.5	5.90	363
June	150	5.0	11.9	708
July	5.0	3.7	3.94	242
August	62.6	.9	3.54	218
September	2.0	1.3	1.73	103
The period	150	.9	5.99	1,960

Monthly discharge of Cottonwood Creek near Wendover, Wyo., for 1916–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
April 5–30	22.8	4.4	9.36	482
May	445	24	152	9,350
June	340	11	112	6,660
July	18	2.0	4.97	306
August	2.4	1.8	2.10	129
September	3.0	2.2	2.53	151
The period				17,100
1918.				
April	36	3	8.5	506
May	117	6	25.1	1,540
June	106	4	20.8	1,240
July	7	2	4.3	264
August	7	2	2.2	135
September	2	2	2.0	119
The period				3,800
1919.				
April	3.8	2.6	3.00	179
May	3.5	3.2	3.41	210
June	3.5	.2	1.86	111
July	.2	.2	.20	12
August	.2	.2	.20	12
September	.2	.2	.20	12
The period				536
1920.				
April	27	2	2.8	16
May	396	14	145	8,920
June	15	3	6.5	387
July	4	2	3.4	209
August	116	2	5.8	357
September	2	2	2.0	119
The period				10,200
1921.				
April	3	1	1.9	113
May	184	2	8.5	523
June	427	12	113	6,720
July	9	1	3.1	191
August	2	1	1.4	86
September	7	3	6.1	363
The period				8,000

IRRIGATION.

PRESENT DEVELOPMENT.

COLORADO.

In North Park, Colo., which embraces the headwater portion of the basin, the North Platte and its headwater streams are used to irrigate the pastures and hay meadows that occupy the greater part of all the stream valleys. Owing to the high altitude of the park (7,800 feet) the growing season is short, and irrigation is confined chiefly to native hay and pasturage. The summer range in the forests is almost entirely utilized, and the further expansion of the stock-raising industry will depend upon additional forage crops. Extensions and enlargements of ditches are gradually covering the

sagebrush bench lands, which are turned into meadows by a heavy application of water for several years. Bottom meadow lands comprise 70,000 acres of the 110,000 acres irrigated in 1921.

WYOMING.

It is impossible to state accurately the area irrigated in the Wyoming part of the basin, as no actual survey has been made. An idea of the extent of irrigation may be obtained from the following table:

Areas covered by adjudicated ditches and completed ditches not yet adjudicated in North Platte basin, exclusive of the Laramie, in Wyoming, in acres.

[Compiled from Fourteenth Biennial Report of State engineer.]

Stream.	Adjudicated (including territorial rights).	Completed but not adjudicated.	Total.
North Platte River	34,356	24,190	58,546
Big Creek and tributaries	8,525	872	9,397
French Creek and tributaries	663	12	675
Brush Creek and tributaries	9,532	10,465	19,997
Beaver Creek and tributaries	5,312	1,486	6,798
Encampment River and tributaries	9,095	787	9,882
Spring Creek and tributaries	15,554	4,683	20,237
Jack Creek and tributaries	7,763	330	8,093
Pass Creek and tributaries	15,422	928	16,350
Medicine Bow	19,163	1,044	20,207
Rock Creek and tributaries	68,466	2,369	70,835
Little Medicine Bow and tributaries	36,130	3,398	39,528
Sweetwater and tributaries	19,438	12,411	31,849
Bates Creek and tributaries	6,450	6,166	12,616
Muddy Creek and tributaries	7,076	518	7,594
Deer Creek and tributaries	5,598	3,719	9,317
Boxelder Creek and tributaries	7,950	2,846	10,796
La Prele Creek and tributaries	7,924	38,288	46,212
Labonte Creek and tributaries	5,559	2,009	7,568
Horseshoe Creek and tributaries	5,705	822	6,527
Cottonwood Creek and tributaries	2,332	293	2,625
Rawhide Creek and tributaries	4,355	1,877	6,232
Horse Creek and tributaries	18,637	5,127	23,764
	321,005	124,640	445,645

The largest area is near Saratoga and comprises valley lands of the North Platte and its tributaries. Other large areas are in the valleys of the Medicine Bow and its tributaries and in the lower North Platte Valley near the State line.

Most of the irrigation is done by means of individual and cooperative ditches, which divert water directly from the streams without storage. The only projects of any considerable magnitude are the North Platte project of the United States Reclamation Service, the Rock Creek project of the Rock Creek Conservation Co., the La Prele project, the Hawk Springs project, and the High Line or Platte Valley project, which is under construction.

Under the North Platte project the Reclamation Service stores water in the Pathfinder reservoir, in central Wyoming, 50 miles southwest of Casper, and diverts it at the Whalen dam, in T. 26 N., R. 64 W., for irrigation in eastern Wyoming and western Nebraska. The Pathfinder reservoir is formed by the Pathfinder dam, which is

in a deep, narrow gorge 3 miles below the junction of North Platte and Sweetwater rivers. The dam is of the masonry-arch type, 218 feet high and 432 feet long at the crest. A quarter of a mile south of the dam a gap in the river is closed by an earth dike 1,650 feet long, with a maximum height of 40 feet. There is an outlet tunnel driven through granite on each side of the river, and in addition the crest of the dam itself is designed for use as a spillway. The dam backs water up the North Platte for a distance of 20 miles and up the Sweetwater for 15 miles, forming the reservoir, which has an area of 22,700 acres and a capacity of 1,070,000 acre-feet.

The Whalen diversion dam is a concrete weir 300 feet long with a maximum height of 29 feet. At each end of the dam are two sluice gates each 5 feet 9 inches wide and 6 feet high. Beyond the sluice gates and at right angles to the dam are at the north end the headwaters of the Interstate canal and at the south end the Fort Laramie canal. The Interstate canal, which has a capacity of 1,400 second-feet, irrigates 130,000 acres, of which 20,000 acres is in Wyoming. The Fort Laramie canal has a capacity of 1,435 second-feet and is designed to irrigate 100,000 acres in Wyoming and Nebraska. During 1921 the Fort Laramie canal was prepared to irrigate 16,000 acres, all in Wyoming.

The irrigation season on the North Platte project is from April 1 to September 30, and the duty of water is 2.5 acre-feet per acre at the farm. The chief crops are alfalfa, cereals, corn, sugar beets, and potatoes.

The project owned by the Rock Creek Conservation Co. comprises 33,000 acres west of Rock Creek, chiefly in Tps. 21 and 22, R. 76 W. Water is diverted from Rock Creek and its tributaries. One reservoir having a capacity of 2,480 acre-feet has been built, and other reservoirs, the largest of which is Bosler reservoir, are contemplated as required. During 1921, about 3,000 acres was irrigated from this project.

The Douglas Reservoir Co., which acquired the rights of the original company, has a project to irrigate 11,000 acres east of the lower end of La Prele Creek between that stream and the North Platte. A reservoir in secs. 28 and 33, T. 32 N., R. 73 W., having a capacity of 20,000 acre-feet, is formed by a concrete dam of the Ambursen arch type, 135 feet high and 285 feet long. The radius of the crest is 200 feet. During 1921 about 8,000 acres was irrigated. The chief crop is alfalfa.

The Hawk Springs Development Co. has a project covering about 12,000 acres, chiefly in Tps. 21 and 22 N., R. 62 W. Water is diverted from Horse Creek and stored in the Hawk Springs reservoir, which is in secs. 9, 10, 15, and 16, T. 20 N., R. 61 W. Four earth dams ranging in height from 8 to 64 feet and having a combined crest

length of 9,000 feet create a reservoir that has an area of 1,530 acres and a capacity of 19,400 acre-feet. From the reservoir a main supply ditch and laterals irrigate the land. During 1921, 3,000 acres were irrigated.

Construction was begun in 1918 on the High Line or Platte Valley project to reclaim 10,000 acres in the North Platte Valley east of Saratoga. Water is to be diverted from French and Brush creeks, and storage is contemplated in a system of reservoirs either on Brush Creek or adjacent to it. Very little construction work had been done up to 1921.

Between the Pathfinder reservoir and Whalen are nine small pumping plants, six of which are near Casper. The pumps are either electrically driven or operated by gas engines. The duty of the plants ranges from 1 to 1.5 acre-feet to an acre. Several water wheels are used to divert water between Douglas and Guernsey, but they are frequently washed out by high water.

FUTURE DEVELOPMENT.

COLORADO.

The floor of North Park is so level that a large part of it can be irrigated if sufficient water is available, but it is impossible to state the exact amount needed. Two projects, one partly constructed, will irrigate 23,000 acres.

The Jackson County project covers about 11,000 acres lying north of Michigan River in Tps. 8 and 9 N., R. 78 W., and T. 9 N., R. 79 W., which will be irrigated by a recently constructed ditch diverting water from Michigan River in sec. 36, T. 8 N., R. 78 W.

The Walden ditch and reservoir project will irrigate 12,000 acres northwest of Walden, between North Platte and Michigan rivers. Storage is to be provided by a reservoir of 36,000 acre-feet capacity, 2 miles southwest of Walden. The project has been surveyed, but no construction work has been done.

WYOMING.

Investigation by the United States Reclamation Service and the State of Wyoming show the following possible projects:

Possible irrigation projects in Wyoming.

Name.	Location.	Source of water supply.	Area (acres).
Casteel	Both sides of Big Creek	Big Creek	25,000
Saratoga and Encampment.	West side of North Platte north of Spring Creek	North Platte	35,000
Sierra Madre	West of Saratoga	Jack Creek	10,000
Pass Creek flats	Between Lake and Pass creeks	North Platte	35,000
Medicine Bow	West of Medicine Bow	Medicine Bow	15,000
Pumping units	Below Alcova	North Platte	36,000
Casper canal	Vicinity of Casper	do	120,000
			276,000

The Casteel project contemplates the irrigation of 25,000 acres lying on both sides of Big Creek above the area included in the Saratoga and Encampment project. It is proposed to divert water from Big Creek 2 miles above the mouth of the canyon. Storage amounting to 20,000 acre-feet is contemplated.

The Saratoga and Encampment project covers an area west of the North Platte, extending from a point opposite French Creek northwestward to Spring Creek. Water is to be diverted from the east side of North Platte River in or near sec. 17, T. 13 N., R. 80 W., and carried across the river by pipe line above French Creek.

The Sierra Madre project covers land lying southwest of Saratoga between Jack and North Spring creeks. The area susceptible of irrigation from the waters of these creeks comprises 10,000 acres, but as both streams are heavily appropriated storage of flood waters will be necessary. Surveys for the project, which was started under the Carey Act show three reservoir sites known as the Sierra Madre, Matheson, and Canyon sites, of 33,460 acre-feet capacity.

On the Pass Creek flats it is proposed to irrigate 35,000 acres lying between Lake Creek and Pass Creek, just south of Walcott. Of this area 27,000 acres is on the flats and 8,000 acres between Lake Creek and the flats. The point of diversion is on the west side of North Platte River 3 miles above the mouth of Brush Creek.

The Medicine Bow project will irrigate 15,000 acres south of the Union Pacific Railroad near Medicine Bow. The water supply is to be diverted from Medicine Bow River in or near sec. 11, T. 20 N., R. 80 W. and stored in the proposed Halleck reservoir.

Between the Pathfinder reservoir and the Whalen dam 10 pumping units are proposed to irrigate 36,000 acres.

The State engineer has surveyed a possible project in the vicinity of Casper. From a point of diversion near Alcova it is proposed to construct a canal leading north to Casper Creek and thence eastward nearly to the North Platte, irrigating all the arable land between the canal and the river. The area covered by the proposed canal is about 120,000 acres.

WATER SUPPLY.

MEDIAN YEAR.

For determining the discharge of North Platte River for the median year records at Pathfinder since 1904 are available. The Reclamation Service, which compiled the records, has corrected them for storage since 1909, when the Pathfinder reservoir first stored water.

Yearly discharge of North Platte River, 1904–1921, and percentage to discharge of median year.

Year.	Total (acre-feet).	Percentage of median year (1906).	Year.	Total (acre-feet).	Percentage of median year (1906).
1904	1,160,000	84	1913	1,200,000	86
1905	1,190,000	86	1914	1,560,000	112
1906	1,390,000	100	1915	891,000	64
1907	1,790,000	129	1916	1,240,000	89
1908	910,000	65	1917	2,380,000	171
1909	2,430,000	175	1918	1,540,000	111
1910	854,000	61	1919	857,000	62
1911	1,150,000	83	1920	1,870,000	134
1912	1,880,000	135	1921	1,780,000	128

WATER AVAILABLE FOR IRRIGATION.

The record at the diversion dam at Whalen shows the discharge available for irrigation under the Reclamation Service project and also for the use of canals in Nebraska. Although Laramie River enters the North Platte below Whalen, it can not be counted upon to supply water for Nebraska irrigators, as existing systems when fully developed will take practically the entire discharge. All the future irrigation development described will divert water above Whalen, and the effect will be measured at that point.

Owing to storage in the Pathfinder reservoir, the mean flow rather than the median flow at Whalen will represent the discharge available for irrigation. The mean of the 12-year record above Whalen (1910 to 1921) is 1,620,000 acre-feet. The mean for the period 1904 to 1921, as shown by the Pathfinder records, is 101 per cent of the mean for 1910–1921, or 1,630,000 acre-feet above Whalen.

EFFECT OF FURTHER DEVELOPMENT.

If the projects above outlined are completed, the irrigated area will be increased by 23,000 acres in Colorado and 276,000 acres in Wyoming, or 299,000 acres in all. With a consumptive duty of 1.5 acre-feet to an acre, the mean discharge above Whalen will be reduced 450,000 acre-feet, or to 1,180,000 acre-feet.

TRANSMOUNTAIN DIVERSIONS.

Two ditches divert water from that part of the North Platte basin not drained by Laramie River—the Rist & McNab ditch, owned by the North Poudre Irrigation Co., and the Cameron Pass ditch, owned by the Water Supply & Storage Co.

The Rist & McNab ditch is 2½ miles long and has a capacity of 50 second-feet. It diverts water from Middle Fork of Michigan River at an elevation of 10,300 feet in sec. 12, T. 6 N., R. 76 W., and carries it over Cameron Pass into Joe Wright Creek, a tributary of the Cache la Poudre flowing through Chambers Lake. The area

intercepted by the ditch is 3.7 square miles ranging in altitude from 10,300 to 12,800 feet. The Cameron Pass ditch, which has a capacity of 10 second-feet, diverts water from the tributaries of Middle Fork in sec. 2, T. 6 N., R. 76 W., and parallels the Rist & McNab ditch across Cameron Pass to Joe Wright Creek. The drainage area intercepted is very small.

Other transmountain diversions have been considered but have not been built, because of the small drainage area available and the heavy cost of construction.

The following table shows the annual amount diverted by the Rist & McNab ditch. The original records represent average weekly flow, and although they do not have a high degree of accuracy they are believed to be fairly accurate. The Cameron Pass ditch diverts about 300 acre-feet annually.

Annual amount diverted by Rist & McNab ditch, in acre-feet.

1905..... 861	1911..... 2,840	1917..... 713
1906..... 1,920	1912..... 4,750	1918..... 2,660
1907..... 3,980	1913..... 3,750	1919..... 2,660
1908..... 4,120	1914..... 2,440	1920..... 3,840
1909..... 3,750	1915..... 2,270	1921..... 2,720
1910..... 2,310	1916..... 6,500	Mean..... 3,060

WATER POWER.

DEVELOPED POWER.

Except for a small amount of power used to operate the gates at the Pathfinder dam, the only developed power on North Platte River is that of the plant of the United States Reclamation Service near Lingle. The old plant formerly in operation on Encampment River at Encampment has been dismantled.

The Lingle plant, which was built to furnish power for excavating the canals on the North Platte project, has been retained permanently and furnishes light and power to Lingle and Torrington, Wyo., and Morrell and Mitchell, Nebr., all project towns. The power plant, in sec. 25, T. 25 N., R. 62 W., 2 miles southwest of Lingle, receives water from the Fort Laramie irrigation canal. A 54-inch wood-stave pipe of 150 second-feet capacity supplies water to two 24-inch Trump wheels developing 450 horsepower each under a 110-foot head. Each turbine is direct connected to a 375-kilovolt-ampere Allis-Chalmers generator at 2,300 volts. The power is transmitted at 33,000 volts by 52 miles of single-circuit line.

UNDEVELOPED POWER.

NORTH PLATTE RIVER.

Profile of river.—The following table has been compiled from topographic maps and other sources:

Elevations and distances along North Platte River from source to mouth.

Point on river.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From source.	Point to point.		Total.	Per mile.
Source of North Fork, near Red Elephant Mountain	0	.....	11,000	.....	.....
Boetcher ranch	9	9	8,310	2,690	300
Highway bridge west of Cowdrey	37	28	7,870	440	16
Mouth of Canadian River	39	2	7,850	20	10
Mouth of Douglas Creek	64	25	7,410	440	18
Mouth of Mullen Creek	69	5	7,370	40	8
Mouth of Big Creek	74	5	7,300	70	14
Mouth of Brush Creek	90	16	7,050	250	16
Saratoga	102	12	6,775	275	23
Mouth of Jack Creek	108	6	6,730	45	8
Mouth of Pass Creek	136	28	6,550	180	8
Fort Steele	145	9	6,470	80	9
Sec. 33, T. 23 N., R. 84 W	184	39	6,330	140	4
Sec. 35, T. 24 N., R. 84 W	196	12	6,280	50	4
Mouth of Medicine Bow River	201	5	6,240	40	8
Sec. 10, T. 24 N., R. 84 W	203	2	6,230	10	5
Line between secs. 9 and 16, T. 25 N., R. 85 W., head of canyon	213	10	6,180	50	5
	215	2	6,162	18	9
Head of upper falls in Seminoe Canyon	217	2	6,016	146	73
Foot of lower falls in Seminoe Canyon	.....	½	5,945	71	.....
Upper end Pathfinder reservoir (sec. 9, T. 26 N., R. 84 W.)	221	4	5,850	95	24
Spillway of Pathfinder dam	239	18	5,850	0	0
Water level at foot of dam	239	0	5,665	185	.....
Alcova	255	16	5,330	335	21
Mouth of Coal Creek	281	26	5,195	135	5
Casper	297	16	5,110	85	5
Glenrock	325	28	5,000	110	4
Douglas	358	33	4,800	200	6
Orin Junction	376	18	4,680	120	7
Cassa	405	29	4,480	200	7
Guernsey	431	26	4,350	130	5
Mouth of Laramie River	449	18	4,210	140	8
Mouth of Boxelder Creek	472	23	4,080	130	6
Wyoming-Nebraska line	480	8	4,040	40	5
Bridge north of Gering	506	26	3,870	170	7
Bridgeport	536	30	3,680	190	6
Bridge south of Oshkosh	573	37	3,370	310	8
Bridge north of Ogalalla	609	36	3,145	225	6
Mouth of Birdwood Creek	645	36	2,915	230	6
Junction with South Platte	667	22	2,760	155	7

A study of this table shows that the heaviest fall is in Seminoe Canyon, the possibilities of which are discussed on page 197. Between the mouth of Big Creek and Saratoga, a distance of 28 miles, there is a total fall of 525 feet. As the river flows through a canyon or narrow valley for the greater part of that distance, it is impossible to equalize the flow by storage, so that only the natural run-off would be available for power. This run-off frequently drops to 250 second-feet or even less in winter at the lower end of the section, as shown by the Saratoga records.

Below the Pathfinder reservoir there is a fall of about 335 feet from the foot of the Pathfinder dam to Alcova, a distance of 16 miles. As the Pathfinder reservoir is operated wholly in the interest of irrigation, and as practically all the flow is stored during the winter, it is impracticable to generate power at this site.

From Alcova to the mouth of the river in Nebraska the fall ranges between 4 and 8 feet to a mile, which is too slight to permit any except low-head developments.

Without storage the value for power of the North Platte is small, as the fall is inadequate to develop any considerable amount of power by direct diversion. With storage, two opportunities are afforded for the development of a great amount of power—one in North Park, Colo., and the other in Seminoe Canyon, south of the Pathfinder reservoir, in Wyoming. Both sites have been surveyed in more or less detail, enabling a detailed study of storage to be made.

North Park.—The North Park reservoir site lies in Jackson County, Colo., just south of the Colorado-Wyoming line. It was surveyed by the State of Wyoming in 1916. A dam 220 feet high and 850 feet long in sec. 26, T. 12 N., R. 80 W., would form a reservoir having a capacity of 1,500,000 acre-feet.

The report of this survey states that if the outlet of the reservoir were placed at an elevation of 200 feet, a conduit leading to a power-house site at the mouth of Big Creek, where a static head of 650 feet would be available, could be constructed through the Big Creek divide. In this plan only the capacity of the reservoir above 200 feet, amounting to 460,000 acre-feet, would be available for storage.

A mass curve was constructed from the flow of the North Platte at the dam site for the 11-year period 1911 to 1921 and shows that with a maximum storage of 350,000 acre-feet the following uniform rates of flow could have been maintained, allowance being made for evaporation losses:

Uniform rates of flow at North Park reservoir, in second-feet.

June, 1911, to June, 1914	500
July, 1914, to June, 1917	480
July, 1917, to June, 1918	580
June, 1918, to June, 1921	450

The minimum draft during the 11-year period would have been 450 second-feet, which would have developed 23,000 horsepower at 70 per cent efficiency.

The United States Reclamation Service has filings on all the unutilized water in the North Platte for storage in the Pathfinder reservoir. As the North Park project contemplates filling permanently to an elevation of 7,950 feet, which would require 1,020,000 acre-feet, probably at least several years would elapse before this could be done, as the permanent storage could be obtained only in years of high run-off. Once the reservoir was filled to a level of 7,950 feet there should be little or no further conflict with the Pathfinder reservoir, as the additional storage required would be held only to supplement the flow through periods of low water.

A power plan of less magnitude than the North Park project and conflicting less with the rights of the Pathfinder dam is shown by a filing in the office of the State engineer of Colorado. A dam 120 feet

high in sec. 1, T. 11 N., R. 80 W., about 2 miles above the North Park dam site, would create a reservoir of 356,000 acre-feet capacity. This would assure a uniform draft of 450 second-feet. A 7-mile tunnel and canal would make available a fall of 200 feet, developing 7,200 horsepower at 70 per cent efficiency.

Seminoe Canyon.—At the point where the North Platte breaks through the Seminoe Mountains, in T. 25 N., R. 85 W., there is a fall of 260 feet in 5 miles, with a dam site at the head of the fall. Surveys made by the Seminole Power Co. show the following capacities:

Area and capacity of Seminoe Canyon reservoir at different elevations.

Elevation (feet).	Area (acres).	Capacity of section (acre-feet).	Total capacity (acre-feet).
6,180	0		
6,205	535	4,460	4,460
6,230	1,710	28,060	32,520
6,255	3,670	67,250	99,770
6,280	7,020	133,630	233,400
6,305	9,605	207,810	441,210
6,330	12,244	273,120	714,330
6,355 [a]	15,000	340,550	1,055,000

[a] Actual survey not carried above 6,330 feet; results for 6,355 feet are estimated.

The records for the North Platte above Pathfinder, which are available from 1914 to 1921, represent closely the discharge at the reservoir site. These records were extended back to 1911 by comparison with the records at Saratoga. A mass curve was constructed for the 11-year period 1911 to 1921 and shows that with a maximum storage of 780,000 acre-feet the following uniform rates of flow could have been obtained, allowance being made for evaporation losses:

Uniform rates of flow at Seminoe Canyon reservoir, in second-feet.

June, 1911, to June, 1912	1,770
July, 1912, to June, 1913	1,580
June, 1913, to June, 1914	1,780
June, 1914, to June, 1917	1,430
July, 1917, to July, 1918	1,940
July, 1918, to June, 1920	1,430
July, 1920, to June, 1921	2,210

The capacity above an elevation of 6,285 feet would give the required capacity of 780,000 acre-feet, which would leave a minimum head of 105 feet on the dam. This, with the 258-foot fall through the canyon in a distance of 5 miles, gives a total static head of 363 feet, which with a discharge of 1,430 second-feet would develop 42,000 horsepower at 70 per cent efficiency. This is continuous horsepower that could have been relied upon during the entire 11-year period 1911–1921. In a distance of about 2 miles beyond the power site as outlined there is an additional fall of 70 feet to the Pathfinder reservoir, giving a total static head of 433 feet and developing 49,500 horsepower.

TRIBUTARY STREAMS.

No profile surveys have been made on the tributary streams, and but few topographic maps are available, so it is impossible to determine their power possibilities except for Douglas and French creeks and Encampment River. However, considerable power is available on the headwater streams in North Park.

Elevations and distances along Douglas Creek from source to mouth.

[Compiled from topographic maps.]

Point on creek.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From source.	Point to point.		Total.	Per mile.
Source	0	.....	10,100	.....	.....
Mouth of Bear Creek	7	7	9,390	710	101
Keystone	10.5	3.5	8,880	510	146
Mouth of Muddy Creek	15	4.5	8,510	370	82
Mouth of Beaver Creek	21	6	8,250	260	43
Mouth of Devils Gate Creek	27.5	6.5	7,950	300	46
Mouth	31.5	4	7,410	540	135

Undeveloped water power on Douglas Creek.

Section of creek.	Distance (miles).	Total fall (feet).	Run-off (second-feet).[a]		Horsepower (70 per cent efficiency).	
			90 per cent of time.	50 per cent of time.	90 per cent of time.	50 per cent of time.
Keystone to Muddy Creek	4.5	370	4	7	117	204
Muddy Creek to Beaver Creek	6	260	9	13	184	266
Beaver Creek to Devils Gate Creek	6.5	300	20	26	472	614
Devils Gate Creek to mouth	4	540	24	30	1,020	1,280

[a] Based on mean drainage area of section.

From the North Fork to its mouth French Creek falls 500 feet in 4 miles, or 125 feet to a mile. The undeveloped power in this section is 354 horsepower based on the lowest monthly run-off and 905 horsepower based on the run-off for 50 per cent of the time.

The following table covers the part of Encampment River having the greatest fall:

Elevations and distances along Encampment River from source to mouth of North Fork.

[Compiled from topographic maps.]

Point on river.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From source.	Point to point.		Total.	Per mile.
Source	0	.....	10,500	.....	.....
Contour crossing	3.8	3.8	9,500	1,000	263
Contour crossing	6.5	2.7	9,000	500	185
Mouth of West Fork	9.4	2.9	8,200	800	276
Contour crossing	13.1	3.7	8,000	200	54
Mouth of Soldier Creek	18.5	5.4	7,390	610	113
Mouth of North Fork	24.7	6.2	7,210	180	29

The drainage area above an elevation of 9,000 feet is so small that the power has not been estimated. The following table shows the undeveloped power for the lower part of the river:

Undeveloped water power on Encampment River.

Section of river.	Distance (miles).	Total fall (feet).	Run-off (second-feet).[a]		Horsepower (70 per cent efficiency).	
			90 per cent of time.	50 per cent of time.	90 per cent of time.	50 per cent of time.
Contour at 9,000 feet to West Fork	2.9	800	18	40	1,130	2,510
West Fork to contour 8,000	3.7	200	28	56	452	882
Contour at 8,000 feet to Soldier Creek	5.4	610	28	62	1,350	2,980
Soldier Creek to North Fork	6.2	180	33	74	468	1,050

[a] Based on mean drainage area of section.

STORAGE.

DEVELOPED SITES.

Five reservoir sites have been developed in the North Platte drainage basin, exclusive of the Laramie, as shown by the following table:

Principal features of developed reservoir sites in North Platte drainage basin.

Name.	Project.	Location.	Height of dam (feet).	Maximum area (acres).	Capacity (acre-feet).
Pathfinder	United States Reclamation Service.	In Tps. 28 and 29 N., R. 84 W.	218	22,700	1,070,000
La Prele	La Prele	Secs. 28–33, T. 32 N., R. 73 W.	135	728	20,000
Richards	Muddy Creek	Secs. 19–24, T. 26 N., R. 80 W.	40	1,250	16,800
Pierce	Rock Creek	Sec. 19, T. 20 N., R. 78 W.	21	199	2,480
Hawk Springs	Hawk Springs	Secs. 9, 10, 15, 16, T. 20 N., R. 61 W.	64	1,530	19,400

These reservoirs are used for irrigation, no power reservoirs being built.

UNDEVELOPED SITES.

The following table, compiled chiefly from reservoir filings in the State engineer's office, shows the larger undeveloped reservoir sites:

Principal features of undeveloped reservoir sites in North Platte drainage basin.

Name.	Source of supply.	Location.	Tributary drainage area.	Height of dam.	Crest length.	Area.	Capacity.
			Square miles.	*Feet.*	*Feet.*	*Acres.*	*Acre-feet.*
North Park	North Platte River	Just south of Wyoming-Colorado line.	1,440	240	850	38,500	2,245,000
				120	.....	.....	356,000
Seminoe	....do	T. 25 N., R. 85 W.	7,300	175	.....	15,000	1,055,000
Guernsey	....do	2 miles above Guernsey.	16,300	97	600	.....	65,000

Principal features of undeveloped reservoir sites in North Platte drainage basin—Contd.

Name.	Source of supply.	Location.	Tributary drainage area.	Height of dam.	Crest length.	Area.	Capacity.
			Square miles.	*Feet.*	*Feet.*	*Acres.*	*Acre-feet.*
Big Creek Lakes..	Big Creek.....	Secs. 16 and 21, T. 11 N., R. 82 W.	11	15	.....	740	11,000
Casteel.....	.....do.....	Secs. 14, 15, 22, 23, T. 12 N., R. 82 W.	72	132	.....	1,625	66,200
Brush Creek.....	Brush Creek.....	Secs. 7, 18, T. 16 N., R. 81 W., and secs. 12 and 13, T. 16 N., R. 82 W.	90	189 35	1,500 750	976	59,000 .....
Hog Park.....	Encampment.....	Secs. 3, 4, 5, 8, 9, 10, 11, 14, 16, T. 12 N., R. 84 W.	107	115	460	756	37,800
Canyon.....	North Spring Creek.	Sec. 19, T. 16 N., R. 85 W.	26	100	320	112	6,360
Sierra Madre.....	Jack Creek.....	Secs. 12 and 1, T. 15 N., R. 87 W.	10	125	620	215	9,200
Matheson.....	.....do.....	Sec. 31, T. 17 N., R. 89 W.	32	90	1,120	779	17,900
Stillwater.....	West Fork of Medicine Bow River.	Secs. 2 and 11, T. 17 N., R. 80 W.	22	551	2,200	.....	.....
Sand Creek.....	Medicine Bow River.	Secs. 21, 22, 28, T. 21, N., R. 79 W.	178	.....	.....	749	22,800
Cronberg.....	.....do.....	Secs. 19, 30, 31, T. 23 N., R. 79 W.		.....	.....	989	13,500
Wister.....	.....do.....	Secs. 12–14, T. 22 N., R. 79 W., secs. 7, 18, 17–20, T. 22 N., R. 78 W.	450	6	1,530	2,340	20,200
Halleck.....	.....do.....	Secs. 11, 12, 14, 15, T. 20 N., R. 81 W.	.....	25	670	1,280	11,500
Turpin Park.....	Turpin Creek.....	Secs. 16 and 21, T. 17 N., R. 80 W.	6	65	1,600	193	7,250
Bosler.....	Rock Creek.....	Secs. 19, 20, T. 19 N., R. 77 W.	70	66	820	.....	58,000
Sand Lake.....	Deep Creek.....	Sec. 16, T. 17 N., R. 79 W.	3.7	37	1,200	148	3,290
Two Bar.....	Sheep Creek.....	Secs. 2 and 3, T. 25 N., R. 76 W.	164	48	825	502	9,940
Devils Gate.....	Sweetwater River.	T. 29 N., Rs. 87 and 88 W.	2,200	120	325	5,820	190,000
Buckhorn.....	Cottonwood Creek.	Secs. 4, 5, 8, 9, T. 26 N., R. 68 W.	.....	27	2,100	843	8,340
M. Bar.....	Chugwater Creek.	Secs. 25, 26, 36, T. 22 N., R. 67 W.	380	80	.....	647	17,900

The North Park and Seminoe sites and the available water supply are described under "Undeveloped water power" (pp. 196–197).

The construction of a reservoir at the Guernsey site for the purpose of controlling more closely the flow at Whalen is contemplated by the United States Reclamation Service. It will be a service rather than a storage reservoir, and no question of water supply is involved in its construction.

The Big Creek Lakes are on the headwaters of Big Creek in Colorado at an elevation of 9,010 feet. The uncontrolled flow from the lakes is utilized by the Independence ditch, which diverts water to irrigate 3,000 acres in North Park. From the record near Big Creek post office the mean annual run-off at Big Creek Lakes is estimated to be 11,000 acre-feet.

The Casteel site, which is considered in connection with the proposed Casteel irrigation project, is just south of the State line. The mean annual run-off at the reservoir site, including the run-off from Big Creek Lakes, is estimated to be 50,000 acre-feet.

The Brush Creek site, which is considered in connection with the High Line project, is in the channel of Brush Creek in secs. 7 and 18, T. 16 N., R. 81 W., and secs. 12 and 13, T. 16 N., R. 82 W. Two dams, one 189 feet high and 1,500 feet long and the other 35 feet high and 750 feet long, will be required to store 59,000 acre-feet. It is proposed to divert water from the North Fork of French Creek into Barrett Creek and thence into the Brush Creek reservoir. Additional small reservoirs filled from the same source are also contemplated—one known as the Elk Hollow reservoir, having a capacity of 11,000 acre-feet, and another known as the Cedar Creek reservoir, having a capacity of 7,000 acre-feet. The mean annual run-off at the Brush Creek site as determined from five years' records on Brush Creek and eight years' records on French Creek is 76,000 acre-feet.

Hog Park is a natural reservoir site on the headwaters of Encampment River just north of the State line. The mean annual run-off based on records at Encampment is estimated to be 128,000 acre-feet.

The Canyon site is near the head of North Spring Creek, 14 miles southwest of Saratoga. Its construction was considered in connection with the Sierra Madre project. The mean annual run-off is estimated to be 19,500 acre-feet.

At the Sierra Madre site, on Jack Creek 25 miles southwest of Saratoga, the mean annual run-off is estimated to be 7,000 acre-feet. At the Matheson site, on the same creek a short distance above North Jack Creek, the mean annual run-off is 14,500 acre-feet, including the run-off at the Sierra Madre site.

The Stillwater site is on the West Fork of Medicine Bow River at an altitude of 9,200 feet, in the Medicine Bow Mountains. The mean annual run-off, based on comparative records of Deep and Rock creeks, is estimated to be 22,000 acre-feet.

The Sand Creek and Cronberg sites were considered in connection with the Medicine Bow project. A supply ditch from Medicine Bow River is required for the Sand Creek site, which is on Sand Creek, and a second supply ditch from this site to the Cronberg site, 12 miles north of it. The mean annual run-off of Medicine Bow River at the Sand Creek site is 84,000 acre-feet.

The Wister site is east of Medicine Bow River and south of Rock Creek. The proposed point of diversion is Medicine Bow River in sec. 29, T. 22 N., R. 78 W., 6 miles above Rock Creek. The mean annual run-off, estimated from that at the Sand Creek site, is 95,000 acre-feet, including the discharge at that point.

The Turpin Park site is on Turpin Creek at an altitude of 9,300 feet, in the Medicine Bow Mountains. The mean annual run-off, based on comparative records in Deep and Rock creeks, is estimated to be 6,000 acre-feet.

The Bosler site, which is part of the Rock Creek project, is on a tributary of Rock Creek. A supply ditch would divert water from

Rock Creek below the canyon. The mean annual run-off at the proposed point of diversion is estimated to be 70,000 acre-feet.

Sand Lake lies in the Medicine Bow Mountains at an elevation of 10,100 feet, on the headwaters of Deep Creek, a tributary of Rock Creek. The mean annual run-off is estimated to be 3,980 acre-feet.

The Two Bar site is on Sheep Creek 12 miles above its mouth. Sheep Creek rises at an elevation of 9,000 feet in the mountain range south of North Platte River. As no records of flow for this region are available, no estimate of the mean annual run-off at the reservoir site has been made.

The site above the Devils Gate, where Sweetwater River cuts through the Granite Hills in a narrow gorge 80 feet wide at the base and 400 feet deep, will probably not be utilized, as the unappropriated flow of Sweetwater River is claimed by the United States Reclamation Service for storage in the Pathfinder reservoir, at the junction of Sweetwater and North Platte rivers.

The Buckhorn site is south of Cottonwood Creek, from which it can derive its water supply. No records of discharge except at the mouth of the stream, below all diversions, are available, and no estimate of the mean annual run-off at the reservoir site has been made.

The M. Bar site, between Chugwater and Richards creeks, 10 miles north of Chugwater, can derive its supply from both streams. The mean annual run-off of Chugwater Creek is 20,000 acre-feet.

LARAMIE RIVER BASIN.

GENERAL FEATURES.

The region drained by Laramie River includes a small area in Colorado east of North Park and an area in Wyoming extending northeastward to North Platte River near the Nebraska line. The upper part of the area lies between the Medicine Bow and Laramie mountains.

Laramie River rises in the northern part of T. 7 N., R. 76 W., in Larimer County, Colo., at an elevation of 10,000 feet, and flows northward through a valley whose width ranges from half a mile to 2 miles. Just north of the Wyoming line the valley disappears and the river flows through a canyon for 8 miles, emerges on the Laramie Plains across which it flows in a northerly direction for about 75 miles, turns abruptly to the east, cuts through the Laramie Mountains in a narrow precipitous canyon, and below the canyon flows through a narrow valley which is nowhere more than a mile wide and is bordered by rugged, broken hills.[21] At Fort Laramie, 50 miles below the Laramie Canyon, the river joins the North Platte. Few large tributaries enter Laramie River; the largest are Little Laramie and North Lar-

[21] Davis, A. P., Report of progress of stream measurements for the calendar year 1896: U. S. Geol. Survey Eighteenth Ann. Rept., pt. 4, p. 142, 1897.

amie rivers and Sibille and Chugwater creeks, all of which rise in the Medicine Bow or Laramie mountains.

In Colorado the basin is mountainous and is bounded on the west by steep slopes and on the east by gentle slopes reaching lower altitudes. Between the canyon north of the Colorado line and the lower canyon cut through the Laramie Mountains are the Laramie Plains—a wide rolling area, 90 miles long, 30 miles in maximum width, and between 7,000 and 7,500 feet in altitude. On the east the surface rises in a long, gentle slope to the Laramie Mountains, 1,500 feet above the plains. On the west the rise is more abrupt, as the Medicine Bow Mountains, which form the boundary, are higher and more rugged. Within the Laramie Plains there are a number of large depressions draining toward the center, where the surface waters are lost by evaporation and seepage. In the aggregate these nonproductive areas amount to 277 square miles, so that the effective drainage area of the basin is reduced by that amount. East of the Laramie Mountains the drainage basin is part of the Great Plains and the relief is characteristically low.

The mean annual precipitation in the Laramie Basin is about 30 inches at the crest of the Medicine Bow Mountains and about 25 inches on the Laramie Mountains. It decreases rapidly to 14 inches at the edges of the Laramie Plains and is less than 12 inches within that area, except in the lower portion, where it increases to 15 inches near the Wheatland reservoir. Eastward to the mouth of the river the precipitation is about 15 inches.

MEASURED DRAINAGE AREAS.

Measured drainage areas in Laramie River basin, in square miles.

Stream.	Drainage area above.	Area.
Laramie River	Gaging station at Glendevey	102
Do	Gaging station a quarter of a mile north of State line.	293
Do	Gaging station in sec. 36, T. 14 N., R. 77 W.	409
Do	Little Laramie River	1,290
Do	Wheatland reservoir	2,100
Do	Gaging station below Wheatland reservoir at McGill.	2,190
Do	Gaging station in sec. 33, T. 23 N., R. 72 W.	2,230
Do	Sibille Creek	2,480
Do	Mouth	4,580
Fox Creek	do	31
Sand Creek	do	210
Willow Creek	do	105
Little Laramie River	Gaging station in sec. 9, T. 15 N., R. 77 W.	155
Do	Mouth	310
North Fork of Little Laramie	do	60
South Fork of Little Laramie	do	79
Sibille Creek	Gaging station near mouth	568
North Fork of Sibille Creek	Mouth	156
South Fork of Sibille Creek	do	56
Bluegrass Creek	do	117
North Laramie River	Gaging station in sec. 2, T. 25 N., R. 70 W.	366
Do	Mouth	535
Chugwater Creek	Gaging station at Chugwater	359
Do	Mouth	710
North Fork of Chugwater Creek	do	74
Richards Creek	do	79

GAGING-STATION RECORDS.

LARAMIE RIVER NEAR GLENDEVEY, COLO.

LOCATION.—In SW. ¼ sec. 25, T. 10 N., R. 76 W., at highway bridge 3 miles east of Glendevey, Larimer County. Nearest tributary, Nunn Creek, enters just above station.

DRAINAGE AREA.—101 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 24, 1904, to October 31, 1905; August 18, 1910, to September 30, 1921.

GAGE.—Water-stage recorder installed November 8, 1910, and referred to datum of vertical staff used previously.

EXTREMES OF DISCHARGE.—1904–5, 1910–1921: Maximum stage recorded, 5.0 feet on June 1, 1914 (discharge, 1,380 second-feet); minimum stage recorded, 1.5 feet on February 14 and 15, 1911 (discharge, 5 second-feet).

DIVERSIONS.—There are court decrees for diversions of 49 second-feet from Laramie River above station and 545 second-feet from tributaries entering above. Of this latter amount, 400 second-feet are for diversion into the Cache la Poudre basin through the Skyline ditch. In addition, the United States Supreme Court has granted the Laramie-Poudre tunnel an annual diversion of 215,000 acre-feet. (For amounts actually diverted see transmountain diversions on p. 240.)

ACCURACY.—Gage read twice daily during 1904–5 and gage heights from continuous records since 1910. From 1910 to 1919 complete records furnished by State engineer. Rating curves well defined. Records good except during winter, for which they are fair.

Monthly discharge of Laramie River at Glendevey, Colo., for 1904–5, 1910–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1904.				
June 24–30	405	265	299	4,150
July	405	90	165	10,100
August	90	50	63.4	3,900
September	50	25	31.7	1,890
The period	.....	.....	.....	20,000
1904–5.				
October	50	7	26.6	1,640
November	.....	.....	8	476
December	.....	.....	8	492
January	.....	.....	8	492
February	.....	.....	10	575
March	.....	.....	10	615
April	90	11	31.3	1,860
May	462	90	241	14,800
June	1,040	305	627	37,300
July	285	105	162	9,960
August	120	25	60.7	3,730
September	50	7	18.5	1,100
The year	1,040	.....	101	73,000
1910.				
August 18–31	36	26	31.0	861
September	76	31	42.1	2,510
1910–11.				
October	42	31	32.5	2,000
November	31	15	20.8	1,240
December	22	13	16.9	1,040
January	20	10	15.1	928
February	16	5	11.3	628
March	31	12	22.1	1,360
April	85	13	42.3	2,520
May	370	85	233	14,300
June	630	185	424	25,200
July	270	50	131	8,060
August	58	27	41.1	2,530
September	58	23	31.1	1,850
The year	630	5	85.2	61,700

Monthly discharge of Laramie River at Glendevey, Colo., for 1904–5, 1910–1921—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911–12.				
October	85	16	35.2	2,160
November	23	16	20.1	1,260
December			15.0	922
January	16	10	13.9	855
February	16	14	15.2	874
March	22	14	15.9	978
April	42	10	20.0	1,190
May	568	36	205	12,600
June	798	286	542	32,300
July	568	117	266	16,400
August	142	30	53.7	3,300
September	60	22	37.0	2,200
The year	798	10	103	75,000
1912–13.				
October	46	25	36.1	2,220
November	34	19	21.1	1,260
December			12	738
January			13	799
February			12	666
March			15	922
April	142		70	4,170
May	360	85	197	12,100
June	342	98	199	11,800
July	127	40	63.6	3,910
August	40	25	31.9	1,960
September	36	22	27.8	1,650
The year	360		58.3	42,200
1913–14.				
October	36	25	32.7	1,240
November			25	1,490
December			15	922
January			13	799
February			13	722
March	15	10	14.3	879
April	115	10	50.6	3,010
May	990	91	393	24,200
June	1,380	272	640	38,100
July	272	80	146	8,980
August	80		60	3,690
September			25	1,490
The year	1,380		118	85,500
1914–15.				
October			35	2,150
November			15	893
December			10	615
January			8	492
February			10	555
March			10	615
April			50	2,980
May	300	57	163	10,000
June	521	156	258	15,490
July	172	33	80.3	4,940
August	87	33	49.9	3,070
September	57	19	34.1	2,030
The year	521		60.4	43,700
1915–16.				
October	40	33	34.1	2,100
November	33		20	1,190
December			15	922
January			15	922
February			15	863
March			20	1,230
April	180		60	3,570
May	378	80	202	12,400
June	397	166	287	17,100
July	180	60	95.8	5,890
August	80	31	57.5	3,540
September	102	31	42.8	2,550
The year	397		72.2	52,300

Monthly discharge of Laramie River at Glendevey, Colo., for 1904–5, 1910–1921—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916–17.				
October 1–17	42	36	51.5	1,740
June 8–30	1,340	447	980	44,700
July	548	149	331	20,400
August	158	62	101	6,210
September	75	28	54.9	3,270
1917–18.				
October	36	21	25.9	1,590
November	36	24	28.0	1,670
December	.....	.....	12	738
January	.....	.....	12	738
February	.....	.....	12	666
March	.....	.....	15	922
April	82	28	41.8	2,490
May	735	96	373	22,900
June	1,130	149	681	40,500
July	237	57	129	7,930
August	68	28	33.6	2,070
September	36	28	30.7	1,280
The year	1,130	.....	11.5	83,500
1918–19.				
October	.....	.....	25	1,540
November	.....	.....	20	1,190
December	.....	.....	15	922
January	.....	.....	15	922
February	.....	.....	15	833
March	.....	.....	18	1,110
April	130	.....	35	2,080
May	310	82	213	13,100
June	240	48	110	6,540
July	50	16	27.6	1,700
August	45	14	21.6	1,330
September	.....	.....	18	1,070
The year	310	.....	44.6	32,300
1920.				
June	955	359	579	34,500
July	429	75	161	9,900
August	99	45	63.3	3,890
September	76	30	43.1	2,560
1920–21.				
October	34	20	25.9	1,590
November	20	6	8.7	518
December	.....	.....	10	615
January	.....	.....	12	738
February	.....	.....	12	666
March	.....	.....	15	922
April	47	16	27.8	1,650
May	655	52	248	15,200
June	1,020	275	619	36,800
July	266	67	153	9,410
August	110	35	61.5	3,780
September	53	23	32.4	1,930
The year	1,020	.....	102	73,800

NOTE.—Records revised from Oct. 1, 1910, to Mar. 31, 1912. Winter records estimated.

LARAMIE RIVER NEAR JELM, WYO.

LOCATION.—In sec. 15, T. 12 N., R. 77 W., at highway bridge at Boswell's ranch, a quarter of a mile below Colorado-Wyoming line, 4 miles south of Jelm, Albany County.

DRAINAGE AREA.—297 square miles (measured on topographic map).

RECORDS AVAILABLE.—May 7, 1911, to September 30, 1921. From June 22, 1904, to October 31, 1905, a station was maintained at Decker's ranch, half a mile south of the State line. The records at the two stations are practically comparable, as there are no tributaries nor diversions of any account between.

GAGE.—Bristol water-stage recorder at downstream side of right bridge abutment used since 1911. Vertical staff during 1904–5.

EXTREMES OF DISCHARGE.—1904–5, 1911–1921: Maximum stage recorded, 4.2 feet at noon June 8, 1920, from high-water mark (discharge, 3,840 second-feet); minimum stage recorded, 1.8 feet on September 22–24, October 4–8, 18–23, 28–31, 1905 (discharge, 22 second-feet).

DIVERSIONS.—Between Glendevey and Jelm stations court decrees for diversion of 292 second-feet from Laramie River and 329 second-feet from intervening tributaries.

COOPERATION.—Station maintained in cooperation with State engineer of Colorado.

ACCURACY.—Gage read twice daily during 1904–5. Since 1911 gage heights obtained from continuous record. Rating curves well defined. Records good except during winter, for which they are fair

Monthly discharge of Laramie River near Jelm, Wyo., for 1904–5, 1911–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1904.				
June 22–30	733	408	560	10,000
July	635	140	272	16,700
August	156	68	101	6,210
September	68	32	45.9	2,730
The period	.....	.....	.....	35,600
1904–5.				
October	49	32	44.6	2,740
November	.....	.....	40	2,380
December	.....	.....	35	2,150
January	.....	.....	30	1,840
February	.....	.....	25	1,390
March	.....	.....	22	1,350
April	112	22	50.1	2,980
May	1,128	112	458	28,200
June	1,920	435	1,160	69,000
July	455	124	212	13,000
August	160	45	97.8	6,010
September	58	22	39.6	2,360
The year	1,920	.....	184	133,000
1911.				
May 7–31	833	387	629	31,200
June	1,210	300	792	47,100
July	492	106	223	13,700
August	106	43	71.4	4,390
September	74	33	43.1	2,560
The period	.....	.....	.....	99,000
1911–12.				
October	132	56	68.1	4,180
November	94	50	62.3	3,710
December	.....	.....	45	2,770
January	.....	.....	40	2,460
February	.....	.....	45	2,590
March	.....	.....	45	2,770
April	147	.....	60	3,570
May	2,020	76	518	31,800
June	2,460	690	1,510	89,900
July	1,390	240	547	33,600
August	290	57	120	7,380
September	134	57	81.7	4,860
The year	2,460	.....	263	190,000

Monthly discharge of Laramie River near Jelm, Wyo., for 1904–5, 1911–1921—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1912–13.				
October	110	57	83.3	5,120
November	76	38	55.3	3,290
December			35	2,150
January			40	2,460
February			35	1,940
March			50	3,070
April	334		175	10,400
May	906	250	516	31,700
June	836	212	441	26,200
July	230	90	135	8,300
August	102	35	55.3	3,400
September	77	28	52.0	3,090
The year	836		140	101,000
1913–14.				
October	130	50	71.4	4,390
November	67	42	55.9	3,330
December			45	2,770
January			40	2,460
February			40	2,220
March			50	3,070
April	202		115	6,840
May	2,280	155	957	58,800
June	2,980	472	1,340	79,700
July	472	130	234	14,400
August	170	60	108	6,640
September	80	25	37.3	2,220
The year	2,980		258	187,000
1914–15.				
October	80	50	71.6	4,400
November			45	2,680
December			28	1,720
January			22	1,350
February			28	1,560
March			30	1,840
April			120	7,140
May	547	110	304	18,700
June	984	250	477	28,400
July	250	67	129	7,930
August	88	49	73.1	4,490
September	99	41	63.4	3,770
The year	984		116	84,000
1915–16.				
October	99	49	68.8	4,230
November			50	2,980
December			45	2,770
January			48	2,950
February			48	2,760
March			65	4,000
April	270	60	116	6,900
May	1,500	170	528	32,500
June	1,110	375	762	45,300
July	330	80	154	9,470
August	145	70	97.6	6,000
September	170	52	82.4	4,900
The year	1,500		173	125,000
1916–17.				
October			90	5,530
November			80	4,760
December			65	4,000
January			52	3,200
February			50	2,780
March			40	2,460
April			100	5,950
May	1,090	104	470	28,900
June	2,970	512	2,000	119,000
July	2,300	284	876	53,900
August	305	91	172	10,600
September	93	62	81.0	4,820
The year	2,970		340	246,000

Monthly discharge of Laramie River near Jelm, Wyo., for 1904–5, 1911–1921—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917–18.				
October	62	24	44.5	2,740
November			40	2,380
December			35	2,150
January			35	2,150
February			35	1,940
March			45	2,770
April			87	5,180
May	1,280	95	581	35,700
June	1,790	335	1,170	69,600
July	510	112	242	14,900
August	140	46	90.7	5,580
September	101	46	61.0	3,630
The year	1,790		206	149,000
1918–19.				
October			50	3,070
November			45	2,680
December			45	2,770
January			45	2,770
February			45	2,500
March			50	3,070
April			120	7,140
May	708	185	425	26,100
June	497	147	282	16,800
July	190	50	91.8	5,640
August	114	28	54.9	3,380
September	67	26	37.8	2,250
The year	708		108	78,200
1919–20.				
October	50	34	42.6	2,620
November			35	2,080
December			30	1,840
January			30	1,840
February			25	1,440
March			30	1,840
April			50	2,980
May	1,520	100	590	36,300
June	2,130	796	1,390	82,700
July	756	138	284	17,500
August	395	68	148	9,100
September	114	58	75.9	4,520
The year	2,130		228	165,000
1920–21.				
October	75	52	59.7	3,670
November			30	1,790
December			40	2,460
January			40	2,460
February			40	2,220
March			50	3,070
April			85	5,060
May	1,600	124	584	35,900
June	2,160	602	1,410	83,900
July	542	131	314	19,300
August	242	78	123	7,560
September	111	49	62.4	3,710
The year	2,160		236	171,000

NOTE.—Winter records estimated. Records for 1912 revised.

LARAMIE RIVER AT WOODS LANDING, WYO.

LOCATION.—In sec. 11, T. 13 N., R. 77 W., at highway bridge at Woods Landing, a short distance below mouth of Wood Creek, nearest tributary.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 1, 1890, to June 30, 1892; April 12, 1896, to September 30, 1900; May 7 to November 11, 1911.

GAGE.—Vertical staff; no determined relation between gage used during 1911 and those used prior to 1900.

DIVERSIONS.—Practically no water is diverted between station near Jelm and Woods Landing.

EXTREMES OF DISCHARGE.—1890–1892; 1896–1900; 1911: Maximum stage recorded, 4.65 feet on June 25, 1899 (discharge, 4,500 second-feet); minimum stage recorded, 1.0 foot on September 23, 1911 (discharge, 17 second-feet).

ACCURACY.—No statement of accuracy, as conditions under which station was maintained are not known. Records fair for 1911.

Monthly discharge of Laramie River at Woods Landing, Wyo., for 1890–91, 1896–1900, 1911.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1890.				
July	587	181	378	23,200
August	302	107	190	11,700
September	117	69	82.6	4,920
The period				39,800
1890–91.				
October	102	67	83.6	5,140
November			50	2,980
December			45	2,770
January			40	2,460
February			40	2,220
March			40	2,460
April			100	5,950
May	1,120	397	852	52,400
June	1,500	703	1,140	67,800
July	980	297	514	31,600
August	451	134	268	16,500
September	198	82	162	9,640
The year	1,500		279	202,000
1892.				
April	295	74	175	10,400
May 1–26	1,260	229	440	22,700
June 8–30	1,980	1,010	1,350	61,600
1896.				
April 12–30	754	69	222	8,370
May	2,170	275	618	38,000
June	1,200	165	499	29,700
July	220	62	127	7,810
August	231	49	94.8	5,830
September	190	62	116	6,900
The period				96,600
1896–97.				
October	130		100	6,150
November			50	2,980
December			40	2,460
January			35	2,150
February			35	1,940
March			40	2,460
April	350	48	128	7,620
May	3,420	443	1,960	12,100
June	2,700	550	1,560	92,800
July	475	125	266	16,400
August	183	70	92.7	5,700
September	70	60	65.3	3,890
The year	3,420		217	157,000
1898.				
October			50	3,070
November			40	2,380
December			35	2,150
January			35	2,150
February			35	1,940
March			45	2,770
April	350	85	129	7,680
May	1,570	125	637	39,200
June	1,400	245	969	57,700
July	200	50	89.4	5,500
August	50	40	44.2	2,720
September	40	40	40.0	2,380
The year	1,570		180	130,000

Monthly discharge of Laramie River at Woods Landing, Wyo., for 1890–91, 1896–1900, 1911—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1898–99.				
October	45		42	2,580
November			40	2,380
December			35	2,150
January			35	2,150
February			35	1,940
March			40	2,460
April			100	5,950
May	2,620	125	1,280	78,700
June	4,500	2,040	3,220	192,000
July	3,200	320	1,250	76,900
August	512	60	191	11,700
September	85	45	56.3	3,350
The year	4,500		528	382,000
1899–1900.				
October	92	45	65.0	4,000
November			50	2,980
December			45	2,770
January			40	2,460
February			40	2,220
March			50	3,070
April	380	50	125	7,440
May	4,000	290	1,940	11,900
June	3,780	290	1,780	106,000
July	290	60	111	6,820
August	70	40	50	3,070
September	55	40	44.3	2,640
The year	4,000		214	155,000
1911.				
May 7–31	975	335	711	36,400
June	1,480	310	943	56,100
July	410	75	242	14,900
August	180	32	77.5	4,770
September	110	17	29.6	1,760
The period				114,000
October	220	32	75.7	4,650
November 1–11	110	24	47.3	1,030

NOTE.—Winter records revised.

LARAMIE RIVER AND PIONEER CANAL NEAR WOODS, WYO.

LOCATION.—In sec. 36, T. 14 N., R. 77 W., at diversion dam for Pioneer canal, 2 miles above Woods post office, in Albany County. Nearest important tributary, Fox Creek, enters 3 miles above.

DRAINAGE AREA.—409 square miles (measured on base maps of Wyoming and Colorado; scale, 1:500,000).

RECORDS AVAILABLE.—May 1, 1912, to September 30, 1921.

GAGE.—Bristol water-stage recorder whose datum is the crest of the dam. Gage originally at left end of dam just below Pioneer canal headgates. On September 23, 1915, gage was moved to upper wing wall of headgates, and although it is actually above the canal intake it still indicates the amount passing the dam, as it is in the pool formed by diversion dam. Chain gage in Pioneer canal is at Johnson Bridge, 1½ miles below intake. It is read by an employee of the Laramie Water Co.

EXTREMES OF DISCHARGE.—1912–1921: Maximum stage recorded, 4.4 feet from 8 a. m. to noon June 23, 1917 (river discharge, 3,310 second-feet, combined discharge, 3,820 second-feet); minimum flow probably occurs during winter.

DIVERSIONS.—By decree of district court dated December 27, 1912, there were adjudicated diversions of approximately 10 second-feet from Laramie River between the State line and Pioneer dam, exclusive of the Pioneer canal, which has decrees for 282 second-feet. Enlargement of Pioneer canal has storage rights for 68,500 acre-feet in Lake Hattie.

ACCURACY.—(River) Gage heights from continuous records except as noted. Rating curve well defined below 1,200 second-feet. Records good except during winter, for which they are fair. (Canal) Gage probably read twice daily during 1912–13; May 21 to June 30, 1916; during 1917; and once daily for remainder of period. Records fair.

Monthly discharge of Laramie River near Woods, Wyo., for 1912–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1912.				
May	1,580	0	428	26,300
June	1,900	200	1,040	61,900
July	1,040	152	338	20,800
August	282	10	67.1	4,130
September	95	10	48.3	2,870
The period				
1912–13.				
October	128	86	104	6,400
November	110	0	69.9	4,160
December	55	20	37.6	2,310
January	52	20	39.5	2,430
February	44	25	36.0	2,000
March	169	28	45.6	2,800
April	301	66	184	10,900
May	550	89	262	16,100
June	450	74	260	15,500
July	181	6	64.7	3,980
August	80	10	40.1	2,470
September	63	15	32.2	1,920
The year	550	0	97.9	71,000
1913–14.				
October	118	0	43.2	2,660
November	77	26	59.8	3,560
December	60	30	51.8	3,180
January	52	40	46.2	2,840
February	57	40	47.0	2,610
March	73	45	54.6	3,360
April	203	70	130	7,740
May	2,030	203	993	61,000
June	2,400	293	1,020	60,700
July	342	73	153	9,410
August	107	21	41.3	2,540
September	45	10	18.6	1,110
The year	2,400	0	222	161,000
1914–15.				
October	129	38	71.9	4,420
November	75	32	50.2	2,990
December	54	23	30.2	1,860
January	28	19	24.8	1,520
February	41	25	32.6	1,810
March	45	31	35.4	2,180
April	217	45	129	7,680
May	515	47	254	15,600
June	765	222	441	26,200
July	235	26	89.9	5,530
August	43	15	25.3	1,560
September	64	15	34.8	2,070
The year	765	15	101	73,400

Monthly discharge of Laramie River near Woods, Wyo., for 1912–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915–16.				
October	91	15	54.8	3,370
November	66	12	49.5	2,950
December	63	30	46.5	2,860
January	63	42	51.6	3,170
February	66	42	52.9	3,040
March	110	42	69.3	4,260
April	322	32	91.1	5,420
May	940	239	619	38,100
June	940	322	697	41,500
July	293	53	150	9,220
August	147	24	583	3,580
September	128	15	47.2	2,810
The year	940	12	166	120,000
1916–17.				
October	68	15	42.7	2,630
November	96	12	64.3	3,830
December	84	60	68.9	4,240
January	71	44	57.4	3,530
February	60	35	52.6	2,920
March	68	33	43.3	2,660
April	208	55	121	7,200
May	1,420	93	458	28,200
June	2,910	378	1,750	104,000
July	170	231	738	45,400
August	222	81	129	7,930
September	76	33	56.3	3,350
The year	2,910	33	298	216,000
1918.				
March 25–31	118	90	103	1,430
April	153	63	102	6,070
May	1,470	118	829	51,000
June	1,920	333	1,290	76,800
July	530	73	204	12,500
August	73	15	39.6	2,430
September	138	48	88.0	5,240
The period				155,000
1918–19.				
October	68	26	52.7	3,240
April	345	60	130	7,740
May	640	194	391	24,000
June	412	63	223	13,300
July	71	6	27.8	1,710
August	111	8	21.1	1,300
September	40	4	17.5	1,040
1920.				
May 4–31	1,920	314	956	53,100
June	2,100	680	1,310	78,000
July	680	55	197	12,100
August	121	9	59.3	3,650
September	87	46	60.8	3,620
The period				150,000
1920–21.				
October	76	31	55.0	3,380
November	102	48	72.7	4,330
December 1–11	93	58	64.0	1,400
March 11–31	96	44	69.1	2,880
April	177	48	91.3	5,430
May	1,920	153	842	51,800
June	2,370	492	1,460	86,900
July	434	105	225	13,800
August	242	47	110	6,760
September	93	15	35.1	2,090

Monthly discharge of Pioneer canal near Woods, Wyo., for 1912–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1912.				
May	700	50	222	13,600
June	815	149	540	32,100
July	517	55	221	13,600
August	104	47	60.5	3,720
September 1–25	51	7	38.2	1,890
The period				64,900
1913.				
January 14–31	8	1	6.1	218
February	7	6	6.5	361
March	9	6	8.0	492
April	212	1	29.2	1,740
May	520	244	361	22,200
June	515	114	187	11,100
July	122	4	47.0	2,890
August	40	4	10.8	664
September	40	4	18.7	1,110
The period	520			40,800
1913–14.				
October	40	2	18.0	1,110
November	2	2	2.0	119
December	1	1	1.0	61
May	154	1	54.4	3,340
June	731	62	311	18,500
July	165	26	69.2	4,250
August	31	21	24.6	1,510
September	28	8	17.8	1,060
1914–15.				
October	8	2	4.0	236
April	76	0	3.0	179
May	128	20	77.9	4,790
June	107	92	98.8	5,880
July	87	44	50.2	3,090
August	41	34	39.2	2,410
September	35	28	28.2	1,680
1915–16.				
October	35	2	10.3	633
November	2	2	2.0	119
December	2	2	2.0	123
January	2	2	2.0	123
February	2	2	2.0	115
March	46	2	4.84	298
April	67	44	57.6	3,430
May	101	66	72.0	4,430
June	118	91	104	6,190
July	99	72	74.8	4,600
August	72	61	67.0	4,120
September	61	42	48.0	2,860
The year	118	2	37.2	27,000
1916–17.				
October	70	47	62.2	3,820
November	70	2	22.4	1,330
December			2	123
January			2	123
February			2	111
March			2	123
April	34	2	5.4	321
May	420	40	158	9,720
June	818	119	619	36,800
July	657	106	155	9,530
August	101	14	52.9	3,250
September	20	13	13.4	797
The year	818		91.2	66,000
1918.				
March 25–31	4	4	4.0	56
April	4	4	4.0	238
May	60	5	22.6	1,390
June	95	60	92.2	5,490
July	80	12	37.7	2,320
August	36	16	28.6	1,760
September	2	2	2.0	119
The period				11,400

Monthly discharge of Pioneer canal near Woods, Wyo., for 1912–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
April			4	238
May	148	2	72.2	4,440
June	94	52	68.5	4,080
July	65	34	48.1	2,960
August	62	20	36.1	2,220
September	31	2	20.9	1,240
The period				15,200
1920.				
May	595	4	122	7,500
June	363	158	275	16,400
July	174	96	131	8,060
August	106	28	78.9	4,850
September	25	10	17.2	1,020
The period				37,800
1921.				
April			10	595
May	90	12	38.9	2,390
June	230	77	127	7,560
July	109	54	86.9	5,340
August	53	37	44.2	2,720
September	36	14	21.1	1,260
The period				19,900

Monthly discharge of Laramie River and Pioneer canal near Woods, Wyo., for 1912–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1912.				
May			650	39,900
June			1,580	94,000
July			559	34,400
August			128	7,850
September			86.5	4,760
The period				181,000
1912–13.				
October			104	6,400
November			69.9	4,160
December			37.6	2,310
January	55	21	43.1	2,650
February	50	34	42.4	2,350
March	178	34	53.6	3,300
April	445	86	213	12,700
May	1,060	341	623	38,300
June	959	196	447	26,600
July	202	70	111	6,820
August	84	30	50.9	3,130
September	74	30	50.8	3,020
The year				112,000
1913–14.				
October	120	37	61.8	3,800
November	79	28	61.8	3,680
December	61	31	52.8	3,250
January	51	41	46.2	2,840
February	58	46	47.0	2,610
March	74	46	54.6	3,360
April	204	71	130	7,740
May	2,080	204	1,050	64,400
June	2,600	437	1,330	79,200
July	507	111	222	13,700
August	134	42	65.9	4,050
September	73	30	36.4	2,170
The year	2,600	28	184	191,000

Monthly discharge of Laramie River and Pioneer canal near Woods, Wyo., for 1912–1921—Continued

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1914–15.				
October	129	38	71.9	4,420
November	75	32	50.2	2,990
December	54	23	30.2	1,860
January	28	19	24.8	1,520
February	41	25	32.6	1,810
March	45	31	35.4	2,180
April	217	45	132	7,860
May	563	98	332	20,400
June	872	314	540	32,100
July	290	70	140	8,610
August	81	49	64.5	3,970
September	92	45	63.0	3,750
The year	872	19	126	91,500
1915–16.				
October	93	17	65.1	4,000
November	68	14	51.5	3,060
December	65	32	48.5	2,980
January	65	44	53.6	3,300
February	68	44	54.9	3,160
March	112	44	74.1	4,560
April	389	84	149	8,870
May	1,010	305	691	42,500
June	1,030	440	801	47,700
July	392	125	224	13,800
August	219	86	125	7,690
September	171	65	95.1	5,660
The year	1,030	14	203	147,000
1916–17.				
October	121	85	105	6,460
November	98	82	86.7	5,160
December	86	62	70.9	4,360
January	73	46	59.4	3,650
February	65	37	54.6	3,030
March	70	35	45.3	2,790
April	218	57	126	7,500
May	1,550	163	616	37,900
June	3,420	839	2,370	141,000
July	2,360	342	893	54,900
August	323	97	182	11,200
September	91	46	69.7	4,150
The year	3,420	35	389	282,000
1918.				
March 25–31	122	94	107	1,490
April	157	67	106	6,310
May	1,530	123	851	52,300
June	2,020	428	1,390	82,700
July	567	102	246	15,100
August	110	50	78.0	4,800
September	83	60	72.7	4,330
The period	.....	.....	.....	167,000
1919.				
April	.....	.....	134	7,970
May	748	196	463	28,500
June	486	126	292	17,400
July	136	40	75.9	4,670
August	154	28	57.2	3,520
September	67	26	38.4	2,280
The period	.....	.....	.....	64,300
1920.				
May	2,230	318	1,080	66,400
June	2,440	857	1,580	94,000
July	854	151	328	20,200
August	227	79	138	8,480
September	104	56	78	4,640
The period	.....	.....	.....	194,000

Monthly discharge of Laramie River and Pioneer canal near Woods, Wyo., for 1912–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1920–21.				
October	82	37	61.0	3,750
November	108	54	78.7	4,680
December	.....	.....	48	2,950
January	.....	.....	45	2,770
February	.....	.....	45	2,500
March	.....	.....	60	3,690
April	225	60	101	6,010
May	2,030	230	881	54,200
June	2,480	546	1,590	94,600
July	543	159	312	19,200
August	288	86	154	9,470
September	127	29	56.2	3,340
The year	2,480	.....	286	207,000

LARAMIE RIVER AT TWO RIVERS, WYO.

LOCATION.—In sec. 5, T. 17 N., R. 74 W., at highway bridge at Two Rivers, Albany County. Nearest tributary, Little Laramie River, enters a quarter of a mile below.

DRAINAGE AREA.—1,290 square miles (measured on base map of Wyoming; scale, 1: 500,000).

RECORDS AVAILABLE.—May 1, 1911, to September 30, 1921. Station maintained by State engineer during 1913 and 1914.

GAGE.—Friez water-stage recorder on left bank, installed May 2, 1920, 45 feet downstream from bridge and site of Bristol gage used from 1915 to 1919. Datum unchanged since 1915. Gage used in 1912 referred to datum 0.74 foot lower. Gage on left bank 400 feet above bridge used during 1913 and 1914.

EXTREMES OF DISCHARGE.—1911–1921: Maximum stage recorded, 6.4 feet June 22, 1917 (discharge, 2,600 second-feet). No flow September 22–25, 1911.

DIVERSIONS.—By decree of district court dated December 27, 1912, there were adjudicated diversions of 414 second-feet from Laramie River between the station near Woods and this one.

ACCURACY.—Staff gage probably read twice daily 1911–1913. During 1914–1921 gage heights from water-stage recorder, which did not operate continuously. Rating curve fairly well defined 1911–12 and well defined 1913–1921 except for periods of shifting control. Records good.

Monthly discharge of Laramie River at Two Rivers, Wyo., for 1911–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
May	575	90	291	17,900
June	740	141	473	28,100
July	141	4	61.1	3,760
August	16	1	8.0	492
September	13	0	7.7	458
The period	.....	.....	.....	50,700
1911–12.				
October	33	10	23.0	1,410
April 5–30	422	34	96.7	4,980
May	595	34	180	11,100
June	1,360	200	826	49,200
July	555	135	272	16,700
August	495	10	108	6,640
September	71	10	29.9	1,780

Monthly discharge of Laramie River at Two Rivers, Wyo., for 1911-1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1912-13.				
October	125	10	69.7	4,290
April 8-30	335	115	200	9,120
May	187	74	113	6,950
June	187	51	134	7,970
July	115	12	40.8	2,510
August	62	12	27.4	1,680
September	115	12	64.0	3,810
1913-14.				
October	74	20	51.3	3,150
November 1-16	74	31	60.6	1,920
April 14-30	198	122	161	5,430
May	1,420	190	589	36,200
June	1,580	251	790	47,000
July	254	97	180	11,100
August	242	30	81.9	5,040
September	200	22	60.7	3,610
1914-15.				
October	270	56	174	10,700
April 21-30	186	93	125	2,480
May	199	80	136	8,360
June	395	177	276	16,400
July	159	28	79.4	4,880
August	37	25	30.2	1,860
September	32	22	26.7	1,590
1915-16.				
October	107	20	68.8	4,236
November 1-11	113	75	89.9	1,960
May 5-31	446	42	280	15,000
June	502	183	371	22,100
July	180	42	95.0	5,840
August	92	12	57.5	3,540
1917.				
April 16-30	251	195	224	6,660
May	1,170	140	517	31,800
June	2,560	853	1,870	111,000
July	1,940	302	894	55,000
August	289	50	137	8,420
September	62	48	56.0	3,330
1918.				
April 13-30	217	145	188	6,710
May	1,150	168	523	32,200
June	1,850	346	1,180	70,200
July	374	100	239	14,700
August	90	29	55.2	3,390
September	27	21	26.3	1,560
The period				129,000
1919.				
July 16-31	13	5	7.8	247
August	24	2	6.7	412
September	7	2	4.5	268
1920.				
May	1,350	132	499	30,700
June	2,030	605	1,260	75,000
July	535	74	207	12,700
August	120	63	84.0	5,160
September	121	55	83.0	4,940
The period				128,000
1920-21.				
October	98	45	76.7	4,720
April	123	35	90.4	5,380
May	1,650	94	480	29,500
June	2,150	480	1,510	89,800
July	450	185	278	17,100
August	196	84	140	8,610
September	89	34	52.9	3,150

NOTE.—Records for 1914 revised.

LARAMIE RIVER NEAR LOOKOUT, WYO.

LOCATION.—About sec. 33, T. 21 N., R. 74 W., at steel highway bridge 9 miles northeast of Lookout, in Albany County. No important tributary between station and Wheatland reservoir No. 2, a short distance downstream.

DRAINAGE AREA.—2,100 square miles (measured on base map of Wyoming; scale, 1: 500,000).

RECORDS AVAILABLE.—May 27, 1912, to August 31, 1917. State engineer maintained station during 1913 and 1914.

GAGE.—Bristol water-stage recorder on downstream side of right bridge abutment.

EXTREMES OF DISCHARGE.—1912–1917: Maximum stage occurred June 26, 1917, at a time when recording gage was not in operation; discharge as estimated from flow at other Laramie River stations, 3,100 second-feet; minimum flow recorded, 9 second-feet on July 21, August 29, and September 10, 1913.

DIVERSIONS.—By decree of district court dated December 27, 1912, there were adjudicated diversions of 211 second-feet from Laramie River between Two Rivers and the Lookout station.

ACCURACY.—Gage heights from continuous record. Rating curve well defined. Records good, except for period of no gage heights, for which they are fair.

Monthly discharge of Laramie River near Lookout, Wyo., for 1912–1917.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1912.				
May 27–31	580	395	484	4,810
June	1,710	203	964	57,400
July	778	192	403	24,800
August	498	52	149	9,160
September	153	25	93	5,530
The period				102,000
1912–13.				
October	258	88	158	9,720
May	472	135	216	13,300
June	507	71	265	15,800
July	135	9	47.6	2,930
August	88	9	37.3	2,290
September	125	9	51.7	3,080
1913–14.				
October	98	38	63.6	3,910
April 14–30	284	193	236	7,960
May	2,190	240	758	46,600
June	2,910	360	1,400	83,300
July	310	103	188	11,600
August	336	29	110	6,760
September	166	25	52.4	3,120
1914–15.				
October	280	100	199	12,200
April 22–30	231	131	171	3,050
May	237	88	150	9,220
June	470	114	244	14,500
July	136	35	89.4	5,500
August	109	19	37.9	2,330
September	40	17	26.3	1,560
1915–16.				
October	114	28	69.8	4,290
April 27–30	91	60	70	555
May	382	80	241	14,800
June	651	143	442	26,300
July	189	69	119	7,320
August	297	34	76.9	4,730
September	91	20	45.8	2,730
1916–17.				
October 1–22	42	20	32.1	1,400
April 17–30	1,860	361	994	27,600
May	1,380	244	656	40,300
June	3,100	806	1,900	113,000
July	2,200	430	1,120	68,900
August	430	50	170	10,500

LARAMIE RIVER AT McGILL, WYO.

LOCATION.—In sec. 24, T. 22 N., R. 74 W., a quarter of a mile east of McGill post office, in Albany County. No tributary between station and outlet of Wheatland reservoir No. 2, 1 mile upstream.

DRAINAGE AREA.—2,190 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—May 25, 1912, to September 30, 1915. State engineer maintained station during 1913 and 1914.

GAGE.—Bristol water-stage recorder at left bank at nearest point to McGill post office. Gage maintained by State engineer was 400 feet downstream.

EXTREMES OF DISCHARGE.—1912–1915: Maximum stage recorded, 3.60 feet June 11, 1914 (discharge, 1,630 second-feet); minimum flow recorded, 1 second-foot October 27–28, November 1–2, 1912. Practically no flow during winter, as water is stored in Wheatland reservoir.

DIVERSIONS.—No diversions between this station and Lookout (see next paragraph).

REGULATION.—Flow at the station shows effect of storage in Wheatland reservoir, which has an adjudicated decree for 633 second-feet and a storage capacity of approximately 110,000 acre-feet. Entire flow of Laramie River below Lookout passes through Wheatland reservoir.

ACCURACY.—Gage read twice daily during 1912, after which time gage heights obtained from continuous record. Rating curve fairly well defined. Records fair.

Monthly discharge of Laramie River at McGill, Wyo., for 1912–1915.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1912.				
May 25–31	862	540	610	8,470
June	605	302	511	30,400
July	640	471	587	36,100
August	426	5	234	14,400
September	331	3	98.4	5,860
The period				95,200
1912–13.				
October	9	1	2.95	181
November	5	1	2.63	156
May	632	2	312	19,200
June	620	495	576	34,300
July	568	15	341	21,000
August	453	12	242	14,900
September	179	9	57.5	3,420
1913–14.				
October	13	2.5	5.48	337
May 15–31	604	37	394	13,300
June	1,620	51	862	51,300
1915.				
May 17–31	470	28	280	8,300
July 3–31	770	154	565	32,500
August	565	10	221	13,600
September 1–13	154	58	93.3	2,400

NOTE.—Records for 1914 revised.

LARAMIE RIVER BELOW McGILL, WYO.

LOCATION.—In sec. 33, T. 23 N., R. 73 W., at J. T. Dodge's ranch, 8 miles below McGill, in Albany County. No tributary between station and outlet of Wheatland reservoir No. 2.

DRAINAGE AREA.—2,230 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—May 4, 1916, to September 14, 1917.

GAGE.—Bristol water-stage recorder at left abutment of private bridge.

EXTREMES OF DISCHARGE.—1916–17: Maximum stage recorded, 5.6 feet on June 26–30, 1917 (discharge, 2,860 second-feet); minimum flow occurs during winter, when there is practically no flow owing to storage in Wheatland reservoir.

DIVERSIONS.—One small diversion between this station and that near Lookout.

REGULATION.—Flow at this station shows effect of storage in Wheatland reservoir, which has an adjudicated decree for 633 second-feet and a storage capacity of about 110,000 acre-feet. Flow entirely regulated by reservoir, as river passes through it.

ACCURACY.—Gage heights from continuous record. Rating curve well defined. Records good.

Monthly discharge of Laramie River below McGill, Wyo., for 1916–1917.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916.				
May 4–31	580	7	361	20,000
June	652	372	575	34,200
July	615	72	326	20,000
1917.				
May 17–27	50	36	45.8	999
June 10–30	2,860	865	2,140	89,100
July	2,700	720	1,590	97,800
August	670	380	572	35,200
September 1 to 14	408	141	279	7,750

LARAMIE RIVER NEAR WHEATLAND, WYO.

LOCATION.—In sec. 35, T. 25 N., R. 69 W., at highway bridge at Wheeler ranch, 10 miles northwest of Wheatland, in Platte County. Nearest tributary, Sibille Creek, enters half a mile below.

DRAINAGE AREA.—2,480 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—April 13, 1912, to November 10, 1916. State engineer maintained station during 1913 and 1914.

GAGE.—Chain gage on upstream side of bridge; read by John Wilkinson. During 1912 a staff gage was at right bank 300 feet above bridge; no determined relation between gages.

EXTREMES OF DISCHARGE.—1912–1916: Maximum mean daily gage height, 6.6 feet on June 8, 1914 (discharge, 1,660 second-feet). No flow July 27, August 8–11, 17 to September 11, 13–14, 1916.

DIVERSIONS.—By decree of district court dated December 27, 1912, there were adjudicated diversions of 14 second-feet from Laramie River between the station at McGill and this station. In addition there is an adjudicated decree of 633 second-feet for storage in Wheatland reservoir, which has a capacity of about 110,000 acre-feet and is situated above McGill. Water from this reservoir passes McGill but is diverted above the Wheatland station.

REGULATION.—(See diversions.)

ACCURACY.—Gage read twice daily. Rating curve well defined. Records good.

Monthly discharge of Laramie River near Wheatland, Wyo., for 1912–1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1912.				
April 13–30	48	5	19.1	684
May	117	15	45.1	2,770
June	70	3	13.3	791
July	44	4	12.1	744
August	27	3	7.16	440
September	13	2	5.63	335
The period				5,760
1912–13.				
October	30	7	14.2	873
November	30	9	15.3	910
December	30	4	10.2	627
April	59	9	25.9	1,540
May	21	4	9.0	553
June	212	9	23.1	1,370
July	350	2	22.7	1,400
August	21	2	5.2	320
September	8	3	5.4	321
1913–14.				
October	13	8	10.3	633
November	17	8	11.4	678
December 1–6	18	10	14.3	170
April	85	18	27.9	1,660
May	184	24	63.5	3,900
June	1,660	31	629	37,400
July	114	45	73.2	4,500
August	79	13	38.4	2,360
September	13	8	11.1	660
1914–15.				
October	24	8	20.6	1,270
April	29	12	19.8	1,180
May	54	11	29.6	1,820
June	67	22	40.2	2,390
July	37	4	12.9	793
August	129	7	22.0	1,350
September	22	5	8.57	510
1915–16.				
October	17	8	10.7	658
November	10	6	8.33	496
March 12–31	34	14	23.4	928
April	18	8	11.9	708
May	23	2	8.94	550
June	14	1	4.93	293
July	3	0	1.81	111
August	2	0	.45	27.7
September	2	0	.07	39.9
October	10	2	6.25	384
November 1–10	6.4	6	6.16	122

NOTE.—Records for 1913 and 1914 revised.

LARAMIE RIVER AT UVA, WYO.

LOCATION.—In sec. 20, T. 25 N., R. 67 W., at railroad bridge half a mile east of Uva, in Platte County. Nearest tributary, North Laramie River, enters 1 mile upstream.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 22, 1895, to October 28, 1899.

GAGE.—Vertical staff; read by J. A. Carley.

EXTREMES OF DISCHARGE.—1895–1899: Maximum stage recorded, 6.0 feet June 27, 1899 (discharge, 3,600 second-feet). No flow August 8, 1896; September 13–19, 23–30, 1897; August 1–10, 1898.

ACCURACY.—Gage read once daily. Rating curves fairly well defined. Records fair to good.

Monthly discharge of Laramie River at Uva, Wyo., 1895–1899.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1895.				
April 22–30	720	190	323	5,770
May	1,350	425	805	49,500
June	3,110	380	1,610	95,800
July	620	56	223	13,700
August	100	16	38.1	2,340
September	16	7	9.6	571
The period				168,000
1895–96.				
October	16	7	13.4	824
November 1–20	22	16	18.4	730
April 6–30	260	81	163	8,080
May	470	100	260	16,000
June	1,940	22	331	19,700
July	260	4	42.2	2,590
August	820	0	73.5	4,520
September	22	4	9.7	577
1896–97.				
October 1–15	22	10	11.2	333
April	1,850	120	743	44,200
May	2,570	670	1,260	77,500
June	2,480	120	1,050	62,500
July	120	10	33.6	2,070
August	520	4	105	6,460
September	10	0	2.0	119
1898.				
April	190	42	76.1	4,530
May	1,220	49	403	24,800
June	980	81	655	39,000
July	64	0	27.3	1,680
August	5	0	1.6	98
September	2	1	1.2	71
The period				70,200
1898–99.				
October	4	1	2.2	135
November 1–26	15	2	7.9	407
April	3,300	100	1,090	64,900
May	2,500	190	1,170	71,900
June	3,600	1,700	2,670	159,000
July	2,900	330	1,520	93,500
August	300	81	204	12,500
September	140	30	55.8	3,320
1899.				
October 1–28	140	30	72.4	4,020

NOTE.—Records have been revised since they were published originally.

LARAMIE RIVER AT FORT LARAMIE, WYO.

LOCATION.—At highway bridge in sec. 28, T. 26 N., R. 64 W., at Fort Laramie, in Goshen County. No important tributary between station and mouth, 1½ miles below.

DRAINAGE AREA.—4,580 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—April 4, 1915, to September 30, 1921.

GAGE.—Vertical staff.

DIVERSIONS.—By decree of district court dated December 27, 1912, there are adjudicated diversions of 61 second-feet between station below McGill and Fort Laramie.

REGULATION.—(See Laramie below McGill).

COOPERATION.—Complete records furnished by United States Reclamation Service.

Monthly discharge of Laramie River at Fort Laramie, Wyo., for 1915–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915.				
April 4–30	166	104	130	6,960
May	241	61	144	8,850
June	824	65	166	9,880
July	1,600	8	176	10,800
August	720	86	206	12,700
September	284	86	169	10,100
The period				59,300
1915–16.				
October	228	157	181	11,100
November	182	153	160	9,520
May	149	40	89.5	5,500
June	41	9.8	20.6	1,230
July	9.8	3.8	6.20	381
August	91	3.8	10.1	621
September	13	5.7	7.90	470
1917.				
April	620	20	201	12,000
May	3,490	292	1,340	82,400
June	4,280	1,640	3,000	179,000
July	3,260	270	1,290	79,300
August	780	79	190	11,700
September	118	60	90.6	5,390
The period				370,000
1917–18.				
October	118	43	72.1	4,430
November	216	118	151	8,980
December	220	148	168	10,300
April	360	245	306	18,200
May	710	280	427	26,300
June	1,640	280	986	58,700
July	525	155	244	15,000
August	215	105	155	9,530
September	111	90	102	6,070
1919.				
April	313	120	231	13,700
May	238	16	89.7	5,520
June	91	12	23.9	1,420
July	820	12	69.6	4,280
August	16	10	12.3	756
September	35	10	20.0	1,190
The period				26,900
1920.				
May	1,520	425	1,030	63,300
June	1,550	425	858	51,100
July	365	66	185	11,400
August	227	66	105	6,460
September	192	76	123	7,320
The period				140,000
1921.				
April	195	107	146	8,690
May	446	140	239	14,700
June	1,940	203	1,280	76,200
July	752	105	236	14,500
August	140	45	77.5	4,770
September	45	8	29.2	1,740
The period				121,000

LITTLE LARAMIE RIVER NEAR FILMORE, WYO.

[Known as Little Laramie River near Hatton in 1902–3.]

LOCATION.—In sec. 9, T. 15 N., R. 77 W., at private bridge at May's ranch, 1½ miles south of Filmore, Albany County. No important tributary between station and junction of North, Middle, and South forks, 4 miles above.

DRAINAGE AREA.—155 square miles (measured on base map of Wyoming; scale 1:500,000).

RECORDS AVAILABLE.—July 5, 1902, to September 30, 1903; May 14, 1911, to September 30, 1921. State engineer maintained station during 1913 and 1914.

GAGE.—Vertical staff at downstream end of left bridge abutment. Gage used since April 1, 1915, was referred to datum 0.21 foot lower than gage at same location used during 1911 and 1912.

EXTREMES OF DISCHARGE.—1902, 1903; 1911–1921. Maximum stage recorded, 5.9 feet at 7 a. m. June 1, 1914 (discharge, 2,400 second-feet); minimum stage recorded, 0.25 foot September 19–20, 1913 (discharge, 1 second-foot).

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 43 second-feet from the Little Laramie above station and 254 second-feet from tributaries entering above.

ACCURACY.—Gage read twice daily. Rating curve well defined except for periods of shifting control. Records good except from 1917 to 1920, for which they are considered excellent, and during winter for which they are fair.

Monthly discharge of Little Laramie River near Filmore, Wyo., for 1902, 1903, 1911–1913, 1915–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1902.				
July 5–31	129	43	75.7	4,050
August	43	17	27.6	1,700
September	154	10	37.7	2,240
The period				7,990
1902–3.				
October	53	43	46.2	2,840
November	53	29	39.3	2,340
December			30	1,840
January			25	1,540
February			25	1,390
March			30	1,840
April	196		115	6,840
May	586	64	222	13,600
June	1,720	302	1,220	72,600
July	700	98	207	12,700
August	98	64	65	4,000
September			50	2,980
The year	1,720		173	125,000
1911.				
May 14–31	555	177	287	10,200
June	930	212	530	31,500
July	225	68	128	7,870
August	68	12	39.4	2,420
September	27	12	18.8	1,120
The period				53,100
1911–12.				
October	75	17	37.9	2,330
November			25	1,490
December			25	1,540
January			20	1,230
February			20	1,150
March			25	1,540
April	107		42	2,500
May	638	66	220	13,500
June	1,440	435	912	54,300
July	772	215	377	23,200
August	375	64	126	7,750
September	145	46	74.7	4,440
The year	1,440		159	115,000

Monthly discharge of Little Laramie River near Filmore, Wyo., for 1902, 1903, 1911, 1913, 1915–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1912–13.				
October	107	41	77.2	4,750
November			50	2,980
December			40	2,460
January			35	2,150
February			35	1,940
March			40	2,460
April	107		64	3,810
May	802	54	337	20,700
June	712	170	375	22,300
July	275	61	110	6,760
August	68	13	35.0	2,150
September	16	1	8.8	524
The year	802		101	73,000
1913–14.				
October	42	13	18.4	1,130
November			20	1,190
December			15	922
January			15	922
February			15	833
March			25	1,540
April	150		80	4,760
May	1,420	98	375	23,100
June	2,400	175	692	41,200
July	338	89	163	10,000
August	127	35	55.0	3,380
September	35	20	26.4	1,570
The year	2,400		125	90,500
1914–15.				
October	35	20	28.5	1,750
November			35	2,080
December			30	1,840
January			25	1,540
February			25	1,390
March			28	1,720
April	152	29	55.8	3,320
May	470	61	200	12,300
June	735	140	317	18,900
July	152	44	70.7	4,350
August	79	27	41.2	2,530
September	67	20	37.0	2,200
The year	735		74.5	53,900
1915–16.				
October	79	36	45.0	2,770
November			35	2,080
December			30	1,840
January			25	1,540
February			25	1,440
March			25	1,540
April	430	13	94.4	5,620
May	388	33	209	12,900
June	656	190	405	24,100
July	178	73	114	7,010
August	127	27	57.0	3,500
September	36	12	18.8	1,120
The year	656		90.3	65,500
1916–17.				
October	47	19	28.2	1,730
November			20	1,190
December			18	1,110
January			18	1,110
February			15	833
March			18	1,110
April	102		62	3,690
May	388	54	191	11,700
June	1,840	251	1,130	67,200
July	1,220	208	572	35,200
August	192	53	96.3	5,920
September	56	30	38.9	2,310
The year	1,840		184	133,000

Monthly discharge of Little Laramie River near Filmore, Wyo., for 1902, 1903, 1911–1913, 1915–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917–18.				
October	45	28	31.3	1,920
November	46	29	37.7	2,240
December			25	1,540
January			25	1,540
February			20	1,110
March			40	2,460
April	93	28	51.8	3,080
May	611	56	222	13,600
June	1,600	285	1,030	61,300
July	436	87	211	13,000
August	102	29	58.9	3,620
September	62	29	44.5	2,650
The year	1,600		149	108,000
1918–19.				
October	59	28	38.1	2,340
November			30	1,790
December			25	1,540
January			20	1,230
February			20	1,110
March			25	1,540
April	94	21	50.5	3,000
May	832	80	305	18,800
June	365	87	187	11,100
July	148	24	52.7	3,240
August	148	8	26.5	1,630
September	13	7	9.5	565
The year	832		66.2	47,900
1919–20.				
October	39	9	17.9	1,100
November			10	595
December			15	922
January			15	922
February			15	863
March			20	1,230
April	87	22	50.7	3,020
May	1,070	87	280	17,200
June	1,520	460	929	55,300
July	344	87	182	11,200
August	128	50	87.0	5,350
September	70	33	43.7	2,600
The year	1,520		138	100,000
1920–21.				
October	49	23	37.9	2,330
November	46	32	40.1	2,390
December			25	1,540
January			20	1,230
February			20	1,110
March 15–31	48		25	1,540
April	84	33	46.0	2,740
May	1,100	62	287	17,600
June	1,640	330	941	56,000
July	306	101	193	11,900
August	152	44	79.7	4,900
September	42	23	29.6	1,760
The year	1,640		145	105,000

NOTE.—Records for 1902 and 1913 revised. Winter records estimated.

LITTLE LARAMIE RIVER AT TWO RIVERS, WYO.

LOCATION.—On line between secs. 5 and 6, T. 17 N., R. 74 W., at highway bridge half a mile south of Two Rivers, Albany County. No tributary between station and mouth, half a mile below.

DRAINAGE AREA.—310 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—May 1, 1911, to September 30, 1921. State engineer maintained station during 1913 and 1914.

GAGE.—Stevens water-stage recorder installed May 4, 1921, at site and datum of Bristol gage used previously. Gage used during 1913 and 1914 was 400 feet down stream and referred to different datum.

EXTREMES OF DISCHARGE.—1911–1921: Maximum discharge recorded, 5.60 feet on June 4, 1914 (discharge, 1,740 second-feet). River frequently is dry in the fall owing to irrigation above.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions from Little Laramie River of 422 second-feet between Filmore and Two Rivers stations.

ACCURACY.—Gage heights from continuous record. Rating curve well defined, but applied indirectly during 1918. Records good except from 1918 to 1921, for which they are fair.

Monthly discharge of Little Laramie River at Two Rivers, Wyo., for 1911–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
May	6	0	3.08	189
June	495	27	169	10,100
July	38	0	9.21	566
August	0	0	0	0
September	0	0	0	0
The period				10,900
1911–12.				
October	18	0	4.07	250
November 1–4	27	22	25.8	205
April 11–30	68	16	35.3	1,400
May	60	16	32.3	1,990
June	618	46	310	18,500
July	305	16	136	8,360
August	135	10	41.1	2,530
September	94	10	43.9	2,610
1912–13.				
October	94	24	57.5	3,540
April 14–30	137	30	68.2	2,300
May	328	30	81.0	4,980
June	345	10	121	7,200
July	33	0	8.6	529
August	33	0	9.4	578
September	6	0	2.1	125
1913–14.				
October	25	6	16.2	996
November 1–16	45	17	25.7	815
April 14–30	74	41	55.4	1,870
May	826	22	190	11,700
June	1,740	31	503	29,900
July	62	2	13.4	824
August	76	3	19.5	1,200
September	5	1	2.23	133
1914–15.				
October	20	3	9.9	609
April 21–30	116	29	54.0	1,070
May	79	5	28.4	1,750
June	238	9	56.2	3,340
July	11	.2	3.23	199
August	8	.3	2.01	124
September	6	.5	1.75	104
1915–16.				
October	38	.7	11.4	701
May 4–31	10	1	3.54	197
June	110	5	44.2	2,630
July	3	0	.78	48
August 12–31	6	2	3.10	123

Monthly discharge of Little Laramie River at Two Rivers, Wyo., for 1911–1921—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
April 16–30	112	55	90.0	2,680
May	592	55	171	10,500
June	1,220	78	665	39,600
July	940	129	395	24,300
August 1–18	105	14	37.1	1,320
September 15–22	2	1	1.5	24
1918.				
April 13–30	120	37	69.6	2,480
May	219	31	54.2	3,330
June	1,240	148	780	46,400
July	138	28	78.9	4,850
August	25	.6	12.0	738
September	5.6	.8	3.93	234
The period				58,000
1918–19.				
October 1–16	9.4	4.6	6.40	203
April	102	10	62.3	3,710
May 1–11	47	24	35.7	780
June 9–30	41	11	20.6	899
July	9.2	0	1.45	89
1920.				
May	290	33	76.3	4,690
June	1,180	195	558	33,200
July	155	27	53.6	3,300
August	63	32	44.7	2,750
September	40	4	18.3	1,090
The period				45,000
1920–21.				
October	32	4	12.7	781
May	830	13	107	6,580
June	1,370	132	842	50,100
July	141	28	66.6	4,100
August	37	7	22.8	1,400
September	12	2	5.8	345

NOTE.—Records for 1914 revised.

SIBILLE CREEK NEAR WHEATLAND, WYO.

LOCATION.—In sec. 35, T. 25 N., R. 69 W., just above highway bridge half a mile above mouth and 10 miles northwest of Wheatland, in Platte County. No tributary between station and mouth.

DRAINAGE AREA.—568 square miles (measured on base map of Wyoming; scale, 1:500,000.

RECORDS AVAILABLE.—May 23 to December 16, 1912; April 1, 1914, to November 10, 1916. State engineer maintained station during 1913 and 1914.

GAGE.—Vertical staff at left bank 150 feet above bridge, read by John Wilkinson. Gage used in 1912 was at opposite bank, and referred to datum 0.15 foot lower.

EXTREMES OF DISCHARGE.—1912, 1914–1916: Maximum stage recorded, 2.95 feet at 7 p. m. August 2, 1912 (discharge, 490 second-feet). No flow July 1–3, 24–31, August and September, 1916.

DIVERSIONS.—By decree of district court dated December 27, 1912, adjudicated diversions of 187 second-feet from Sibille Creek, and 35 second-feet from tributaries, all above station.

ACCURACY.—Gage read once daily during 1912, and twice daily 1914–1916. Rating curve well defined below 150 second-feet. Records good up to 150 second-feet, above which they are fair.

Monthly discharge of Sibille Creek near Wheatland, Wyo., for 1912, 1914–1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1912.				
May 23–31	192	34	141	2,520
June	390	8	96.1	5,720
July	52	4	17.9	1,100
August	490	14	105	6,460
September	180	14	37.0	2,200
October	40	8	20.1	1,240
November	65	24	46.0	2,740
December 1–16	65	46	53.4	1,690
The period				23,700
1914.				
April	215	80	108	6,430
May	250	7	86.8	5,340
June	165	2	37.6	2,240
July	145	1	13.2	810
August	112	2	23.6	1,450
September	8	1	2.1	125
The period				16,400
1914–15.				
October	23	2	7.71	474
April	42	16	29.1	1,730
May	66	12	31.9	1,900
June	58	1	14.1	839
July	252	1	24.6	1,510
August	252	2	40.1	2,470
September	39	1	10.3	613
1915–16.				
October	28	6	13.6	836
November	31	10	20.5	1,220
March 12–31	94	52	68.3	2,710
April	55	17	42.7	2,540
May	122	2	27.5	1,690
June	22	1	4.27	254
July	1.2	0	.35	21.5
August			.00	0
September			.00	0
October	1.9	0	.54	33.2
November 1–10	2.0	1.5	1.78	35.3

NORTH LARAMIE RIVER AT UPPER STATION NEAR WHEATLAND, WYO.

LOCATION.—In sec. 2, T. 25 N., R. 70 W., a quarter of a mile above headgate of North Laramie Land Co.'s ditch and 18 miles northwest of Wheatland, in Platte County. No important tributary within 10 miles of station.

DRAINAGE AREA.—366 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—November 6, 1914, to September 30, 1921.

GAGE.—Bristol water-stage recorder from November 6, 1914, to March 7, 1918, at which time a Stevens 8-day recording gage was installed at left bank on vertical cliff just below proposed dam site; both referred to same datum.

EXTREMES OF DISCHARGE.—1915–1921: Maximum stage, 6.2 feet from high-water mark of April 7, 1920 (discharge, 3,020 second-feet); mininum discharge, no flow during greater part of July, August, and September, 1919.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 37 second-feet from North Laramie River above station, and 27 second-feet below.

ACCURACY.—Gage heights from water-stage recorder, the operation of which was not satisfactory. Rating curve well defined. Records fair 1914–1916, good during 1917, 1919, 1920, excellent during 1918, and fair during 1921.

Monthly discharge of North Laramie River at upper station, near Wheatland, Wyo., for 1914–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1914–15.				
November 6–19	8	5	6.5	180
March 27–31	8	3	4.8	47.6
April	98	5	42.3	2,520
May	188	82	128	7,870
June	175	56	113	6,720
July	75	30	52.7	3,240
August	338	45	92.2	5,670
September	68	40	54.8	3,260
1915–16.				
October	45	8	22.8	1,400
November	18	0	6.2	369
December 1–7	6	1	3.0	41.7
April	166	63	125	7,440
May	145	71	94.4	5,800
June	106	7	36.3	2,160
July 1–8	6	2	3.75	59.5
1917.				
April	560	29	203	12,100
May	1,260	141	681	41,900
June	1,270	198	518	36,800
July	172	22	88.8	5,460
August	29	20	25.4	1,560
September	20	12	16.6	988
The period				98,800
1917–18.				
October	23	16	19.3	1,190
November	23	20	22.0	1,310
December 1–7	23	20	20.9	290
March 24–31	126	78	101	1,600
April	275	57	137	8,150
May	488	141	262	16,100
June	153	19	63.6	3,780
July	31	11	18.7	1,150
August	25	.6	7.45	458
September	13	2.4	6.89	410
1918–19.				
October	35	7.0	10.7	658
November 1–23	13	6.2	9.28	423
April 14–30	152	35	81.4	2,740
May	110	17	51.7	3,180
June	24	2	12.6	750
1919–20.				
November 18–25	6	4	5.0	79
March 17–31	100	16	38.0	1,130
April	2,860	12	368	21,900
May	955	275	616	37,900
June	245	36	92.8	5,520
July	63	21	26.1	1,600
August	40	15	20.4	1,250
September	15	7	10.4	619
1920–21.				
October			10	615
November			12	714
April	180	26	89.7	5,340
May	485	160	240	14,800
June	900	77	256	15,200
July	81	42	55.4	3,410
August	42	3	27.5	1,690
September			10	595

NOTE.—Practically no flow after June 30, 1919.

NORTH LARAMIE RIVER NEAR WHEATLAND, WYO.

LOCATION.—In sec. 6, T. 25 N., R. 69 W., at Wilson's ranch, 17 miles northwest of Wheatland, in Platte County, 1 mile below the headgate of the North Laramie Land Co.'s ditch.

DRAINAGE AREA.—370 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—February 15, 1912, to November 9, 1914. State engineer maintained station during 1913 and 1914.

GAGE.—Vertical staff.

EXTREMES OF DISCHARGE.—1912–1914: Maximum stage recorded, 3.8 feet May 3–4, 1914 (discharge, 665 second-feet); minimum stage recorded 1.0 foot July 13–19, 1914 (discharge, 1 second-foot).

DIVERSIONS.—Between this station and upper station, North Laramie Land Co.'s ditch diverts water.

ACCURACY.—Gage probably read once daily. Rating curve well defined below 100 second-feet. Records good below 100 second-feet; fair above.

Monthly discharge of North Laramie River near Wheatland, Wyo., for 1912–1914.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1912.				
March 15–31	12	5.5	7.9	266
April	345	7.0	94.5	5,620
May	580	108	317	19,500
June	108	12	51.3	3,050
July	24	5.5	12.3	756
August	108	4.0	10.4	640
September	5.5	4.0	4.1	244
The period				30,100
1912–13.				
October	12	2.5	4.4	271
November	12	1.0	6.6	393
December			5.5	338
May 8–31	90	13	34.2	1,630
June	441	13	60.8	3,620
July	13	3	6.7	412
August	7	2	3.0	184
September	3	2	2.0	119
1913–14.				
October	3	2	2.4	148
April 5–30	205	20	84.4	4,350
May	665	30	225	13,800
June	30	7	20.0	1,190
July	7	1	3.3	203
August	13	3	3.8	234
September	3	3	3.0	179
October	7	3	5.6	344
November 1–9	3	3	3.0	55

NOTE.—Records for 1914 revised.

CHUGWATER CREEK AT CHUGWATER, WYO.

LOCATION.—In sec. 31, T. 21 N., R. 66 W., at highway bridge half a mile from railroad station at Chugwater, Platte County. No tributary within several miles.

DRAINAGE AREA.—359 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—May 22, 1911, to September 30, 1921. State engineer maintained station during 1913 and 1914.

GAGE.—Chain gage at left bank 300 feet above bridge, installed April 6, 1916, at the same datum and location as vertical staff previously used. Prior to February 6 1912, gage was on bridge and referred to different datum.

EXTREMES OF DISCHARGE.—1911–1921: Maximum stage recorded, 4.5 feet at 8 a. m. September 4, 1915 (discharge, 350 second-feet). Minimum discharge, stream dry on several days during 1913.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions from Chugwater Creek of 75 second-feet above station, and 98 second-feet below.

ACCURACY.—Gage read twice daily. Rating curves fairly well defined. Records good except during 1921, for which they are fair.

Monthly discharge of Chugwater Creek at Chugwater, Wyo., for 1911–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
May 22–31	3	2	2.50	50
June	26	1	1.90	113
July	62	1	4.13	254
August	42	2	4.29	264
September	3	2	2.10	129
The period				810
1911–12.				
October	6	2	4.10	252
November	15	3	9.27	552
December			3.00	184
January	3	2	2.91	179
February	4	3	3.24	186
March	24	4	7.29	448
April	42	12	27.1	1,610
May	156	42	98.5	6,050
June	84	6	32.7	1,950
July	57	4	9.23	568
August	245	14	42.2	2,590
September	186	10	42.5	2,530
The year	245		23.6	17,100
1912–13.				
October	33	26	29.5	1,810
November 1–7	29	29	29.0	404
April	170	54	98.0	5,830
May	47	8	26.6	1,640
June	46	4	8.2	488
July	56	2	7.5	461
August	23	0	4.5	277
September	4	0	1.5	89
1913–14.				
October	45	0	8.0	492
November	10	1	7.3	434
December	7	0	3.5	215
January	10	2	5.3	326
February	16	4	8.3	461
March	30	10	22.6	1,390
April	99	29	67.8	4,030
May 1–20	121	9	72.8	2,890
June 9–30	12	6	9.0	393
July	9	4	5.1	314
1914–15.				
January	34	21	31.2	1,920
February	34	22	27.4	1,520
March	42	27	36.5	2,240
April	94	34	51.2	3,050
May	79	14	36.1	2,220
June	56	11	32.1	1,910
July	99	7	19.2	952
August	60	18	32.4	1,990
The period				15,800
1915–16.				
October	42	26	31.2	1,920
November	34	10	24.6	1,460
December	27	12	18.8	1,160
January	16	12	13.4	824
February	30	13	20.3	1,170
March	90	14	41.4	2,550
April	48	14	28.2	1,680
May	13	4.9	7.16	440
June	5.3	3.9	4.85	289
July	3.1	2.7	2.92	180
August	3.0	2.5	2.64	162
September	3.1	2.6	2.68	159
The year	90	2.5	16.5	12,000

Monthly discharge of Chugwater Creek at Chugwater, Wyo., for 1911–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916–17.				
October	5.1	3.0	3.69	227
November	4.0	3.4	3.54	211
December	7.6	3.5	4.36	268
January	3.7	2.6	3.04	187
February	11.3	2.7	4.35	242
March	17	5.1	9.26	569
April	97	16	44.8	2,670
May	263	48	122	7,500
June	275	31	129	7,680
July	39	10	18.8	1,160
August	36	12	19.5	1,200
September	26	15	18.8	1,120
The year	275	2.6	31.8	23,000
1917–18.				
October	23	15	17.3	1,060
November	33	20	25.7	1,530
December	36	14	22.2	1,360
January	30	14	19.0	1,170
February	28	14	20.4	1,130
March	74	15	37.8	2,320
April	108	70	78.9	4,690
May	74	22	45.5	2,800
June	208	27	64.2	3,820
July	104	10	20.9	1,290
August	83	10	17.1	1,050
September	14	10	12.2	726
The year	208	10	31.7	22,900
1918–19.				
October	15	12	13.3	818
November	17	6.9	13.4	797
December	19	7.0	10.6	652
January	14	6.8	9.75	600
February	14	6.4	9.83	546
March	28	7.4	17.7	1,090
April	53	18	35.3	2,100
May	14	3.4	6.78	417
June	4.1	2.7	3.30	196
July	26	2.3	4.95	304
August	74	2.5	5.66	348
September	52	2.7	5.54	330
The year	74	2.3	11.3	8,200
1919–20.				
October	5.9	3.1	4.72	290
November	5.9	3.1	4.21	251
December	3.8	1.2	2.70	166
January	8.6	2.7	3.84	236
February	13	5.2	8.96	515
March	12	3.0	8.33	543
April	66	3.5	24.8	1,480
May	215	42	120	7,380
June	80	8.3	21.7	1,290
July	52	6.4	15.2	935
August	257	12	32.4	1,990
September	29	13	18.7	1,110
The year	257	1.2	22.3	16,200
1920–21.				
October	16	13	14.4	885
November	24	8.0	15.5	922
December	26	7.5	11.8	726
January	18	7.5	11.5	707
February	34	10	17.5	972
March	51	29	41.3	2,540
April	27	9.2	13.8	821
May	18	9.2	12.4	762
June	40	9.0	19.7	1,170
July	70	4.1	12.2	750
August	91	7.0	20.6	1,270
September	12	6.4	7.42	442
The year	91	4.1	16.5	12,000

NOTE.—Records for 1913 and 1914 revised.

IRRIGATION.

With reference to irrigation the Laramie River basin can be naturally divided into three sections—the narrow mountain valley in Colorado; the Laramie Plains, extending from a point 10 miles below the State line to the canyon below the Wheatland reservoir No. 2; and the part of the basin below the canyon.

In the upper section the elevation of the irrigable area ranges from 7,500 feet at the State line to 8,500 feet at the upper end. Owing to the short growing season, native hay is practically the only crop, as stock raising is the principal industry.

On the Laramie Plains irrigation is much more extensive and has reached a higher stage of development, a number of large irrigation projects having been constructed. The chief crop is native hay, although alfalfa and grain are also raised, as the Laramie Plains are primarily a stock-raising country. Irrigation of hay ceases about July 15, but other crops are irrigated somewhat later.

In the lower valley, where the irrigable area lies chiefly between elevations of 4,500 and 5,000 feet, the growing season is longer and irrigation extends from the middle of May to the middle of September. The chief crops, named in order of importance, are alfalfa, wheat, sugar beets, and oats.

The following table, compiled from various sources, is as close an estimate as can be given in the absence of a detailed survey.

Areas irrigable and irrigated in Laramie River basin, in acres.

Portion of basin.	Irrigable.	Irrigated.
Upper basin in Colorado	4,000	3,000
Laramie Plains:		
Laramie Water Co. (including Pioneer canal)	83,000	17,000
James Lake district—		
Under James Lake	[a] 30,000	1,500
Oasis ditch	11,000	9,000
Riverside ranch	13,500	13,500
Boughton ditch	7,000	7,000
Minor ditches from Laramie River	16,000	16,000
Little Laramie and tributaries	50,000	48,300
	210,500	112,300
Basin below Laramie Plains:		
Wheatland project	77,000	37,000
North Laramie River	10,000	5,000
Chugwater Creek	6,000	6,000
Sibille Creek	5,000	5,000
Miscellaneous tributaries	17,000	15,000
	115,000	68,000
Grand total	329,500	183,300

[a] Gross area under system; amount irrigable will depend on water supply, which is insufficient for entire area.

Of the total irrigable area of 330,000 acres, 216,000 acres is comprised in six projects, the Wheatland, Laramie Water Co., James Lake, Riverside ranch, Boughton ditch, and North Laramie Land Co. The remainder of the area is under many small ditches and includes lands near the streams.

LARAMIE RIVER.

The Wheatland project, which is the oldest and furthest developed in the basin, was started by the Wyoming Development Co. in the eighties and has gradually been enlarged by the construction of additional units until at present it comprises 77,000 acres susceptible of irrigation, of which 37,000 acres is irrigated. The lands lie on the south side of Laramie River between Chugwater and Sibille creeks near Wheatland. Water is stored in Wheatland reservoir No. 2, which is in the channel of Laramie River

at the lower end of the Laramie Plains. From this reservoir water is released during the irrigation season and allowed to flow down the river to the intake of the tunnel, in sec. 36, T. 23 N., R. 72 W. After passing the tunnel it flows into Bluegrass Creek and down the channel of that stream into Sibille Creek, from which it is diverted into the canal system heading in sec. 13, T. 22 N., R. 70 W. The reservoir, known as Wheatland reservoir No. 2, is formed by an earth dam originally 40 feet high, riprapped on the upstream face. The outlet has four gates, each 7 by 4 feet, discharging into two tubes. The spillway, which is at the extreme north end, has a maximum capacity (with outlet gates) of 3,000 second-feet. The tunnel, which is cut through solid rock, has an opening 8 by 10 feet and is 2,985 feet long, having a grade of 60 feet to the mile. Its capacity is about 800 second-feet. The net duty of water on this project is from 2.5 to 3.0 acre-feet per acre.

The Laramie Water Co., formed by a consolidation of several irrigation interests, operates a system southwest of Laramie on the west side of the river. The system is composed of two distinct units—the Pioneer canal, which is one of the oldest canals in the plains and was acquired with an obligation to furnish water to those holding water rights under the canal, and the recently constructed Lake Hattie unit. The irrigable area tributary to the Pioneer canal and possible laterals and extensions is 40,000 acres, of which 15,000 acres is irrigated. The gross area irrigable under the Lake Hattie unit as now constructed is 43,000 acres, of which perhaps 2,000 acres is irrigated. The intake for both units is the Pioneer canal, which diverts water from Laramie River in sec. 36, T. 14 N., R. 77 W. It extends for a distance of 4 miles to Sodergreen Lake, having a capacity of 1,200 second-feet. Here it divides, the original Pioneer canal continuing in a course parallel to Laramie River at an average distance of 3 miles from it, for a distance of 25 miles. The other branch from Sodergreen Lake is the main source of supply for Lake Hattie. The Lake Hattie unit consists of the Lake Hattie reservoir, between Laramie and Little Laramie rivers, which has one supply ditch from Laramie River through the Pioneer canal and a second from Little Laramie River. Lake Hattie, a natural lake, was turned into a reservoir by the construction of an earth dam having a maximum height of 48 feet and a crest length of 6,000 feet faced with a 6-inch layer of reinforced concrete. The total capacity of the reservoir is 110,000 acre-feet, with a possible draft of 60,000 acre-feet, leaving 50,000 acre-feet as dead storage below the elevation of the outlet. From the outlet a ditch known as the North canal extends northwestward to a point several miles beyond the Pioneer canal, lying parallel to it at an average distance of half a mile. Although the Lake Hattie unit has been practically completed for several years, very little land under it has been settled. The company itself owns only a few thousand acres, expecting to sell water to the lands covered by the canal.

The James Lake project, which is owned by the Laramie Valley Irrigation district, a municipal district organized under the State laws, lies on both sides of Laramie River near its junction with the Little Laramie. The project consists of two distinct units, one on the east side of the river, irrigated by the Oasis ditch, and the other on the west side, irrigated from James Lake. The area susceptible of irrigation in the first unit is about 9,000 acres, and that in the second unit 30,000 acres. The actual area that can be irrigated from James Lake depends entirely upon the water supply, which is inadequate for the entire amount. The Oasis ditch, which was constructed before the formation of the district in 1908, diverts water from Laramie River in sec. 19, T. 17 N., R. 73 W., and irrigates a strip of land from 1 to 2 miles wide paralleling the river for a distance of 15 miles. This strip contains 11,000 acres, of which 9,000 acres is included in the irrigation district. James Lake, a natural lake in the northeast corner of T. 17 N., R. 76 W., was turned into a reservoir by the construction of an earth dam 30 feet high. Its capacity is 41,000 acre-feet with a maximum draft of 30 feet, and its high-water area 1,400 acres. The water supply is received through a ditch that diverts water from Little Laramie River in sec. 2, T.

15 N., R. 77 W., and carries it northward for 14 miles, emptying into Sevenmile Creek, 4 miles above its entrance to James Lake. The ditch intercepts Mill Creek. As an additional source of supply Fourmile Creek has been diverted into James Lake. The main outlet ditch from James Lake has a capacity of 300 second-feet for a distance of 4,000 feet. It then divides into the North and South canals, which cover lands lying between the reservoir and Laramie River.

One of the oldest ranches on the Laramie Plains is the Riverside ranch, in T. 14 N., Rs. 75 and 76W., on both sides of Laramie River. Here four ditches irrigate the bottom and first bench lands, comprising a tract from 2 to 4 miles wide and 12 miles long. The irrigated area of 13,500 acres is either native hay meadow or pasture land. The ranch was sold some years ago, and an unsuccessful attempt was made to colonize it. The duty of water on this ranch is low, as irrigation begins early in May and lasts until the water freezes, usually in October.

The Boughton ditch, which is owned by the Diamond Cattle Co., diverts water from Laramie River in sec. 21, T. 18 N., R. 74 W., and irrigates about 7,000 acres of the company's land on the east side of the river. Native hay is the chief crop.

LITTLE LARAMIE RIVER.

Most of the 48,000 acres of irrigated land in the Little Laramie River basin near the river is irrigated by individual and cooperative ditches. Two irrigation systems, the Laramie Water Co. and James Lake, obtain a portion of their supplies from the Little Laramie.

NORTH LARAMIE RIVER.

Most of the land irrigated from North Laramie River is irrigated from individual ditches, many of them situated on the headwaters. The largest project is that of the North Laramie Land Co. The lands under this project were segregated under the Carey Act and lie south of the river, in Rs. 68, 69, and 70 W. The point of diversion is in sec. 2, T. 25 N., R. 70 W. The system includes three reservoirs having a combined net storage capacity of 5,000 acre-feet. The gross area under the project was originally 8,200 acres. It is impossible to state what the net irrigable area will be, as the water supply is inadequate for the entire area.

WATER SUPPLY.

Laramie River.—Referring the records of stations at Jelm and Woods Landing to that near Woods by adding amounts representing additional inflow gives a record for 18 years. These are not consecutive, as records for 1892–1895, 1901–1904, and 1906–1910 are lacking. As storage facilities are afforded, the mean discharge of the period will be considered instead of that of the median year, which is taken where there is direct diversion without storage. The mean annual

flow for the period is 178,000 acre-feet at the Woods station, which is above practically all irrigation from Laramie River. Exclusive of the Woods Landing records of 1891 and 1896–1900, as the conditions under which they were made are not known, a 12-year record is available, the mean of which is 169,000 acre-feet.

From the records of Little Laramie River it is estimated that the mean annual flow contributed to Laramie River will be 40,000 acre-feet. This quantity added to the mean annual run-off of 169,000 acre-feet makes 209,000 acre-feet available for storage and irrigation. With the comparatively short irrigation season the consumptive duty is about 1.5 acre-feet to an acre, and with this duty 140,000 acres can be irrigated from Laramie River.

Little Laramie River.—For determining the water supply of Little Laramie River records near Filmore are available for a part of 1903 and for the 11-year period 1911–1921. As this station is above most of the irrigable area, the records represent the discharge available for irrigation. The mean discharge for the 11-year period is 91,800 acre-feet. With a consumptive duty of 1.5 acre-feet per acre, 61,000 acres can be irrigated. Storage would be required for the low years. The year of lowest recorded flow was 1919, when the total discharge was 47,900 acre-feet.

DIVERSIONS FROM DRAINAGE BASIN.

Three separate systems divert water from the headwaters of Laramie River in Colorado into the Cache la Poudre, for irrigation in that valley. As these diversions take water out of the basin they diminish the run-off by the total amount diverted, with no deduction for return seepage water. These ditches in order of priority are the Skyline ditch, Wilson Supply ditch, and Laramie-Poudre tunnel.

The Water Supply & Storage Co. built the Skyline ditch in 1891–1893 to divert water from Laramie River into Chambers Lake, in sec. 6, T. 7 N., R. 75 W. The ditch heads in the West Fork of Laramie River in sec. 14, T. 8 N., R. 76 W., at an elevation of 9,300 feet, and takes a southerly course to Chambers Lake, which is across the divide. Throughout its length of 5 miles the ditch lies along a steep mountain side, being built through both loose and solid rock. In its course the ditch intercepts a number of small streams, so that the drainage area which it taps is approximately 14 square miles. Owing to the high altitude, water can not be diverted during the winter, as the ditch is filled with snow and ice. It is necessary to clean out the ditch each spring before diverting water, so that in some years water is not diverted until the latter part of May or June. Although the

ditch has a decree for 400 second-feet under date of August 7, 1891, it appears that its safe carrying capacity is about 200 second-feet.

The Wilson supply ditch, which has a decreed right for 288 second-feet, dated June 15, 1899, under the name Sand Creek ditch system, is owned by the Divide Canal & Reservoir Co. It heads in sec. 35, T. 10 N., R. 75 W., takes water from a tributary of Deadman Creek, and carries it into Sand Creek, tapping a number of small tributaries on the way. The natural channel of Sand Creek is used for a distance of 4 miles, but in sec. 22, T. 11 N., R. 75 W., the water is diverted into Sheep Creek by the Divide canal, which is 1 mile long and has a capacity of 200 second-feet. From Sheep Creek the water is carried into the Cache la Poudre.

The Greeley-Poudre irrigation district, requiring more water for the irrigation of its lands in the Poudre Valley, Colo., constructed the Laramie-Poudre tunnel in 1910–1912 to divert water into Cache la Poudre River. The west portal of the tunnel is in sec. 7, T. 8 N., R. 75 W., at an elevation of 8,570 feet. Its cross section is 7½ by 9½ feet, and its length is 11,306 feet on a 1.7 per cent grade, giving a capacity of 800 second-feet. A system of east and west side collection ditches, 8 and 4½ miles long, respectively, are on either side of Laramie River. These intercept the flow of the numerous tributaries and carry it to the tunnel reservoir constructed in the channel of Laramie River by a dam 1,890 feet long. The drainage area made tributary to the tunnel is 67 square miles, although not all the runoff from that area is available, owing to prior diversions of the Skyline and Wilson supply ditches. It is estimated that about 40,000 acre-feet in a median year passes the tunnel intake. By a decree of the United States Supreme Court dated June 5, 1922, the Laramie-Poudre tunnel is enjoined from diverting more than 5,500 acre-feet annually.

Gages are maintained on each ditch and are read by the water commissioner. The following table, showing the total yearly amount diverted by each ditch, was compiled from two sources—the portion to 1913, inclusive, from evidence submitted in the Colorado-Wyoming lawsuit, and that subsequent to 1913 from the weekly reports of the water commissioner.

Annual diversions from Laramie River basin, 1899–1921, in acre-feet.

Year.	Skyline ditch.	Sand Creek system.	Laramie-Poudre tunnel.	Total diverted from Laramie River.
1899	17,700	.....	.....	17,700
1900	18,700	.....	.....	18,700
1901	23,800	.....	.....	23,800
1902	22,100	1,920	.....	24,000
1903	26,100	1,710	.....	27,800
1904	23,400	6,810	.....	30,200
1905	13,300	0	.....	13,300
1906	16,700	5,000	.....	21,700
1907	15,000	5,400	.....	20,400
1908	18,000	2,090	.....	20,100
1909	12,700	0	.....	12,700
1910	16,400	783	.....	17,200
1911	19,100	4,420	.....	23,500
1912	21,000	2,150	.....	23,200
1913	14,600	0	.....	14,600
1914	10,200	935	813	11,900
1915	15,000	1,990	4,960	22,000
1916	20,300	2,870	4,520	27,700
1917	11,500	(a)	392	11,900
1918	15,800	3,240	10,700	29,700
1919	14,400	2,510	4,090	21,000
1920	13,900	0	12,400	26,300
1921	14,300	0	9,230	23,500
Mean	17,100	2,990	5,890	21,000

a No diversion reported.

WATER POWER.

No water power is developed in the Laramie River drainage basin.

The following table was compiled from topographic maps, except for the section between Little Laramie and North Laramie rivers, which is only approximate.

Elevations and distances along Laramie River from source to mouth.

Point on river.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From source.	Point to point.		Total.	Per mile.
Contour crossing	0	.....	9,100	.....	.....
Do	.1	0.1	9,000	100	1,000
Do	1.0	.9	8,800	200	222
Do	2.1	1.1	8,700	100	91
Do	3.3	1.2	8,600	100	83
(Mouth of West Laramie River)	(3.9)	.....	.....	.....	.....
Contour crossing	5.3	2.0	8,500	100	50
Do	8.2	2.9	8,400	100	34
Do	11.2	3.0	8,300	100	33
(Mouth of Nunn Creek)	(13.6)	.....	.....	.....	.....
Contour crossing	14.5	3.3	8,200	100	30
Do	17.5	3.0	8,100	100	33
Do	20.3	2.8	8,000	100	36
(Mouth of McIntyre Creek)	(21.9)	.....	.....	.....	.....
Contour crossing	23.7	3.4	7,900	100	29
NE. ¼ SW. ¼ sec. 7, T. 11 N., R. 76 W	25.3	1.6	7,840	60	37
Center sec. 1, T. 11 N., R. 77 W	26.8	1.5	7,800	40	27
SW. ¼ NW. ¼ sec. 23, T. 12 N., R. 77 W	28.8	2.0	7,700	100	50
South edge SW. ¼, sec. 10, T. 12 N., R. 77 W	31.5	2.7	7,660	40	15
SW. ¼ SE. ¼ sec. 4, T. 12 N., R. 77 W	33.1	1.6	7,635	25	16
Jelm	36.3	3.2	7,540	95	30
Mouth of Woods Creek	40.8	4.5	7,450	90	20
Head of Pioneer canal	44.1	3.3	7,340	110	33
Riverside ranch	52.0	7.9	7,230	110	14
NE. ¼ sec. 22 T. 14 N., R. 75 W	57.2	5.2	7,200	30	6
Line between Tps. 74 and 75	69.2	12.0	7,150	50	4
Highway bridge at Laramie	72.9	3.7	7,140	10	3
Howell	81.9	9.0	7,100	40	4
Mouth of Little Laramie River	94.0	12.1	7,060	40	3
Entrance to canyon (about line between Rs. 72 and 73)	111.7	17.7	6,800	260	15
Mouth of North Laramie River	149.7	38.0	4,450	2,350	62
Mouth	179.7	30.0	4,230	220	7

As the available water supply is required to meet irrigation needs, power can be developed only by direct diversion, without storage to increase the winter flow. The heaviest fall is on the headwaters, but here the discharge is so small and the winter conditions so severe that development can not be considered feasible.

Topographic maps are not available for the tributary streams, nor have profile surveys been made. It is therefore impossible to estimate their power possibilities, but they are believed to be small and relatively unimportant.

STORAGE.

In addition to the three large reservoirs constructed, preliminary surveys or reconnaissances have been made of three possible sites. The following table shows the principal features of each reservoir:

Completed and proposed reservoirs in Laramie River basin.

Name.	Location of dam.	Source of supply.	Height of dam (feet).	Area (acres).	Capacity (second-feet).
Wheatland No. 2..	Sec. 36, T. 22 N., R. 74 W.....	Laramie River....	40	.....	110,000
Lake Hattie.....	Secs. 22-26, T 15 N., R. 76 W.....	Laramie and Little Laramie.	48	4,500	60,000
James Lake.....	Sec. 2, T. 17 N., R. 76 W.....	Little Laramie....	30	1,400	41,000
Glendevey.....	Sec. 35, T. 9 N., R. 76 W.....	Laramie.....	55	640	14,700
Robertson-McConnell.	Sec. 4, T. 12 N., R. 77 W.....	.....do.....	200	3,930	291,000
Bell.....	Sec. 7, T. 15 N., R. 77 W.....	Douglas Creek.....	100	.....	96,500

The Wheatland No. 2, Lake Hattie, and James Lake reservoirs are described on pages 235–6.

Half a mile above Glendevey the valley narrows, providing a dam site for a reservoir in the main river channel. A reconnaissance of this site showed that a dam 55 feet high would create a reservoir having an area of 640 acres and a capacity of 14,700 acre-feet. The mean annual run-off as determined from seven years' records is 67,700 acre-feet. During this period little or no water was diverted through the Laramie-Poudre tunnel.

The State engineer's records show a filing for a proposed reservoir having a dam site in the canyon of Laramie River 2½ miles north of the State line, in the SW. ¼ SW. ¼ sec. 4, T. 12 N., R. 77 W. This is known as the Robertson-McConnell site. A 200-foot dam here would form a reservoir 8 miles long. The following table taken from the maps filed in the State engineer's office shows the areas and capacities for various depths of storage:

Area and capacity of Robertson-McConnell reservoir at different elevations.

Elevation of reservoir outlet above river bed (feet).	Area (acres).	Capacity (acre-feet).
10[a]	0	0
60	430	9,200
110	1,180	48,500
160	2,450	136,000
210	3,930	291,000

[a] Elevation of outlet above river bed.

The mean annual run-off as determined from 12 years' records is 146,000 acre-feet.

Surveys have been made for the Bell reservoir, in the channel of Little Laramie River, the dam site being in sec. 7, T. 15 N., R. 77 W. It is proposed to divert water from Douglas Creek above Keystone and carry it to the reservoir by means of a canal 16 miles long, a portion of which has been built. Records for 1914 to 1916 show the run-off of Douglas Creek near Keystone to be 18,400, 12,900, and 19,000 acre-feet, respectively, for the period May 1 to October 31, which is considered to be as long as water can be diverted because of the altitude of the Keystone station (8,880 feet). From this record it appears that a mean of 15,000 acre-feet can be diverted from Douglas Creek.

SOUTH PLATTE RIVER BASIN.

GENERAL FEATURES.

Tributaries of South Platte River drain a small area in the southeast corner of the State, which is bounded on the north and west by the North Platte basin. The chief streams in the basin are Lodgepole and Crow creeks.

The area drained by Crow Creek comprises a narrow strip extending from the Laramie Mountains on the west to the Colorado line a few miles south of Carpenter. Crow Creek is formed by the junction of North, Middle, and South forks, a few miles east of the mountains. From this junction it flows east for 30 miles, then turns south, and, crossing the State line, joins South Platte River a few miles east of Kersey. Crow Creek receives no perennial tributaries. The upper part of the basin is mountainous, with elevations ranging from 8,000 to 9,000 feet, and east of the mountains the topography is of the rolling type characteristic of the Great Plains. The mean annual precipitation in the Wyoming portion of the basin decreases from 18 inches at the State line to 14 inches at Cheyenne and then gradually increases to 20 inches in the Laramie Mountains.

MEASURED DRAINAGE AREAS.

Measured drainage areas in Crow Creek basin, in square miles.

Stream.	Drainage area above—	Area.
North Fork	Junction	75
Middle Fork	Cheyenne reservoir	23
Do	Junction	51
South Fork	do	39
Crow Creek	Cheyenne	260
Do	State line	413

GAGING-STATION RECORDS.

MIDDLE CROW CREEK NEAR HECLA, WYO.

LOCATION.—In sec. 15, T. 14 N., R. 70 W., 4 miles northwest of Hecla, in Laramie County. In 1902 station was at footbridge, and in 1903 it was a quarter of a mile above dam. No known relation between gages.

DRAINAGE AREA.—42 square miles.

RECORDS AVAILABLE.—March 24, 1902, to November 21, 1903.

GAGE.—Vertical staff.

EXTREMES OF DISCHARGE.—1902–1903: Maximum stage recorded, 2.6 feet April 27, 1903 (discharge, 76 second-feet); minimum stage recorded, 0.45 foot September 4–8, 1903 (discharge, 1.0 second-foot).

ACCURACY.—Gage read twice daily. Rating curves well defined. Records good.

Monthly discharge of Middle Crow Creek near Hecla, Wyo., for 1902–1903.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1902.				
April	25	3	8.13	483
May	30	10	22.1	1,360
June	9.8	1.5	4.43	264
July	4.8	1.5	2.62	161
The period				2,270
1903.				
April 8–30	76	9.6	37.9	1,720
May	54	25	40.4	2,480
June	30	7	17.4	1,040
July	9.6	2.7	5.26	323
August	15	1.6	2.86	176
September	3.8	1.0	2.17	129
The period				5,880
1903.				
October	4.8	2.2	2.46	151
November 1–21	2.7	2.2	2.63	116

GREEN RIVER BASIN.[32]

LOCATION AND BOUNDARIES.

The Green River basin in Wyoming occupies, roughly, the southwest quarter of the State. On the northwest the basin rises to a rim beyond which the country breaks off abruptly to a much lower level, forming the valley of the Hoback, a large tributary of Snake River. North of this valley rises the magnificent wall of the Gros Ventre Range, which trends northwest and connects the Wind River and Wyoming ranges. The Wind River Range, which reaches altitudes of 12,000 feet, trends north-northwest and limits the basin on the east as far south as South Pass. Beyond this range to the south the basin has no well-defined eastern limit but merges gradually into the sterile plateaus that form the Continental Divide. On the south the transverse range of the Uinta Mountains forms the bound-

[32] Abstracted chiefly from article by Henry Gannett (U. S. Geol. and Geog. Survey Terr. Eleventh Ann Rept., for 1877, pp. 689–693, 1879).

ary through which Green River winds in deep gorges. The southern half of the western limit is as ill defined as the eastern, the land rising gradually to a plateau that separates tributaries of the Green from those of the Bear. Toward the north this plateau rises and becomes cut into long, narrow meridianal ridges, which have been named the Absaroka Ridges and which farther north are eroded into mountains known as the Wyoming Range.

TOPOGRAPHY.

The topographic features of the Green River basin include types ranging from the mountains that form the northern boundary, where the elevations exceed 12,000 feet, to the broad valley with generally flat and unbroken surface extending from the northern rim to the Uinta Mountains, which form the southern boundary at the State line. The elevation of the valley ranges from 6,000 to 7,000 feet.

Much of the country is desert and devoid of running water except for the streams that head in the mountain rim. Between Green River and the Big Sandy, in an area 30 miles wide by 50 miles long, there is no water, and the surface is slightly rolling, rising and sinking in long swells. South of Big Sandy Creek the same desert aspect continues. This is especially true of the eastern part of the area, where it merges into the Red Desert.

PRECIPITATION.

The mean annual precipitation in the Green River valley is low, being less than 8 inches over the greater part of the area. In the mountains that form the northern boundary the precipitation rapidly increases with increase in altitude, to more than 35 inches.

FORESTATION.[23]

The limits of forestation in the Green River basin are between about 8,000 and 10,500 feet above sea level, that is, the forests are found in the mountains on the northern rim of the basin. Practically all this area is included in the Wyoming, Teton, and Bridger national forests.

The area of the national forests in the Green River basin is approximately 1,900 square miles, of which 850 square miles is classed as timbered. Of the timbered area 337 square miles is in the Wyoming Forest, on the western rim of the basin, and 438 square miles in the Bridger Forest, on the northern and eastern rims. In the Wyoming Forest the cover averages 965 M feet b. m. per square mile; in the Bridger Forest it is 2,367 M feet b. m. per square mile. Between the two forests is the Teton Forest, in which the forest cover averages 3,022 M feet b. m. per square mile.

[23] Compiled from data furnished by U. S. Forest Service.

PRINCIPAL STREAMS.

GREEN RIVER.

Green River is one of the largest streams in Wyoming. It rises on the western slopes of the Wind River Range near the Continental Divide, being formed by Trail and Wells creeks. The source of Trail Creek is in the vicinity of Green River Pass, at an elevation of 11,000 feet, and that of Wells Creek in the glaciers about Gannett Peak, which rises to an altitude of 13,785 feet. The river flows northwestward 25 miles, passing through the beautiful Green River Lakes, thence turns sharply to the south and follows that direction to the Utah line. Above the Green River Lakes the river flows in a canyon, but below that point the sides of the valley gradually widen and the slopes become flatter until near Kendall the river leaves the mountains and flows across a rolling plateau as far as Daniel. In this stretch it is joined by Roaring Fork and Wagon, Tepee, Rock, Gypsum, Twin, and Beaver creeks, all of which are important tributaries rising in the mountains. At Daniel, Horse Creek, one of the largest of the upper tributaries, enters the Green. For 4 or 5 miles above its mouth Horse Creek parallels Green River, in the same broad bottom land, before uniting. Here both streams are very sluggish and winding, with many sloughs, channels, and islands. Two or three miles below the mouth of Horse Creek the river turns again to the south and its velocity increases. As far down as the mouth of Slate Creek it is bordered on the east by a high bench 200 to 300 feet above the river, the normal level of the interior of the basin. In most places the edge of this bench is bluff, here precipitous, there presenting easy slopes to the river. Throughout the greater part of the distance its edge is 2 or 3 miles back from the river, but in places the river flows close under its bluff wall.

Between Daniel and the mouth of New Fork River, a distance of 26 miles, there is only one important tributary, Cottonwood Creek, which enters from the west. New Fork River is the most important tributary of Green River, as it carries the run-off from the entire mountainous region forming the northeastern rim of the basin from Green River Pass to the southeast for a distance of 40 miles.

At the mouth of New Fork River the Green turns nearly west, flows in this course about 7 miles, then turns abruptly to the south. At the bend it receives the run-off from Muddy Creek and from North, Middle, and South Piney creeks.

In its southerly course Green River flows through broad bottoms heavily timbered with cottonwoods. From South Piney Creek to the mouth of Big Sandy Creek, about 60 miles, there are no tributaries from the east and but two important tributaries from the west—Labarge and Fontenelle creeks—both heading in the Absaroka Ridges, which form the southern extension of the Wyoming Range.

Ten miles below Fontenelle Creek is the mouth of Slate Creek, a small tributary which rises just outside the basin rim and the waters of which are alkaline.

The Big Sandy is the first stream to enter the Green from the east below New Fork River, as it drains the mountainous area on the northern rim of the basin, from the eastern edge of the area drained by New Fork River to the plateau forming the eastern boundary of the basin.

From the Big Sandy to the Utah line, a distance of 90 miles, the slope of the river is much flatter and its course is more tortuous. Below Green River city the Green flows in deep gorges through the Uinta Range, which forms the southern boundary of the drainage basin in Wyoming.

HORSE CREEK.

Horse Creek, one of the main tributaries of upper Green River, rises on the eastern slope of the Wyoming Range 9,500 feet above sea level. Throughout the upper 16 miles of its course it flows through a deep canyon at nearly right angles to the range until it emerges on the broad Green River valley, across which it flows in a southeasterly direction for a distance of 20 miles, joining Green River near Daniel. The fall is heavy in the upper part of its course but becomes much less after the creek enters the valley, and in the lower 5 miles it becomes so flat that the current is very sluggish and the course tortuous, so that many sloughs, channels, and islands are formed.

The principal tributaries are Lead Creek, which joins Horse Creek from the north just before it emerges from the mountains, and the South Fork, which enters from the south, a few miles below. Both these streams drain the eastern slope of the Wyoming Range. No tributaries enter below the mouth of the South Fork.

Precipitation in the Horse Creek drainage basin decreases from approximately 25 inches on the headwaters to 13 inches at the edge of the valley and to 11 inches at the mouth.

COTTONWOOD CREEK.

Cottonwood Creek is formed by its North and South forks, which rise on the eastern slopes of the Wyoming Range at an elevation of 10,000 feet and flow eastward in deep canyons until they reach the edge of the Green River valley, across which they flow for a distance of 20 miles and then unite. From the junction of the forks Cottonwood Creek flows southeastward in a shallow trough and joins Green River about 15 miles south of Daniel. Beginning at a point 6 miles below the junction, the creek divides and flows for 9 miles in two parallel channels, a mile apart, which reunite 6 miles above the mouth. Both the North and South forks receive numerous tributaries, but no tributaries enter Cottonwood Creek itself.

The upper part of the drainage basin covers the eastern ridges of the Wyoming Mountains, where elevations range from 8,000 to 11,000 feet. East of the mountains the basin is a part of the generally level Green River valley, which slopes eastward from an elevation of 8,000 feet at the base of the mountains to 7,000 feet at the mouth.

The precipitation ranges from about 25 inches on the headwaters to 12 inches at the base of the mountains and to 8 inches at the mouth.

NEW FORK RIVER.

New Fork River, the largest tributary of Green River, drains a portion of the western slope of the Wind River Range extending from Fremont Peak southeastward to Mount Bonneville, Mount Geikie, and Twin Buttes, a distance of 45 miles. West of the mountains the basin includes a triangular area of high plateau, the apex being at the mouth of the river, a few miles west of Big Piney.

The source of New Fork River is in the region of innumerable small mountain lakes immediately west and south of the headwaters of Green River, at an elevation exceeding 10,500 feet. New Fork River itself rises in a chain of tiny lakes and flows southwestward 9 miles to the New Fork Lakes, which cover an area of about 2 square miles and are 7,700 feet above sea level. Above these lakes the river receives numerous small tributaries. Below the New Fork Lakes the river continues its southwesterly course for 5 miles and receives two important tributaries; it then turns abruptly to the southeast and flows in that direction as far as the mouth of East Fork River, where it again makes a sharp turn and flows southwestward to its junction with Green River. Above the East Fork, which is the lowest perennial stream that enters New Fork River, a number of large tributaries enter the river from the Wind River Mountains. The largest, in descending order, are Willow, Pine, Pole, and Boulder creeks. Like New Fork River itself these streams rise in and flow through lakes on the western slopes of the Wind River Range. The largest lakes are Willow Lake, covering 2 square miles, through which Lake Creek flows; Fremont Lake, 8 square miles, in the course of Pine Creek; and Boulder Lake, about 3 square miles, through which Boulder Creek flows.

The general elevation of the drainage basin is about 7,000 feet, but the elevation increases to 11,000 feet at the upper rim. West of the mountains the topography is that of a broad, slightly rolling plateau across which the streams have cut wide, deep valleys.

The mean annual precipitation increases from 8 inches at the mouth to 10 inches at the base of the mountains and to about 25 inches at the upper edge of the basin.

PINEY CREEK.

The name Piney Creek basin is applied to the area drained by North, Middle, and South Piney creeks, three streams rising in the Absaroka Ridges, the southern extension of the Wyoming Range. In the upper stretches the creeks flow in canyon, but after leaving the mountains they flow in shallow depressions across the undulating valley of Green River and unite with that stream near Big Piney, within a short distance of one another. All the streams receive numerous small tributaries in the mountainous parts of their courses but practically no perennial run-off after leaving the mountains.

The upper half of the area drained by these creeks lies on the slopes of the Absaroka Ridges, where elevations range from 8,000 feet at the base to more than 10,000 feet at the summit. In the lower half of the basin the elevations gradually decrease to 7,000 feet at the mouth.

The mean annual precipitation decreases from 26 inches or more at the upper edge of the basin to 12 inches at the base of the mountains and to 8 inches at the mouth.

LABARGE CREEK.

Labarge Creek rises in the Absaroka Ridges at an elevation of 9,000 feet. Its upper course and that of its numerous small tributaries are southerly, in narrow valleys between the ridges, the streams cutting across them in short, close canyons and collecting against the basin rim to force their way through it. After passing the mountains Labarge Creek flows east for a distance of 10 miles and enters Green River in T. 26 N., R. 112 W. In its course east of the mountains Labarge Creek is bordered on the north by low, flat country, but on the south the land rises immediately into a plateau which separates it from Fontenelle Creek. This plateau, far from presenting a uniform surface, is extensively cut by erosion.

In the upper part the basin is bounded on the east by the Thompson Plateau, a broad table-land ranging in altitude from 10,000 to 10,300 feet and facing the Labarge basin in steep cliffs. South of Labarge Creek the Thompson Plateau passes into Meridian Ridge, in which the surface slopes gradually southward from altitudes of 10,000 feet at the upper end to 8,000 feet. Tributaries of Labarge Creek cut this ridge at nearly right angles, in deep canyons.[24]

The mean annual precipitation decreases from 26 inches or more at the upper end of the basin to 8 inches at the mouth.

[24] Schultz, A. R., Geology and geography of a portion of Lincoln County, Wyo.: U. S. Geol. Survey Bull. 543, p. 16, 1914.

FONTENELLE CREEK.

Fontenelle Creek rises in the southern extension of the Wyoming Range known as Meridian Ridge, at an elevation of 9,500 feet. It flows southeastward 25 miles, receiving numerous small tributaries draining narrow, deep valleys, and near the Canyon ranch cuts across Meridian Ridge valley, about 15 miles above the mouth, at an elevation of 6,600 feet. After leaving the mountains Fontenelle Creek occupies a narrow valley bordered on each side by low bluffs that rise to a plateau level. No perennial tributaries enter Fontenelle Creek east of the mountains.

The precipitation decreases from 20 inches or more on the headwaters to 12 inches at the base of the mountains and to 8 inches at the mouth.

BIG SANDY CREEK.

Big Sandy Creek—the only perennial tributary of Green River from the eastern part of the basin between New Fork River and the Utah line, a distance of nearly 200 miles—rises in the Wind River Mountains and drains the comparatively small area between the basin of the New Fork on the west and that of the North Platte on the east. The area comprises a mountain region of about 100 square miles, which is practically the only part of the basin contributing perennial flow.

The source of Big Sandy Creek is a chain of small lakes at elevations between 9,000 and 10,000 feet. Below these lakes the creek is joined by one or two important tributaries and, leaving the mountains, flows in a southerly direction through a low rock canyon with narrow bottom lands here and there. It joins Green River in the southern part of T. 22 N., R. 109 W. After leaving the mountains, Big Sandy Creek receives but one tributary, Little Sandy Creek, which rises in the mountains near Big Sandy. The mountain area drained by this tributary is included in the 100 square miles of similar area in the Big Sandy basin.

Aside from the very small mountainous region, the area is a generally level plateau. The region northwest of the Big Sandy is entirely without water and slightly rolling. This bench on the western edge breaks off in bluffs to the Green. Its general characteristic is that of a desert. South of the lower course and east of Green River the region is also a desert, with a soil of drifting sand, alkaline clay baked smooth and hard, or loose friable clay produced by the disintegration of masses of badland. Farther up the Big Sandy the strip lying between the stream and the Wind River Range is much more attractive.

Except in the small mountainous area, where the precipitation reaches about 25 inches, the mean annual precipitation of the greater part of the drainage basin is less than 7 inches.

BLACKS FORK.

Blacks Fork, one of the chief tributaries of the Green and the only perennial stream that enters it between the mouth of Big Sandy Creek and the State line, drains a large area in the southwest corner of the State, extending from the south end of Meridian Ridge of the Wyoming Range, on the north, to the Uinta Mountains at the State line, on the south, and from the basin of Bear River, which includes a narrow strip adjacent to the Utah line, on the west, nearly to Green River, on the east.

The river itself rises on the northern slope of the Uinta Range on the northern boundary of Utah, at an elevation of 12,000 feet or more. It flows northeastward as far as the Union Pacific Railroad 15 miles west of Granger, where it is joined by Muddy Creek, which drains a large area in the northwestern part of the basin. After receiving this tributary, Blacks Fork turns east, follows the Union Pacific Railroad for 30 miles, then turns south and pursues a winding course to its mouth, about 16 miles south of the city of Green River. The only perennial tributaries besides Muddy Creek are Smith Fork, which enters from the south about 12 miles above that creek, and Hams Fork, which enters from the north at Granger and carries the run-off from a large area including the south end of Meridian Ridge. With the exception of the upper boundary of the basin, which is formed by the northern slope of the Uinta Range, the drainage area consists of a high rolling plateau 7,000 feet in general elevation. At the mouth the altitude decreases to 6,000 feet.

The mean annual precipitation probably ranges from 16 inches on the southern boundary to 8 inches or less at the mouth but is not known accurately on account of an almost entire lack of rainfall records within the basin.

HENRYS FORK.

Henrys Fork, which enters Green River just over the State line in Utah, drains an area of 644 square miles lying west of Green River in Utah and Wyoming. It rises on the northern slope of the Uinta Mountains in northeastern Utah at an elevation of more than 12,000 feet and flows northward into Wyoming to a point near Lonetree, where it turns and flows eastward for a distance of 30 miles, then turns southeastward, crosses into Utah, and joins Green River about 3 miles south of the State line. Its principal tributaries are Beaver Creek and Burnt Fork, both of which rise in the Uinta Mountains.

The upper part of the drainage basin, lying on the northern slope of the Uinta Mountains, is rugged and has elevations of 13,000 feet and more; the lower part of the basin is a rolling plain.

MEASURED DRAINAGE AREAS.

Drainage areas in Green River basin, in square miles.

Green River and tributaries.

Stream.	Drainage area above—	Area.
Green River	Outlet of Green River Lakes	115
Do	Gaging station near Kendall	271
Do	Sec. 4, T. 35 N., R. 111 W	432
Do	Gaging station near line between Tps. 32 and 33 N., R. 110 W	932
Do	New Fork River	1,280
Do	Labarge Creek	3,660
Do	Big Sandy Creek	5,240
Do	Gaging station at Green River	7,670
Do	Utah line	14,400
Tosi Creek	Mouth	47
Beaver Creek	do	173
North Beaver Creek	do	40
South Beaver Creek	do	81
Muddy Creek	do	177
Pine Creek	do	128
Bitter Creek	Ninemile Creek	848
Do	Mouth	2,380
Salt Wells Creek	do	466
Killpecker Creek	do	250

Horse Creek and chief tributary.

Horse Creek	South Fork	65
Do	Mouth	193
South Fork of Horse Creek	do	58

Cottonwood Creek and tributaries.

Cottonwood Creek	Gaging station about in sec. 21, T. 32 N., R. 111 W.	241
Do	Mouth	258
North Fork of Cottonwood Creek	do	107
South Fork of Cottonwood Creek	do	103

New Fork River and tributaries.

East Fork River	Sec. 10, T. 31 N., R. 106 W	106
Do	Mouth of Silver Creek	208
Do	Mouth	348
Muddy Creek	do	54
Silver Creek	do	98
New Fork River	Outlet of New Fork Lakes	36
Do	Mouth of Willow Creek	102
Do	Mouth of Boulder Creek	578
Do	Mouth	1,240
Willow Creek	do	100
Lake Creek	Outlet of Willow Lake	33
Pine Creek	Outlet of Fremont Lake	114
Do	Pinedale	128
Do	Mouth	133
Pole Creek	Outlet of Fayette Lake	51
Do	Mouth	167
Boulder Creek	Outlet of Boulder Lake	94
Do	Mouth	116

Piney Creek and tributaries.

North Piney Creek	Outlet of North Piney Lake	5
Do	Sec. 19, T. 31 N., R. 113 W	58
Do	Mouth	129
Middle Piney Creek	Outlet of Middle Piney Lake	6
Do	Sec. 30, T. 30 N., R. 113 W	46
Do	Mouth	112
South Piney Creek	do	110

Drainage areas in Green River basin, in square miles—Continued.

Labarge Creek.

Stream.	Drainage area above—	Area.
Labarge Creek	Sec. 7, T. 29 N., R. 116 W.	8
Do.	Sec. 29, T. 26 N., R. 113 W.	176
Do.	Mouth	198

Fontenelle Creek.

Fontenelle Creek	Gaging station in sec. 3, T. 24 N., R. 113 W.	224
Do.	Mouth	239

Big Sandy Creek and tributaries.

Big Sandy Creek	Gaging station in sec. 18, T. 27 N., R. 106 W.	322
Do.	Little Sandy Creek	541
Do.	Mouth	1,810
Little Sandy Creek	....do	823
Pacific Creek	....do	546

Blacks Fork and tributaries.

Blacks Fork	Gaging station in sec. 23, T. 16 N., R. 115 W.	261
Do.	Muddy Creek	854
Do.	Hams Fork	2,170
Do.	Gaging station at Granger	2,840
Do.	Mouth	3,710
Smith Fork	....do	438
Cottonwood Creek	....do	165
Muddy Creek	....do	1,100
Little Muddy Creek	....do	648
Albert Creek	....do	208
Hams Fork	Kemmerer	383
Do.	Mouth	668

GAGING-STATION RECORDS.

GREEN RIVER.

GREEN RIVER NEAR KENDALL, WYO.

LOCATION.—In sec. 23, T. 38 N., R. 110 W., at Kendall ranger station, 6 miles north of Kendall post office, in Fremont County. Nearest tributary, Rock Creek, enters a short distance below.

DRAINAGE AREA.—271 square miles (measured on topographic map).

RECORDS AVAILABLE.—August 2, 1910, to June 30, 1912; May 15 to October 17, 1918.

GAGE.—Chain gage at left bank 1,000 feet below ranger station; read by forest ranger.

EXTREMES OF DISCHARGE.—1910–1912, 1918: Maximum stage recorded, 6.8 feet at 8 a. m. June 15 and 16, 1918 (discharge, 5,090 second-feet). Minimum discharge occurs during winter.

DIVERSIONS.—Prior to December 31, 1916, no adjudicated diversions from Green River above station.

ACCURACY.—Gage read twice daily. Rating curve well defined prior to July 31, 1918. Records good except for periods of shifting control and days of missing gage heights, for which they are fair.

Monthly discharge of Green River near Kendall, Wyo., for 1910–1912, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1910.				
August	720	300	486	29,900
September	280	130	187	11,100
1910–11.				
October	176	60	111	6,820
April 26–30	160	135	150	1,490
May	740	181	438	26,900
June	3,010	900	1,880	112,000
July	1,660	660	1,210	74,400
August	624	260	406	25,000
September	320	160	224	13,300
1911–12.				
October 1–14	210	160	199	5,530
June 8–30	2,900	750	1,910	87,100
1918.				
May 15–31	534	331	443	14,900
June	5,030	503	2,900	173,000
July	1,550	550	972	59,800
August	670	293	422	25,900
September	370	205	268	15,900
October 8–17	370	215	272	5,400

GREEN RIVER NEAR DANIEL, WYO.

LOCATION.—Near line between Tps. 32 and 33 N., R. 110 W., at highway bridge 6 miles southwest of Daniel, in Fremont County. No important tributary within several miles.

DRAINAGE AREA.—932 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—April 20, 1913, to September 30, 1921. State engineer maintained station at this point during 1913 and 1914.

GAGE.—Chain on downstream side of bridge.

EXTREMES OF DISCHARGE.—1913–1921: Maximum stage recorded, 7.0 feet at 10 a. m. June 16, 1918 (discharge, 8,750 second-feet); minimum stage recorded, 2.2 feet September 30, 1916 (discharge, 190 second-feet); minimum discharge probably occurs during winter.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 241 second-feet from Green River above Daniel station.

ACCURACY.—Gage read once daily. Rating curves well defined. Records good to excellent.

Monthly discharge of Green River near Daniel, Wyo., for 1913–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913.				
April 20–30	3,430	1,120	2,120	46,300
May	5,000	975	2,530	156,000
June	4,900	2,490	3,370	201,000
July	4,000	1,280	2,060	127,000
August	1,600	510	943	58,000
September	1,440	330	546	32,500
The period				621,000
1913–14.				
October	360	275	317	19,500
April 14–30	2,130	840	1,410	47,400
May	3,720	975	2,120	130,000
June	4,400	1,440	2,880	171,000
July	2,490	840	1,660	102,000
August	1,520	300	751	46,200
September	300	230	258	15,400

Monthly discharge of Green River near Daniel, Wyo., for 1913–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1914–15.				
October 1–10	275	250	252	5,000
April	1,000	465	716	42,600
May	1,000	356	607	37,300
June	1,590	640	1,070	63,700
July	2,180	1,000	1,360	83,600
August	1,000	465	609	37,400
September	1,140	272	611	36,400
1915–16.				
October	695	250	354	21,800
November	340	206	252	15,000
December 1–4	246	246	246	1,950
March 21–31	1,670	690	1,260	27,500
April	2,390	385	956	56,900
May	2,750	1,190	1,840	113,000
June	4,620	1,670	2,700	161,000
July	1,890	1,280	1,720	106,000
August	1,500	480	1,050	64,600
September	515	190	333	19,800
1917.				
April 27–30	1,730	670	1,010	8,010
May	3,670	500	2,240	138,000
June	4,810	1,810	3,400	202,000
July	4,050	1,810	2,880	177,000
August	1,810	500	936	57,600
September	720	430	498	29,600
The period				612,000
1917–18.				
October	394	245	301	18,500
November	245	245	245	14,600
March 28–31	1,640	1,140	1,430	11,500
April	1,140	498	656	39,000
May	2,080	1,080	1,470	90,400
June	8,210	1,310	4,740	282,000
July	2,980	930	1,600	98,400
August	930	454	634	39,000
September	454	330	389	23,100
1918–19.				
October	530	310	387	23,800
November 1–23	310	136	218	9,950
April	1,250	300	734	43,700
May	2,280	385	929	57,100
June	2,620	400	771	45,900
July	478	238	316	19,400
August	498	254	361	22,200
September	530	254	406	24,200
1919–20.				
October	491	200	311	19,100
May	2,980	465	1,870	115,000
June	2,980	1,640	2,320	138,000
July	2,280	1,500	1,990	122,000
August	1,500	530	1,020	62,700
September	530	320	419	24,900
1920–21.				
October	310	254	268	16,500
November	390	254	292	17,400
December 1–9	294	254	270	4,820
April 9–30	1,040	336	717	31,300
May	2,710	800	1,640	101,000
June	5,710	1,460	3,250	193,000
July	2,180	720	1,090	67,000
August	720	575	661	40,600
September	610	395	475	28,300

NOTE.—Records for 1913 and 1914 revised.

GREEN RIVER AT GREEN RIVER, WYO.

LOCATION.—At Union Pacific pumping station at Green River, in Sweetwater County. No tributary within several miles.

DRAINAGE AREA.—7,670 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—May 2, 1895, to October 31, 1906; March 1, 1915, to September 30, 1921.

GAGE.—Chain on left bank at pumping station. From March 1, 1915, to September 29, 1920, chain at highway bridge a third of a mile downstream. Gage used from 1895 to 1906 vertical staff on submerged cribbing near present site. No determined relation between different gages.

EXTREMES OF DISCHARGE.—1895–1906, 1915–1921: Maximum stage recorded, 12.3 feet at 5 p. m. June 19, 1918 (discharge, 22,200 second-feet); minimum mean daily discharge recorded, 160 second-feet on November 17, 1898.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 223 second-feet from Green River between Daniel and Green River stations.

ACCURACY.—Gage read twice daily since 1915; it is not known whether gage was read once or twice daily from 1895 to 1906. Rating curves well defined except for 1903, during which year no measurements were made. Records good 1895 to 1906; excellent 1915 to 1921, except during winter, for which they are fair.

Monthly discharge of Green River at Green River, Wyo., for 1895–1899, 1901–1906, 1915–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1895.				
May 2–31	6,120	2,560	4,060	242,000
June	6,780	3,730	4,600	274,000
July	6,900	2,730	4,200	258,000
August	2,910	1,200	1,880	116,000
September	1,170	530	749	44,600
The period	.....	.....	.....	935,000
1895–96.				
October	718	355	517	31,800
November	355	220	265	15,800
December	.....	.....	260	16,000
January	.....	.....	250	15,400
February	.....	.....	250	14,400
March	.....	.....	300	18,400
April	1,480	910	975	58,000
May	6,980	1,380	2,200	135,000
June	15,500	6,820	11,800	702,000
July	6,230	2,440	4,190	258,000
August	2,530	1,390	1,880	116,000
September	1,520	800	1,120	66,600
The year	15,500	.....	2,000	1,450,000
1896–97.				
October	960	640	740	45,500
November	.....	.....	600	35,700
December	.....	.....	500	30,700
January	.....	.....	450	27,700
February	.....	.....	400	22,200
March	.....	.....	400	24,600
April	3,200	1,200	1,960	117,000
May	17,900	2,720	9,770	601,000
June	14,400	4,400	7,550	449,000
July	4,400	1,760	2,790	172,000
August	2,500	640	1,600	98,400
September	640	400	465	27,700
The year	17,900	.....	2,270	1,650,000

NOTE.—Records for 1895 and 1896 revised. Winter records prior to 1915 estimated.

Monthly discharge of Green River at Green River, Wyo., for 1895–1899, 1901–1906, 1915–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1897–98.				
October	1,760	500	1,010	62,100
November			760	45,200
December			550	33,800
January			500	30,700
February			400	22,200
March			450	27,700
April	5,520	800	2,660	158,000
May	7,680	2,320	4,060	250,000
June	15,100	4,200	9,060	539,000
July	9,120	2,160	4,620	284,000
August	2,080	720	1,420	87,300
September	1,200	260	646	38,400
The year	15,100		2,180	1,580,000
1898–99.				
October	400	300	347	21,300
November	1,280	160	400	23,800
December			300	18,400
January			300	18,400
February			400	22,200
March			450	27,700
April	2,390	990	1,600	95,200
May	5,690	1,530	3,270	201,000
June	21,400	5,480	12,500	744,000
July	20,700	8,880	14,500	892,000
August	8,650	2,460	5,170	318,000
September	2,460	1,700	2,060	123,000
The year	21,400		3,440	2,500,000
1899.				
October	1,990	1,640	1,820	112,000
1900–1901.				
October			600	36,900
November			600	35,700
December			500	30,700
January			500	30,700
February			400	22,200
March			500	30,700
April	2,880	500	1,320	78,600
May	12,400	1,780	6,750	415,000
June	10,200	3,400	5,420	323,000
July	4,200	1,840	2,750	169,000
August	2,460	905	1,410	86,700
September	905	500	632	37,600
The year	12,400		1,780	1,300,000
1901–2.				
October			500	30,700
November			450	26,800
December			400	24,600
January			300	18,400
February			300	16,700
March			300	18,400
April	1,380	285	844	50,200
May	7,920	845	2,260	139,000
June	10,800	4,380	7,100	422,000
July	4,550	1,720	2,670	164,000
August	2,260	950	1,390	85,500
September	950	380	656	39,000
The year	10,800		1,430	1,040,000
1902–3.				
October	380	285	329	20,200
November			300	17,900
December			300	18,400
January			300	18,400
February			250	13,900
March			600	36,900
April	1,740	582	1,200	71,400
May	2,660	1,300	1,840	113,000
June	13,000	2,020	9,570	569,000
July	8,010	2,400	3,990	245,000
August	2,160	1,110	1,460	89,800
September	3,320	792	1,550	92,200
The year	13,000		1,810	1,310,000

Monthly discharge of Green River at Green River, Wyo., for 1895–1899, 1901–1906, 1915–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1903–4.				
October	1,160	845	1,010	62,100
November			800	47,600
December			600	36,900
January			500	30,700
February			700	40,300
March			900	55,300
April	3,660	1,160	1,960	117,000
May	13,100	2,690	6,130	377,000
June	12,200	7,160	10,300	607,000
July	8,010	3,470	5,260	323,000
August	3,540	1,220	2,040	125,000
September	1,400	620	890	53,000
The year	13,100		2,580	1,870,000
1904–5.				
October	838	597	698	42,900
November			550	32,700
December			500	30,700
January			400	24,600
February			400	22,200
March			550	33,800
April	1,260	600	883	52,500
May	3,600	820	1,580	97,200
June	8,540	3,320	5,950	354,000
July	5,590	1,820	3,460	213,000
August	1,740	860	1,120	68,900
September	964	420	639	38,000
The year	8,540		1,390	1,010,000
1905–6.				
October	600	420	486	29,900
November			400	23,800
December			300	18,400
January			300	18,400
February			300	16,700
March			500	30,700
April	3,360	893	2,040	121,000
May	8,700	2,060	5,030	309,000
June	12,200	4,510	6,830	406,000
July	6,210	2,740	4,860	299,000
August	4,060	1,390	2,240	138,000
September	1,990	790	1,260	75,000
The year	12,200		2,050	1,490,000
1906.				
October	790	560	660	40,600
1914–15.				
October			550	33,800
November			500	29,800
December			400	24,600
January			325	20,000
February			325	18,000
March			800	49,200
April	2,140	910	1,420	84,500
May	2,560	1,140	1,620	99,600
June	3,960	2,010	2,820	168,000
July	3,770	1,580	2,650	163,000
August	1,580	840	1,110	68,200
September	3,600	738	1,270	75,600
The year	3,960		1,150	834,000
1915–16.				
October	1,620	910	1,170	71,900
November	910	625	816	48,600
December	910	345	624	38,400
January	565	295	416	25,600
February	798	422	569	32,700
March	6,280	595	1,970	121,000
April	4,390	1,670	2,640	157,000
May	5,780	2,670	3,880	239,000
June	13,800	2,530	8,330	496,000
July	9,040	2,820	5,460	336,000
August	3,290	1,290	2,150	132,000
September	1,290	660	898	53,400
The year	13,800	295	2,410	1,750,000

Monthly discharge of Green River at Green River, Wyo., for 1895–1899, 1901–1906, 1915–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916–17.				
October	990	692	874	53,700
November	950	250	518	30,800
December	448	340	405	24,900
January	448	315	374	23,000
February	392	340	364	20,200
March	1,030	420	529	32,500
April	5,170	1,030	2,260	134,000
May	8,400	1,890	4,760	293,000
June	18,400	4,560	10,100	601,000
July	17,300	5,170	10,400	640,000
August	5,170	1,470	2,400	148,000
September	1,570	1,030	1,340	79,700
The year	18,400	250	2,870	2,080,000
1917–18.				
October	1,120	795	930	57,200
November	1,030	475	790	47,000
December	.....	.....	550	33,800
January	.....	.....	375	23,100
February	.....	.....	400	24,600
March	.....	.....	890	54,700
April	2,890	1,320	1,800	107,000
May	3,880	1,660	3,050	188,000
June	21,800	3,020	13,400	797,000
July	7,770	2,260	4,280	263,000
August	.....	1,000	1,570	96,500
September	1,160	825	901	53,600
The year	21,800	.....	2,410	1,750,000
1918–19.				
October	.....	.....	900	55,300
November	1,130	410	749	44,600
December	.....	.....	449	27,600
January	.....	.....	358	22,000
February	.....	.....	346	19,200
March	1,640	350	655	40,300
April	2,120	890	1,600	95,200
May	5,100	1,420	2,580	159,000
June	8,050	890	2,140	127,000
July	890	350	542	33,300
August	715	330	523	32,200
September	750	330	499	29,700
The year	8,050	.....	946	685,000
1919–20.				
October	925	460	724	44,500
November	960	.....	575	34,200
December	.....	.....	375	23,100
January	.....	.....	350	21,500
February	.....	.....	375	21,600
March	1,420	680	935	57,500
April	4,030	820	1,710	102,000
May	9,190	1,220	4,390	270,000
June	12,300	4,720	8,730	519,000
July	6,200	2,250	4,050	249,000
August	2,200	890	1,430	87,900
September	890	820	881	52,400
The year	12,300	.....	2,040	1,480,000
1920–21.				
October	980	760	827	50,800
November	900	650	766	45,600
December	.....	.....	500	30,700
January	.....	.....	450	27,700
February	.....	.....	500	27,800
March	2,280	860	1,530	94,100
April	4,170	1,340	2,310	137,000
May	10,100	1,610	4,150	255,000
June	21,200	7,350	13,000	774,000
July	6,050	1,610	2,950	181,000
August	1,760	1,130	1,380	84,800
September	1,130	770	939	55,900
The year	21,200	.....	2,440	1,760,000

HORSE CREEK.

HORSE CREEK AT DANIEL, WYO.

LOCATION.—About sec. 2, T. 33 N., 111 W., at highway bridge three-fourths mile south of Daniel, in Lincoln County. No tributary between station and mouth.

DRAINAGE AREA.—193 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—April 20, 1913, to November 18, 1918. State engineer maintained station during 1913 and 1914.

GAGE.—Vertical staff on upstream side of left bridge abutment.

EXTREMES OF DISCHARGE.—1913–1918: Maximum stage recorded, 5.7 feet at 10 a.m. June 16, 1918 (discharge, 1,530 second-feet); minimum stage recorded, 0.7 foot August 29–30, 1915 (discharge, 1 second-foot).

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 161 second-feet from Horse Creek, all above station.

ACCURACY.—Gage read once daily. Rating curves well defined except for 1913–14, for which they were only fairly well defined; Records considered only fair, as gage is read but once daily, and they are uncertain at several periods.

Monthly discharge of Horse Creek at Daniel, Wyo., for 1913–1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913.				
April 20–30	665	199	360	7,850
May	1,260	448	838	51,500
June	1,240	380	771	45,900
July	380	50	133	8,180
August	76	11	41.3	2,540
September	161	22	44.4	2,640
1913–14.				
October	44	24	33.1	2,040
April 19–30	335	199	273	6,500
May	1,020	212	575	35,000
June	1,100	225	606	36,100
July	225	51	126	7,750
August	51	18	36.6	2,250
September	22	8	16.1	958
1914–15.				
October	76	4	20.6	1,270
April	275	25	112	6,660
May	275	15	132	8,120
June	275	7	128	7,620
July	25	7	8.16	502
August	15	1	5.06	311
1915–16.				
April 25–30	720	237	424	5,050
May	530	224	345	21,200
June	1,080	237	607	36,100
July	408	45	180	11,100
August	84	11	44.4	2,730
September	11	11	11.0	655
The period				76,800
1916–17.				
October	21	13	18.9	1,160
November 1–22	21	15	16.4	716
May	715	102	406	25,000
June	1,160	390	820	48,800
July	940	37	336	20,700
August	95	16	33.7	2,070
September	44	13	20.9	1,270
1917–18.				
October	33	11	18.5	1,140
November 1–19	51	37	49.4	1,860
April 22–30	132	108	116	2,070
May	358	114	267	16,400
June	1,330	185	794	47,200
July	260	39	113	6,950
August	39	24	33.8	2,080
September	23	14	19.9	1,180
October	38	14	20.7	1,270
November 1–18	30	22	25.4	907

NOTE.—Records for 1913 and 1914 revised.

COTTONWOOD CREEK.

COTTONWOOD CREEK NEAR BIG PINEY, WYO.

LOCATION.—About sec. 21, T. 32 N., R. 111 W., at highway bridge near Hayden's ranch, 16 miles north of Big Piney, in Lincoln County.

DRAINAGE AREA.—241 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—April 25, 1916, to September 30, 1919.

GAGE.—Creek flows in two channels 1 mile apart; vertical staff on North channel and Stevens water-stage recorder on South channel at highway bridge.

EXTREMES OF DISCHARGE.—1916–1919 (North channel): Maximum stage recorded, 4.2 feet at 8 p. m. June 16, 1918, affected by backwater. Maximum discharge of 590 second-feet occurred at 5 p. m. June 23 and 24, 1917; minimum discharge, channel dry during August and September, 1919. (South channel). Maximum stage recorded, 5.0 feet from 8 a. m. to 2 p. m. June 17, 1918 (discharge, 355 second-feet); minimum discharge, channel dry during periods in summer of 1919.

DIVERSIONS.—Prior to July 1, 1919, adjudicated diversions of 48 second-feet from Cottonwood Creek above station, and 52 second-feet below.

ACCURACY.—(North channel). Gage read twice daily during high water and once daily at other times. Rating curve well defined except during June, 1918, when drift lodged on fence below gage and caused backwater. Records fair. (South channel.) Gage read once daily during 1916–1917; continuous record from recording gage during 1918 and 1919. Rating curve well defined except during high water of 1917. Records good except for 1917, for which they are fair.

Monthly discharge of North channel of Cottonwood Creek near Big Piney, Wyo., for 1916–1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916.				
April 25–30	288	89	196	2,330
May	184	33	69.7	4,290
June	248	53	116	6,900
July	170	36	77.8	4,780
August	124	36	54.7	3,360
September	40	30	33.2	1,980
The year				23,600
1916–17.				
October 1–21	30	15	25.0	1,040
May 20–31	492	276	365	8,690
June	590	152	329	19,600
July	396	78	191	11,700
August	86	28	51.1	3,140
September	30	20	25.3	1,510
1917–18.				
October	20	16	18.4	1,130
November	40	16	28.0	1,670
April 7–30	142	52	86.8	4,130
May	220	42	116	7,130
June	586	54	309	18,400
July	156	39	79.5	4,890
August	46	19	27.6	1,700
September	27	20	24.1	1,430
1918–19.				
October	32	19	28.5	1,750
November 1–13	32	23	29.1	751
April	244	42	121	7,200
May	39	5	20.2	1,240
June	42	1.5	12.6	750
July	42	.5	18.6	1,140
August	10	.0	1.86	114
September	0	.0	0	0

Monthly discharge of South channel of Cottonwood Creek near Big Piney, Wyo., for 1916–1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916.				
April 25–30	166	84	115	1,370
May	130	13	58.2	3,580
June	166	42	84.3	5,020
July	67	5	26.6	1,640
August	56	5	12.3	756
September	5	3	4.28	255
The period				12,600
1916–17.				
October	11	4	6.8	418
November 1–18	4	.2	1.68	60
May 11–31	214	132	189	7,870
June	266	64	164	9,760
July	201	23	74.8	4,600
August	29	12	20.2	1,240
September	14	12	13.2	786
1917–18.				
October	14	12	13.6	836
November	13	4	6.1	363
April 7–30	54	8	36.3	1,730
May	106	49	69.2	4,250
June	354	46	193	11,500
July	87	20	44.0	2,710
August	23	16	17.9	1,100
September	20	13	16.4	976
1918–19.				
October	23	15	18.6	1,140
November 1–3	24	18	20.4	526
April 14–30	62	45	51.6	1,740
May 1–12	44	17	24.8	590
June	18	1.0	9.34	556
July	7.5	0	2.50	154
August	2.6	0	.88	54
September 1–9	2.2	0	1.02	18

EAST FORK RIVER BASIN.

EAST FORK RIVER AT EAST FORK CANAL, WYO.

LOCATION.—In sec. 10, T. 31 N., R. 106 W., 300 feet above intake of East Fork canal, and 18 miles southeast of Boulder, Fremont County. No tributary within several miles.

DRAINAGE AREA.—106 square miles (measured on base map of Wyoming; scale, 1: 500,000).

RECORDS AVAILABLE.—May 14, 1916, to September 29, 1917; May 15 to September 30, 1921.

GAGE.—Vertical staff at left bank.

EXTREMES OF DISCHARGE.—1916–1917; 1921: Maximum stage recorded, 4.6 feet on June 23, 25, 1917 (discharge, 1,260 second-feet); minimum stage occurred during winter.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 26 second-feet from East Fork River above station.

ACCURACY.—Gage read once daily. Rating curve fairly well defined. Records fair.

Monthly discharge of East Fork River at East Fork canal, Wyo., for 1916–1917; 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916.				
May 14–31	315	139	204	7,280
June	1,260	315	675	40,200
July	455	97	227	14,000
August	97	12	37.5	2,310
September	18	8	12.9	768
The period				64,600
1917.				
May 15–31	205	135	178	6,000
June	1,400	155	731	43,500
July	900	135	441	27,100
August	115	27	46.6	2,870
September	65	18	34.2	2,040
The period				81,500
1921.				
May 15–31	1,110	230	523	17,600
June	1,180	285	651	38,700
July	315	38	120	7,380
August	51	8	17.6	1,080
September	27	12	14.3	851
The period				65,600

EAST FORK RIVER AT NEW FORK, WYO.

LOCATION.—About sec. 33, T. 32 N., R. 108 W., at highway bridge a quarter of a mile south of New Fork, Fremont County. No tributary between station and mouth, 1 mile below.

DRAINAGE AREA.—348 square miles (measured on base map of Wyoming; scale, 1: 500,000).

RECORDS AVAILABLE.—April 1, 1905, to October 31, 1906; May 11, 1915, to September 30, 1921.

GAGE.—Vertical staff on downstream side of left abutment. Gage used during 1905 was a quarter of a mile upstream; during 1906, gage was at bridge, and referred to datum 0.27 foot higher than present gage.

EXTREMES OF DISCHARGE.—1905–1906; 1915–1921: Maximum stage recorded, 6.8 feet at 6 a. m. on June 11, 1918, caused by backwater from New Fork. Maximum discharge recorded, 2,940 second-feet at 6.30 a. m. on June 19, 1917; minimum discharge, 25 second-feet at 6 p. m. April 4, 1920.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 141 second-feet from East Fork River, all above station.

ACCURACY.—Gage read twice daily except during 1905–1906, when it was read once daily. Rating curve fairly well defined 1905–1906 and well defined 1915–1921. Records good for 1905–1906, and excellent for remainder of period, except during winter, for which they are fair.

Monthly discharge of East Fork River at New Fork, Wyo., for 1905–1906, 1915–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1905.				
April	58	43	52.9	3,150
May	820	58	286	17,600
June	2,550	370	1,230	73,400
July	338	58	147	9,040
August	58	43	47.8	2,940
September	43	30	33.5	1,990
The period				108,000
1905–6.				
October	133	30	35.8	2,200
November			30	1,790
December			30	1,840
January			25	1,540
February			25	1,390
March			30	1,840
April			75	4,460
May	1,480	100	713	43,800
June	2,380	306	887	52,800
July	600	109	321	19,700
August	299	59	120	7,380
September	90	47	61.6	3,670
The year	2,380		196	142,000
October	59	47	50.1	3,080
1915.				
May 11–31	595	190	356	14,800
June	1,020	268	499	29,700
July	338	48	160	9,840
August	109	38	50.5	3,110
September	181	38	81.3	4,840
The period				62,300
1915–16.				
October	148	73	99.2	6,100
November			70	4,170
December			65	4,000
January			60	3,690
February			55	3,160
March			60	3,690
April	370		178	10,600
May	799	216	412	25,300
June	2,120	582	1,330	79,100
July	655	100	268	16,500
August	104	59	75.0	4,610
September	64	48	54.1	3,220
The year	2,120		226	164,000
1916–17.				
October	89	48	72.5	4,460
November	72		63	3,750
December			55	3,380
January			50	3,070
February			50	2,780
March			55	3,380
April	410		125	7,440
May	370	74	225	13,800
June	2,940	202	1,520	90,400
July	2,100	150	716	44,000
August	134	69	83.9	5,160
September	87	57	68.9	4,100
The year	2,940		257	186,000

Monthly discharge of East Fork River at New Fork, Wyo., for 1905–1906, 1915–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917–18.				
October	73	59	65.2	4,010
November	77	66	69.2	4,120
December	.....	.....	60	3,690
January	.....	.....	50	3,070
February	.....	.....	50	2,780
March	.....	.....	50	3,070
April	138	.....	90	5,360
May	432	100	308	18,900
June	2,540	231	1,530	91,000
July	174	68	102	6,270
August	68	60	62.6	3,850
September	60	54	56.9	3,390
The year	2,540	.....	207	150,000
1918–19.				
October	82	58	68.5	4,210
November	75	40	61.4	3,650
September 11–30	46	36	37.6	1,490
1919–20.				
October	53	40	45.9	2,820
November	49	.....	35	2,080
December	.....	.....	30	1,840
January	.....	.....	30	1,840
February	.....	.....	30	1,730
March	.....	.....	35	2,150
April	400	25	95.8	5,700
May	2,130	63	583	35,800
June	2,320	262	1,050	62,500
July	351	57	120	7,380
August	66	57	58.4	3,590
September	57	54	55.1	3,280
The year	2,320	.....	181	131,000
1920–21.				
October	59	52	57.0	3,500
November	.....	.....	57.0	3,390
December	.....	.....	55	3,380
January	.....	.....	50	3,070
February	.....	.....	50	2,780
March	.....	.....	95	5,840
April	102	56	64.8	3,860
May	2,340	52	518	31,900
June	2,800	308	1,370	81,500
July	290	59	94.0	5,780
August	64	52	56.3	3,460
September	52	50	50.8	3,020
The year	2,800	.....	209	151,000

NOTE.—Winter records estimated.

NEW FORK RIVER NEAR CORA, WYO.

LOCATION.—In sec. 29, T. 36 N., R. 110 W., 3½ miles below outlet of New Fork Lake and 10 miles northwest of Cora post office, in Fremont County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 29 to November 30, 1910.

GAGE.—Vertical staff; read by Eugene Alexander.

DIVERSIONS.—Only one small ditch above station.

ACCURACY.—Gage read once daily, except during high water when it is read twice daily. Rating curve well defined below 100 second-feet, above which it is uncertain. Records good below 100 second-feet.

Monthly discharge of New Fork River near Cora, Wyo., for 1910.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1910.				
August	42	9	23.1	1,420
September	9	2	6.5	387
October	7	7	7.0	430
November	7	7	7.0	417
The period				2,650

NEW FORK RIVER NEAR BOULDER, WYO.

LOCATION.—About sec. 8, T. 32 N., R. 108 W., at highway bridge 1 mile west of Boulder, in Fremont County. Nearest tributary, Boulder Creek, enters one-eighth of a mile below.

DRAINAGE AREA.—578 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—May 11, 1915, to September 30, 1921.

GAGE.—Vertical staff at downstream side of left abutment.

EXTREMES OF DISCHARGE.—1915–1921: Maximum stage recorded, 8.7 feet at 6 a. m., on June 17, 1918 (discharge, 12,300 second-feet); minimum discharge, 22 second-feet from December 15 to 17, 1915.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 191 second-feet from New Fork River above station.

ACCURACY.—Gage read twice daily. Rating curves fairly well defined. Records good except during winter, for which they are fair.

Monthly discharge of New Fork River near Boulder, Wyo., for 1915-1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915.				
May 11-31	468	270	377	15,700
June	1,040	520	833	49,600
July	1,070	486	826	50,800
August	486	154	298	17,800
September	486	144	259	15,400
The period				149,000
1915-16.				
October	385	189	293	18,000
November	189	144	166	9,880
December	118	42	79.3	4,880
January	206	61	139	8,550
February	260	82	187	10,800
March	223	105	180	11,100
April	832	91	387	23,000
May	832	430	562	34,600
June	3,200	475	1,860	111,000
July	2,520	800	1,560	95,900
August	865	299	553	34,000
September	299	120	174	10,400
The year	3,200	42	512	372,000

Monthly discharge of New Fork River near Boulder, Wyo., for 1915–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916–17.				
October	199	128	169	10,400
November	170	87	140	8,330
December			110	6,760
January			90	5,530
February			80	4,440
March			80	4,920
April			175	10,400
May	1,090	300	596	36,600
June	3,100	495	1,490	88,700
July	3,180	1,410	2,300	141,000
August	1,340	340	650	40,000
September	400	280	339	20,200
The year	3,180		521	377,000
1917–18.				
October	300	177	239	14,700
November	256	140	172	10,200
December			130	7,990
January			120	7,380
February			120	6,660
March			150	9,220
April	588	176	307	18,300
May	588	238	433	26,600
June	11,800	461	4,120	245,000
July	2,000	506	1,130	69,500
August	461	163	297	18,300
September	176	126	143	8,510
The year	11,800		611	442,000
1918–19.				
October	294	148	240	14,800
November	216	99	154	9,160
December			100	6,150
January			95	5,840
February			95	5,280
March			115	7,070
April	160	117	128	7,620
May	2,200	160	667	41,000
June	1,900	230	613	36,500
July	206	68	110	6,760
August	107	64	80.0	4,920
September	107	64	91.9	5,470
The year	2,200		209	151,000
1919–20.				
October	174	125	140	8,610
November	154	100	134	7,970
December			90	5,530
January			80	4,920
February			80	4,600
March			100	6,150
April			250	14,900
May			530	32,600
June	2,950	990	2,260	134,000
July	2,100	680	1,320	81,200
August	680	242	432	26,600
September	231	151	200	11,900
The year	2,950		468	339,000
1920–21.				
October	183	135	158	9,720
November			120	7,140
December			100	6,150
January			95	5,840
February			95	5,280
March			120	7,380
April	360	130	232	13,800
May	1,350	220	476	29,300
June	4,620	1,430	2,700	161,000
July	1,800	535	933	57,400
August	562	212	359	22,100
September	231	120	178	10,600
The year	4,620		463	336,000

NOTE.—Winter records estimated.

PINE CREEK AT PINEDALE, WYO.

LOCATION.—In sec. 4, T. 33 N., R. 109 W., at highway bridge at Pinedale, in Fremont County. No important tributary between station and mouth, 3 miles below.

DRAINAGE AREA.—128 square miles (measured on base map of Wyoming; scale, 1: 500,000).

RECORDS AVAILABLE.—April 26, 1904, to October 31, 1906; October 1, 1911, to June 30, 1912; May 8, 1915, to September 30, 1921.

GAGE.—Vertical staff on downstream side of bridge pier; read by United States Forest Service. During 1904, vertical staff was a quarter of a mile west of Pinedale, and during 1905–6 at a point 1 mile above Pinedale. From April 1, 1911, to June 30, 1912, chain at outlet of Fremont Lake 4 miles upstream. From May 8, 1915, to August 16, 1917, vertical staff a quarter of a mile below bridge on left bank was used. Flow at different sites practically comparable.

EXTREMES OF DISCHARGE.—1904–1906; 1911–12; 1915–1921: Maximum stage recorded, 5.0 feet on June 17, 1918 (discharge, 2,310 second-feet); minimum discharge recorded, 6 second-feet January 28–30, 1916.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 78 second-feet from Pine Creek above Pinedale and 4 second-feet below.

ACCURACY.—Gage probably read once daily during 1904 to 1906 and at irregular intervals during 1911 and 1912. Read twice daily during greater part of the time during 1915–1921. Rating curves well defined below 2,000 second-feet. Records good except during winter, for which they are fair.

Monthly discharge of Pine Creek at Pinedale, Wyo., for 1904–1906, 1915–1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1904.				
May	610	99	240	14,800
June	1,340	530	906	53,900
July	975	490	663	40,800
August	450	168	239	14,700
September	168	99	123	7,320
The period				132,000
1904–5.				
October	99	24	42.4	2,610
November			22	1,310
December			20	1,230
January			20	1,230
February			20	1,110
March			22	1,350
April	35	26	29.6	1,760
May	258	43	95.8	5,890
June	1,310	258	932	55,500
July	1,200	451	904	55,600
August	451	159	236	14,500
September	138	54	96.9	5,770
The year	1,310		205	148,000
1905–6.				
October	67	35	45.1	2,770
November			30	1,790
December			25	1,540
January			20	1,230
February			20	1,110
March			25	1,540
April	34	26	32.9	1,960
May	594	55	228	14,000
June	1,320	378	745	44,300
July	1,200	479	859	52,800
August	554	202	359	22,100
September	378	18	118	7,020
The year	1,320		210	152,000

Monthly discharge of Pine Creek near Pinedale, Wyo., for 1911–12, 1915–1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
October			50	3,070
November			40	2,380
December			30	1,840
January			25	1,540
February			25	1,390
March			25	1,540
April	42	29	29.9	1,780
May	247	29	88.0	5,410
June	1,620	266	965	57,400
July	1,150	325	818	50,300
August	306	97	165	10,100
September	97	42	54.6	3,250
The year	1,620		193	140,000
1911–12.				
October	76	45	59.6	3,660
November			40	2,380
December			30	1,840
January			25	1,540
February			25	1,440
March			25	1,540
April	42	29	32.2	1,920
May	188	42	81.4	5,010
June	1,280	188	851	50,600
The period				69,900
1915.				
May 8–31	144	72	108	5,130
June	460	168	291	17,300
July	500	221	394	24,200
August	216	74	127	7,810
September	123	74	99.3	5,910
The period				60,400
1915–16.				
October	123	54	91.6	5,630
November	51	14	34.2	2,040
December	31	10	19.0	1,170
January	38	6	19.6	1,210
February	50	20	33.3	1,920
March	50	28	35.9	2,210
April	77	38	50.0	2,980
May	165	80	125	7,690
June	1,750	114	752	44,700
July	1,560	384	981	60,300
August	410	114	243	14,900
September	104	28	56.7	3,370
The year	1,750	6	204	148,000
1916–17.				
October	50	31	40.2	2,470
November	44	19	27.6	1,640
December			20	1,230
January			20	1,230
February			18	1,000
March			20	1,230
April	37	22	25.9	1,540
May	196	27	87.5	5,380
June	1,710	140	551	32,800
July	1,800	806	1,360	83,600
August	769	128	296	18,200
September	141	95	118	7,020
The year	1,800		217	157,000

Monthly discharge of Pine Creek near Pinedale, Wyo., for 1911–12, 1915–1918—Contd.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917–18.				
October	95	43	70.6	4,340
November	42	26	33.0	1,960
December	.....	.....	25	1,540
January	.....	.....	25	1,540
February	.....	.....	20	1,110
March	.....	.....	25	1,540
April	40	28	36.7	2,180
May	112	33	78.1	4,800
June	2,170	100	1,240	73,800
July	1,200	314	712	43,800
August	301	83	178	10,900
September	82	49	60.8	3,620
The year	2,170	.....	208	151,000
1918–19.				
October	102	50	79 9	4,910
November	71	40	53.5	3,180
December	.....	.....	30	1,840
January	.....	.....	25	1,540
February	.....	.....	25	1,390
March	.....	.....	20	1,230
April	32	19	21.6	1,290
May	1,050	20	258	15,900
June	910	97	314	18,700
July	85	20	34.9	2,150
August	45	26	33.5	2,060
September	60	32	50.1	2,980
The year	1,050	.....	79	57,200
1919–20.				
October	62	50	57.5	3,540
November	.....	.....	45	2,680
December	.....	.....	35	2,150
January	.....	.....	25	1,540
February	.....	.....	25	1,440
March	26	25	25.2	1,550
April	37	25	32.1	1,910
May	270	37	101	6,210
June	1,040	320	788	46,900
July	900	320	663	40,800
August	320	85	161	9,900
September	91	45	66.4	3,950
The year	1,040	.....	170	123,000
1920–21				
October	45	40	42.2	2,590
November	43	38	39.7	2,360
December	.....	.....	28	1,720
January	.....	.....	25	1,540
February	.....	.....	20	1,230
March	.....	.....	22	1,350
April	40	28	34.5	2,050
May	295	32	79.7	4,900
June	1,640	345	1,040	61,900
July	910	275	506	31,100
August	275	85	146	8,980
September	100	28	65.6	3,900
The year	1,640	.....	171	124,000

NOTE.—Winter records estimated.

POLE CREEK AT FAYETTE, WYO.

LOCATION.—In sec. 9, T. 33 N., R. 108 W., about 300 yards from Fayette post office.

DRAINAGE AREA.—126 square miles (measured on General Land Office map).

RECORDS AVAILABLE.—April 24, 1904, to October 31, 1906.

GAGE.—Vertical staff set in bed of stream and braced to left bank; read by G. N. Stadin.

EXTREMES OF DISCHARGE.—1904–1906: Maximum stage recorded, 3.5 feet on May 24–27, June 19–20, 1904 (discharge, 1,220 second-feet); minimum discharge occurs during winter.

DIVERSIONS.—Prior to May 1, 1904, adjudicated diversions of 28.6 second-feet above station.

ACCURACY.—Gage read once daily. Rating curve well defined. Because of only one daily gage reading, records good, except during winter, for which they are fair.

Monthly discharge of Pole Creek at Fayette, Wyo., for 1904–1906.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1904.				
May	1,220	64	419	25,800
June	1,220	445	800	47,600
July	615	205	371	22,800
August	205	64	116	7,130
September	64	22	48.8	2,900
The period				106,000
1904–5.				
October	22	16	21.5	1,320
November			12	714
December			10	615
January			10	615
February			10	555
March			15	922
April	36	16	23.8	1,420
May	359	42	132	8,120
June	1,080	221	669	39,800
July	635	137	319	19,600
August	150	54	91.5	5,630
September	47	19	32.8	1,950
The year	1,080		112	81,300
1905–6.				
October	19	16	17.3	1,060
November			12	714
December			10	615
January			10	615
February			10	555
March			15	922
April	85	25	35.5	2,110
May	600	85	313	19,200
June	980	255	476	28,300
July	470	190	328	20,200
August	359	76	168	10,300
September	635	60	264	15,700
The year	980		138	100,000

NOTE.—Winter records estimated.

FALL CREEK NEAR FAYETTE, WYO.

LOCATION.—In sec. 10, T. 33 N., R. 108 W., 1 mile southeast of Fayette post office, at the crossing of upper Boulder road.

DRAINAGE AREA.—46 square miles.

RECORDS AVAILABLE.—April 24, 1904, to October 31, 1905.

GAGE.—Vertical staff set in bed of stream and braced to left bank; read by G. N. Stadin.

EXTREMES OF DISCHARGE.—1904–1905: Maximum stage recorded, 3.0 feet June 19–21, 1904 (discharge, 480 second-feet); minimum stage recorded, 1.10 feet September 26–30, October 8–14, 1905 (discharge, 2 second-feet).

DIVERSIONS.—Prior to April 1, 1904, adjudicated diversions of 15.9 second-feet from Fall Creek above station.

ACCURACY.—Gage read once daily. Rating curve well defined. Records good, except during winter, for which they are fair.

Monthly discharge of Fall Creek near Fayette, Wyo., for 1904-1905.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1904.				
May	480	25	189	11,600
June	480	138	302	18,000
July	180	51	99.3	6,110
August	70	16	31.0	1,910
September	16	7	8.0	476
The period				38,100
1904-5.				
October	7	7	7	430
November			5	298
December			4	246
January			3	184
February			3	167
March			4	246
April			10	595
May	157	18	50.4	3,100
June	380	157	252	15,000
July	365	46	130	7,990
August	46	10	23.5	1,440
September	10	2	5.33	317
The year	380		41.5	30,000
October	3	2	2.77	170

NOTE.—Winter records estimated.

BOULDER CREEK NEAR BOULDER, WYO.

LOCATION.—In sec. 4, T. 32 N., R. 108 W., at Sandlin ranch 2 miles northwest of Boulder, in Fremont County. No tributary between station and mouth, 2 miles below.

DRAINAGE AREA.—112 square miles (measured on base map of Wyoming; scale, 1:500.000).

RECORDS AVAILABLE.—April 23, 1904, to October 31, 1906; May 10, 1915, to September 30, 1921.

GAGE.—Chain installed May 19, 1920, 50 feet upstream from vertical staff used prior to that date, and referred to same datum. Gage used 1904–1906 a short distance upstream.

EXTREMES OF DISCHARGE.—1904–1906, 1915–1921: Maximum stage recorded, 6.8 feet at 7 a. m. June 14, 1918 (discharge, 3,240 second-feet); minimum stage recorded, 0.20 foot at 7 p. m. August 25 and 7 a. m. August 26, 1917 (discharge, 1 second-foot).

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 83 second-feet from Boulder Creek, all above station.

ACCURACY.—Gage read twice daily. Rating curves well defined below 2,000 second-feet. Records good except during winter, for which they are fair.

Monthly discharge of Boulder Creek near Boulder, Wyo., for 1904–1906, 1915–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1904.				
May	1,720	127	594	36,500
June	2,060	888	1,550	92,200
July	1,280	308	620	38,100
August	271	77	134	8,240
September	77	24	43.6	2,590
The period	.....	.....	.....	178,000
1904–5.				
October	24	18	18.8	1,160
November	.....	.....	18	1,070
December	.....	.....	20	1,230
January	.....	.....	20	1,230
February	.....	.....	20	1,110
March	.....	.....	20	1,230
April	.....	.....	35	2,080
May	544	42	188	11,600
June	1,940	913	1,350	80,308
July	1,160	157	543	33,400
August	133	35	64.5	3,970
September	35	9	23.6	1,400
The year	1,940	.....	193	140,000
1905–6.				
October	9	9	9	553
May	1,030	100	532	32,700
June	2,620	429	1,040	61,900
July	970	206	614	37,800
August	345	77	155	9,530
September	157	29	69.2	4,120
October	42	18	29.0	1,780
1915.				
May 10–31	378	88	218	9,500
June	765	360	551	32,800
July	515	34	226	16,400
August	37	1	12.7	781
September	184	3	42.6	2,530
The period	.....	.....	.....	62,000
1915–16.				
October	190	30	101	6,210
November	.....	.....	30	1,790
December	.....	.....	30	1,840
January	.....	.....	35	2,150
February	.....	.....	35	2,010
March	.....	.....	33	2,030
April	144	33	65	3,870
May	488	130	241	14,800
June	2,340	334	1,270	75,600
July	1,100	102	510	31,400
August	144	12	56.5	3,470
September	12	7.4	8.79	523
The year	2,340	.....	202	146,000
1916–17.				
October	41	7	18.7	1,150
November	.....	.....	20	1,190
December	.....	.....	20	1,230
January	.....	.....	25	1,540
February	.....	.....	25	1,390
March	.....	.....	20	1,230
April	.....	.....	20	1,190
May	230	18	118	7,260
June	2,710	141	1,150	68,400
July	2,480	288	1,140	70,100
August	237	1	70.4	4,330
September	118	23	64.5	3,880
The year	2,710	.....	225	163,000

Monthly discharge of Boulder Creek near Boulder, Wyo., for 1904–1906, 1915–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917–18.				
October	47	3	14.9	916
November	31	14	26.0	1,550
December	.....	.....	25	1,540
January	.....	.....	25	1,540
February	.....	.....	25	1,390
March	.....	.....	35	2,150
April	66	12	48.7	2,900
May	215	14	123	7,560
June	3,160	178	1,700	101,000
July	450	43	213	13,100
August	35	7	16.5	1,010
September	8	6	6.6	393
The year	3,160	.....	186	135,000
1918–19.				
October	63	5	27.5	1,690
November	51	22	35	2,080
December	.....	.....	25	1,540
January	.....	.....	20	1,230
February	.....	.....	20	1,110
March	21	.....	18	1,110
April	82	4	32.7	1,950
May	1,900	54	551	33,900
June	700	25	178	10,600
July	25	6	9.4	578
August	6	3	3.7	228
September	3	3	3.0	179
The year	1,900	.....	77.6	56,200
1919–20.				
October	69	4	49.8	3,060
November	68	40	55.0	3,270
April 14–30	95	82	85.3	2,880
May	1,160	87	339	20,800
June	1,880	490	1,140	67,800
July	700	90	313	19,200
August	81	16	35.5	2,180
September	16	9	11.1	660
1920–21.				
October	44	7	21.8	1,340
November	48	36	42.8	2,550
December	.....	.....	30	1,840
January	.....	.....	25	1,540
February	.....	.....	25	1,390
March	.....	.....	25	1,540
April	.....	.....	25	1,490
May	1,420	14	287	17,600
June	2,760	495	1,530	91,000
July	625	42	197	12,100
August	41	13	23.2	1,430
September	13	8	12.9	768
The year	2,760	.....	187	135,000

NOTE.—Winter records estimated. Records for 1904 revised.

PINEY CREEK.

NORTH PINEY CREEK NEAR MARBLETON, WYO.

LOCATION.—In sec. 19, T. 31 N., R. 113 W., 300 yards above headgate of North Piney canal and 20 miles northwest of Marbleton, in Lincoln County. No important tributary within several miles.

DRAINAGE AREA.—58 square miles (measured on special map published in United States Geological Survey Bull. 543).

RECORDS AVAILABLE.—May 17, 1915, to September 30, 1916.

GAGE.—Lallie water-stage recorder on left bank 300 yards above headgate of North Piney canal.

EXTREMES OF DISCHARGE.—1915–1916: Maximum stage from recording gage chart, 4.98 feet at noon June 19, 1916 (discharge, 613 second-feet); minimum discharge probably occurs during winter.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of about 8 second-feet from North Piney Creek above the station, and 209 second-feet below.

ACCURACY.—Gage heights from continuous record. Rating curve well defined. Records excellent except during winter, for which they are fair.

Monthly discharge of North Piney Creek near Marbleton, Wyo., for 1915–1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915.				
June	130	64	99.0	5,890
July	88	42	54.2	3,330
August	43	30	37.4	2,300
September	41	28	32.8	1,950
The period				13,500
1915–16.				
October	33	25	27	1,660
November			25	1,490
December			20	1,230
January			15	922
February			15	863
March			15	922
April	180		63	3,870
May	120	28	69.1	4,250
June	591	94	312	18,600
July	322	88	172	10,600
August	88	35	56.7	3,490
September	39	28	31.2	1,860
The year	591		68.9	49,800

MIDDLE PINEY CREEK NEAR BIG PINEY, WYO.

LOCATION.—In sec. 30, T. 30 N., R. 113 W., at Black's ranch, 15 miles west of Big Piney, in Lincoln County. No important tributary within several miles.

DRAINAGE AREA.—46 square miles (measured on special map published in United States Geological Survey Bull. 543).

RECORDS AVAILABLE.—April 1, 1915, to November 23, 1918. State engineer maintained station at Budd's ranch during 1914.

GAGE.—Vertical staff at left bank 200 feet below house. Prior to 1916, gage was 1 mile downstream at C. P. Budd's ranch.

EXTREMES OF DISCHARGE.—1915–1918: Maximum stage recorded, 2.65 feet at 6 a. m. on June 16, 17, 18, 1918 (discharge, 282 second-feet); minimum stage recorded, 0.70 foot May 2 to 15, 1915 (discharge, 2 second-feet).

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 34 second-feet from Middle Piney Creek above station and 72 second-feet below.

ACCURACY.—Gage read twice daily. Rating curve well defined. Records excellent except during winter, for which they are fair.

Monthly discharge of Middle Piney Creek near Big Piney, Wyo., for 1915–1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915.				
April	9	4	5.70	339
May	22	2	7.06	434
June	53	8	19.5	1,160
July	58	13	29.2	1,800
August	22	10	14.9	916
September	16	10	13.6	809
The period				5,460
1915–16.				
October	16		12	738
November			10	595
December			8	492
January			5	307
February			5	288
March			5	307
April	37		16	952
May	28	12	17.2	1,060
June	134	12	66.8	3,970
July	98	42	62.8	3,860
August	56	22	32.4	1,990
September	23	11	16.1	958
The year	134		21.4	15,500
1916–17.				
October	13	7	10.5	646
November			6	357
December			5	307
January			5	307
February			5	278
March			5	307
April	26	5	9	536
May	63	14	40.2	2,470
June	255	37	131	7,800
July	260	68	148	9,100
August	62	24	42.2	2,590
September	27	17	21.6	1,290
The year	260		36.0	26,000
1917–18.				
October	16	8	12.4	762
November	12	5	7.8	464
December			5	307
January			5	307
February			5	278
March			5	307
April	22	6	14.9	887
May	33	16	23.2	1,430
June	282	19	141	8,390
July	82	42	56.4	3,470
August	47	16	28.0	1,720
September	17	10	13.9	827
The year	282		26.4	19,100
1918.				
October	12	9	10.7	658
November 1–23	10	4	7.0	319

NOTE.—Winter records estimated.

LABARGE CREEK.

LABARGE CREEK NEAR LABARGE, WYO.

LOCATION.—In sec. 29, T. 26 N., R. 113 W., at Welty's ranch, 3 miles west of Labarge, in Lincoln County. No important tributary between station and mouth, 6 miles below.

DRAINAGE AREA.—176 square miles (measured on special map published in United States Geological Survey Bull. 543).

RECORDS AVAILABLE.—April 17 to September 20, 1913; April 1, 1915, to November 8, 1916. State engineer maintained station during 1913 and 1914.

GAGE.—Vertical staff at right bank 250 feet downstream from highway bridge at Welty's ranch.

EXTREMES OF DISCHARGE.—1913, 1915–1916: Maximum stage recorded, 2.45 feet May 27, 1913 (discharge, 478 second-feet); minimum stage recorded, 0.65 foot at 7 p. m. July 1, 5 p. m. July 3, and July 7–14, 1915 (discharge, 3 second-feet).

DIVERSIONS.—Prior to December 31, 1916, there were adjudicated diversions of 185 second-feet from Labarge Creek above station and 103 second-feet below.

ACCURACY.—Gage read twice daily. Rating curve fairly well defined except for periods of shifting control. Records fair.

Monthly discharge of Labarge Creek near Labarge, Wyo., for 1913, 1915–1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913.				
April 17–30	316	154	222	6,160
May	478	172	321	19,700
June	442	172	250	14,900
July	280	38	114	7,010
August	136	64	101	6,210
September 1–20	136	82	91.8	3,640
The period				57,600
1915.				
April 1–27	120	98	106	5,680
May 4–28	104	55	74.9	4,160
June	62	6	29.9	1,780
July	38	4	13.3	818
August	62	38	51.6	3,170
September	148	48	75.8	4,510
1915–16.				
October	88	64	70.8	4,350
November 1–9	64	61	63.1	1,130
April 2–30	258	98	156	8,970
May	302	214	256	15,700
June	296	181	240	14,300
July	170	104	129	7,930
August	154	93	105	6,460
September	110	82	90.8	5,400
October	98	82	89.5	5,500
November 1–8	98	93	96.8	1,540

FONTENELLE CREEK.

FONTENELLE CREEK NEAR FONTENELLE, WYO.

LOCATION.—About sec. 3, T. 24 N., R. 113 W., at bridge at Holden's ranch on stage road from Opal to Big Piney and 5 miles west of Fontenelle, Lincoln County. No important tributary between station and mouth.

DRAINAGE AREA.—224 square miles (measured on special map published in United States Geological Survey Bull. 543).

RECORDS AVAILABLE.—May 21, 1915, to September 30, 1919. State engineer maintained station during 1914.

GAGE.—Vertical staff at downstream end of right abutment.

EXTREMES OF DISCHARGE.—1915–1919: Maximum stage recorded, 2.7 feet on May 22, 1917 (discharge, 900 second-feet); minimum discharge, 1 second-foot or less on days during summer of 1919.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 78 second-feet from Fontenelle Creek; percentage above station not known.

ACCURACY.—Gage read once daily except during high water in 1917, when it was read twice daily. Rating curve fairly well defined. Records good except during winter, for which they are fair.

Monthly discharge of Fontenelle Creek near Fontenelle, Wyo., for 1915–1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915.				
May 21–31	80	38	62.1	1,350
June	65	2	32.7	1,950
July 1–6	2	2	20	25
August	26	15	19.9	1,220
September	104	16	40.6	2,420
1915–16.				
October	42	27	35.5	2,180
November 1–13	50	20	30.7	792
March 21–31	190	50	126	2,750
April	565	76	269	16,000
May	549	168	315	19,400
June	449	150	331	19,700
July	150	69	94.6	5,820
August	87	47	60.5	3,720
September	69	34	40.5	2,410
1916–17.				
October	122	33	70.8	4,350
November	.....	.....	30	1,790
December	.....	.....	25	1,540
January	.....	.....	25	1,540
February	.....	.....	25	1,390
March	.....	.....	25	1,540
April	.....	.....	95	5,650
May	900	111	482	29,600
June	825	435	617	36,700
July	435	97	201	12,400
August	109	62	82.7	5,080
September	62	19	44.5	2,650
The year	900	.....	144	104,000
1917–18.				
October	49	23	32.8	2,020
November	.....	.....	28	1,670
December	.....	.....	25	1,540
January	.....	.....	25	1,540
February	.....	.....	25	1,390
March	.....	.....	40	2,460
April	240	54	140	8,330
May	496	176	319	19,600
June	496	143	308	18,300
July	143	62	97.6	6,000
August	70	40	56.1	3,450
September	54	37	41.9	2,490
The year	496	.....	95.0	68,800
1918–19.				
October	66	40	47.4	2,910
November	.....	.....	35	2,080
December	.....	.....	30	1,840
January	.....	.....	30	1,840
February	.....	.....	30	1,670
March	.....	.....	30	1,840
April	138	28	79.7	4,740
May	132	74	97.7	6,010
June	74	8	27.2	1,620
July	.....	.....	5.0	307
August	25	1	18.6	1,140
September	20	1	13.6	809
The year	138	.....	37.0	26,800

NOTE.—Winter records estimated,

BIG SANDY CREEK BASIN.

BIG SANDY CREEK NEAR BIG SANDY, WYO.

LOCATION.—At Leckie's ranch, in sec. 18, T. 30 N., R. 104 W., 4 miles east of Big Sandy post office; below all mountain tributaries.

DRAINAGE AREA.—105 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—July 26, 1910, to August 31, 1911.

GAGE.—Chain gage on left bank a quarter of a mile below Leckie's ranch house; read by Mrs. Annie Leckie.

EXTREMES OF DISCHARGE.—Data too meager.

DIVERSIONS.—No diversions above station. Eden Irrigation Co. has a reservoir at the site of this gaging station.

ACCURACY.—Gage probably read twice daily. Rating curve well defined. Records fair.

Monthly discharge of Big Sandy River near Big Sandy, Wyo., for 1910–1911.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1910.				
July 26–31	71	47	53.0	631
August	77	16	30.3	1,860
September	20	16	19.1	1,140
The period				3,630
1910–11.				
October	25	16	22.9	1,410
November 1–20	16	12	15.6	619
May	208	82	168	10,300
June	396	208	292	17,400
July	241	68	147	9,040
August	77	52	59.8	3,680

BIG SANDY CREEK NEAR EDEN, WYO.

LOCATION.—About sec. 13, T. 28 N. R. 106 W., at Poston's ranch, 20 miles north of Eden.

DRAINAGE AREA.—Approximately 265 square miles.

RECORDS AVAILABLE.—April 28 to October 7, 1911.

GAGE.—Probably vertical staff; read by W. E. Robertson.

EXTREMES OF DISCHARGE.—Data too meager.

DIVERSIONS.—Prior to July 1, 1912, adjudicated diversions of 38 second-feet above the station.

ACCURACY.—Gage read once daily. Rating curve fairly well defined. Records fair to good.

Monthly discharge of Big Sandy Creek near Eden, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
May	294	27	174	10,700
June	818	342	536	31,900
July	510	86	180	11,100
August	86	13	45.3	2,790
September	56	13	28.9	1,720
October 1–7	118	56	102	1,420
The period				59,600

BIG SANDY CREEK NEAR FARSON, WYO.

LOCATION.—In sec. 18, T. 27 N., R. 106 W., three-quarters of a mile below Ten Trees and 18 miles north of Farson, Sweetwater County. No tributary within several miles of station.

DRAINAGE AREA.—322 square miles (measured on base map of Wyoming; scale, 1: 500,000).

RECORDS AVAILABLE.—May 6, 1915, to September 30, 1917; April 28 to September 30, 1921.

GAGE.—Stevens 8-day water-stage recorder installed May 1, 1921, at left bank half a mile above head of Eden canal, referred to datum of staff gage at same site used from 1915 to 1917.

EXTREMES OF DISCHARGE.—1915–1917, 1921: Maximum stage recorded, 5.7 feet June 26, 1917 (discharge, 1,160 second-feet); minimum stage, 1.35 feet September 28–30, 1917 (discharge, 7 second-feet).

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 43 second-feet from Big Sandy Creek above station and 4 second-feet below.

ACCURACY.—Gage read once daily from 1915 to 1917; continuous record during 1921. Rating curve fairly well defined. Records fair for 1915 to 1917, and excellent for 1921.

Monthly discharge of Big Sandy Creek near Farson, Wyo., 1915–1917, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915.				
May	500	126	280	17,200
June	600	220	330	19,600
July	290	30	103	4,140
August	200	20	67.4	
The period				47,300
1916.				
May	440	146	268	16,500
June	740	340	547	32,500
July	440	135	252	15,500
August	116	34	71.8	4,410
September	135	22	60.6	3,610
The period				72,500
1917.				
May	410	252	333	20,500
June	1,160	252	700	41,700
July	902	180	419	25,800
August	278	12	71.4	4,390
September	76	7	30.7	1,830
The period				94,200
1921.				
May	752	28	304	18,700
June	1,020	380	647	38,500
July	353	74	183	11,300
August	87	10	37.0	2,280
September	34	8	17.6	1,050
The period				71,800

SQUAW CREEK NEAR BIG SANDY, WYO.

LOCATION.—In sec. 4, T. 30 N., R. 104 W., at Dutch Joe ranger station, 1 mile above mouth of Dutch Joe Creek, 1½ miles above junction of Squaw and Big Sandy creeks, and 6 miles southeast of Big Sandy.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 17, 1911, to June 30, 1912.

GAGE.—Vertical staff attached to pine tree on left bank.

EXTREMES OF DISCHARGE.—1911–1912: Maximum stage recorded, 1.7 feet June 6, 1912 (discharge, 173 second-feet); minimum discharge occurs during winter.

DIVERSIONS.—No diversions above station.

ACCURACY.—Gage read about twice weekly. Rating curve well defined up to 50 second-feet. Records good up to 50 second-feet, above which they are approximate.

Monthly discharge of Squaw Creek near Big Sandy, Wyo., for 1911–1912.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
May 17–31	51	30	43.3	1,290
June	101	44	63.7	3,790
July	51	14	28.9	1,780
August	14	8	10.7	658
September	10	8	9.0	536
The period				8,050
1911–12.				
April	14	11	12.3	219
May	10	7.8	9.0	536
June	85	10	34.7	2,130
	173	60	111	6,600

LITTLE SANDY CREEK NEAR EDEN, WYO.

LOCATION.—In sec. 34, T. 25 N., R. 106 W., at highway bridge a quarter of a mile above mouth and 6½ miles south of Eden.

DRAINAGE AREA.—823 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—April 25, 1911, to September 11, 1912.

GAGE.—Vertical staff attached to highway bridge; read by W. E. Robertson.

EXTREMES OF DISCHARGE.—Data too meager.

DIVERSIONS.—Prior to July 1, 1912, adjudicated diversions of 63 second-feet from Little Sandy Creek.

ACCURACY.—Gage read once daily. Rating curve fairly well defined. Records fair.

Monthly discharge of Little Sandy Creek near Eden, Wyo., for 1911– 1912.

Month	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
April 25–30	21	16	17.3	206
May	60	23	36.9	2,270
June	213	34	126	7,500
July	101	20	59.1	3,630
August	20	0	6.0	369
September	4	0	.7	42
The period				14,000
1911–12.				
October	13	4	9.7	596
May	70	35	52.7	3,240
June	222	94	129	7,680
July	160	60	84.1	5,170
August	60	17	33.2	2,040
September 1–11	15	13	13.2	288

BLACKS FORK BASIN.

BLACKS FORK NEAR URIE, WYO.

LOCATION.—In sec. 23, T. 16 N., R. 115 W., at highway bridge 4 miles northwest of Urie, Uinta County. No tributary within 10 miles.

DRAINAGE AREA.—261 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—August 21, 1913, to September 30, 1921.

GAGE.—Vertical staff on downstream side of center pier. August, 1915, datum lowered 0.50 foot to avoid negative readings.

EXTREMES OF DISCHARGE.—1913–1921: Maximum stage recorded, 4.72 feet 7 p. m. June 19 and 9 a. m. June 20, 1917 (discharge, 2,680 second-feet); minimum discharge recorded, 1 second-foot September 17–22, 1916 (gage height, 0.3 foot).

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 636 second-feet from Blacks Fork above station and 4 second-feet below.

ACCURACY.—Gage read twice daily. Rating curve well defined. Records good.

Monthly discharge of Blacks Fork near Urie, Wyo., for 1913–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913.				
August 21-31	84	7	17.5	382
September	107	8	23.9	1,420
1913–14.				
October	89	17	45.0	2,770
November	67	18	41.2	2,450
March 15-31	298	96	182	6,140
April	255	138	194	11,500
May	1,670	184	786	48,300
June	1,280	227	588	35,000
July	193	20	78.3	4,810
August	63	15	26.8	1,650
September	29	16	17.6	1,050
1914–15.				
October	54	24	39.9	2,450
November	54	30	39.9	2,370
April	500	47	156	9,280
May	478	100	241	14,800
June	642	245	401	23,900
July	200	5	65.4	4,020
August	7.4	2.3	4.25	261
September	159	2.3	37.8	2,250
1915–16.				
October	62	22	37.2	2,290
November 1-20	64	20	43.8	1,740
March 12-31	193	46	127	5,040
April	193	46	97.1	5,780
May	560	62	267	16,400
June	710	23	458	27,300
July	26	8	15.5	953
August	16	2	5.90	363
September	3	1	2.10	125
1916–17.				
October	12	6	9.6	591
November 1-4	12	11	11.5	91
April 8-30	398	82	191	8,710
May	467	70	226	13,900
June	2,440	221	1,090	64,900
July	772	16	232	14,300
August	65	4	12.0	738
September	10	3	5.7	339

Monthly discharge of Blacks Fork near Urie, Wyo., for 1913–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917–18.				
October	8	3	4.6	283
November	20	8	12.2	726
March 17–31	78	48	66.6	1,980
April	88	19	41.2	2,450
May	517	25	300	18,400
June	1,360	13	653	33,900
July	70	4	16.7	1,030
August	8	2	3.4	209
September	8	3	4.8	286
1918–19.				
October	45	10	19.4	1,190
November 1–23	25	7	11.6	529
March 23–31	61	44	51.6	921
April	46	14	21.0	1,250
May	680	27	309	19,000
June	108	6.0	31.0	1,840
July	8.0	1.8	4.28	263
August	6.8	2.2	3.99	245
September	6.0	3.0	4.19	249
1919–20.				
October	13	6	10.0	615
November 1–15	13	10	10.2	303
March 20–31	101	44	64.3	1,530
April	206	44	102	6,070
May	1,220	101	535	32,900
June	1,130	52	393	23,400
July	30	15	19.3	1,190
August	32	5	16.3	1,000
September	20	8	14.2	845
1920–21.				
October	20	10	16.5	1,010
November 1–13	18	13	14.6	376
March 20–31	45	20	29.4	700
April	54	20	38.9	2,310
May	1,270	38	447	27,500
June	2,180	320	1,070	63,700
July	480	28	128	7,870
August	42	5	21.1	1,300
September	106	13	35.7	2,120

BLACKS FORK AT GRANGER, WYO.

LOCATION.—A quarter of a mile below Granger. From April 18, 1896, to April 27, 1897, station was at Union Pacific Railroad bridge, 3 miles west of Granger, and above Hams Fork.

DRAINAGE AREA.—Upper station, 2,170 square miles. Lower station, 2,840 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—April 18, 1896, to September 30, 1900.

GAGE.—Vertical staff used at upper station, and a cantilever wire gage at lower station.

EXTREMES OF DISCHARGE.—1896–1900: Maximum discharge, 6,780 second-feet June 14–15, 1899. No flow August 31 to October 1, 1898; August 15 to September 30, 1900.

ACCURACY.—Gage probably read once daily. Rating curve fairly well defined. Records good except during winter, for which they are fair.

Monthly discharge of Blacks Fork at Granger, Wyo., for 1896–1900.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1896.				
April 18–30	470	230	388	10,000
May	4,160	380	1,130	69,500
June	5,020	440	1,760	105,000
July	410	190	278	17,100
August	620	40	174	10,700
September	620	60	131	7,800
The period				220,000
1896–97.				
October	120	70	89.2	5,480
April	1,350	300	618	36,800
May	5,830	1,400	3,750	231,000
June	3,370	495	1,310	78,000
July	570	145	315	19,400
August	210	90	146	8,980
September	245	65	131	7,800
1897–98.				
October			400	24,600
November			200	11,900
December			180	11,100
January			100	6,150
February			80	4,440
March			500	30,700
April	2,260	990	1,670	99,400
May	2,590	1,180	1,700	105,000
June	2,520	990	1,730	103,000
July	822	145	405	24,900
August	245	0	108	6,640
September			0	0
The year				428,000
1898–99.				
October	210	0	127	7,810
November			80	4,760
December			70	4,300
January			60	3,690
February			50	2,780
March			400	24,600
April	2,090	520	987	58,700
May	3,870	640	2,260	139,000
June	6,780	2,950	4,740	282,000
July	3,710	455	1,630	100,000
August	510	110	287	17,600
September	145	15	62.2	3,700
The year				649,000
1899–1900.				
October	145	15	90	5,530
November			100	5,950
December			80	4,920
January			70	4,300
February			70	3,890
March			450	27,700
April	860	372	576	34,300
May	2,650	770	1,650	101,000
June	2,270	135	910	54,100
July	110	19	44.1	2,710
August	27	0	10.6	652
September			1.0	60
The year				245,000

NOTE.—Winter records estimated.

HAMS FORK AT DIAMONDVILLE, WYO.

LOCATION.—In SW. ¼ sec. 24, T. 21 N., R. 116 W., at highway bridge in Diamondville, Lincoln County. No important tributary within many miles.

DRAINAGE AREA.—383 square miles (measured on base map of Wyoming; scale, 1: 500,000).

RECORDS AVAILABLE.—May 1, 1918, to September 30, 1921.

GAGE.—Staff attached to downstream side of bridge. During 1918, gage located at Kemmerer 2 miles upstream; records at two points comparable.

EXTREMES OF DISCHARGE.—1918–1921: Maximum stage recorded, 4.4 feet at 8 a.m. May 23, 1920 (discharge, 2,980 second-feet); minimum stage, river dry August 29–31, 1919.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 50 second-feet from Hams Fork above station and 112 second-feet below.

ACCURACY.—Gage read twice daily. Rating curve well defined prior to September 1. Records good for 1918, excellent for 1919 and 1920, fair for 1921, and fair during winter.

Monthly discharge of Hams Fork at Diamondville, Wyo., for 1918–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918.				
May	1,500	670	965	59,300
June	895	215	644	38,300
July	245	70	145	8,920
August	68	24	43.0	2,640
September	42	26	30.5	1,810
The period				110,000
1918–19.				
October	45	32	39.4	2,420
November	43		32	1,900
December			30	1,840
January			25	1,540
February			25	1,390
March	248	22	43	2,640
April	560	55	276	16,400
May	560	294	385	23,700
June	405	27	123	7,320
July	25	5	10.3	633
August	18	0	10.5	646
September	23	1	13.3	791
The year	560	0	84.3	61,200
1919–20.				
October	47	26	34.2	2,100
November	43	33	37.6	2,240
December			30	1,840
January			25	1,540
February			25	1,440
March	57		40	2,460
April	405	35	147	8,750
May	2,640	480	1,420	87,300
June	1,380	280	698	41,500
July	241	45	86.6	5,320
August	53	26	38.3	2,360
September	49	26	33.9	2,020
The year	2,640		220	159,000
1920–21.				
October	60	39	48.7	2,990
November	56		43	2,560
December			30	1,840
January			30	1,840
February			25	1,390
March	228		75	4,610
April	643	78	307	18,300
May	2,170	444	1,480	91,000
June	1,830	330	1,060	63,100
July	306	68	145	8,920
August	83	35	50.9	3,130
September	48	31	37.6	2,240
The year	2,170		279	202,000

NOTE.—Winter records estimated.

HENRYS FORK.

HENRYS FORK NEAR LINWOOD, UTAH.

LOCATION.—In sec. 30, T. 3 N., R. 21 E., Salt Lake meridian, at Finch's ranch 3 miles from Linwood, Uinta County, and 48 miles south of Green River, Wyo.

DRAINAGE AREA.—644 square miles (measured on map published in Water-Supply Paper 395).

RECORDS AVAILABLE.—April 19 to September 30, 1916, when station was discontinued.

GAGE.—Vertical staff on left bank 200 yards below observer's house; read by Miss Nora Finch.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.1 feet at 5 p. m. May 10 (discharge, 313 second-feet); minimum stage, 2.6 feet for periods in July and September (discharge, about 2 second-feet).

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 104 second-feet from Henrys Fork.

ACCURACY.—Stage-discharge relation not permanent. Rating curve well defined between 30 and 250 second-feet. Shifting-control method used April 19 to May 21. Gage read to tenths twice daily. Daily discharge determined by applying mean daily gage height to rating table. Records good.

Monthly discharge of Henrys Fork near Linwood, Utah, for 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 19–30	106	33	52.2	1,240
May	282	58	128	7,870
June	220	43	130	7,740
July	138	2	21.6	1,330
August	97	8	29.9	1,840
September	21	4	9.1	541
The period				20,600

IRRIGATION.

PRESENT DEVELOPMENT.

With the exception of the Lyman project and that of the Cottonwood Development Co. now under construction, irrigation in the Green River basin is in the earliest stage—the stage in which the lands irrigated are chiefly narrow strips of bottom lands along the tributaries of the main stream. The ditches are small and were constructed for individual ranches at slight expense, obtaining water by direct diversion with little or no provision for storage. The following table compiled by the State engineer's office shows the area covered by completed ditches in 1921:

Area covered by completed ditches in Green River drainage basin, in acres.

Stream.	Adjudicated (including territorial rights).	Completed but not adjudicated.	Total.
Green River	33,749	4,668	38,417
Horse Creek and tributaries	17,401	1,000	18,401
Cottonwood Creek and tributaries	22,469	12,803	35,272
New Fork River and tributaries	58,106	28,433	86,539
North Piney Creek and tributaries	16,975	5,146	22,121
Middle Piney Creek and tributaries	9,054	147	9,201
South Piney Creek and tributaries	13,061	752	13,813
Labarge Creek and tributaries	12,056	701	12,757
Fontenelle Creek and tributaries	8,206	1,623	9,829
Big Sandy Creek and tributaries	11,388	21,874	33,262
Blacks Fork	45,611	59,903	105,514
Hams Fork	15,526	4,303	19,829
Smith Fork	18,738	12,118	30,856
Minor tributaries of Blacks Fork	12,196	2,647	14,843
Henrys Fork and tributaries	15,754	839	16,593
Little Snake River and tributaries	17,664	2,533	20,197
Minor tributaries of Green River	25,964	2,624	28,588
	353,918	162,114	516,032

A joint report made by the United States Reclamation Service and the State of Wyoming in 1916 shows that of the area covered by completed ditches about 380,000 acres was actually irrigated. Of this area 92 per cent consists of bottom lands, almost untilled and unprepared for the proper distribution of water. The principal crop is native hay. The remainder of the irrigated area (30,000 acres) can be classed as tilled land. Native hay will probably continue to be the chief crop, as stock raising is the principal industry of the region.

GREEN RIVER.

The project under construction by the Cottonwood Development Co. consists of three units comprising 27,300 acres. The main supply canal, which has a capacity of 300 second-feet, diverts water from Green River in sec. 9, T. 33 N., R. 110 W., and runs south to the upper end of the first unit in the east half of T. 32 N., R. 111 W. From this point the canal runs southward along the west side of this unit to Cottonwood Creek, which is crossed by an inverted siphon. It continues southward along the west side of the second unit, which lies between Cottonwood and Piney creeks in Tps. 30 and 31 N., R. 111 W. The supply canal ends at a tributary of Muddy Creek and is 130 miles long. The third unit in the project lies between North Piney Creek and Meadow Canyon Creek, northwest of Big Piney. Secondary sources of supply are to be obtained from Cottonwood and North Piney creeks.

BLACKS FORK.

The lands under the Lyman project have an area of 62,600 acres lying on both sides of Blacks Fork, between Muddy and Cottonwood creeks, and represent the highest type of irrigation in the Green River basin. They are irrigated by seven separate canals.

Area under canals in Lyman project, in acres.

Name of canal.	Source of supply.	Point of diversion.	Irrigable.	Irrigated.
Blacks Fork canal	Blacks Fork	Sec. 14, T. 14 N., R. 116 W	20,000	16,000
Pine Grove canal	do	Sec. 28, T. 14 N., R. 116 W	11,000	6,000
Bridger Butte canal	do	Sec. 19, T. 15 N., R. 115 W	3,500	2,500
Fort Bridger canal	do	Sec. 17, T. 15 N., R. 115 W	3,100	2,100
Twin Buttes canal	do	Sec. 4, T. 15 N., R. 115 W	3,300	2,500
Deeben-Heinze canal	do	Sec. 28, T. 16 N., R. 115 W	1,700	1,500
Utah-Wyoming canal	do	Near Utah-Wyoming line	[a] 20,000	500
			62,600	31,100

[a] Covered by possible enlargement.

In addition to the canals listed above, the Uinta No. 3 canal was constructed in 1916 to irrigate land lying between Blacks Fork and Muddy Creek in Tps. 17 and 18 N. The gross area under this canal is 50,000 acres, of which not more than 20,000 acres can be classed as irrigable. The canal diverts water from Blacks Fork 1 mile above Fort Bridger and conveys it to a reservoir that has a capacity of about 4,000 acre-feet and is located on the project. At present 500 acres is irrigated. The principal crops are alfalfa, timothy, red top, and native hay, oats, wheat, and potatoes. The duty of water is about 2½ acre-feet.

BIG SANDY CREEK.

The State obtained under the Carey Act an original segregation of 95,658 acres in Sweetwater and Fremont counties about 40 miles north of Rock Springs, near Eden, to be irrigated from Big Sandy Creek and its tributaries. Eden canal No. 1, having an intake in sec. 17, T. 27 N., R. 106 W., has been constructed, together with laterals; also reservoir No. 1, which has a capacity of 25,000 acre-feet and is 12 miles below the intake. The State has acquired patent to 19,015 acres. Certificates of location covering 10,000 acres have been issued, leaving 9,015 acres open to entry. An extension of the system by the construction of additional canals and reservoirs depends upon the settlement of the completed unit.

BOULDER CREEK.

The Boulder project, which was constructed under the Carey Act, covers an area of 6,100 acres north of Boulder on the east side of Boulder Creek. The intake canal takes water from Boulder Creek, 4½ miles above Boulder. The project is completed, and patent to the land has been obtained by the State, which has issued certificates of location for 4,520 acres, leaving 1,580 acres open to entry.

FUTURE DEVELOPMENT.

The limit of the present type of irrigation has nearly been reached, as most of the bottom lands susceptible of cheap irrigation by individual effort are now under ditch. Future irrigation projects must

embrace the bench lands and therefore must be treated in large units to keep the cost down. A joint investigation of the Green River basin in Wyoming was made by the United States Reclamation Service and the State in 1915. This work consisted of reconnaissance surveys to determine roughly the area susceptible of irrigation. Later more detailed surveys showed the following possible projects:

Proposed irrigation projects in Green River basin.[a]

Project.	Source of supply.	Irrigable area (acres).
Big Seedskadee	Green River	65,000
Little Seedskadee	do	28,000
Big Piney-Labarge	do	6,000
Green River canal [b]	do	[c] 75,000
Total Green River		174,000
Opal	Hams Fork	[d] 30,000
Total in basin		204,000

[a] The investigation included also the Bonneville project, comprising lands lying between Green River and Big Sandy Creek north of the Green River canal project and having a gross area of 610,000 acres. This project involves diverting waters of Green River into New Fork River and the New Fork into Boulder Lake, and the magnitude of the canals required make the chance of construction so remote that it is not included in the above list. The Church Buttes project was also proposed to irrigate land lying south of Blacks Fork, by means of water diverted from Henrys Fork into Cottonwood Creek. Records of flow of Henrys Fork obtained since the investigation show that the water supply would be insufficient.

[b] Not surveyed by U. S. Reclamation Service, as land was segregated under Carey Act at time of survey. Has since been relinquished by State.

[c] Estimated gross area; irrigable area not determined.

[d] Irrigable area will depend entirely on water supply.

GREEN RIVER.

The Little Seedskadee project would divert water at Anderson's Island, in T. 25 N., R. 11 W., and would cover an irrigable area of 28,000 acres lying southwest of Green River. A low diversion dam would be required in Green River, and the canal line for the greater part of its length would follow easy country in earth excavation. The Big Seedskadee project would divert water at Labarge, about 10 miles farther upstream, and would add an irrigable area estimated at 65,000 acres. The construction of the main canal for this project would be very heavy work, and the additional land is rolling and broken, with scattered patches of good land.

The water supply for the Big Piney-Labarge project can be taken from Green River near Big Piney. A canal 33 miles long would cover 6,000 acres of irrigable land, held largely in public ownership and lying in a narrow strip along the west side of Green River. The canal would involve practically no expensive work.

The land proposed to be irrigated under the Green River canal is between Green River and Big Sandy Creek, just north of their junction. The point of diversion from Green River is near Fontenelle. A gross area of 75,257 acres was segregated under the Carey Act, but as no construction work was done, the lands were later relinquished. No detailed survey has been made to determine the irrigable area.

The area proposed to be irrigated from Green River is 174,000 acres. As the irrigation season is short, extending chiefly from May until August, probably the consumptive duty of water would be 1.2 acre-feet to an acre. This would require a net diversion of 209,000 acre-feet. The requirements of the unadjudicated ditches that have not been using the total amount of water to which they are entitled must be considered. It is safe to assume that of the 66,000 acres under completed ditch a considerable part is already irrigated. By the more economical use of water fully half the completed area can be taken care of, leaving 33,000 acres under completed ditches requiring an additional water supply. There are also water rights for 90,000 acres under uncompleted ditches on some of which construction work has not been started and probably never will be. It is assumed that half the area under uncompleted ditches may be irrigated at some future time with rights prior to the proposed projects. It will therefore be necessary to assume prior rights for 78,000 acres not yet irrigated. With a consumptive duty of 1.2 acre-feet, this area will require 94,000 acre-feet annually.

Monthly irrigation requirements for uncompleted ditches and new projects, in acre-feet.

Area.	May.	June.	July.	August.	September.
New projects	20,900	73,100	62,800	37,600	14,600
Uncompleted ditches	9,400	32,800	28,200	17,000	6,600
	30,300	106,000	91,000	54,600	21,200

Water-supply records for Green River at Green River are available for 1895–1899, 1901–1906, 1915–1921, making a total of 18 years. The median year for the period was 1906, which had a total run-off of 1,490,000 acre-feet.

Percentage of yearly discharge of Green River at Green River, 1895–1921, to that of median year.

Year.	Total discharge (second-feet).	Percentage of discharge to median year.	Year.	Total discharge (second-feet).	Percentage of discharge to median year.	Year.	Total discharge (second-feet).	Percentage of discharge to median year.
1895	1,300,000	87	1902	1,040,000	70	1916	1,750,000	118
1896	1,420,000	95	1903	1,310,000	88	1917	2,080,000	140
1897	1,650,000	111	1904	1,870,000	126	1918	1,750,000	118
1898	1,580,000	106	1905	1,010,000	68	1919	685,000	46
1899	2,500,000	168	1906	1,490,000	100	1920	1,480,000	99
1901	1,300,000	87	1915	834,000	56	1921	1,770 000	119

Monthly discharge of Green River at Green River, irrigation requirements, and surplus, in acre-feet.

	May.	June.	July.	August.	September.
Monthly discharge, median year	291,000	364,000	279,000	133,000	72,000
Irrigation requirements	30,300	106,000	91,000	54,600	21,200
Surplus	261,000	258,000	188,000	78,000	50,800

HAMS FORK.

The land under the Opal project lies north of Blacks Fork, between Hams Fork and Green River. Water would be supplied from Hams Fork by a low diversion dam near Opal The gross area of 125,000 acres contains a great deal of rough and broken land, but also a considerable area of irrigable land, the extent of which can be determined only by careful surveys. About half the irrigable land is held in public ownership. Water-supply records at Green River for 18 years show that discharge for 1920 was 99 per cent of that for the period. The records of Hams Fork at Diamondville for 1920 show that the annual run-off would be in excess of 130,000 acre-feet available for the Opal project. A storage reservoir in the stream valley near Frontier was surveyed in detail. It was found that a dam 115 feet high would give a capacity of 130,000 acre-feet.

EFFECT ON DISCHARGE OF GREEN RIVER.

If the ditches are completed as outlined, and if the new projects are constructed, the flow of Green River at the State line will be reduced by 383,000 acre-feet; this allows 80,000 acre-feet for the Hams Fork project. The discharge of Green River at the State line for the median year is 1,940,000 acre-feet, as determined by adding to 1,490,000 acre-feet, the median flow at Green River, 450,000 acre-feet to represent the flow of Blacks Fork, which enters between the Green River gaging station and the State line. The reduction of 383,000 acre-feet is 20 per cent of the total flow at the State line.

WATER POWER.

GREEN RIVER.

No water power is developed in the Green River basin. The United States Geological Survey has prepared a reconnaissance profile of Green River from the mouth of Beaver Creek to the foot of Andersons Island, a distance of 85 miles, and has made a topographic survey of the headwater region beginning at a point 8 miles below Green River lakes. With these data as a basis, augmented by elevations at other points obtained from undoubtedly reliable sources, the following table of elevations has been compiled:

Elevations and distances along Green River from source to Henrys Fork.

Point on river.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From source.	Point to point.		Total.	Per mile.
Small Lake at head of Trail Creek	0	.....	10,900	.....	.....
Junction Trail and Wells creeks	5	5	8,370	2,530	506
Outlet of lower Green River Lake	17	12	7,960	410	34
Wells	32	15	7,790	170	11
Kendall	52	20	7,630	160	8
Mouth of Beaver Creek	70	18	7,380	250	14
Mouth of Horse Creek	84	14	7,165	215	15
Sec. 10, T. 33 N., R. 110 W	89	5	7,110	55	11
Mouth of Cottonwood Creek	103	14	6,915	195	14
Mouth of New Fork	114	11	6,790	125	11
Head of Tartars Island, sec. 21, T. 29 N., R. 110 W	124	10	6,705	85	8
Foot of Long Island, sec. 35, T. 28 N., R. 112 W	133	9	6,640	65	7
Mouth of Labarge Creek	145	14	6,555	85	6
Foot of Andersons Island	155	10	6,480	75	8
Sec. 13, T. 24 N., R. 112 W	166	11	6,410	70	6
Mouth of Big Sandy Creek	198	32	6,240	170	5
Green River City	230	32	6,075	165	5
Mouth of Blacks Fork	260	30	5,940	135	4
Mouth of Henrys Fork	290	30	5,850	90	3

Above Green River Lakes the river has a heavy fall, but the small drainage area and severe winter climate make this section unsuited to the development of power. Below the lakes the river has so slight a fall that here also it is not suited to the development of power, nor is the valley sufficiently narrow to afford a favorable dam site for creating power at reservoirs, except in a stretch of river in sec. 4, T. 35 N., R. 111 W., and sec. 34, T. 36 N., R. 111 W., where it might be possible to build a comparatively short dam 100 feet high. With storage a uniform flow of 300 second-feet could be obtained, which would develop 2,400 horsepower.

The only possibility of developing water power on a large scale is in connection with the Flaming Gorge reservoir site, just across the State line in Utah. At 4 miles south of the Wyoming line Green River flows into Flaming Gorge, 1 mile below which is the upper end of Horseshoe Canyon. The dam site for the Flaming Gorge reservoir is near the lower end of Horseshoe Canyon, 3 miles by river below Flaming Gorge, 4 miles below the mouth of Henrys Fork, and 8 miles below the Wyoming line. LaRue[25] made the following report on the possibility of developing power at the reservoir site.

The Flaming Gorge power site is at the dam site for the Flaming Gorge reservoir, in northeastern Utah. The elevation of the low-water level of Green River at the dam site in Horseshoe Canyon is 5,825 feet. By constructing a dam to elevation 6,050 for storing to elevation 6,040 feet, the reservoir capacity would be 3,130,000 acre-feet. The storage capacity between the 6,000 and 6,040 foot contours would be 1,210,000 acre-feet, or sufficient to equalize the flow of the river at this point and insure a minimum flow of 2,700 second-feet. By constructing a 3-mile tunnel at elevation 6,000 feet an effective head of about 290 feet could be obtained. With a head of 290 feet and a flow of 2,700 second-feet, 71,000 brake horsepower could be developed.

[25] LaRue, E. C., Colorado River and its utilization: U. S. Geol. Survey Water-Supply Paper 395, p. 175, 1916.

PINE CREEK.

Between Fremont Lake and Pinedale, a distance of 3 miles, Pine Creek has a fall of 290 feet. A study of the run-off records of Pine Creek at the outlet of the lake shows that a maximum storage of 100,000 acre-feet would be required to equalize the flow throughout the year, giving a uniform run-off of 200 second-feet. A dam 20 feet high would afford the necessary storage, making available by means of a pipe line 3 miles long 4,560 horsepower continuously at 70 per cent efficiency.

OTHER TRIBUTARIES.

Power sites undoubtedly exist on the tributaries draining the other headwater lakes in the eastern part of the Green River basin, but the fall on these streams is not known, and it is impossible to estimate the undeveloped power. The western tributaries are so fully utilized for irrigation that the flow can not be equalized by storage. The normal winter flow is too small to make the streams of value for power.

STORAGE.

DEVELOPED SITES.

Three reservoirs have been built in the Green River basin, as shown by the following table:

Developed reservoirs in Green River basin.

Name.	Project.	Source of supply.	Location.	Height of dam.	Maximum area.	Capacity.
				Feet.	*Acres.*	*Acre-feet.*
Sixty-seven...	Sixty-seven.....	North Piney Creek.	Secs. 7, 8, 17, T. 30 N., R. 112 W.	30	333	4,330
Eden No. 1...	Eden Land & Irrigation Co.	Big Sandy..	Secs. 7, 8, 16–18, T. 25 N., R. 105 W.	125	1,360	25,000
Uinta No. 3...	Uinta.....	Blacks Fork.	Secs. 27–29, 32–34, T. 17 N., R. 114 W.	40	1,200	[a] 18,000

[a] Present capacity, 4,000 acre-feet.

UNDEVELOPED SITES.

LAKES IN WIND RIVER MOUNTAINS.

The numerous lakes on the west slope of the Wind River Mountains afford opportunity for storage at a comparatively low cost. To determine the capacity of reservoirs with dams of moderate height, the State engineer made a reconnaissance survey of the larger lakes in 1915. The Wyoming Range, on the west side of the basin, affords no reservoir sites of any considerable capacity, owing to the absence of lakes, except North Piney and Middle Piney lakes, which drain areas of 5 square miles each. Even were sites available they would be of little use in augmenting the flow of Green River for

proposed new irrigation projects, as the flow of these streams is largely appropriated and the greater part of the run-off is needed to supply existing rights. This is not true of the streams draining the Wind River Range, as in that area irrigation is not nearly so far advanced, and the existing rights can be supplied in addition to providing storage for new projects.

To determine the run-off above the reservoir sites, records of flow are available as follows: Fremont Lake, 11 years; Boulder Lake, 9 years; Green River near Kendall, 2 years. As the drainage areas are similar, the run-off can be computed for the areas for which no records are available by means of unit run-off. The following table gives the results of the reconnaissance surveys and the estimated mean annual run-off available for storage.

Capacity of lake reservoir sites in Wind River Mountains.

Lake.	Approximate height of dam.	Capacity.	Drainage area above outlet.	Estimated mean annual run-off.
	Feet.	*Acre-feet.*	*Sq. miles.*	*Acre-feet.*
Green River [a]	130	160,000	115	160,000
Boulder	100	130,000	94	148,000
Fremont	19	100,000	114	148,000
Half Moon	70	95,000	73	106,000
Burnt	35	30,000	39	62,000
New Fork	35	46,000	36	50,000
Willow	10	19,000	33	40,000
	.....	580,000	.....	714,000

[a] Area and height of dam determined from topographic map.

WESTERN TRIBUTARIES.

A number of reservoir sites exist on the tributaries entering Green River from the west, as shown by the records in the State engineer's office.

Reservoir sites on western tributaries of Green River.

Name.	Source of supply.	Location.	Tributary drainage area.	Height of dam.	Crest length.	Area.	Capacity.
			Sq. miles.	*Feet.*	*Feet.*	*Acres.*	*Acre-ft.*
North Piney	North Piney Creek	Secs. 20, 29, 30, T. 31 N., R. 115 W.	4.8	.....	.....	90	1,980
Taylor	.....do.....	Secs. 23, 24, T. 31 N., R. 115 W.	27	40	.....	240	5,180
Middle Piney Lake.	Middle Piney Creek.	Sec. 17, 18, T. 30 N., R. 115 W.	5.5	68	250	244	11,000
Labarge	Labarge Creek	Secs. 7, 8, 17, T. 29 N., R. 116 W.	8	60	330	177	4,030

North Piney Lake lies in the Wyoming Range at an elevation of 8,600 feet. From meager records available the mean annual run-off is estimated to be 5,000 acre-feet.

The Taylor site was surveyed in connection with the Cottonwood-North Piney project, but the dam was not built. The mean annual run-off at the intake on North Piney Creek is estimated to be 27,000 acre-feet.

Middle Piney Lake lies in the Wyoming Range at an elevation of 9,600 feet. The mean annual run-off at the lake is estimated to be 4,500 acre-feet.

The Labarge site is on the headwaters of Labarge Creek, in the Wyoming Range. The mean annual run-off based on four years' records is estimated to be 8,000 acre-feet.

LITTLE SNAKE RIVER BASIN.

GENERAL FEATURES.

Little Snake River, an important tributary of Yampa River, which in turn is a tributary of Green River from Colorado, drains an area lying partly in Wyoming and partly in Colorado. This area is bounded on the north by the region known as the Red Desert, on the east by the Sierra Madre and the southern extension in Colorado known as the Park Range, on the south by the Yampa River basin, and on the west by the Green River basin.

Little Snake River rises on the western slope of the Park Range near the crest of the Continental Divide, at an elevation of 9,900 feet, in T. 11 N., R. 84 W. Its general course is west and then southwest to Yampa River, which it joins near Lily, Colo., in T. 6 N., R. 98 W. The principal tributaries in Wyoming are Battle, Savery, and Muddy creeks. The first two of these creeks drain areas in the Sierra Madre, but Muddy Creek drains a high rolling plateau.

MEASURED DRAINAGE AREAS.

Measured drainage areas in Little Snake River basin, in square miles.

Stream.	Drainage area above—	Area.
Little Snake River	Gaging station in sec. 6, T. 12 N., R. 90 W.	1,060
Savery Creek	Savery	354
Muddy Creek	Gaging station near Baggs	904

GAGING-STATION RECORDS.

LITTLE SNAKE RIVER NEAR DIXON, WYO.

LOCATION.—In sec. 6, T. 12 N., R. 90 W., at highway bridge 1 mile west of Dixon, in Carbon County. No important tributary within several miles.

DRAINAGE AREA.—1,060 square miles.

RECORDS AVAILABLE.—May 27, 1910, to September 30, 1921.

GAGE.—Chain gage on bridge.

EXTREMES OF DISCHARGE.—1910–1921: Maximum mean daily gage height, on May 24, 1914 (discharge, 6,740 second-feet); minimum stage recorded, 0.2 foot on August 6, 1911 (discharge, 5 second-feet).

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 101 second-feet from Little Snake River above station and 112 second-feet below.

COOPERATION.—Complete records furnished by State engineer of Colorado.

Monthly discharge of Little Snake River near Dixon, Wyo., for 1910–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1910.				
June	1,900	77	663	39,500
July	149	11	34.3	2,110
August	47	9	16.3	1,000
September	69	17	38.4	2,280
1910–11.				
October	149	35	78.9	4,850
November	95	54	77.3	4,600
December	.....	.....	77.1	4,740
March	488	140	219	13,400
April	2,110	320	830	49,400
May	3,000	1,230	2,150	132,000
June	2,690	400	1,520	90,400
July	360	15	117	7,200
August	22	5	12	758
September	75	10	23	1,350
1911–12.				
October	760	65	198	12,200
April	991	193	526	31,300
May	6,140	778	3,240	199,000
June	5,480	1,210	2,910	173,000
July	1,120	122	401	24,600
August	272	20	76	4,680
September	122	20	77	4,560
1912–13.				
October	420	82	158	9,700
November	223	100	152	9,220
April	2,320	363	1,350	80,300
May	2,600	1,370	1,890	116,000
June	1,580	163	611	36,400
July	135	11	51	3,140
August	20	8	12.3	756
September	49	11	36.6	2,180
1913–14.				
October	135	34	88	5,410
November	135	82	103	6,130
March 22–31	505	163	304	6,020
April	3,430	390	1,570	93,400
May	6,740	2,060	4,160	256,000
June	5,660	580	2,400	143,000
July	580	57	209	12,900
August	122	20	43	2,640
September	82	20	42	2,500

Monthly discharge of Little Snake River near Dixon, Wyo., for 1910–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1914–15.				
October	330	65	145	8,930
November	122	100	106	6,320
May	2,570	1,040	1,580	97,200
June	2,970	370	1,690	101,000
July	310	8	95.8	5,890
August	15	9	10.2	627
September	120	8	41.6	2,480
1915–16.				
October	105	60	78.3	4,810
November	120	70	95.6	5,690
March 13–31	1,070	425	601	22,600
April	3,700	365	1,320	78,600
May	4,370	1,520	2,480	152,000
June	2,660	598	1,660	98,800
July	530	30	189	11,600
August	665	70	198	12,200
September	220	70	96.7	5,750
1916–17.				
October	735	90	282	17,300
April	2,660	507	1,200	71,400
May	5,260	760	3,000	184,000
June	4,990	3,100	4,040	240,000
July	2,850	332	1,160	71,300
August	432	30	126	7,750
September	100	38	67.4	4,010
1917–18.				
October	140	70	95.6	5,880
November	188	100	136	8,090
March 17–31	638	255	437	13,000
April	1,320	345	653	38,900
May	3,950	1,110	2,790	172,000
June	3,370	358	2,100	125,000
July	358	18	173	10,600
August	21	5.7	9.4	578
September	125	9.1	34.8	2,070
1918–19.				
October	381	60	105	6,460
November 1–24	170	96	134	6,380
March 23–31	1,960	702	1,340	23,900
April	3,960	411	1,700	101,000
May	3,420	2,310	2,910	179,000
June	2,510	133	1,020	60,700
July	161	5	31.9	1,960
August	43	5	10.9	670
September	170	6	17.5	1,040
1919–20.				
October	337	66	134	8,240
November 1–15	147	124	135	4,020
April	1,180	155	512	30,500
May	8,960	860	5,700	350,000
June	6,840	1,060	3,630	216,000
July	1,230	100	330	20,300
August	112	56	75.5	4,640
September	190	66	94.7	2,840
1920–21.				
October	280	100	173	10,600
April	1,090	251	576	34,300
May	6,680	1,290	4,560	280,000
June	6,280	1,010	3,530	210,000
July	908	54	275	16,900
August	203	22	76.3	4,690
September	87	24	47.5	2,830

SAVERY CREEK AT SAVERY, WYO.

LOCATION.—About in sec. 8, T. 12 N., R. 89 W., half a mile east of Savery, in Carbon County. No tributary between station and mouth, 1½ miles below.

DRAINAGE AREA.—354 square miles (measured on base map of Wyoming; scale. 1:500,000).

RECORDS AVAILABLE.—May 1, 1915, to September 30, 1916; April 5, 1918, to September 30, 1921.

GAGE.—Vertical staff.

EXTREMES OF DISCHARGE.—1915–1916, 1918–1921: Maximum mean daily stage recorded, 5.7 feet May 19, 21, 22, 1921 (discharge, 1,770 second-feet). No flow July 6 to September 3, 1915; August 5–6, 9 to September 14, 1918.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 64 second-feet from Savery Creek and 13 second-feet from tributaries entering above.

COOPERATION.—Complete records furnished by State engineer of Colorado.

Monthly discharge of Savery Creek at Savery, Wyo., for 1915–1916, 1918–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915.				
May	395	164	223	13,700
June	448	46	181	10,800
July	52	0	7.0	430
August	0	0	.0	0
September	52	6	16.4	976
The period				25,900
1915–16.				
October	39	6	17.0	1,050
November	46	15	31.8	1,890
December 1–13	65	46	59.5	1,530
March 19–31	264	110	203	5,310
April	896	110	377	22,400
May	793	160	398	24,500
June	264	48	136	8,090
July	25	3	13.3	818
August	25	9	17.8	1,090
September	25	9	15.0	893
1918.				
April 5–30	321	56	178	7,300
May	509	202	319	19,600
June	275	18	164	9,760
July	131	.6	339	2,080
August	.6	0	.08	4.9
September	63	0	12.0	714
The period				39,500
1918–19.				
October	63	18	30.8	1,890
November 1–21	79	24	50.0	2,080
March 27–31	870	790	834	8,280
April	870	171	507	30,200
May	630	190	362	22,300
June	254	2	94.4	5,620
July	3	0	1.50	92
August	0	0	0	0
September	6	0	.02	12
1919–20.				
October	140	18	52.3	3,220
November	50	18	33.8	2,010
April 9–30	650	72	213	9,290
May	1,770	434	1,180	72,600
June	908	50	353	21,000
July	60	4	11.0	676
August	13	2	5.0	307
September	40	3	12.6	750
1920–21				
October	50	24	34.5	2,120
March 24–31	220	188	194	3,080
April	622	188	355	21,100
May	1,590	292	1,240	76,200
June	1,300	116	542	32,300
July	92	18	524	3,220
August	274	18	79.1	4,860
September	40	18	23.8	1,420

MUDDY CREEK NEAR BAGGS, WYO.

LOCATION.—About in sec. 33, T. 13 N., R. 91 W., at highway bridge 1¼ miles northeast of Baggs, in Carbon County. No tributary between station and mouth, 1 mile below.

DRAINAGE AREA.—904 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—May 1, 1915, to August 10, 1916; April 5 to August 31, 1918.

GAGE.—Chain gage on upstream side of single-span bridge.

EXTREMES OF DISCHARGE.—1915–1916, 1918: Maximum mean daily gage height recorded, 10.0 feet June 23, 1918 (discharge, 445 second-feet). No flow July 20 to August 1, 7–9, 17–31, September 12–13, 16–30, November 20–30, 1915; August 14–17, 27 to September 23, 1918.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 3 second-feet from Muddy Creek, above station.

COOPERATION.—Complete records furnished by State engineer of Colorado.

Monthly discharge of Muddy Creek near Baggs, Wyo., for 1915–1916, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915.				
May	40	14	23.8	1,460
June	147	.8	38.2	2,280
July	42	0	1.0	65
August	3.8	0	.7	44
September	5	0	1.3	78
The period				3,930
1915–16.				
October	179	40	90.9	5,590
November	90	0	13.8	821
March 11–31	399	92	250	10,400
April	87	44	67.7	4,030
May	354	44	130	7,990
June	66	.2	11.3	672
July	1.0	.0	.72	44.3
1918.				
April 6–30	134	12	35.4	1,760
May	39	12	23.2	1,430
June	445	6	51.1	3,040
July	240	8	56.4	3,470
August	158	0	23.0	1,410
September	392	0	46.2	3,750
The period				13,900

BEAR RIVER BASIN.

GENERAL FEATURES.

Bear River, which is the only stream of Wyoming that flows into the Great Basin, drains an area in the extreme southwest corner of the State. This area is bounded on the south by the east-west Uinta Range, and on the west by the north-south Wasatch Range. On the north and east the boundary is the high rolling plateau that separates Bear River from the tributaries of Blacks Fork.

Bear River rises in Utah 15 miles south of the State line, on the northern slope of the Uinta Range, which reaches an altitude of

12,000 feet. It flows in general northwestward, cutting across the southwest corner of Wyoming and again entering Utah 18 miles north of Evanston. It flows back into Wyoming and finally into Utah near Border, but this report deals only with the area above the point where it leaves Wyoming for the first time. Through Wyoming, Bear River pursues a winding course through bottom lands which are generally about 1 mile wide but which reach a width of 3 miles near the southern boundary of the State. The bottoms are very narrow where the river passes through a narrow gorge just above Evanston and again at the Narrow, 18 miles below The principal tributaries, which are relatively small, are Mill, Sulphur, and Yellow creeks.

The drainage basin is a generally rolling plateau into which the tributary streams, most of them flood-water channels, have cut deep. Elevations within the basin range from 12,000 feet on the summit of the southern boundary to 6,000 feet at the lower end. For the most part the elevation is about 7,000 feet.

So far as can be determined from the meager rainfall records, the mean annual precipitation in the Bear River basin in Wyoming ranges from 12 inches in the northern portion to 14 inches in the southern. On the headwaters in the Uinta Mountains the rainfall is considerably greater.

MEASURED DRAINAGE AREAS.

Measured drainage areas in Bear River basin, in square miles.

Stream.	Drainage area above—	Area.
Bear River	Gaging station in sec. 1, T. 15 N., R. 121 W.	645
Do	Utah line, sec. 27, T. 18 N., R. 120 W.	814
Sulphur Creek	Mouth	83
Yellow Creek	do	186

GAGING-STATION RECORDS.

BEAR RIVER NEAR EVANSTON, WYO.

LOCATION.—In sec. 1, T. 15 N., R. 121 W., 300 feet above highway bridge and 3½ miles northwest of Evanston, Uinta County. Nearest tributary, a small stream entering from southwest half a mile above.

DRAINAGE AREA.—645 square miles (measured on base map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—October 26, 1913, to September 30, 1921.

GAGE.—Chain on left bank 300 feet above bridge.

EXTREMES OF DISCHARGE.—1913–1921: Maximum stage recorded, 6.35 feet at 6.30 p. m. June 14, 1921 (discharge, 3,690 second-feet); minimum stage, 0.49 foot at 8.15 a. m. August 26, 1919 (discharge, 0.1 second-foot).

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 381 second-feet from Bear River above station and 390 second-feet below.

ACCURACY.—Gage read twice daily. Rating curves well defined. Records excellent except during 1921, for which they are good.

Monthly discharge of Bear River near Evanston, Wyo., for 1913–1921.

Month	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913–14.				
October 26–31	117	75	89.3	1,060
November	135	68	96.4	5,740
December 1–21	108	63	75.6	3,150
March 26–31	311	152	219	2,610
April	1,100	231	611	36,400
May	2,390	435	1,480	91,000
June	2,220	415	1,210	72,000
July	475	187	326	20,000
August	562	30	131	8,060
September	40	27	32.9	1,960
1914–15.				
October	216	43	121	7,440
November 1–16	112	36	75.1	2,380
March 25–31	510	223	335	4,650
April	1,010	252	487	29,000
May	795	268	472	29,000
June	1,240	430	877	52,200
July	470	30	167	10,300
August	40	18	28.1	1,730
September	217	25	68.8	4,090
1915–16.				
October	115	53	74.6	4,590
November	72	51	61.2	3,640
March 20–31	1,230	262	756	18,000
April	1,170	345	653	38,900
May	1,600	502	872	53,600
June	1,600	277	1,040	62,900
July	277	15	101	6,210
August	102	18	46.1	2,830
September	44	8	21.0	1,250
1916–17.				
October	121	25	88.8	5,460
November 1–18	70	46	56.5	2,020
April 15–30	1,890	524	1,150	36,500
May	1,740	401	911	56,000
June	2,500	890	1,790	107,000
July	1,560	252	701	43,100
August	352	49	141	8,670
September	134	58	81.1	4,830
1917–18.				
October	89	54	65.2	4,010
November	79	54	65.8	3,920
March 18–31	810	208	417	11,600
April	382	130	215	12,800
May	810	251	570	35,000
June	1,940	208	1,180	70,200
July	660	46	149	9,160
August	44	3	20.8	1,280
September	40	2	10.4	619
1918–19.				
October	86	23	61.0	3,750
November 1–23	77	64	70.0	3,210
March 27–31	382	348	365	3,620
April	440	128	262	15,600
May	1,380	365	781	48,000
June	995	61	395	23,500
July	56	.8	5.84	359
August	6.6	.1	2.42	149
September	23	2.8	12.4	738
1919–20.				
October	102	41	78.6	4,830
November	113	81	98.0	5,830
March 21–31	72	51	61.6	1,340
April	1,260	67	411	24,500
May	2,520	1,140	1,700	105,000
June	2,170	660	1,190	70,800
July	502	59	163	10,000
August	70	43	56.3	3,460
September	60	35	46.5	2,770
1920–21.				
October	128	48	84.7	5,210
November	139	84	123	7,320
March 14–31	930	216	384	13,700
April	620	258	387	23,000
May	2,230	372	1,170	71,900
June	3,390	930	1,940	115,000
July	820	202	398	24,500
August	244	88	147	9,040
September	190	70	111	6,600

IRRIGATION.

The waters of Bear River and its tributaries are used extensively for irrigation, and most of the bottom lands are being irrigated. Further extension of irrigation to bench lands can come only through storage, as the normal flow during the later part of the irrigation season is fully appropriated.

For the eight-year period, 1914–1921, the mean annual run-off at gaging station near Evanston was 210,000 acre-feet.

WATER POWER.

No water power is developed in that part of the Bear River basin considered in this report. No profile surveys have been made nor are topographic maps available from which the elevation of the river at different points can be determined.

A filing in the State engineer's office shows a proposed development of 250 feet, comprising 22,300 feet of ditch and 3,300 feet of pipe line leading to a power-house site in sec. 13, T. 12 N., R. 120 W. Records of run-off are not available for determining the power possibility of this site.

STORAGE.

No reservoirs of any considerable size have been built in the portion of the Bear River drainage basin considered in this report. Filings in the State engineer's office show two reservoir sites in the basin.

Undeveloped reservoir sites in Bear River basin.

Name.	Source of supply.	Location.	Tributary drainage area.	Height of dam.	Crest length.	Area.	Capacity.
			Sq. miles.	*Feet.*	*Feet.*	*Acres.*	*Acre-feet.*
Narrows...	Bear River..	Sec. 32, T. 18 N., R. 120 W.; secs. 5, 8, 17, 20, 29, 32, T. 117 N., R. 120 W.; and sec. 1, T. 116 N., R. 120 W.	814	112	876	3,630	233,000
Neponset..	.....do.....	Secs. 34, 35, T. 8 N., R. 7 E., and secs. 3, 4, T. 7 N., R. 7 E., in Utah.	645	25	2,300	.....	8,700

At the Narrows site a dam 112 feet above the bed of the river would back water upstream 7 miles, creating a reservoir of 233,000 acre-feet capacity. The mean annual run-off based on eight years' records is 225,000 acre-feet at the dam site.

Although the Neponset site is in Utah, it is proposed to divert water for it from Bear River in sec. 25, T. 16 N., R. 121 W., in Wyoming. The mean annual run-off based on eight years' records is 210,000 acre-feet.

SNAKE RIVER BASIN.

GENERAL FEATURES.

The portion of the Snake River basin that lies in Wyoming occupies a comparatively small area in the northwestern part of the State, including the southern part of Yellowstone National Park. The northern boundary is the Continental Divide, which is here a high plateau, called Ocean Plateau, with comparatively low relief. On the eastern and southern boundaries the divide becomes much more rugged, and the high plateau gives way to the Wind River, Gros Ventre, and Wyoming ranges, which exhibit some of the boldest relief in the State. On the west the Wyoming part of the drainage basin is bounded by the Teton Range, the relief of which is even bolder than that of the eastern ranges.

Except for the extreme upper end of the basin, which is a high plateau, and the area embraced in Jackson Hole, which is 30 miles long and has a width decreasing from 12 miles at the upper end to 2 miles at the lower, the drainage basin is extremely rugged, comprising chiefly the slopes of the mountain ranges that form the boundaries. The elevations range from 6,000 to 11,000 feet.

The mean annual precipitation increases from 20 inches in Jackson Hole to 25 inches in Yellowstone Park and to 40 inches or more in the mountains on the east and west boundaries.

Snake River rises in Ocean Plateau, its principal source being Shoshone Lake, and flows southward through Lewis Lake into Jackson Lake, at the upper end of Jackson Hole. From the lower end of Jackson Lake it flows east for several miles, then turns sharply and flows southwestward for 70 miles, entering Idaho near the mouth of Star Valley. Below Lewis Lake as far as the southern boundary of the park Snake River flows through a canyon, but from the park to Jackson Lake the side walls recede and the valley widens. Below Jackson Lake for a distance of 30 miles Snake River flows through Jackson Hole. Here the banks are low and the bordering areas generally flat for a distance of several miles on either side. From the lower end of Jackson Hole to the State line the river flows through a canyon. The principal tributaries from the east are Heart River, Pacific and Buffalo creeks, and Gros Ventre, Hoback, Grays, and Salt rivers. The chief western tributaries are Cottonwood and Fish creeks.

MEASURED DRAINAGE AREAS.

Measured drainage areas in Snake River basin, in square miles.

Stream.	Drainage area above—	Area.
Snake River	Outlet of Jackson Lake	820
Do	Mouth of Buffalo Fork	1,020
Do	SE. ¼ sec. 22, T. 44 N., R. 115 W.	1,520
Do	NE. ¼ sec. 35, T. 43 N., R. 116 W.	1,680
Do	Mouth of Gros Ventre River	1,740
Do	NW. ¼ sec. 7, T. 41 N., R. 116 W.	2,500
Do	Mouth of Hoback River	2,900
Do	Mouth of Salt River	4,080
Buffalo Fork	Mouth of North Buffalo Fork	131
Do	Mouth of Box Creek	239
Do	Mouth of Blackrock Creek	270
Do	Mouth	378
North Buffalo Fork	do	95
Box Creek	do	17
Blackrock Creek	do	54
Gros Ventre River	Mouth of Clear Creek	37
Do	SW. ¼ sec. 3, T. 40 N., R. 111 W.	76
Do	Mouth of Fish Creek	105
Do	Mouth of Burnt Cabin Creek	525
Do	Mouth of Crystal Creek	592
Do	Mouth of Horsetail Creek	697
Do	elly (sec. 1, T. 42 N., R. 115 W.)	725
Do	Mouth	758
Clear Creek	do	22
Fish Creek	do	336
Crystal Creek	do	73
Hoback River	do	572

GAGING-STATION RECORDS.

SNAKE RIVER AT SOUTH BOUNDARY OF YELLOWSTONE NATIONAL PARK.

LOCATION.—A quarter of a mile below junction of Lewis and Snake rivers, half a mile north of Snake River soldier station and south boundary of Yellowstone National Park, and 25 miles north of Moran.

DRAINAGE AREA.—490 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 19, 1913, to September 30, 1921.

GAGE.—Chain gage on right bank.

EXTREMES OF DISCHARGE.—1913–1921: Maximum mean daily stage recorded, 6.5 feet on May 28, 1921 (discharge, 5,580 second-feet); minimum stage recorded, 1.4 feet October 26–31, 1915 (discharge, 160 second-feet).

DIVERSIONS.—None above station.

ACCURACY.—Records fair.

Monthly discharge of Snake River at south boundary of Yellowstone National Park for 1913–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913.				
June 19–30	3,230	2,450	2,820	67,100
July	2,750	887	1,680	103,000
August	1,480	641	923	56,800
September	821	510	612	36,400
The period	.....	.....	.....	263,000
1913–14.				
October	561	510	521	32,000
November	587	462	516	30,700
December	486	394	428	26,300
January	587	394	446	27,400
February	587	486	530	29,400
March	535	330	379	23,300
April	854	351	536	31,900
May	5,330	821	3,080	189,000
June	5,690	2,310	3,690	220,000
July	2,050	587	1,100	67,600
The period	.....	.....	.....	678,000
1914–15.				
October	.....	439	859	52,800
November	439	310	376	22,400
December	587	310	424	26,100
January	486	351	436	26,800
February	439	310	356	19,800
March	462	271	347	21,300
April	2,310	535	1,560	92,800
May	2,450	1,380	1,880	116,000
June	3,070	1,000	2,050	122,000
July	1,030	486	621	38,200
August	486	271	342	21,000
September	486	271	362	21,500
The year	3,070	271	802	581,000
1915–16.				
October	439	160	263	16,200
November	271	178	238	14,200
December	535	233	380	23,400
January	535	310	420	25,800
February	439	351	389	22,400
March	486	351	430	26,400
April 1–29	561	416	464	26,700
July 2–31	4,790	1,280	2,830	168,000
August 1–26	1,280	486	869	44,800
1916–17.				
October 9–31	486	394	449	20,500
November 1–18	486	351	416	24,800
December	486	394	435	15,500
July	.....	1,330	3,120	192,000
August	1,240	510	773	47,500
September	561	416	470	28,000
1917–18.				
October	462	318	368	22,600
November	360	279	307	18,300
December	545	381	408	25,100
January	496	381	419	25,800
February	412	360	381	21,200
March	403	360	374	23,000
April	652	360	417	24,800
May 1–18	1,350	625	912	32,600
July 21–31	1,230	771	903	19,700
August	764	415	520	32,000
September 1–14	465	356	385	10,700

Monthly discharge of Snake River at south boundary of Yellowstone National Park for 1913–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October 12–31	556	448	501	19,900
November	506	211	336	20,000
December			224	13,800
January			219	13,500
February	248	211	239	13,300
March	377	248	293	18,000
April	1,130	368	508	30,200
May 1–26	3,980	847	2,120	109,000
June 4–30	1,890	416	990	53,000
August 10–31	302	185	219	9,500
September 1–5	385	241	297	2,950
1919–20.				
October 26–31	222	185	205	2,440
November	339	203	257	15,300
December	339	260	285	17,500
January	260	185	235	14,400
February	260	185	224	12,900
March	260	203	232	14,300
April	260	241	249	14,800
May	3,690	250	1,450	89,200
June	5,100	2,270	3,710	221,000
July	2,560	576	1,340	82,400
August	742	385	464	28,500
September 1–4	385	353	377	2,990
1920–21.				
December	412	326	349	21,500
January	368	347	362	22,300
February	368	287	325	18,000
March	326	287	305	18,800
April	458	306	383	22,800
May	5,580	744	2,960	182,000
June	5,310	1,250	3,240	193,000
July	1,250	466	720	44,300
August	490	340	390	24,000
September 1–24	448	324	373	17,800
The period				564,000

SNAKE RIVER AT MORAN, WYO.

LOCATION.—In sec. 17, T. 45 N., R. 114 W., 1½ miles below Moran post office, Lincoln County, and United States Reclamation Service dam at outlet of Jackson Lake. No important tributaries between dam and station.

DRAINAGE AREA.—820 square miles.

RECORDS AVAILABLE.—October 1, 1903, to September 30, 1921.

GAGE.—Friez water-stage recorder installed in 1916, referred to inclined staff gage used previously; datum lowered 1.0 foot July 26, 1915; read by employees of United States Reclamation Service.

EXTREMES OF DISCHARGE:—1907–1912: Maximum mean daily discharge, 14,700 second-feet on June 13, 1918. Discharge from dam shut off entirely September 28 to October 4, 1910.

REGULATION.—Flow of Snake River has been controlled by Jackson Lake dam since 1907.

ACCURACY.—Stage-discharge relation fairly constant; gage-height records reliable. Records good, except during winter when ice effect may make them only fair.

Monthly discharge of Snake River at Moran, Wyo., for 1903–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1903–4.				
October	720	640	674	41,400
November	640	570	596	35,500
December	640	500	561	34,500
January	500	440	446	27,400
February	500	440	481	27,700
March	720	500	667	41,000
April	970	570	714	42,500
May	7,930	970	3,560	219,000
June	7,930	5,650	7,190	428,000
July	5,650	2,590	3,870	238,000
August	2,590	1,150	1,700	104,000
September	1,250	720	1,060	63,000
The year	7,930	440	1,790	1,300,000
1904–5.				
October	720	440	574	35,300
November	500	390	428	25,500
December	390	390	390	24,000
January	590	374	397	24,400
February	590	530	547	30,400
March	560	502	522	32,100
April	824	560	630	37,500
May	2,880	824	1,270	78,300
June	4,990	3,210	4,180	248,000
July	3,420	1,410	2,350	145,000
August	1,370	824	1,010	62,400
September	788	530	619	36,800
The year	4,990	374	1,080	780,000
1905–6.				
October	530	422	475	29,200
November	422	374	377	22,400
December	374	374	374	23,000
January	530	374	449	27,600
February	530	474	511	28,400
March	560	530	532	32,700
April	823	530	572	34,000
May	4,720	859	2,450	151,000
June	5,930	3,640	4,480	267,000
July	3,720	1,720	2,820	173,000
August	1,680	895	1,120	68,800
September	859	590	708	42,100
The year	5,930	374	1,240	899,000
1906–7.				
October 1–12	560	474	526	12,500
February 16–28	788	686	738	19,000
March	932	590	734	45,100
April	1,160	859	1,010	60,100
May	4,620	1,080	2,650	163,000
June	7,380	4,780	6,480	386,000
July	7,200	3,420	5,560	342,000
August	3,420	1,540	2,250	138,000
September	1,540	0	610	36,300
1907–8.				
October	1,730	0	874	53,700
November	970	686	793	47,200
December	686	622	637	39,200
January	719	622	669	41,100
February	622	560	602	34,600
March	686	590	627	38,600
April	1,410	622	878	52,200
May	2,880	1,460	2,380	146,000
June	6,300	2,700	4,500	268,000
July	4,540	1,080	2,370	146,000
August	4,860	1,460	3,100	191,000
September	1,460	859	1,110	66,000
The year	6,300	0	1,540	1,120,000

Monthly discharge of Snake River at Moran, Wyo., for 1903-1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1908-9.				
October	824	686	753	46,300
November	686	622	651	38,700
December	622	590	610	37,500
January	896	590	750	46,100
February	788	754	781	43,400
March	754	622	679	41,800
April	622	590	605	36,000
May	3,490	622	1,340	82,400
June	10,600	3,780	8,160	486,000
July	10,300	1,150	3,500	215,000
August	7,840	1,910	4,970	306,000
September	1,910	0	1,380	82,100
The year	10,600	0	2,010	1,460,000
1909-10.				
October	1,810	0	1,080	66,400
November	1,440	850	1,020	60,700
December	1,310	885	1,100	67,600
January	920	855	908	55,800
February	850	780	801	44,500
March	920	815	845	52,000
April	4,370	850	1,590	94,600
May	5,590	2,290	4,030	248,000
June	5,840	1,270	2,900	173,000
July	12,100	1,950	4,890	301,000
August	1,860	712	1,130	69,500
September	698	.....	146	8,690
The year	5,890	0	1,700	1,240,000
1910-11.				
October	.....	.....	60	3,690
November	425	.....	94.8	5,640
December	810	.....	352	21,600
January	1,070	400	678	41,700
February	1,430	670	986	54,800
March	2,220	670	940	57,800
April	1,530	735	907	54,000
May	4,370	805	2,700	166,000
June	9,610	950	6,960	414,000
July	9,350	1,030	3,490	215,000
August	9,700	1,010	4,700	289,000
September	2,160	56	1,030	61,300
The year	9,610	.....	1,910	1,380,000
1911-12.				
October	56	44	54.6	3,360
November	44	44	44.0	2,620
December	3,900	44	1,140	70,100
January	2,030	875	1,360	83,600
February	840	610	685	39,400
March	610	69	334	20,500
April	109	72	84.9	5,050
May	192	109	141	8,670
June	9,350	192	4,380	261,000
July	6,230	990	3,230	199,000
August	3,680	950	3,860	237,000
September	6,910	1,800	4,140	246,000
The year	9,350	44	1,620	1,180,000
1912-13.				
October	1,800	1,200	1,600	98,400
November	1,200	770	953	56,700
December	770	640	682	41,900
January	770	670	716	44,000
February	735	104	643	35,700
March	138	104	113	6,950
April	391	143	253	15,100
May	582	259	348	21,400
June	10,100	582	7,300	434,000
July	7,250	1,910	4,280	263,000
August	5,570	1,280	3,790	233,000
September	5,400	1,380	3,790	226,000
The year	10,100	104	2,040	1,480,000

Monthly discharge of Snake River at Moran, Wyo., for 1903-1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913–14.				
October	1,280	805	1,000	61,500
November	875	735	802	47,700
December	735	582	632	38,900
January	610	109	524	32,200
February	217	109	162	9,000
March	267	217	243	14,900
April	391	267	315	18,700
May	2,950	255	474	29,100
June	9,520	610	5,210	310,000
July	7,950	1,680	3,870	238,000
August	6,060	2,540	4,070	250,000
September	3,680	40	907	54,000
The year	9 520	40	1,530	1,100,000
1914–15.				
October	840	28	200	12,300
November	840	640	760	45,200
December	1,110	555	636	39,100
January	555	28	473	29,100
February	28	28	28.0	1,560
March	34	28	28.8	1,770
April	114	34	72.2	4,360
May	149	114	131	8,060
June	9,520	35	3 400	202,000
July	8,300	990	4,200	258,000
August	6,230	950	3,020	186,000
September	912	528	687	40,900
The year	9,520	28	1,150	828,000
1915–16.				
October	610	35	204	12,500
November	35	30	32.8	1,950
December	.....	.....	35.0	2,150
January	.....	.....	40.0	2,460
February	.....	.....	44.0	2,530
March	805	45	250	15,400
April	1,800	50	188	11,200
May	2,680	450	1,470	90,400
June	7,780	322	1,630	97,000
July	6,230	840	3,210	197,000
August	9,350	3,830	6,920	425,000
September	6,060	381	2,670	159,000
The year	9,350	30	1,410	1,020,000
1916–17.				
October	555	57	475	29,200
November	57	53	55.9	3,330
December	61	53	59.8	3,680
January	62	61	61.3	3,770
February	62	62	62.0	3,140
March	62	62	62.0	3,810
April	69	62	63.5	3,780
May	111	69	85.2	5,240
June	12,000	76	3,640	217,000
July	10,700	4,300	6,290	387,000
August	9,240	4,890	7,090	436,000
September	5,460	44	1,090	64,900
The year	12,000	44	1,600	1,160,000
1917–18.				
October	45	36	39.8	2,450
November	36	35	35.1	2,090
December	36	34	34.7	2,130
January	.....	.....	35.6	2,190
February	.....	.....	44.6	2,480
March	53	42	47.7	2,930
April	58	37	40.4	2,400
May	87	49	62.4	3,840
June	14,700	55	8,600	512,000
July	11,200	2,050	4,540	279,000
August	11,500	4,440	7,370	453,000
September	6,200	22	2,660	158,000
The year	14,700	22	1,970	1,420,000

Monthly discharge of Snake River at Moran, Wyo., for 1903–1921—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	28	23	24.9	1,530
November	26	24	25.4	1,510
December	.....	.....	24.0	1,480
January	.....	.....	24.0	1,480
February	.....	.....	25.0	1,390
March	.....	.....	25.0	1,540
April	52	25	32.0	1,900
May	56	24	33.3	2,050
June	11,600	24	7,970	474,000
July	7,340	2,200	4,620	284,000
August	2,140	198	987	60,700
September	785	128	343	20,400
The year	11,600	.....	1,180	852,000
1919–20.				
October	753	13	84.7	5,210
November	13	13	13.0	774
December	15	13	13.7	842
January	.....	.....	15.6	959
February	.....	.....	16.0	920
March	.....	.....	17.0	1,050
April	.....	.....	17.0	1,010
May	69	17	40.0	2,460
June	4,180	27	295	17,600
July	10,800	41	6,120	376,000
August	8,960	2,100	6,620	407,000
September	2,040	13	616	36,700
The year	10,800	.....	1,170	851,000
1920–21.				
October	12	12	12	738
November	12	12	12	714
December	12	12	12	738
January	12	12	12	738
February	16	12	12.6	700
March	19	16	16.3	1,000
April	37	19	28.6	1,700
May	74	37	46.6	2,870
June	6,200	41	2,320	138,000
July	10,700	2,570	8,180	503,000
August	10,900	2,760	5,750	354,000
September	2,760	22	613	36,500
The year	10,900	12	1,440	1,040,000

PACIFIC CREEK NEAR MORAN, WYO.

LOCATION.—About sec. 23, T. 45 N., R. 114 W., near mouth of creek 4 miles east of Moran, in Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 20, 1917, to September 30, 1918 (during periods when stored water was released from Jackson Lake).

GAGE.—Leitz water-stage recorder referred to vertical staff.

DIVERSIONS.—Prior to December 31, 1916, no adjudicated diversions from Pacific Creek.

ACCURACY.—Records good.

Monthly discharge of Pacific Creek near Moran, Wyo., for 1917-18.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
July 20-31	581	322	452	10,800
August	299	98	153	9,410
September	140	68	80.0	4,760
The period				25,000
1918.				
June 12-30	3,030	825	2,010	75,700
July	786	134	377	23,200
August	148	73	109	6,700
September	80	62	70.0	4,170
The period				110,000

BUFFALO FORK NEAR MORAN, WYO.

LOCATION.—In SE. ¼ sec. 26, T. 45 N., R. 114 W., at highway bridge half a mile above mouth of river and 6 miles east of Moran, in Lincoln County.

DRAINAGE AREA.—378 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 9, 1917, to September 30, 1918 (during periods when stored water was released from Jackson Lake).

GAGE.—Vertical staff; read twice daily.

DIVERSIONS.—Prior to December 31, 1916, no adjudicated diversions from Buffalo Fork.

ACCURACY.—Records good.

Monthly discharge of Buffalo Fork near Moran, Wyo., for 1917–18.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
July 9-31	3,250	1,160	2,150	98,100
August	1,100	355	564	34,700
September	355	260	310	18,400
The period				151,000
1918.				
June 28-30	3,920	2,980	3,450	20,500
July	3,280	746	1,800	111,000
August	826	309	482	29,600
September	426	238	283	16,800
The period				178,000

SPREAD CREEK NEAR ELK, WYO.

LOCATION.—In sec. 9, T. 44 N., R. 114 W., 1½ miles above mouth of creek and 3 miles south of Elk, in Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 15, 1917, to September 30, 1918 (during periods when stored water is released from Jackson Lake).

GAGE.—Vertical staff moved 500 feet upstream in 1918; read twice daily.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 27 second-feet from Spread Creek, all above station.

ACCURACY.—Records fair.

Monthly discharge of Spread Creek near Elk, Wyo., for 1917–18.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
July 15–31	228	131	163	5,500
August	132	71	95.2	5,850
September	80	61	67.8	4,030
The period				15,400
1918.				
June 13–30	715	314	540	19,300
July	298	92	163	10,000
August	89	58	72.2	4,440
September	53	48	51.1	3,040
The period				36,800

COTTONWOOD CREEK NEAR TETON, WYO.

LOCATION.—In sec. 24, T. 43 N., R. 116 W., 1½ miles above mouth of creek and 5 miles northeast of Teton, in Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 16, 1917, to September 30, 1918 (during periods when stored water was released from Jackson Lake).

GAGE.—Vertical staff installed near mouth; moved 1½ miles upstream June 26, 1918.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 2 second-feet from Cottonwood Creek below station.

ACCURACY.—Records fair for 1917, good for 1918.

Monthly discharge of Cottonwood Creek near Teton, Wyo., for 1917–18.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
July 16–31	642	405	601	19,100
August	382	138	219	13,500
September	133	48	83.2	4,950
The period				37,600
1918.				
June 26–30	1,180	700	932	9,240
July	651	232	473	29,100
August	332	101	179	11,000
September	95	40	59.3	3,530
The period				52,900

GROS VENTRE RIVER AT KELLY, WYO.

LOCATION.—In sec. 1, T. 42 N., R. 115 W., 300 feet below highway bridge at Kelly, in Lincoln County. Nearest tributary, Turpin Creek, enters 2 miles upstream.

DRAINAGE AREA.—725 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 16 to September 30, 1918.

GAGE.—Vertical staff; read once daily.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 122 second-feet, of which 9 second-feet were above station.

ACCURACY.—Records good.

Monthly discharge of Gros Ventre River at Kelly, Wyo., for 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 16–30	6,220	1,680	4,110	122,000
July	1,600	510	1,070	65,800
August	510	278	370	22,800
September	334	245	272	16,200
The period				227,000

GROS VENTRE RIVER AT ZENITH, WYO.

LOCATION.—In sec. 4, T. 41 N., R. 116 W., three-quarters of a mile above mouth of river at Zenith, in Lincoln County.

DRAINAGE AREA.—758 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 13, 1917, to September 30, 1918 (during periods when stored water was released from Jackson Lake).

GAGE.—Vertical staff moved one-third of a mile upstream in 1918.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 122 second-feet, all above station.

ACCURACY.—Records fair.

Monthly discharge of Gros Ventre River at Zenith, Wyo., for 1917–18.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
July 13–31	1,770	709	1,180	44,500
August	648	247	406	25,000
September	287	139	209	12,400
The period				81,900
1918.				
July 11–31	897	353	589	24,500
August	340	139	213	13,100
September	222	121	164	9,760
The period				47,400

FISH CREEK NEAR WILSON, WYO.

LOCATION.—About sec. 27, T. 41 N., R. 117 W., 300 feet above mouth of creek, 4 miles southeast of Wilson, Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 20, 1917, to September 30, 1918 (during periods when stored water was released from Jackson Lake).

GAGE.—Stevens water-stage recorder installed in 1918 and referred to vertical staff used during 1917.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 5 second-feet, of which 4 second-feet diverted above station.

ACCURACY.—Records for 1917 range from poor to good, and for 1918 good.

Monthly discharge of Fish Creek near Wilson, Wyo., for 1917–18.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
July 20–31	423	367	395	9,400
August	362	174	268	16,500
September	195	152	167	9,940
The period				35,800
1918.				
July	690	243	429	26,400
August	246	151	199	12,200
September	156	134	144	8,570
The period				47,200

FLAT CREEK NEAR CHENEY, WYO.

LOCATION.—In sec. 29, T. 40 N., R. 116 W., 2 miles above mouth of creek, 1 mile south of Cheney, in Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 7, 1917, to September 30, 1918 (during periods when stored water was released from Jackson Lake).

GAGE.—Vertical staff; read twice daily.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 106 second-feet, all above station.

ACCURACY.—Records fair for 1917; good for 1918.

Monthly discharge of Flat Creek near Cheney, Wyo., for 1917–18.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
July 7–31	259	137	175	8,680
August	232	201	219	13,500
September	215	129	179	10,700
The period				32,900
1918.				
June 18–30	420	282	347	8,950
July	261	137	168	10,300
August	174	122	145	8,920
September	132	101	113	6,720
The period				34,900

HOBACK RIVER NEAR CHENEY, WYO.

LOCATION.—In sec. 26, T. 39 N., R. 116 W., a quarter of a mile above mouth of river, 8 miles southeast of Cheney, in Lincoln County.

DRAINAGE AREA.—572 square miles.

RECORDS AVAILABLE.—July 9, 1917, to September 30, 1918 (during periods when stored water was released from Jackson Lake).

GAGE.—Vertical staff; read twice daily.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 2 second-feet from Hoback River, all above station.

ACCURACY.—Records range from fair to good.

Monthly discharge of Hoback River near Cheney, Wyo., for 1917–18.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
July 9–31	3,750	975	2,250	103,000
August	975	474	671	41,300
September	513	397	440	26,200
The period				170,000
1918.				
June 14–30	6,120	2,380	4,590	155,000
July	2,230	750	1,490	91,600
August	718	398	524	32,200
September	398	326	339	20,200
The period				299,000

FALL CREEK NEAR CHENEY, WYO.

LOCATION.—About sec. 22, T. 39 N., R. 116 W., near mouth of creek 8 miles south of Cheney, in Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 19, 1917, to September 30, 1918 (during periods when stored water was released from Jackson Lake).

GAGE.—Vertical staff; read once daily.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 2 second-feet, all above station.

ACCURACY.—Records for 1917 excellent, and for 1918 good.

Monthly discharge of Fall Creek near Cheney, Wyo., for 1917.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
July 19–31	142	109	119	3,070
August	93	41	59.1	3,630
September	41	38	40.5	2,410
The period				9,110
1918.				
June 12–30	440	143	317	11,900
July	137	52	86.8	5,340
August	52	42	45.7	2,810
September	40	28	32.0	1,900
The period				22,000

WOLF CREEK NEAR ALPINE, IDAHO.

LOCATION.—About sec. 4, T. 37 N., R. 117 W., near mouth of creek 9 miles east of Alpine, Idaho, in Lincoln County, Wyo.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 16, 1917, to September 30, 1918 (during periods when stored water is released from Jackson Lake).

GAGE.—Leitz water-stage recorder, which was moved 400 feet downstream in 1918.

DIVERSIONS.—Prior to December 31, 1916, no adjudicated diversions from Wolf Creek.

ACCURACY.—Records fair.

Monthly discharge of Wolf Creek near Alpine, Idaho, for 1917–18.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
July 17–31	68	39	55.5	1,650
August	36	18	24.9	1,530
September	18	14	16.0	952
The period				4,130
1918.				
July 14–31	36	21	27.3	975
August	21	16	17.6	1,080
September	16	11	13.0	774
The period				2,830

GREYS RIVER NEAR ALPINE, IDAHO.

LOCATION.—About sec. 20, T. 37 N., R. 118 W., near mouth of river 8 miles southeast of Alpine, in Lincoln County, Wyo.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 6, 1917, to September 30, 1918 (during periods when stored water was released from Jackson Lake).

GAGE.—Vertical staff; read once daily.

DIVERSIONS.—Prior to December 31, 1916, no adjudicated diversions from Greys River.

ACCURACY.—Records good.

Monthly discharge of Greys River near Alpine, Idaho, for 1917–18.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
July 6–31	2,520	935	1,570	81,000
August	910	550	698	42,900
September	556	420	484	28,800
The period				153,000
1918.				
June 4–30	5,130	1,690	3,610	193,000
July	1,690	680	1,100	67,600
August	680	466	562	34,600
September	466	358	412	24,500
The period				320,000

SALT RIVER NEAR ALPINE, IDAHO.

LOCATION.—Near mouth of river 6 miles southeast of Alpine.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 1, 1917, to September 30, 1918 (during periods when stored water was released from Jackson Lake).

GAGE.—Vertical staff whose datum was changed in 1918; read once daily.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 212 second-feet in Wyoming, all above the station.

ACCURACY.—Records for 1917, excellent; for 1918, good.

Monthly discharge of Salt River near Alpine, Idaho, for 1917–18.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
July	2,010	1,000	1,370	84,200
August	1,170	925	1,070	65,800
September	918	801	863	51,400
The period				201,000
1918.				
June 5–30	2,380	1,240	1,950	101,000
July	1,320	915	1,110	68,200
August	915	722	816	50,200
September	722	609	664	39,500
The period				259,000

IRRIGATION.

PRESENT DEVELOPMENT.

Snake River is not used extensively for irrigation, but some of its tributaries, notably Salt and Gros Ventre rivers and Flat Creek, irrigate large areas.

Areas covered by adjudicated and nonadjudicated ditches in Snake River basin, in acres.

[Compiled from Fourteenth Biennial Report of State engineer.]

Stream.	Adjudicated (including territorial rights).	Completed but not adjudicated.	Total.
Snake River	2,632	718	3,350
Buffalo Creek and tributaries	258	846	1,104
Cottonwood Creek and tributaries	180	542	722
Spread Creek and tributaries	2,302	429	2,731
Ditch Creek and tributaries	575	1,397	1,972
Gros Ventre River and tributaries	9,680	1,267	10,947
Flat Creek and tributaries	8,768	698	9,466
Fish Creek and tributaries	2,716	1,874	4,590
Fall River and tributaries	171	4,798	4,969
Greys River and tributaries	2	233	235
Salt River and tributaries	49,030	4,348	53,378
Minor tributaries	2,645	1,195	3,840
Total	78,959	18,345	97,304

Practically all the areas lie near the streams and are irrigated by many small ditches; there are no large projects in the basin.

The most extensively irrigated areas are in Salt River (or Star) valley, and here most of the diversions are effected by short individual or cooperative ditches from the tributaries of Salt River. The longest ditch is the East Side ditch, which is 12 miles long and diverts water from Salt River some distance above Thayne. Practically all the irrigable bottom land in Star Valley is under ditch. The principal crops are hay, wheat, and oats.

FUTURE DEVELOPMENT.

Except in relatively small areas in the valleys of tributary streams, the chief possibilities for additional irrigation lie in Jackson Hole and are limited by the water supply. The waters of Snake River are so extensively used for the irrigation of highly developed projects in Idaho that this use may prevent any considerable increase of irrigation in Wyoming.

Under the Carey Act a project, known as the Teton project, has been formed to irrigate land on the east side of Snake River in the upper part of Jackson Hole. The State has asked for the segregation of 15,330 acres to be irrigated by direct diversion from Gros Ventre River and Spread and Ditch creeks. In addition, it is expected to irrigate 20,000 acres held in private ownership, making a gross area of 35,000 acres on the east side of Snake River between the mountains forming the east side of Jackson Hole and the river in Tps. 42, 43, and 44.

WATER POWER.

DEVELOPED POWER.

Power is developed at three points in the Snake River basin.

At the Schwab mill, a sawmill on Salt River in T. 30 N., R. 118 W., near Smoot, a canal and pipe line of 15 second-feet capacity leads to a 17-inch Leffel turbine of 29 horsepower under the available head of 22 feet. The water supply is sufficient from May 1 to August 31.

The Afton Electric Co. has a hydroelectric plant in sec. 29, T. 32 N., R. 118 W., 1 mile east of Afton, on Swift Creek. A canal 1,500 feet long connects with a 28-inch wood-stave pipe leading to the power house, developing a head of 30 feet. In the power house is a 15-inch S. Morgan Smith turbine rated at 63 horsepower and controlled by a Woodward automatic governor. The turbine is belt-connected to a Warren 60-kilowatt single-phase alternating-current generator of 2,400 volts. The transmission line consists of No. 8 copper wire suspended from native red-pine poles. The plant operates evenings and during the day on Tuesdays and Thursdays. No auxiliary steam power is provided, as the water supply is adequate from June until freezing occurs in October.

The Afton roller mills and Gardner Bros. sawmill, on Swift Creek near Afton, are operated by two Leffel turbines, one 17-inch and one 23-inch, under a head of 40 feet, created by a ditch 3,000 feet long. No additional details are available.

UNDEVELOPED POWER.

The following table was compiled from topographic maps, except for the elevations of Hoback and Salt rivers, which are roughly approximate.

Elevations and distances along Snake River from Jackson Lake to Salt River.

Point on river.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From Jackson Lake.	Point to point.		Total.	Per mile.
Jackson Lake (crest of dam)	0	.....	6,769	.....	.....
Jackson Lake (bottom of gate sills)	0	0	6,728	41	.....
Mouth of Buffalo Fork	6.6	6.6	6,705	23	3
SE. ¼ sec. 22, T. 44 N., R. 115 W	14.3	8.7	6,600	105	12
NE. ¼ sec. 18, T. 43 N., R. 115 W	20.6	6.3	6,500	100	16
NE. ¼ sec. 35, T. 43 N., R. 116 W	24.5	3.9	6,400	100	26
NW. ¼ sec. 21, T. 21 N., R. 116 W	29.8	5.3	6,300	100	19
Mouth of Gros Ventre River	32.9	3.1	6,230	70	23
NW. ¼ sec. 7, T. 41 N., R. 116 W	34.7	1.8	6,200	30	17
Sec. 23, T. 41 N., R. 117 W	39.0	4.3	6,150	50	12
Mouth of Hoback River	56.0	17.0	6,000	150	9
Mouth of Salt River	82.0	26.0	5,360	640	25

As the flow from Jackson Lake is practically shut off during the winter, Snake River is of little value for power in Wyoming, except during the irrigation season.

The following tables were compiled from topographic maps. Owing to a lack of run-off records during the low-water period, no estimates of available power have been made.

Elevations and distances along Buffalo Fork.

Point on river.	Distance (miles).		Elevation above sea level (feet).	Descent (feet).	
	From North Buffalo Fork.	Point to point.		Total.	Per mile.
Mouth of North Buffalo Fork	0	.....	7,170	.....	.....
Mouth of Box Creek	4.6	4.6	6,880	290	63
Contour crossing	8.0	3.4	6,800	80	23
Mouth	19.0	11.0	6,705	95	9

Elevations and distances along Gros Ventre River.

Point on river.	Distance (miles.)		Elevation above sea level (feet).	Descent (feet).	
	From Clear Creek.	Point to point.		Total.	Per mile.
Mouth of Clear Creek	0	.....	8,160	.....	.....
SW. ¼ sec. 3, T. 40 N., R. 111 W	3.5	3.5	7,700	460	131
Mouth of Fish Creek	12.0	8.5	7,430	270	32
Mouth of Burnt Cabin Creek	17.5	5.5	7,270	160	29
Mouth of Crystal Creek	24.0	6.5	7,000	270	42
Mouth of Horsetail Creek	28.8	4.8	6,880	120	25
Kelly, SW. ¼ sec. 1, T. 42 N., R. 115 W	35.0	6.2	6,680	200	32
NE. ¼ sec. 18, T. 42 N., R. 115 W	40.0	5.0	6,500	180	36
Mouth	47.0	7.0	6,230	270	39

STORAGE.

In the Snake River basin three reservoir sites of considerable capacity, the largest of which—Jackson Lake—is now utilized, have been surveyed. There may be other sites not yet surveyed in detail in the valleys of the tributary streams entering from the east.

Principal features of reservoir sites in Snake River basin.

Name.	Source of supply.	Location.	Tributary drainage area.	Height of dam.	Crest length.	Maximum area.	Capacity.
			Square miles.	*Feet.*	*Feet.*	*Acres.*	*Acre-feet.*
Jackson Lake.	Snake River....	North end of Jackson Hole.	820	67	4,450	25,530	847,000
Leigh Lake...	Leigh Canyon...	2 miles south of Jackson Lake.	21	15	172	1,300	13,000
Jenny Lake...	Glacier Creek and Leigh Lake.	2 miles south of Leigh Lake.	[a] 30	15	215	1,300	13,000

[a] Exclusive of run-off from Leigh Lake.

The United States Reclamation Service has converted Jackson Lake into a reservoir by the construction of an earth-fill dam, having a massive concrete gate section. The dam raises the lake level 35 feet. Water is released as needed during the irrigation season and diverted into Idaho. The mean annual discharge of Snake River at the outlet of Jackson Lake from 1904 to 1918 was 1,170,000 acre-feet.

A dam at the outlet of Leigh Lake, raising the water surface 10 feet, would give a storage capacity of 13,000 acre-feet, and a dam raising the water surface 15 feet would store about 20,000 acre-feet. No records of run-off are available, but as the mean annual run-off for the Snake River basin above Jackson Lake is 1,540 acre-feet per square mile, allowing for evaporation from Jackson, Shoshone, and Lewis lakes, probably the run-off from the west side of the Teton Mountains will be about the same, or a total of 29,000 acre-feet for the entire drainage area of 21 square miles, allowing for evaporation from the reservoir surface.

A dam at the outlet of Jenny Lake raising the water surface 10 feet would give a storage capacity of 13,000 acre-feet, and one raising the water surface 15 feet would increase the capacity to 20,000 acre-feet. The run-off from the drainage area is similar to that for Leigh Lake, and doubtless the mean annual run-off will be 43,000 acre-feet for the 30 square miles exclusive of the area adjacent to Leigh Lake which empties into Jenny Lake.

CHEYENNE RIVER BASIN.

In the northeastern part of Wyoming between Powder River on the west and the North Platte on the south lies the drainage basin of the Cheyenne and its principal tributary, Belle Fourche River. The entire area lies on the high plains and has their typically rolling topography. The general elevation decreases from 5,000 feet to less than 4,000 feet at the State line. The most rugged portion of the basin is that occupied by the Bear Lodge Mountains, which lie south of the Belle Fourche in the lower part of the basin, and also that occupied by a spur of the Black Hills southeast of the Bear Lodge Mountains, near the South Dakota line. Elevations here reach 6,000 feet.

As the mean annual rainfall of the upper part of the basin is between 12 and 14 inches, the flow of the streams in that section is intermittent. The rainfall increases toward the lower portion of the basin until it is 20 inches at the State line, and the flow becomes perennial where the rainfall exceeds 15 inches.

No gaging stations in this basin have been maintained in Wyoming, but records are available for stations a short distance beyond the State line in South Dakota, at Edgemont, and near Hot Springs on Cheyenne River and near Belle Fourche on Belle Fourche River.

EVAPORATION FROM WATER SURFACES.

FACTORS INFLUENCING RATE OF EVAPORATION.

The chief factors influencing evaporation are temperature of the water surface, relative humidity of atmosphere above water surface, and velocity of wind.

As the temperature of the water surface increases, the vapor pressure corresponding to it likewise increases, and thus the rapidity with which the water particles are given off into the air in evaporation is increased. The rate of evaporation for any given temperature is influenced by the relative humidity or percentage of possible saturation of the layer of air adjacent to the water surface. The greater the relative humidity the nearer to saturation is the vapor in the air, and the less the difference between the vapor pressure corresponding to the water surface and the vapor pressure of the air. The rate of evaporation bears an important relation to the difference between these two vapor pressures. If the air is still, a blanket of vapor is soon formed after evaporation begins, and as this blanket increases the humidity of the air, the rate of evaporation lessens. If, on the other hand, the wind is blowing, it carries away the vapor blanket, replacing it with drier air, so that the relative humidity is kept down and the original rate of evaporation more nearly maintained. An increase in wind velocity carries away the vapor blanket more quickly.

EVAPORATION RECORDS IN WYOMING.

Records of evaporation are available at several points in Wyoming, but as these records have been taken by means of pans varying in diameter, depth, and immediate surroundings, they are not directly comparable, nor does any one of them give the actual evaporation from a reservoir surface under like conditions of temperature, relative humidity, and wind velocity. It is therefore necessary to reduce them to the corresponding reservoir equivalent before using.

So far as the writer knows, the only comprehensive experiments carried on to determine the proper reduction factors for pans of various diameters, depth, and immediate surroundings were those of the Office of Public Roads and Rural Engineering in Denver during 1915 and 1916.[25] In this investigation evaporation was measured simultaneously in pans of the varying dimensions and surroundings most commonly used. Although the investigation lasted only from November, 1915, to November, 1916, it was carefully made and determined the relative effect of the different pans under conditions existing at the open-air laboratory in Denver. The results have not been verified under different surroundings and atmospheric conditions, but it is believed that the reduction factors are applicable, at least in a general way, to the points in Wyoming where records of observed evaporation are available. The following table of coefficients applicable to various Wyoming land pans to show reservoir equivalants has been compiled from the Denver experiments:

Coefficients for land pans to show equivalent reservoir evaporation.

Type	Size of pan-	Depth (inches).	Coefficients for reservoir equivalents-
A	Weather Bureau standard pan for class A station, circular, 4 feet in diameter, placed on top of ground.	10	0.66
B	Square pan 3 by 3 feet placed 2.75 feet in ground	36	.80
C	Circular pan 6 feet in diameter set in ground with narrow rim not more than 3 inches above ground.	24	.90

By means of these reduction coefficients the records of evaporation from land pans in Wyoming (there being no floating-pan records) have been reduced to equivalent reservoir evaporation. Both the observed and deduced results are given in the following table:

[25] Jour. Agr. Research, vol. 10, p. 237, July 30, 1917.

Observed evaporation, in inches, at stations in Wyoming, reduced to reservoir equivalent.

Month.	Observed evaporation.	Reservoir equivalent.
Laramie. (a)		
1891.		
July 22–31	4.42	3.54
August	8.59	6.87
September	5.04	4.03
October	3.72	2.97
November 1–11	.93	.74
1892.		
May 24–31	1.59	1.27
June	8.25	6.59
July	9.19	7.35
August	8.27	6.62
September	6.10	4.88
October 1–10	1.50	1.20
1893.		
April 24–30	.56	.45
May	4.80	3.84
June	7.88	6.31
July	9.35	7.48
August	6.59	5.27
September	6.02	4.82
October	2.89	2.31
1894.		
April 26–30	.91	.73
May	6.06	4.85
June	7.49	5.99
July	6.69	5.35
August	6.28	5.03
September	6.44	5.16
October 1–27	3.31	2.65
1895.		
April 17–30	2.53	2.02
May	7.33	5.87
June	6.24	4.99
July	7.29	5.83
August	6.07	4.86
September	4.95	3.96
October	2.62	2.09
Archer. (b)		
1913.		
May 24–31	1.35	1.21
June	7.10	6.39
July	7.76	6.98
August	7.56	6.80
September	4.50	4.05
Oct. 1–17	2.04	1.84
1914.		
April	3.57	3.21
May	5.70	5.13
June	8.32	7.49
July	7.99	7.19
August	8.58	7.72
September	6.77	6.09
Archer (b)—Continued.		
1915.		
April	3.16	2.84
May	4.70	4.23
June	5.56	5.00
July	6.64	5.98
August	5.35	4.82
September	4.96	4.46
1916.		
April	4.53	4.08
May	6.16	5.54
June	7.57	6.81
July	9.06	8.15
August	5.94	5.35
September	6.35	5.72
1917.		
April	3.76	3.38
May	3.43	3.09
June	7.29	6.56
July	8.32	7.49
August	6.99	6.29
September	5.56	5.00
1918.		
May	5.95	5.35
June	6.34	5.71
July	5.46	4.92
August	8.39	7.55
September	3.61	3.24
October	2.89	2.60
Pathfinder (c)		
1914.		
June	10.55	6.96
July	12.01	7.94
August	10.94	7.22
September	8.90	5.88
October	4.45	2.94
1915.		
May	6.06	4.00
June	8.27	5.46
July	9.84	6.49
August	9.06	5.98
September	6.50	4.29
October	5.47	3.61
1916.		
May	5.94	3.92
June	10.28	6.78
July	12.48	8.24
August	10.12	6.67
September	9.17	6.05
Pathfinder (c)—Continued.		
1917.		
May		
June	9.50	6.27
July	12.50	8.25
August	10.75	7.10
September	7.52	4.97
1918.		
May	6.81	4.51
June	9.37	6.18
July	9.88	6.52
August	10.93	7.22
September	6.46	4.26
October	3.66	2.42
November 1–6	1.06	.70
Ralston reservoir. (c)		
1911.		
August	10.7	7.06
September	7.3	4.32
October	4.0	2.64
1912.		
May	7.0	4.62
June	8.2	5.41
July	9.00	5.94
August	8.30	5.48
September	3.00	1.98
October	2.5	1.65
1913.		
May	4.0	2.64
June	8.4	5.54
July	8.7	5.74
August	7.4	4.88
September	6.5	4.29
1914.		
May	6.2	4.01
June	8.8	5.81
July	10.5	6.93
August	8.9	5.87
September	5.5	3.63
October	3.2	2.11
1915.		
June	7.3	4.82
July	8.1	5.35
August	8.1	5.35
1916.		
May	6.0	3.96
June	8.36	5.52
July	9.83	6.49
August	10.05	6.63

Observed evaporation, in inches, at stations in Wyoming, reduced to reservoir equivalent—Continued.

Month.	Observed evaporation.	Reservoir equivalent.	Month.	Observed evaporation.	Reservoir equivalent.	Month.	Observed evaporation.	Reservoir equivalent.
Near Shoshone reservoir. (c)			**Sheridan field station. (b)**			**Powell.(c)**		
1915			1917			1917		
June	7.2	4.75	May	4.91	4.42	April	1.00	.66
July	7.5	4.95	June	5.82	5.24	May	4.80	3.17
August	6.0	3.96	July	9.81	8.83	June	7.20	4.75
September	5.0	3.30	August	7.65	6.88	July	6.10	4.03
October	3.1	2.05	September	5.06	4.55	August	3.90	2.57
November	.7	.46				September	1.80	1.19
1916			1918			1918		
April	3.12	2.06	May	4.23	3.81	April 23–30	1.4	.92
May	5.43	3.58	June	6.61	5.96	May	6.0	3.96
June	7.30	4.82	July	6.59	5.93	June	11.75	7.77
July	8.48	5.59	August	7.50	6.75	July	7.65	5.04
August	7.25	4.78	September	3.97	3.57	August	7.65	5.04
September	4.21	2.77						
October	2.29	1.51						
1917								
June	6.0	3.96						
July	8.5	5.61						
August	6.5	4.29						
September	4.5	2.97						
1918.								
May	4.77	3.15						
June	9.05	5.96						
July	9.37	6.19						
August	8.20	5.41						
September	8.02	5.28						
October	3.84	2.53						

(a) Type B pan, coefficient 0.80. (b) Type C pan, coefficient 0.90. (c) Type A pan, coefficient 0.66.

NOTE.—Evaporation records at Laramie, Archer, and Sheridan Field stations compiled by agricultural experiment station at those points. Records at Pathfinder, Ralston reservoir, Shoshone reservoir, and Powell compiled by U. S. Reclamation Service.

COMPUTATION OF EVAPORATION.

The records do not cover all parts of the State and are available for the open-water period only, as freezing prevents ordinary evaporation observations, although it is a recognized fact that evaporation takes place from ice surfaces at a slow rate. It is therefore desirable that evaporation be computed for other points, if this can be done with a fair degree of accuracy.

The effect of the various factors influencing evaporation is so complex that most of the formulae for evaporation are cumbersome and require data not usually available. Meyer[26] proposes a formula based on the Dalton law, modified by observation and comparison with actual records of evaporation. This formula, which has been called the Dalton-Meyer formula, may be written:

$$E = C\ (e_s - e_d)\left(1 + \frac{W}{10}\right)$$

[26] Meyer, A. F., Elements of hydrology, John Wiley & Sons, 1917.

E = evaporation in inches (the unit being the month in this paper).

C = a constant.

e_s = maximum vapor pressure in inches of mercury corresponding to the temperature of the water.

e_d = actual pressure in inches of mercury of vapor present in the atmosphere above the water.

W = wind velocity in miles per hour, where the wind is measured at a considerable height above the ground, as is usual with Weather Bureau records.

This formula involves temperature of water surface (which is considered to be substantially the same as air temperature, any difference being taken into account in the determination of the constant C, relative humidity, and wind movement in miles per hour. All these factors are available in Weather Bureau records at several points in the State. Preliminary comparisons with actual records (reduced to reservoir equivalents) indicated that a value of C=13.5 most nearly fitted conditions in the portions of Wyoming for which records were available.

The following table shows the comparison between the mean monthly evaporation for five years as observed and as computed, the mean of the climatologic data for the same years being used.

Comparison between observed and computed evaporation, in inches, at stations in Wyoming.

Cheyenne.				Laramie.			
Month.	Observed at Archer.	Computed.		Month.	Observed.	Computed.	
		Quantity.	Per cent observed evaporation.			Quantity.	Per cent observed evaporation.
April	3.38	2.72	80	May	4.85	3.47	72
May	4.49	3.57	80	June	5.97	5.94	100
June	6.45	6.26	97	July	6.50	6.34	98
July	7.16	7.73	108	August	5.75	5.70	99
August	6.20	6.16	99	September	4.57	4.69	103
September	5.06	5.21	103	October	2.53	2.89	114

Data are also available for similar comparisons at Pueblo and Fort Collins, Colo., and Santa Fe, N. Mex. These comparisons are presented to give further information on the reliabilty of the Dalton-Meyer formula in giving fairly accurate results.

Comparison between observed and computed evaporation, in inches, at stations in Colorado and New Mexico.

Month.	Fort Collins, Colo.[a]			Pueblo, Colo.[b]			Sante Fe, N. Mex.[c]		
	Observed.[d]	Computed.		Observed.[d]	Computed.		Observed.[d]	Computed.	
		Quantity.	Per cent of observed evaporation.		Quantity.	Per cent of observed evaporation.		Quantity.	Per cent of observed evaporation.
January	1.04	0.95	91	1.77	1.77	100	1.78	1.45	81
February	1.27	.94	74	1.07	1.90	177	2.00	1.67	83
March	2.31	1.79	78	3.05	3.18	104	3.51	2.94	84
April	3.41	3.40	100	4.05	3.98	98	5.14	4.61	90
May	3.70	3.77	102	5.16	5.82	113	6.48	7.32	113
June	4.30	4.73	110	7.36	8.85	120	7.66	7.93	103
July	4.47	4.77	107	8.35	8.64	103	6.63	6.75	102
August	4.00	4.62	115	7.63	7.72	101	5.57	6.65	119
September	3.44	3.74	109	7.47	5.94	80	5.38	5.27	98
October	2.66	2.51	94	4.75	3.98	84	4.34	3.61	83
November	1.23	1.39	113	2.53	2.50	100	3.51	2.50	71
December	.91	1.05	116	1.52	1.42	93	2.42	2.00	83
Annual	32.74	33.66	103	54.71	55.74	102	54.42	52.70	97

[a] Mean of 24 years' records.
[b] Mean of 2 years' records. Evaporation station 5 miles distant from Weather Bureau station.
[c] Mean of 2 years' records.
[d] Reduced to reservoir equivalent.

In the foregoing comparisons it should be noted that, in general, the greatest discrepancies are in the months of least evaporation, owing partly to the fact that in spring and fall the temperature of the air and water is not equal, as has been assumed in the computations.

The comparison between computed and observed evaporation indicates that the mean monthly evaporation for a period of years can be computed with at least a fair degree of accuracy. Such computations have been made for points in Wyoming for which data on temperature, relative humidity, and wind movement are available. These points are Cheyenne, Laramie, Sheridan, Lander, and Yellowstone Park. The following table shows the monthly evaporation at these points for a mean of six years or more, together with the factors influencing it:

Computed evaporation at points in Wyoming.

Month.	Temperature of air (°F.).	Relative humidity (per cent).	Wind velocity (miles per hour).	Evaporation (inches).
Cheyenne, elevation 6,062 feet.				
January	25.8	53	12.6	1.12
February	27.0	60	12.3	1.29
March	32.7	58	12.2	2.33
April	41.2	58	11.5	3.13
May	50.9	60	10.8	4.18
June	61.0	56	9.8	6.30
July	67.0	54	8.5	7.58
August	65.9	54	8.1	7.15
September	57.1	50	8.9	5.96
October	45.6	52	9.7	3.88
November	34.8	54	11.0	2.61
December	28.6	54	12.5	2.13
Annual	44.8	55	10.7	48.46
Laramie, elevation 7,148 feet.				
January	22.2	67	11.3	1.09
February	21.9	70	11.0	.95
March	29.3	67	11.0	1.47
April	37.2	65	11.0	2.19
May	46.6	61	10.7	3.47
June	56.3	54	11.2	5.94
July	62.4	55	8.6	6.34
August	61.6	56	7.5	5.70
September	53.6	55	8.8	4.69
October	42.2	60	10.0	2.89
November	32.2	61	10.4	1.96
December	22.2	69	8.8	.89
Annual	40.6	62	10.0	37.58
Sheridan, elevation 3,738 feet.				
January	19.4	73	4.7	0.55
February	21.3	73	6.1	.65
March	30.2	62	7.4	1.48
April	42.9	58	9.0	2.97
May	50.8	64	9.4	3.50
June	60.0	68	6.2	3.61
July	67.3	58	6.2	6.09
August	66.3	58	5.6	5.72
September	56.8	62	5.8	3.75
October	44.8	66	6.6	2.26
November	32.3	70	5.4	1.15
December	24.2	80	6.2	.54
Annual	43.0	66	6.6	32.27

Month.	Temperature of air (°F.).	Relative humidity (per cent).	Wind velocity (miles per hour).	Evaporation (inches).
Lander, elevation 5,372 feet.				
January	20.3	72	3.4	0.52
February	22.2	70	3.4	.62
March	28.1	63	4.8	1.12
April	41.2	57	5.2	2.28
May	50.6	57	5.1	3.21
June	58.8	52	4.7	4.72
July	66.1	50	4.2	6.13
August	65.3	51	3.9	5.71
September	55.8	54	4.4	3.97
October	44.1	62	3.4	1.97
November	32.1	68	3.7	1.07
December	20.0	74	3.2	.48
Annual	42.0	61	4.1	31.80
Yellowstone Park, elevation 6,200 feet.				
January	19.1	76	9.5	0.63
February	18.6	72	8.3	.66
March	26.9	66	8.2	1.18
April	36.2	65	8.1	1.80
May	46.0	63	7.9	2.78
June	54.0	55	7.6	4.47
July	61.2	55	7.0	5.57
August	60.5	55	6.9	5.41
September	50.9	59	6.8	3.47
October	41.0	66	6.9	1.98
November	29.9	67	7.5	1.27
December	21.0	74	7.5	.66
Annual	38.8	64	7.7	29.88

The effects of temperature, relative humidity, and wind velocity are brought out in the foregoing table. The temperatures at Cheyenne, which are higher than those at Laramie, induce a greater capacity for absorption of moisture and hence reduce the relative humidity (62 per cent at Laramie, 55 per cent at Cheyenne) and in turn increase the total evaporation (37.58 inches at Laramie, 48.46 inches at Cheyenne), the wind velocities being nearly the same. The effect of wind velocity is shown in the comparison between Sheridan and Lander, at which the temperatures are nearly the same. Although the relative humidity at Sheridan is considerably higher, the evaporation is actually greater than at Lander, as the higher wind velocity over the water surface at Sheridan tends to keep the atmosphere moving at a faster rate. The effect is to increase the evaporation from 31.80 inches at Lander to 32.27 inches at Sheridan, in spite of the lower humidity at Lander.

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