PLACER MINING IN THE FORTYMILE, EAGLE, AND SEVENTYMILE RIVER DISTRICTS.

By E. A. Porter.

GENERAL CONDITIONS.

The estimated value of the combined gold production of the Fortymile and Seventymile river districts for 1911 was $212,000; the estimated value of the output for 1910 was $200,000. The result of the work done during the open season of 1911 was disappointing to most of the small operators in these districts, as the creeks were at an extreme minimum stage for practically the entire season, and it was impossible to strip or tear down any large areas of overburden in order to get at the gold on bedrock. The winter operations were somewhat more successful, however, but even the winter yardage was considerably less, for fewer miners were at work on the creeks than in preceding years. On the other hand, the dredges and other large enterprises were very successful, and the result of their work tended to overcome the general depression prevailing among the smaller operators.

The increase of the gold output for 1911 over that for 1910 must be attributed to the success of the two dredges on the headwaters of Fortymile River. They were the only dredges in operation in the district during 1911, but their success was so marked that no doubt others will be installed, especially on Seventymile River. It was fortunate that these dredges were so successful, for they gave employment to many men who otherwise would have had to leave the district for more promising fields. The drought and the abandonment of Fort Egbert, at Eagle, threw many men out of employment, forcing them to seek work in other parts of the district or elsewhere.

On Dome Creek extensive ditch building for hydraulic mining was undertaken to develop the higher placer grounds along the creek. During the season of 1911 a small ditch was in operation and an extension was planned which would enable it to deliver practically the entire flow of Dome Creek. Further plans call for a 5-mile ditch with a capacity of 20 second-feet. All these improvements were undertaken by the Auburn Gold Mining Co.

Other ditches for hydraulic work were either built or contemplated on Denison Fork, Franklin Creek (below its mouth), and Twin Creek, in the Fortymile River district, and on Alder, Pleasant, Sonickson, and Crooked creeks, in the Seventymile district, but owing to the dryness of the season they could not exert much influence on production along these creeks.

No new discoveries were made in this region, but in December it was reported that a rich strike had been made near the head of Sixtymile River, which is close to the headwaters of South Fork of Fortymile River. The extreme headwaters of the Sixtymile are in Alaska, but the greater part of the river is in Canada. It is not known at this time whether the reported strike is in Canada or Alaska. The gold is said to average one dollar to the square foot of bedrock, and the rock lies about 20 feet deep. The valley in which the discovery was made is about 20 miles long and 2,000 feet wide.

During the season of 1911 a new power plant was put in operation by the Treadgold interests near Dawson, Yukon Territory. It utilized water power from Klondike River and was thus able to supply cheap power to both the Treadgold projects and the Guggenheim interests. As a result the power supplied by the Coal Creek Co. lost its market, and the expensive plant on Coal Creek was forced to close down. Having large capital invested, the Coal Creek Co. was forced to seek a new field and naturally turned to the Fortymile district as the one nearest at hand. Near the close of the season of 1911 representatives were sent to various parts of the district to find new ground to open up, but the results of their investigations have not yet been announced. It is only reasonable to expect, however, that the Coal Creek Co. will transfer their power to the Fortymile district if they can get proper inducements.

The difficulty of transportation in the Fortymile and Seventymile regions is burdensome to both permanent residents and transient visitors. Several years ago a road was constructed from Eagle to the head of Discovery Fork—about 16 miles—but this has been so much neglected that it has become almost impassable. There is also little indication of the road once constructed between the head of Discovery Fork and Fortymile River. An old road from Steele Creek to Jack Wade Creek is in use, but during the open season the first few miles of this road are so boggy as to be impassable. Well-worn or even well-defined trails are rare, and the few miles of good trail have been located and built by mail carriers and other individuals. A private road has been built from Eagle to Seventymile River by the miners of the district, who by hard labor and with few appliances maintain it in winter, so that it is fairly serviceable for small loads. In summer this road is so wet and spongy as to be almost impassable. Private trails have been blazed, but most of

them are hardly recognizable. A road from Eagle northward to Fortymile River and southward to Seventymile River seems to be greatly desired by the people of the district. Such a highway, if properly built and maintained by the Government, would be amply justified, for good roads would do more than any other thing to reestablish confidence in the district. The topography and geology of this region is similar to that of the Klondike district and other parts of Yukon Territory, so that the problem of locating and constructing good roads should not be difficult.

FORTYMILE DISTRICT.

A report on water-supply investigations in the Fortymile and Seventymile districts (pp. 219–235) furnishes information that bears on this report. The water was exceptionally low during the season of 1911, when the minimum stream flow for the district was probably reached. With a low water supply the production of the placer mines must fall below the average, and had it not been for the successful work of two dredges the total production of Fortymile district during the season would have been very small. In fact, the climatic conditions and the abandonment of many claims have kept the output of the small operators at a minimum ever since the discovery of gold in the district.

Considerable lode prospecting was attempted during the season, but no important lode was found. The ground is covered with a heavy growth of moss, which seriously handicaps the work of the quartz or lode prospector.

NOTES ON LODE PROSPECTS.

A little work has been done on a copper deposit situated near the headwaters of Kechumstuk Creek. This property was not visited and nothing was learned of the character of the deposit. So far as known not much development has been accomplished.

In the basin of Mosquito Fork small quartz veins cut the greenstones and greenstone schists, which form the country rock. These are iron stained and some carry gold. None have been developed, except on what is known as the Tweeden property, near the mouth of Gold Creek, where a cliff of greenstone, which has been fractured, contains some quartz veins and stringers along lines of cleavage. These veins or stringers are iron stained and carry free gold, which is probably derived from the decomposition of iron sulphides. The ore exposed is small in amount, but the owner reports that it carries a large content of gold. The development work accomplished when the place was visited consisted of a 4 by 8 foot tunnel, 40 feet long, entering at the base of the cliff, and a crude arrastre propelled by a

water wheel placed in Gold Creek. Operations were discontinued early in June, as the owner was unable to collect the gold, which is very fine.

PLACER WORKINGS.

Eagle Creek.—Five men spent the season in various kinds of work on Eagle Creek and were able to take out some winter ground for sluicing during the spring run-off. On account of low water the summer was practically lost, so far as productive mining was concerned, but much dead work was done in preparation for the winter work. The winter of 1911–12 promises to be exceptionally prosperous, as the prospecting indicated that the gravels carry much gold.

Chicken Creek and branches.—It is estimated that 26 men were at work on Chicken Creek and its branches during the season of 1910–11 and all were working up to June 12. After that date very little was accomplished, as the water supply fell to the minimum and remained low for the rest of the season. On one or two of the small creeks the operators were unable to finish sluicing their winter dumps. It has been estimated that, on account of the dry season, the production of Chicken Creek fell 65 per cent below what it would have been with a good water supply. Toward the end of the season there was talk of options for dredging being taken on the entire creek, and it is known that advances were made to several of the miners. A meeting was held at Chicken Creek in August, at which a neighboring power company proposed to pump water from Mosquito Fork to the head of Myers Fork and thereby supplement the present supply. It is understood that the proposed undertaking was not considered feasible on account of the great cost of raising the water to the higher elevation.

The placer grounds of Chicken Creek contain much gold, although the gravel is rather deep, and if an adequate supply of water can be procured without too great expense, they should yield good returns. Various plans contemplate obtaining water either by storage, by pumping, or by diverting water at Kechumstuk into a canal running to Chicken Creek. The plan last named seems the most practicable, but it would involve heavy expense and should be preceded by extensive prospecting to determine whether the quantity of gold obtainable is sufficient to warrant the expenditure.

Denison Fork.—Adjoining the right bank of Denison Fork near its mouth are some bench lands that carry gold in placers. In the summer of 1911 Mr. J. V. Anderson constructed several hundred feet of ditch to a small branch, and during the spring run-off expects to get enough water to work down these benches and recover the gold. This plan seems feasible, even though it is on a small scale and can be carried on for only part of the season.

Napoleon Creek.—Owing to the poor water supply but little work was done on Napoleon Creek in the summer of 1911. Practically the whole output for the year was obtained from the winter dumps, which were sluiced during the early summer.

Franklin Creek.—Franklin Creek was practically dry throughout the season. Mining was done for only a few days.

Walker Fork.—The main source of production on Walker Fork came from the upper Mulvane dredge, which had a very successful season, although for about three weeks in August there was barely enough water to float the dredge. It was kept afloat by making the low dams as tight as possible, and no other difficulties were met with in operating it. The dredge consists of a 25 by 60 foot scow drawing 3 feet of water and carrying 36 open-connected buckets, which have a capacity of 2½ cubic feet each. It is capable of digging to a depth of about 30 feet, but on Walker Fork the average depth to bedrock was about 12 feet. The ground ahead of the dredge has been stripped for the last two seasons, and there was very little frost to interfere with the operation of the buckets. It is planned to work the dredge up to the mouth of Poker Creek in 1912 and there dismantle it and move it downstream about 3 miles. Here the dredge will be rebuilt, and it should have ground for three seasons' work. The ground at this place has been stripped and prospected by a drill every 50 feet across the creek bed. The plans for moving the dredge indicate that the prospecting afforded encouraging results.

On Poker, Davis, and Cherry creeks work was done by about six men, who were handicapped all summer by the low water. Below Cherry Creek no work was going on, as the dredge formerly located here had been moved to South Fork of Fortymile River.

Wade Creek.—There was almost no production from Wade Creek on account of the inadequate water supply. The winter work was more successful, and this occupied about 28 men. Several operators left Wade Creek at the end of the season, not intending to return. Its production is not likely to be again as great as it has been in the past, unless some more rich ground is found or cheaper methods are used to work the low-grade placers now known.

Canyon and Squaw creeks.—On Squaw Creek also the season of 1911 was a failure on account of lack of water. Much dead work was accomplished, however, and several prospect holes were sunk. If the season of 1912 has an average water supply there should be renewed activity on the creek.

The season of 1911 was an average one on Canyon Creek. Below Squaw Gulch an outfit was at work with a steam plow and scraper and accomplished much assessment work. Most of the placers on Canyon Creek are reported to be of low grade, but it is hoped that

they can be successfully worked by dredge. One man did some work near the head of Canyon Creek, but was unable to take out much gold on account of continued low water.

South Fork of Fortymile River.—The principal producer on the South Fork was the Mulvane dredge, which began operations about the 20th of June at a point known as Pump Bar, about 3 miles below Franklin. This dredge consists of a 30 by 70 foot scow with a draft of 3 feet and carries 28 open-connected buckets with a capacity of 3 cubic feet each and a 35-foot ladder. The depth of the workable gravels averaged about 11 feet. In 1909 a dredge was installed at practically the same point, but proved to be a failure. The new dredge, however, gave encouraging results from the start, and the season's work appears to have been very satisfactory to the company. High water occurred several times during the summer, but caused no delay, as the superintendent was prepared for it.

The gold seems to be deposited not across the entire bed of the stream but mainly along the sides or on the inside edges of the curves. The dredge passed over several spots where the ground above low-water level had been worked some years ago by men who used rockers, and who had evidently done their work well, for in the clean-up on the dredge little gold was recovered at these places. This result emphasizes the fact that much preliminary prospecting should be done before a dredge is installed. At the end of the season the company obtained options on the river claims up to the mouth of Franklin Creek, and it will probably take at least two years to dredge these claims.

The success of this work shows that many of the placers of the district can be worked by dredge and has restored confidence among the miners of the district, many of whom, because of repeated failures, had become discouraged. Almost every failure, however, is traceable to lack of proper equipment or to poor judgment in the installation of the plant.

Dome Creek.—As already stated (p. 211), the Auburn Mining Co. has undertaken to develop the placer benches along this stream. A 5,000-foot ditch has been constructed to divert the waters of Powers Pup to a high bench farther down Dome Creek. Further plans call for an extension of this ditch to a point 4 miles above Powers Pup, where the waters from Dome Creek will be available for an increased supply for the ditch. This ditch will have a capacity of 20 second-feet (1,000 inches), with a grade of 1 foot in a thousand. The water will be used in washing down the deep gravels along the high benches near and below the Eagle summer trail. During June, 1911, the company employed nine men in building ditches and other work, and it proposes to construct an additional ditch in 1912.

Other creeks.—A 9,000-foot ditch has been completed, which diverts the waters of Twin Creek into a small reservoir 150 feet above a high bench extending along Fortymile River. The miners were unable to operate this plant because of the scant water supply. The bench is said to carry considerable gold in places, but scarcity of water prevented the stripping of much ground to bedrock.

On Flat Creek and Fortyfive Pup little work was accomplished on account of low water, and in the North Fork area of the Fortymile practically nothing was done.

The two dredges near the mouth of Fortymile River—the smaller being in Alaska and the other on the Canadian side—were sunk at the spring break-up. A few men attempted to obtain a little gold from the Fortymile bars by rocking, and another man built several hundred feet of ditch below Franklin Creek to wash down bench gravels.

EAGLE DISTRICT.

In the Eagle district, as in the adjoining districts, mining operations were handicapped by lack of water, and operations probably reached the lowest stage known in many years. On American Creek four men worked for a part of the season, but the production was very small. The only excitement on the creek was caused by the finding of a $135 nugget on "No. 8 above."

On Discovery Fork the production was limited by the small water supply, although some very rich ground was practically stripped. On Wolf Creek considerable dead work was done in constructing a first-class automatic dam. The builders left for the Ruby strike in July, but intended to return and prospect the ground thoroughly during 1912.

SEVENTYMILE DISTRICT.

The total production from the Seventymile district for 1911 fell to a minimum, the decrease being due in large measure to a lack of water. Because of the continued drought the miners found it impossible to remove the overburden from the bedrock. Eighteen men were working in the district nearly all summer but were unable to accomplish very much except on Crooked Creek, where the operators were satisfied with the results of the season, though they were handicapped by lack of water. Flume Creek was abandoned except for assessment work. On Alder Creek three men were at work for the whole or a part of the season. The operations on this creek are in a preliminary stage, and consequently little gold was taken out, but the results appear to have been encouraging.

Barney Creek.—Nothing was attempted on Barney Creek until the later part of the season, and during that period the creek was so low that it was barely possible to get a sluice head. By utilizing the

water supplied by light rains an operator was able to strip a small area to bedrock.

On the bench land between Barney and Pleasant creeks four men attempted to wash down a part of the bench by hydraulic pressure. Several thousand feet of ditch was built, but owing to lack of water nothing was accomplished.

Washington Creek.—One man by hard work was able to take out a little gold at the mouth of Washington Creek and on the neighboring benches, but his operations were small.

Sonickson Creek.—The ditch recently constructed leading from Sonickson Creek to the bench lands near the falls on Seventymile River was much used during the season of 1911. The canal proved to be very successful, giving a head of 150 feet at the falls. The pressure was used in washing the overburden into the main river and leaving the bedrock exposed to be shoveled in later.

Crooked Creek.—Three men were at work on Crooked Creek for the entire season and operations were more successful here than elsewhere in the Seventymile district. A considerable area of bedrock was cleaned up on a group of claims, but for several periods during the summer operations were suspended on account of low water. However, the season on Crooked Creek was fairly satisfactory and much dead work was accomplished for the future.

Other creeks.—On Fox Creek three men were at work for two months and stripped about 300 feet of ground with the aid of an automatic dam, but the results of the season were very unsatisfactory, as much time was lost on account of the low stage of the creek.

On Curtis Creek or bar one man attempted to strip a small area of ground, but was unable to accomplish much with the small amount of water available. On Hudson Collie, a pup of Rock Creek, several shafts were sunk to bedrock during the winter season, but the results were not encouraging.

A little "sniping" was done on the Seventymile River bars near the falls and considerable gold was taken out during the short time available.

WATER SUPPLY OF THE FORTYMILE, SEVENTYMILE, AND EAGLE DISTRICTS.

By E. A. PORTER.

INTRODUCTION.

The object of the water-supply investigations in the Alaska placer districts, begun in Seward Peninsula in 1906 and extended to the Fairbanks district in 1907, is to obtain information that will be of value to the mining industry. The work consists of stream gaging not only in well-developed districts like the Fairbanks but also in districts like the Fortymile, where but little use has yet been made of water.

In 1910 [1] studies of water supply were begun in the Fortymile and Seventymile regions, by C. E. Ellsworth. In May, 1911, the work in these regions was taken up by the writer and continued through the season, and its results are given briefly in this preliminary report. The season of 1911 was exceptionally dry, but some very interesting and valuable data were obtained in regard to what is considered to be a comparatively low run-off of the several streams.

The writer desires to express thanks to the many mine operators who not only have cordially cooperated in the work, but who have extended every courtesy to different members of the Survey working in this field. Among those who deserve special mention are J. V. Anderson, J. P. Carroll, Mr. Coffin, Mrs. E. C. Curtis, Earl Davis, August Fritch, Arthur Froelick, F. J. Herbster, J. A. Kemp, Jack McLin, Charles Martin, L. G. Michaels, Jay A. Mattison, Frank Montgomery, James Murphy, Mr. Patterson, T. E. Phillips, John B. Powers, John Roberts, E. A. Robertson, Joseph Shatshok, Henry Siemer, Ole Tweeden, and Alex. Turnbull.

GEOGRAPHIC SKETCH.

The country included in the Fortymile and Seventymile River drainage areas is a typical example of a thoroughly dissected upland. It is a westerly continuation of the famous Klondike region and forms part of the Yukon Plateau. Long ago it was elevated and was

[1] Ellsworth, C. E., and Parker, G. L., Water supply of the Yukon-Tanana region, 1910: Bull. U. S. Geol. Survey No. 480, 1910, pp. 173-215.

deeply trenched by a number of small streams; in comparatively recent times it has been again elevated, the uplift resulting in a further deepening of the valleys by 500 to 700 feet. Parts of the old valley bottoms, still covered with heavy accumulations of gravel, are found at many points, where they form terraces along the river valleys. From a distance the region has a hilly or mountainous aspect, but in reality it consists of a series of long branching ridges, the summits of which have been carved by unequal denudation into irregular hills and hollows. Most of the ridges radiate from domes, of which there are many in this region. Elevations range from about 800 feet above sea level at Eagle, to 6,000 feet or more at other points, the highest area being the Glacier Mountains, not far west of Eagle. On this rugged well-defined ridge snow lies late and comes early, and in protected spots remains throughout some years; masses of ice also accumulate in sheltered canyons and afford a steady supply of water to Mission Creek and to tributaries of the North Forks of Fortymile and Seventymile rivers.

CLIMATE AND VEGETATION.

Much general ignorance prevails in regard to the climate of Alaska and especially of the Fortymile and Seventymile regions, to which many ascribe a year of continuous ice and snow. It is true that the cold is intense at times, but not for long periods. The snowfall in the interior of Alaska is very light compared with that in other parts of Alaska and that in the northern United States. The winter days are short but both days and nights are generally clear, and the sharp air is invigorating. The summers are very pleasant, and there is practically no darkness from May 25 to August 10. Data regarding precipitation in the Fortymile region are included in the tables appearing elsewhere in this volume (pp. 248–250).

At Eagle, Steele Creek, and other points many vegetables are grown that compare favorably in size and quality with any of the imported products.

The timber supply of the region is moderate, but affords the various miners and companies plenty of logs and lumber. The most valuable timber consists of birch and spruce, which grow in many valleys. Cottonwood grows rapidly in many places, and the majority of the ridges are overgrown with a thick, tough brush. The entire area is covered with a heavy growth of moss.

WATER POWER.

The following tables summarize briefly the records made of the flow of streams in the Fortymile and Seventymile River districts that offer a possibility of water-power development.

In comparing the columns showing days of deficient discharge for different years on any stream, allowance should be made for difference in length of periods, also for the part of the season covered by the records. Ordinarily the longer the period the greater will be the number of days of deficient discharge for any given number of horsepower, and the less favorable will be the comparison with some other year in which the records extend over a shorter time. Moreover the days of deficient discharge will be a greater percentage of the total number of days if the observations include only the low-water months.

The tables also give the horsepower (80 per cent efficiency) per foot of fall that may be developed at different rates of discharge and show the number of days on which the discharge and the corresponding horsepower were respectively less than the amounts given in the columns for "discharge" and "horsepower."

Estimated discharge and horsepower table for Fortymile and Seventymile rivers for 1911.

Discharge in second-feet.	Horsepower (80 per cent efficiency) per foot fall.	Days of deficient discharge.		Discharge in second-feet.	Horsepower (80 per cent efficiency) per foot fall.	Days of deficient discharge.	
		Fortymile River at Steele Creek, May 16 to Sept. 20, 1911.	Seventymile River at "the falls," June 20 to Sept. 25, 1911.			Fortymile River at Steele Creek, May 16 to Sept. 20, 1911.	Seventymile River at "the falls," June 20 to Sept. 25, 1911.
165	15	.....	18	770	70	29	88
176	16	.....	30	880	80	34	92
187	17	.....	33	990	90	43	95
198	18	.....	42	1,100	100	45	96
209	19	.....	42	1,650	150	66	98
220	20	0	43	2,200	200	79	98
275	25	1	43	2,750	250	84	98
330	30	3	64	3,300	300	88	98
385	35	4	71	3,850	350	88	98
440	40	9	74	4,400	400	93	98
495	45	10	75	4,950	450	99	98
550	50	15	83	5,500	500	103	98
720	60	28	87				

FORTYMILE DISTRICT.

LOCATION OF AREA.

The Fortymile district is included in the area drained by Fortymile River. The district has been topographically surveyed and is covered by three maps,[1] two published separately and one in process of compilation.

[1] Fortymile quadrangle, No. 640: Maps can be obtained from the Director, U. S. Geological Survey, Washington, D. C., at 5 cents per copy.

Circle quadrangle, No. 641: Contained in Bulletin 295, which can be obtained from the Director, U. S. Geological Survey; also in print as a separate publication, price 10 cents.

Area south of Circle and Fortymile quadrangles: In process of compilation.

The following list gives the locations at which gaging stations were maintained or discharge measurements were made in 1911 in the Fortymile district:

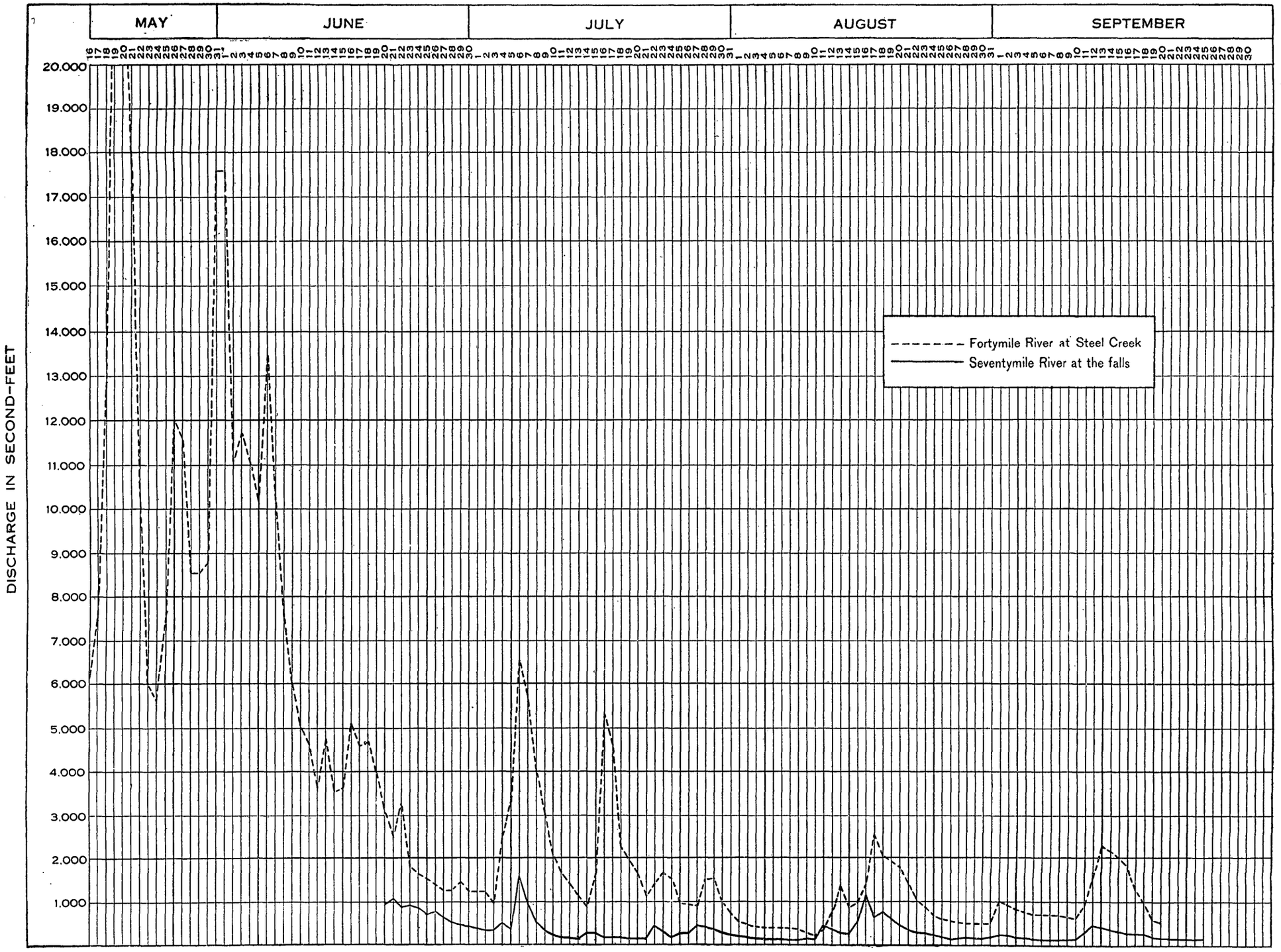
Fortymile River drainage basin:
- Fortymile River at Steele Creek.
- King Solomon Creek at Liberty.
- Liberty Fork at mouth.
- Dome Creek at trail crossing.
- Dick Vale Creek at trail crossing.
- Twin Creek at head of ditch.
- Steele Creek at mouth.
- Canyon Creek below Squaw Gulch:
- Squaw Gulch at claim "No. 1 above."
- South Fork of Fortymile River drainage basin:
  - South Fork of Fortymile River above Franklin Creek.
  - Denison Fork at mouth.
  - Mosquito Fork above Chicken Creek.
  - Gold Creek at mouth.
  - Mosquito Fork below Kechumstuk Creek.
  - Kechumstuk Creek at mouth.
  - Walker Fork at mouth.
  - Walker Fork above Cherry Creek.
  - Wade Creek at claim "No. 10 above."
  - Buckskin Creek above Fortyfive Pup.
  - Fortyfive Pup at claim No. 13.
- North Fork of Fortymile River drainage basin:
  - North Fork of Fortymile River above Middle Fork.
  - Champion Creek below Arkansas Creek.
  - Champion Creek above Bear Creek.
  - Bear Creek at mouth.
  - Bullion Creek at mouth.
  - Hutchinson Creek below Confederate Creek.
  - Hutchinson Creek below Montana Creek.
  - Montana Creek at claim No. 7.

FORTYMILE RIVER DRAINAGE BASIN.

FORTYMILE RIVER.

Fortymile River, which is formed by the union of its North and South forks, flows eastward for about 40 miles and joins the Yukon. The total drainage area of Fortymile River is approximately 6,350 square miles, about 4 per cent of which lies in Canadian territory. Parts of the uppermost headwaters of Walker Fork, a tributary of South Fork, lie in Yukon Territory, Canada, and the main river crosses the Canadian boundary about 23 miles above its mouth. The mouth of Fortymile River is midway between Dawson and Eagle, 45 miles from either.

Near the international boundary the river flows through a narrow rock canyon, from which it emerges into an open valley and thence takes a more moderate grade to its union with the Yukon. A promi-



HYDROGRAPH SHOWING DAILY DISCHARGE OF FORTYMILE AND SEVENTYMILE RIVERS

nent feature of the lower Fortymile is a well-defined bench that marks the elevation of an earlier valley floor. At Steele Creek this bench is about 500 feet above the water level. The plane of the present valley floor and that of the older one converge downstream and unite near the mouth of Kechumstuk Creek at an elevation of about 2,000 feet above sea level.

Below the junction of the forks of the Fortymile the river is joined by O'Brien, Flat, Twin, Nugget, and Uncle Sam creeks from the north and Steele, Canyon, Davis, and Moose creeks from the south. All these streams have heavy gradients and most of them are marked by high bench lands at their mouths.

Daily discharge, in second-feet, of Fortymile River at Steele Creek for 1911.[a]

[Drainage area, 5,890 square miles.]

Day.	May.	June.	July.	Aug.	Sept.
1	.....	17,600	1,220	580	1,020
2	.....	11,100	1,220	475	920
3	.....	11,700	970	425	830
4	.....	11,100	2,400	400	750
5	.....	10,200	3,180	400	700
6	.....	13,400	6,550	400	700
7	.....	10,200	5,700	400	700
8	.....	7,550	4,080	325	690
9	.....	6,000	3,030	275	670
10	.....	5,100	2,080	250	640
11	.....	4,590	1,650	375	920
12	.....	3,630	1,420	790	1,550
13	.....	4,760	1,120	1,370	2,275
14	.....	3,560	875	875	2,140
15	.....	3,630	1,550	920	2,020
16	6,100	5,100	5,300	1,420	1,800
17	7,680	4,590	4,680	2,540	1,320
18	13,200	4,680	2,280	2,080	970
19	40,000	4,000	1,950	1,950	640
20	38,000	3,100	1,650	1,800	550
21	18,000	2,470	1,120	1,420	.....
22	10,000	3,260	1,420	1,020	.....
23	6,000	1,800	1,650	875	.....
24	5,600	1,650	1,550	710	.....
25	7,550	1,600	970	610	.....
26	12,000	1,420	920	580	.....
27	11,600	1,270	920	525	.....
28	8,550	1,270	1,470	500	.....
29	8,550	1,470	1,550	500	.....
30	8,800	1,220	970	500	.....
31	17,600	.....	710	500	.....
Mean	13,700	5,470	2,130	832	1,090
Mean per square mile	2.33	.930	.361	.141	.185
Run-off (depth in inches on drainage area)	1.38	1.0	.42	.16	.14

[a] The rating curve is well defined below 16,000 second-feet.

A hydrograph showing the discharge of Fortymile River at Steele Creek in 1911 is given on Plate XI.

Daily discharge, in second-feet, of Steele and Twin creeks for 1911.

Day.	Steele Creek at mouth.[a] [Drainage area, 125 square miles.]					Twin Creek at head of canal.[b] [Drainage area, 4.4 square miles.]			
	May.	June.	July.	Aug.	Sept.	May.	June.	July.	Aug.
1	.....	15.6	0.4	1.3	3.3	.....	6.2	3.1	0.5
2	.....	8.6	.3	1.0	2.5	.....	4.7	4.7	.5
3	.....	4.0	.5	.9	2.5	.....	4.2	6.2	.5
4	.....	4.4	1.0	2.2	1.8	.....	4.2	10.8	.5
5	.....	14.0	12.5	1.8	1.8	.....	6.2	12.6	.5
6	.....	15.6	14.0	1.3	1.8	.....	14.4	12.6	.5
7	.....	11.0	9.5	.9	1.8	.....	6.2	10.8	.5
8	.....	7.0	5.0	.6	1.8	.....	10.8	10.8	.5
9	.....	7.0	2.8	.5	1.8	.....	10.8	10.8	.5
10	.....	7.0	1.3	.5	1.8	.....	6.2	9.0	.5
11	.....	8.0	1.0	6.0	2.5	.....	6.2	7.5	.5
12	.....	6.4	.8	6.0	15.5	.....	6.2	4.7	.5
13	.....	4.0	.5	2.8	28.0	.....	4.7	4.2	.5
14	.....	4.0	.4	3.3	20.0	.....	3.6	3.6	.5
15	.....	2.5	2.2	6.0	12.5	.....	3.6	2.5	.5
16	.....	3.3	1.3	7.0	7.0	.....	4.7	.8	1.6
17	.....	2.8	1.0	7.8	3.3	.....	4.7	.8	3.3
18	.....	2.8	1.0	5.0	1.0	.....	4.2	.8	2.7
19	.....	2.5	.9	5.0	1.0	.....	2.5	12.6	1.4
20	.....	.6	.5	3.7	.9	.....	2.5	9.0	.8
21	.....	.5	.5	2.5	.....	.....	2.5	6.2	.8
22	.....	.5	.5	2.2	.....	.....	2.5	6.2	1.0
23	15.6	.5	.5	1.0	.....	5.5	1.6	4.7	1.0
24	14.6	.5	18.5	1.0	.....	5.5	1.2	4.7	1.0
25	19.4	.5	9.5	1.0	.....	6.8	1.2	9.0	1.0
26	15.6	.5	8.6	1.0	.....	6.8	.8	6.2	1.0
27	11.0	.4	9.5	1.0	.....	6.8	.8	6.2	1.0
28	6.4	.4	9.5	1.0	.....	6.8	.5	4.7	1.0
29	6.0	.4	5.6	1.0	.....	5.5	1.2	4.2	1.0
30	45.0	.4	3.3	1.0	.....	14.4	2.0	3.0	1.0
31	26.0	.....	2.5	1.8	.....	14.4	.....	1.0	1.0
Mean	18.0	4.5	4.0	2.5	5.6	8.0	4.4	6.3	1.1
Mean per square mile	1.44	.360	.320	.200	.448	1.82	1.00	1.43	.25
Run-off (depth in inches on drainage area)	.48	.40	.37	.23	.33	.61	1.12	1.65	.29

[a] The discharge is well defined below 20 second-feet.
[b] The discharge curve is based on two measurements and is only approximate.

Daily discharge, in second-feet, of Liberty Fork and King Solomon creeks for 1911.

Day.	Liberty Fork Creek at mouth.[a] [Drainage area, 45 square miles.]					King Solomon Creek at Liberty Fork.[b] [Drainage area, 552 square miles.]				
	June.	July.	Aug.	Sept.	Oct.	June.	July.	Aug.	Sept.	Oct.
1							12.0	12.0	31.0	
2			8.5		26.5		10.5	9.6	22.0	
3							18.5			
4							18.5			
5							102			
6							133			
7		50.5					59.5			
8			7.2	9.2	12.5		38.8	3.0	10.5	
9				9.2			37.5	3.0		
10	40.5					278	36.0	9.0	15.0	
11			15.5		11.2	386	33.5		15.0	9.0
12		20.0					22.0			
13							19.0			
14							16.0			
15							12.0			
16							9.0			
17		9.3	20.0	20.0		84.0	6.5	9.0	36.0	
18						78.7	5.0	36.0	22.0	
19							4.0			
20							3.0	15.0		
21		8.5	7.2	15.5		55.0	4.5	15.0	22.0	1.5
22							6.0			
23							12.0			
24							26.5			
25							32.0			
26			10.0				38.8			
27		15.5		26.5		18.5	73.5	12.0	31.0	
28		17.8				15.0	72.8	12.0	31.0	
29							38.8			
30			15.5				25.6			
31							17.8			
Mean							17.8			
Mean per square mile							.553			

[a] The rating curve is well defined below 40 second-feet.
[b] The rating curve is well defined below 120 second-feet.

Daily discharge, in second-feet, of Canyon and Squaw creeks for 1911.

Day.	Canyon Creek 2 miles below Squaw Creek.[a] [Drainage area, 58.4 square miles.]			Squaw Creek at claim "No. 1 above."[b] [Drainage area, 24.4 square miles.]			
	July.	Aug.	Sept.	June.	July.	Aug.	Sept.
1		7.2	8.7		1.9	0.7	3.1
2		6.9	8.7		1.9	.6	3.1
3		7.2	7.9		3.1	.6	3.1
4		7.9	7.9		3.1	.6	2.5
5		7.2	7.9		6.7	.5	2.5
6		7.2	7.6		4.7	.5	2.5
7		6.9	7.6		4.7	.5	2.5
8		6.9	7.6	85.0	3.1	.3	
9		6.9		76.0	1.9	.3	
10		7.9		67.7	1.9	.6	
11		13.5		67.7	1.2	1.2	
12		9.8		59.0	.7	1.2	
13		9.4		44.1	.7	1.2	
14		9.4		31.7	.7	3.1	
15		10.3		25.7	1.9	3.7	

[a] The discharges are well defined below 8 second-feet.
[b] The discharges are well defined for all stages.

Daily discharge, in second-feet, of Canyon and Squaw creeks for 1911—Continued.

Day.	Canyon Creek 2 miles below Squaw Creek. [Drainage area, 58.4 square miles.]			Squaw Creek at claim "No. 1 above. [Drainage area, 24.4 square miles.]			
	July.	Aug.	Sept.	June.	July.	Aug.	Sept.
16	.....	11.0	.....	20.8	1.2	4.7	.....
17	.....	10.3	.....	20.8	1.2	4.7	.....
18	.....	10.3	.....	20.8	.7	6.7	.....
19	.....	9.4	.....	16.5	.7	4.7	.....
20	.....	8.7	.....	14.4	.7	3.7	.....
21	.....	8.7	.....	12.2	.7	3.1	.....
22	.....	7.9	.....	12.2	.7	3.1	.....
23	3.9	7.9	.....	9.2	.5	2.5	.....
24	6.6	7.9	.....	6.7	.5	1.9	.....
25	7.2	7.6	.....	6.7	.5	1.9	.....
26	7.2	7.6	.....	6.7	.6	1.9	.....
27	7.9	7.6	.....	5.6	.6	1.9	.....
28	9.4	7.6	.....	5.6	2.5	1.2	.....
29	7.9	7.6	.....	4.7	2.5	1.2	.....
30	7.2	7.9	.....	3.1	1.2	1.2	.....
31	7.2	8.7	.....	.....	.7	2.5	.....
Mean	7.2	8.4	8.0	27.0	17.0	2.0	2.8
Mean per square mile	.123	.144	.135	1.11	.697	.082	.114
Run-off (depth in inches on drainage area)	.04	.17	.04	.95	.80	.09	.03

Miscellaneous measurements in Fortymile River drainage basin in 1911.

Date.	Stream and locality.	Drainage area.	Discharge.	Discharge per square mile.
		Sq. mile.	*Sec.-ft.*	*Sec.-ft.*
June 9	Dome Creek, at summer trail	24.9	20.30	0.82
July 7	....do	24.9	5.91	.24
8	Dick Vale Creek at forks	13.1	2.75	.21
27	Dome Creek at summer trail	24.9	4.54	.18
Sept. 4	....do	24.9	2.83	.11
6	....do	24.9	2.50	.10

SOUTH FORK OF FORTYMILE RIVER.

South Fork of Fortymile River is formed by the union of Denison and Mosquito forks about 25 miles above its mouth. From the forks the river flows due east for about 4 miles to a point below the mouth of Atwater Creek, where the stream makes an abrupt turn to the left and flows north to its union with the North Fork.

The principal tributaries to the South Fork from the west are Butte, Buckskin, and Franklin creeks; those from the east and south are Uhler and Napoleon creeks, Walker Fork, and Atwater Creek. The largest of these is Walker Fork, which has its source in Canadian territory. This stream is important because the placers on several of its tributaries, including Wade, Twelvemile, Davis, and Poker creeks, have been large producers of gold. Liberty Fork and Cherry Creek are the most important streams flowing into Walker Fork from the south.

Mosquito Fork, which with Denison Fork forms South Fork of Fortymile River, heads at an elevation between 3,000 and 4,000

feet in the ridge paralleling Tanana River at a distance of about 20 miles. The first tributary to Mosquito Fork above its mouth is Chicken Creek, which although it has a very small drainage area, is important on account of its great production of placer gold. Eagle Creek, also the scene of some mining, affords only a scanty water supply. Gold Creek is an important branch of Mosquito Fork, which it joins about 12 miles below Kechumstuk Creek, the largest tributary of the fork. Near the mouth of Kechumstuk Creek, at an elevation of about 2,000 feet, an abrupt decrease in the gradient of the fork is noticeable, and its valley above this point widens out into low, grassy meadows divided by many sloughs. These meadows narrow again about 8 miles above Kechumstuk Creek at a point where a spur from the south approaches the fork. This spur marks the lower end of the flat swampy area known as Mosquito Flats, which constitutes a large part of the upper drainage area of Mosquito Fork. The flats extend along the stream for about 20 miles and at some places are 12 to 14 miles wide. They are a tangle of swamps and lakes and sloughs and during wet seasons are said to be practically covered with water.

Denison Fork, the other main tributary of the South Fork, rises not far from Tanana River. The flat basin at its head is not so pronounced as that of Mosquito Fork, but the valleys are broad and swampy and have very gentle slopes. Its drainage area of 1,540 square miles is about equally divided between two forks which unite to form the main stream about 12 miles above its mouth.

Daily discharge, in second-feet, of South Fork and Denison Fork for 1911.

Day.	South Fork of Fortymile River at Franklin.[a] [Drainage area, 3,180 square miles.]					Denison Fork Creek at mouth.[b] [Drainage area, 1,540 square miles.]				
	May.	June.	July.	Aug.	Sept.	June.	July.	Aug.	Sept.	Oct.
1	.....	3,240	340	340	200	.....	.....	.....	.....	314
2	.....	2,560	340	340	200	.....	.....	.....	.....	.....
3	.....	2,300	340	340	200	.....	.....	.....	.....	.....
4	.....	2,170	340	265	200	.....	.....	.....	.....	.....
5	.....	2,210	340	265	200	.....	.....	.....	.....	273
6	.....	2,340	340	265	200	.....	.....	.....	.....	226
7	.....	1,950	1,040	265	200	.....	.....	.....	.....	.....
8	.....	1,910	1,250	200	200	.....	.....	.....	.....	.....
9	.....	940	705	200	200	.....	.....	.....	.....	.....
10	.....	575	795	200	200	.....	.....	.....	.....	.....
11	.....	575	750	200	232	.....	.....	.....	.....	.....
12	.....	575	750	302	340	.....	.....	.....	.....	.....
13	.....	575	705	340	415	.....	.....	.....	.....	.....
14	.....	575	660	415	495	.....	.....	.....	.....	.....
15	.....	495	3,210	415	495	.....	.....	.....	.....	.....
16	.....	495	4,140	415	495	.....	.....	.....	.....	.....
17	.....	495	3,700	415	415	.....	.....	.....	.....	.....
18	.....	495	2,210	495	415	.....	.....	.....	.....	.....
19	7,000	495	1,420	495	340	.....	.....	.....	.....	.....
20	6,000	415	705	495	340	.....	700	.....	.....	.....

[a] The rating curve is well defined below 5,000 second-feet.
[b] The discharges are probably accurate within 10 per cent.

Daily discharge, in second-feet, of South Fork and Denison Fork for 1911—Continued.

Day.	South Fork of Fortymile River at Franklin. [Drainage area, 3,180 square miles.]					Denison Fork Creek at mouth. [Drainage area, 1,540 square miles.				
	May.	June.	July.	Aug.	Sept.	June.	July.	Aug.	Sept.	Oct.
21	5,000	415	660	495	.....	.....	520	.....	.....	.....
22	4,000	415	575	415	.....	.....	426	.....	.....	.....
23	3,000	415	495	378	.....	.....	374	138	.....	.....
24	3,000	415	455	415	.....	.....	321	.....	.....	.....
25	2,690	340	415	340	.....	.....	289	.....	.....	.....
26	3,100	340	415	340	.....	.....	280	.....	.....	.....
27	2,690	340	378	302	.....	.....	273	.....	.....	.....
28	2,170	340	378	265	.....	.....	257	.....	289	.....
29	1,780	340	340	265	.....	.....	242	.....	305	.....
30	2,300	340	340	265	.....	.....	242	.....	321	.....
31	4,100	.....	340	265	.....	.....	240	.....	.....	.....
Mean	3,600	970	932	336	299	.....	.....	.....	.....	.....
Mean, per square mile	1.13	.305	.293	.106	.094	.....	.....	.....	.....	.....
Run-off (depth in inches on drainage area)	.55	.34	.34	.12	.07	.....	.....	.....	.....	.....

Daily discharge, in second-feet, of Gold, Mosquito Fork, and Kechumstuk creeks for 1911.

Day.	Gold Creek at mouth.[a] [Drainage area, 115 square miles.]				Mosquito Fork Creek at Kechumstuk.[b] [Drainage area, 824 square miles.]			Kechumstuk Creek at Kechumstuk.[b] [Drainage area, 189 square miles.]		
	May.	June.	July.	Aug.	Aug.	Sept.	Oct.	Aug.	Sept.	Oct.
1	.....	328	.....	.....	.....	71	455	.....	15	257
2	.....	216	.....	.....	.....	70	440	.....	15	250
3	.....	195	.....	.....	.....	70	413	.....	13	129
4	.....	160	.....	.....	.....	70	393	.....	13	131
5	.....	216	.....	.....	.....	70	382	.....	15	129
6	.....	216	.....	.....	.....	69	285	.....	14	124
7	.....	140	.....	.....	.....	69	168	.....	14	111
8	.....	110	.....	.....	.....	69	70	.....	14	131
9	.....	.....	.....	.....	.....	72	62	.....	13	25
10	.....	.....	.....	.....	.....	72	66	.....	14	35
11	.....	.....	.....	.....	.....	138	74	.....	15	33
12	.....	.....	.....	.....	.....	542	66	.....	224	31
13	.....	.....	.....	.....	.....	816	58	.....	530	22
14	.....	.....	.....	.....	.....	896	61	.....	535	23
15	.....	.....	.....	.....	.....	888	61	.....	476	22
16	.....	.....	.....	.....	.....	888	.....	.....	472	16
17	.....	.....	.....	.....	.....	880	.....	.....	444	.....
18	.....	.....	17.0	.....	.....	868	.....	.....	420	.....
19	.....	.....	.....	.....	.....	868	.....	.....	412	.....
20	.....	.....	.....	.....	.....	864	.....	31	404	.....
21	.....	.....	.....	.....	182	860	.....	26	396	.....
22	.....	.....	.....	.....	160	848	.....	23	388	.....
23	.....	.....	.....	.....	136	840	.....	21	380	.....
24	.....	.....	.....	10.2	133	824	.....	19	360	.....
25	.....	.....	.....	.....	122	816	.....	18	352	.....
26	.....	.....	.....	.....	81	800	.....	18	349	.....
27	.....	.....	.....	.....	75	536	.....	16	331	.....
28	80.0	.....	.....	.....	72	515	.....	16	331	.....
29	61.5	.....	.....	.....	72	512	.....	15	320	.....
30	435.0	.....	.....	.....	72	497	.....	15	295	.....
31	510.0	.....	.....	.....	71	.....	.....	15	.....	.....
Mean	.....	.....	.....	.....	107	513	203	194	252	92
Mean, per square mile	.....	.....	.....	.....	.130	.624	.246	.103	1.33	.487
Run-off (depth in inches on drainage area)	.....	.....	.....	.....	.05	.70	.14	.04	1.48	.28

[a] The discharges for this station are well defined below 50 second-feet.
[b] The rating table is well defined for all stages.

Daily discharge, in second-feet, of Walker Fork, and Wade and Napoleon creeks for 1911.

Day.	Walker Fork above Cherry Creek.[a] [Drainage area, 15.8 miles.]			Wade Creek at claim "No. 10 above."[a] [Drainage area, 23.1 square miles.]					Napoleon Creek at mouth. [Drainage area, 13.3 square miles.]			
	June.	July.	Aug.	June.	July.	Aug.	Sept.	Oct.	June.	July.	Aug.	Sept.
1	.....	13 9	5.2	.....	2.3	2.3	5.2	12.1	.....	1.0	1.0	0.7
2	.....	13.9	4.3	.....	2.3	2.3	5.2	15.7	.....	1.0	1.0	.7
3	.....	16.3	3.3	19.8	2.3	2.3	5.2	12.1	.....	1.0	.8	.8
4	.....	25.0	6.5	29.6	2.3	3.5	5.2	9.5	.....	1.0	.8	.8
5	45.8	16.3	5.2	79.4	5.2	3.5	3.5	9.5	4.2	1.0	.8	.8
6	69.0	12.0	3.8	39.2	12.1	2.3	3.5	5.2	15.5	1.0	.8	.8
7	57.4	8.3	3.8	29.6	5.2	2.3	2.3	7.1	11.0	1.0	.8	.8
8	60.0	10.0	3.8	19.8	3.5	1.3	2.3	5.2	8.5	.85	.8	.8
9	65.0	5.2	3.8	15.7	2.9	1.3	2.3	3.5	3.3	.85	.8	1.0
10	70.0	6.5	4.3	19.8	3.5	.6	3.5	3.5	2.3	.80	3.0	1.0
11	70.0	8.3	78.6	15.7	5.2	5.2	3.5	3.5	1.0	.80	10.0	3.0
12	65.0	3.8	40.0	15.7	4.2	5.2	19.8	2.3	1.0	.80	3.2	10 0
13	75.0	3.8	25.0	15.7	3.5	5.2	24.3	2.3	1.0	.80	1.3	7.5
14	70.0	8.3	23.7	12.1	2.9	7.1	15.7	2.3	1.0	3.00	.8	7.5
15	60.0	8.3	25.0	12.1	3.5	5.2	15.7	2.3	1.0	12.20	1.3	3.2
16	50.0	5.2	40.0	9.5	7.1	7.1	15.7	2.3	1.0	1.30	3.2	2.0
17	20.0	3.8	34 2	9.5	5.2	7.1	9.5	3.5	1.0	1.30	3.2	2.0
18	20.0	2.5	25 0	9.5	3.5	5.2	3.5	3.5	1.0	1.30	3.2	2.2
19	20.0	2.5	18.8	7.1	2.3	5.2	3.5	.....	1.0	1.00	2.0	2.1
20	16.3	1.3	13.9	7.1	2.3	3.5	3.5	.....	1.0	.80	1.0	1.8
21	16.3	2.5	13.1	5.2	2.3	3.5	5.2	.....	1.0	.60	1.0	1.0
22	16.3	2.5	9.3	6.1	2.3	2.3	5.2	.....	1.0	.60	1.0	2.1
23	18.8	1.8	8.3	5.2	2.3	2.3	5.2	.....	1.0	.60	1.0	2.0
24	13.9	2.5	8.3	3.5	5.2	2.3	7.1	.....	1.0	.60	.8	2.5
25	13.9	1.3	6.5	2.3	3.5	2.3	7.1	.....	1.0	.60	.6	3.0
26	16.3	4.3	6.5	.6	5.2	2.3	9.5	.....	1.0	.80	.5	3.2
27	16.3	12.0	6.5	2.3	7.1	3.5	44.6	.....	1.0	.90	.4	7.5
28	16.3	13.1	10.0	3.5	3.5	2.3	15.7	.....	1.0	1.00	.4	3.2
29	10.0	10.0	12.0	2.3	3.5	2.3	15.7	.....	1.0	1.30	.5	2.3
30	12.0	9.3	12.0	2.3	2.3	5.2	12.1	.....	1.0	1.30	.5	1.3
31	.....	8.7	14.0	.....	2.3	5.2	.....	.....	.....	1.00	.5	.....
Mean	37.8	7.8	15.3	14.3	3.9	3.6	9.3	5.8	2.49	1.36	1.49	2.59
Mean, per square mile	2.39	.494	.968	.619	.169	.156	.403	.251	.187	.102	.113	.194
Run-off (depth in inches on drainage area).	2.31	.570	1.12	.64	.19	.18	.45	.17	.18	.12	.13	.22

[a] The discharges for this station are well defined below 35 second-feet.
[b] Records should be accurate within 10 per cent.

Daily discharge, in second-feet, of Forty-five Pup and Buckskin creeks for 1911.

Day	Forty-five Pup at claim No. 13.[a] [Drainage area 9.1 square miles.]						Buckskin Creek above Forty-five Pup.[a] [Drainage area, 33 square miles.]				
	May.	June.	July.	Aug.	Sept.	Oct.	May.	June.	July.	Aug.	Sept.
1	.....	18.6	1.8	1.8	2.5	7.4	.....	.....	.....	.....	.....
2	.....	13.2	1.8	1.8	2.5	.....	.....	42.2	.....	.....	.....
3	.....	13.2	1.8	1.3	1.8	.....	.....	.....	.....	.....	.....
4	.....	13.2	1.8	3.5	1.8	.....	.....	.....	5.9	4.7	.....
5	.....	24.2	1.8	3.5	1.8	.....	.....	.....	5.9	3.4	.....
6	.....	18.6	1.3	2.5	1.8	.....	.....	.....	.....	.....	.....
7	.....	13.2	1.3	1.8	1.3	.....	.....	.....	.....	.....	.....
8	.....	7.4	.7	1.8	.7	.....	.....	.....	.....	.....	.....
9	.....	5 5	.7	1.3	.7	.....	.....	.....	.....	.....	.....
10	.....	5.5	.7	1.3	1.8	.....	.....	.....	.....	.....	.....
11	.....	3.5	1.8	3.5	5.5	.....	.....	.....	22.6	.....	.....
12	.....	5.5	1.3	3.5	15.9	.....	.....	.....	5.9	.....	.....
13	.....	7.4	1.3	2.5	13.2	.....	.....	11.8	5.9	.....	.....
14	.....	13.2	1.8	2.5	6.6	.....	.....	11.8	.....	.....	.....
15	.....	18.6	3.5	4.4	5.5	.....	61.1	.....	16.7	.....	.....

[a] The discharges are well defined below 20 second-feet.

Daily discharge, in second-feet, of Forty-five Pup and Buckskin creeks for 1911—Contd.

Day.	Forty-five Pup at claim No. 13.[a] [Drainage area, 9.1 square miles.]						Buckskin Creek above Forty-five Pup.[a] [Drainage area, 23 square miles.]				
	May.	June.	July.	Aug.	S pt.	Oct.	May.	June.	July.	Aug.	Sept.
16		13.2	1.8	4.4	4.4						
17		30.5	1.3	3.5	3.5						
18		18.6	.7	3.5	3.5						
19		7.4	.7	2.5	3.5						
20		5.5	.7	3.5	3.5						
21		5.5	.7	1.8	2.5					4.7	
22		3.5	.7	1.3	3.5						
23		3.5	.7	1.3	3.5				.9	.9	
24		3.5	.7	1.3	3.5				.9	.9	
25		3.5	.7	.7	4.4			5.9			
26		3.5	1.3	.7	4.4						
27		1.8	5.5	.7	5.5						
28		1.8	5.5	.7	5.5						
29		1.8	4.4	.7	5.5						9.9
30	53.4	1.8	3.5	.7	6.6						
31	36.6		2.5	2.5							
Mean		9.54	1.8	2.2	4.2						
Mean per square mile		1.04	.198	.242	.461						
Run-off (depth in inches on drainage area)		1.16	.22	.27	.51						

Miscellaneous measurements in South Fork of Fortymile River drainage basin for 1911.

Date.	Stream and locality.	Drainage area.	Discharge.	Discharge per square mile.
		Sq. miles.	*Sec.-ft.*	*Sec.-ft.*
July 17	Mosquito Fork at mouth	1,120	313.7	0.28
20	do	1,120	193.4	.17
Aug. 23	do	1,120	198.0	.18
27	Walker Fork at mouth	414	20.8	.05

NORTH FORK OF FORTYMILE RIVER.

North Fork of Fortymile River is a swift and large stream whose volume fluctuates with the precipitation in its basin. The main tributaries of the North Fork rise in an area of irregular ridges ranging in elevation from 3,000 to 6,000 feet above sea level. The North Fork is joined by the Middle Fork, which is a trifle larger than the North Fork. The headwaters of the Middle Fork rise in a country similar to that of Mosquito and Denison forks, and therefore it probably has a more uniform flow than the North Fork. Besides these two streams Comet and Champion creeks are also worthy of mention. The volume of the North Fork is increased by Slate, Bullion, and Hutchinson creeks, entering the main stream from the west. All these streams have heavy grades and their seasonal flow is relatively constant. During the season of 1911 the basin of the North Fork

was practically deserted, and it was impossible to obtain records on the run-off of the streams, except in the Hutchinson Creek basin.

About 10 miles below the union of the North and Middle forks the river formerly followed a large meander locally known as the "Kink." Although the distance around it was 2¾ miles, the two channels at the neck of the meander were separated by a sharp rock ridge only about 100 feet high and about the same distance in width at the water level. Several years ago a channel was blasted through the rock ridge to divert the water and thus drain the meander for mining. A fall of 17 feet was thus concentrated in a horizontal distance of only a little over 100 feet and is capable of developing considerable water power.

Daily discharge, in second-feet, of Montana and Hutchinson creeks for 1911.

Day.	Montana Creek[a] at claim No. 7 above. [Drainage area, 5.9 square miles.]			Hutchinson Creek[a] below Montana Creek. [Drainage area, 29.0 square miles.]			Hutchinson Creek[a] below Confederate Creek. [Drainage area, 22.0 square miles.]		
	July.	Aug.	Sept.	July.	Aug.	Sept.	July.	Aug.	Sept
1	.....	1.2	20.5	.....	.....	125.0	.....	.....	.....
2	.....	1.2	16.0	.....	.....	.....	.....	.....	.....
3	.....	1.2	8.8	.....	.....	100.0	.....	.....	.....
4	.....	1.2	4.4	.....	.....	.....	.....	.....	.....
5	.....	1.2	4.2	.....	.....	.....	.....	.....	8.6
6	.....	1.2	3.9	.....	.....	.....	.....	.....	7.3
7	.....	1.2	3.7	.....	.....	.....	.....	.....	9.1
8	.....	1.2	3.5	.....	.....	.....	.....	.....	9.7
9	.....	1.2	3.5	.....	.....	.....	.....	.....	10.3
10	.....	1.2	6.5	.....	.....	136.0	.....	.....	11.1
11	.....	3.2	12.6	.....	78.0	160.0	.....	.....	35.0
12	.....	2.9	10.7	.....	.....	.....	.....	.....	31.3
13	.....	2.9	8.8	6.8	.....	.....	4.3	.....	28.9
14	1.7	3.0	7.9	.....	.....	35.6	7.3	.....	27.2
15	2.5	3.9	10.0	.....	15.2	.....	.....	.....	12.4
16	1.2	4.4	10.0	.....	.....	.....	.....	.....	11.1
17	1.2	4.4	10.0	.....	.....	.....	.....	.....	.....
18	1.2	3.2	10.0	.....	.....	.....	.....	.....	.....
19	1.2	2.9	10.0	.....	.....	.....	.....	.....	.....
20	1.2	2.7	12.0	.....	.....	.....	.....	5.3	.....
21	3.2	2.2	12.0	.....	.....	.....	.....	.....	.....
22	3.5	2.7	12.0	.....	.....	.....	.....	7.3	.....
23	1.5	3.0	12.0	.....	.....	.....	.....	.....	.....
24	1.7	1.7	12.0	41.0	.....	.....	.....	6.3	.....
25	1.2	1.5	14.1	.....	12.0	136.0	.....	.....	25.6
26	1.7	6.3	.....	.....	64.4	.....	.....	.....	.....
27	2.2	7.9	.....	.....	.....	.....	.....	.....	.....
28	1.7	4.8	.....	.....	.....	.....	.....	.....	.....
29	1.2	3.5	.....	15.2	.....	.....	5.3	.....	.....
30	1.2	4.2	.....	.....	41.0	.....	.....	.....	.....
31	1.2	16.0	.....	.....	110.0	.....	.....	6.3	.....
Mean	1.6	.32	9.6	.....	.....	.....	.....	.....	.....
Mean per square mile	.271	.543	1.63	.....	.....	.....	.....	.....	.....
Run-off (depth in inches on drainage area)	.19	.63	1.52	.....	.....	.....	.....	.....	.....

[a] The records are reliable for all stages of stream.

Miscellaneous measurements in North Fork of Fortymile River drainage basin for 1911.

Date.	Stream and locality.	Drainage area.	Discharge.	Discharge per square mile.
July 5:		*Sq. mile.*	*Sec-ft.*	*Sec.-ft.*
3 p. m.	Quartz Creek at telegraph line	.....	6.94	.....
4 p. m.	....do	.....	48.00	.....
Aug. 16	Champion Creek at Arkansas Cabin	43.4	33.63	0.78
17	Champion Creek just below Bear Creek	173.0	87.48	.50
17	Bear Creek at mouth	48.0	28.55	.60
18	North Fork of Fortymile River above Middle Fork	724.0	1,063.00	1.47
18	Bullion Creek at mouth	34.3	8.97	.26

SEVENTYMILE DISTRICT.

LOCATION OF AREA.

The Seventymile district comprises the area drained by Seventymile River and all its tributaries. This area adjoins the Eagle district on the north and borders the lands drained by tributaries of North Fork of Fortymile River. The district lies within the Eagle precinct, and Eagle is the supply point for all the mines. The area has been topographically surveyed and is shown on the Geological Surveys maps of the Fortymile and Circle quadrangles.

The gaging stations, or points of measurements, for 1911 follow:

Seventymile River drainage basin:
- Seventymile River above Granite Fork.
- Seventymile River at the falls.
- Flume Creek one-fourth mile above mouth.
- Alder Creek at claim "No. 7 above."
- Deep Creek at mouth.
- Nugget Creek at mouth.
- Granite Creek at mouth.
- Barney Creek at ditch intake.
- Barney Creek ditch below forks.
- Barney Creek at mouth.
- Sonickson Creek at ditch intake.
- Sonickson Creek ditch at head.
- Sonickson Creek ditch at mouth.
- Washington Creek at mouth.
- Broken Neck Creek at mouth.
- Mogul Creek at mouth.
- Crooked Creek below Eldorado Creek.
- Curtis Bar Creek at mouth.
- Fox Creek at Rolf's claim.
- Bryant Creek 2 miles above mouth.
- Rock Creek at bridge.

SEVENTYMILE RIVER DRAINAGE BASIN.

Seventymile River drains an area of about 700 square miles, practically three-fourths of its basin lying on the south side of the river. The headwaters of the main river lie in the high rugged

divide separating the basins of Seventymile and Charley rivers. Seventymile River drains the eastern slope of this divide and flows eastward for about 60 miles to a point 4 miles from its mouth, where it makes a right-angle turn and flows northward, joining the Yukon about 20 miles below Eagle.

The principal southern tributaries of Seventymile River, beginning the enumeration at its headwaters, are Diamond Fork, Flume, Alder, Deep, Nugget, Granite, Green, Sonickson, Mogul, and Bryant creeks. Of these streams, Granite and Mogul creeks furnish a steady supply of water to the main river. Both creeks have a heavy fall, but no workable placers have yet been found on them. The heavy timber on Mogul Creek now supplies some large saw logs to the district. The tributaries of the Seventymile from the north are small, short streams, usually falling to a minimum as soon as the snow leaves the ridges. They are Barney, Washington, Broken Neck, Crooked, and Fox creeks—all containing workable placers.

Seventymile River is in the main a swift, treacherous stream, which falls from its head to the flats near its mouth at a rapid rate. Like Fortymile River it has been eroding its bed rapidly. Bench lands are conspicuous along the valley slopes at altitudes ranging from 50 to 150 feet above the river. At the point known as the "falls" there is a vertical drop of about 25 feet, capable of developing considerable power.

Daily discharge, in second-feet, of Seventymile River at the falls for 1911.[a]

[Drainage area, 465 square miles.]

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1	.....	354	190	220	21	1,050	150	346	170
2	.....	304	166	214	22	874	450	304	170
3	.....	340	150	190	23	890	310	274	170
4	.....	500	146	170	24	874	180	235	170
5	.....	390	134	166	25	740	265	196	170
6	.....	1,550	120	154	26	775	265	174	.....
7	.....	906	110	146	27	610	450	180	.....
8	.....	525	110	134	28	510	442	196	.....
9	.....	340	134	130	29	442	370	190	.....
10	.....	250	150	146	30	410	254	170	.....
					31	.....	226	190	.....
11	.....	196	430	310					
12	.....	170	378	442	Mean	737	344	306	219
13	.....	154	280	402	Mean per square mile	1.58	.739	.659	.471
14	.....	280	280	340	Run-off (depth in inches on drainage area)	.64	.85	.76	.43
15	.....	280	580	316					
16	.....	180	1,130	286					
17	.....	170	670	256					
18	.....	150	775	235					
19	.....	134	622	190					
20	930	130	475	180					

[a] The rating table is well defined below 500 second-feet.

A hydrograph showing the discharge of Seventymile River at the falls in 1911 is given on Plate XI (opposite p. 222).

Daily discharge, in second-feet, of Alder Creek at claim "No. 7 above"[a] for 1911.

[Drainage area, 11.8 square miles.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	23.5	6.9	6.1	8.3	5.9	21	12.9	12.1	9.2	8.3	6.7	.....
2	.....	29.0	7.1	5.7	12.1	5.5	22	10.0	10.4	7.3	7.1	5.9	.....
3	.....	43.5	7.1	6.1	7.7	5.5	23	9.7	12.1	6.3	6.7	6.7	.....
4	.....	46.4	8.3	5.9	5.5	5.5	24	8.3	10.4	6.9	8.3	6.9	.....
5	.....	45.0	52.0	5.5	7.7	5.5	25	15.2	10.0	5.9	8.3	6.3	.....
6	8.3	38.0	11.7	5.5	5.3	5.1	26	33.2	9.7	8.1	12.1	6.5	.....
7	12.1	29.0	9.2	5.5	5.1	5.1	27	20.8	8.6	10.4	5.5	6.3	.....
8	12.9	23.5	8.3	5.1	4.7	4.3	28	17.0	8.3	11.7	5.5	6.5	.....
9	11.1	21.0	7.3	5.5	5.1	.....	29	12.9	8.1	10.0	7.7	6.3	.....
10	10.0	15.2	6.1	6.7	5.9	.....	30	35.0	7.3	7.7	5.5	5.9	.....
11	9.2	14.1	8.3	7.7	7.7	.....	31	52.0	.....	6.9	8.3	.....	.....
12	7.7	18.5	8.3	6.5	8.6	.....	Mean	15.7	20.3	9.6	7.9	6.9	5.3
13	8.3	20.0	7.7	7.1	8.3	.....	Mean per square mile	1.33	1.72	.814	.669	.584	.449
14	11.1	20.0	12.1	14.1	7.7	.....	Run-off (depth in inches on drainage area)	1.28	1.92	.94	.77	.65	.14
15	11.1	23.5	12.1	12.1	7.1	.....							
16	10.0	23.5	5.9	12.9	7.1	.....							
17	10.4	21.0	8.3	14.1	7.1	.....							
18	16.0	18.5	7.7	9.6	6.7	.....							
19	22.0	23.5	8.3	10.0	7.3	.....							
20	20.0	15.2	5.5	9.2	7.1	.....							

[a] The discharges are well defined for all stages.

Daily discharge, in second-feet, of Sonickson, Crooked, and Fox creeks for 1911.

Day.	Sonickson Creek above ditch intake.[a] [Drainage area, 12.6 square miles.]			Crooked Creek below Eldorado Creek.[a] [Drainage area, 17.2 square miles.]				Fox Creek 3 miles above mouth.[a] [Drainage area, 8.3 square miles.]			
	July.	Aug.	Sept.	June.	July.	Aug.	Sept.	May.	June.	July.	Aug.
1	4.0	7.1	.....	.....	1.5	2.0	3.5	.....	.....	2.5	3.4
2	4.4	.....	.....	.....	1.5	1.5	3.5	.....	.....	2.5	3.1
3	4.2	.....	.....	.....	9.5	1.5	3.5	.....	.....	2.5	3.1
4	7.5	4.4	.....	.....	3.5	1.5	2.5	.....	.....	2.5	2.8
5	.....	.....	.....	.....	2.5	1.2	2.5	.....	.....	2.5	2.8
6	.....	.....	.....	.....	2.5	1.2	2.5	.....	.....	2.5	2.5
7	.....	3.8	.....	.....	2.5	1.2	2.0	.....	.....	2.5	2.5
8	18.2	.....	6.4	.....	2.0	1.2	2.0	.....	.....	2.8	2.5
9	.....	.....	.....	.....	2.0	1.2	2.0	.....	.....	2.5	2.5
10	.....	.....	.....	.....	2.0	2.0	2.0	.....	.....	2.5	3.3
11	3.8	13.9	.....	.....	1.2	8.0	4.5	.....	.....	2.5	5.1
12	.....	.....	18.2	10.3	1.2	4.5	1.5	.....	.....	2.3	4.1
13	.....	.....	.....	55.0	1.2	3.5	21.5	.....	.....	2.1	3.7
14	10.7	.....	.....	21.5	1.2	3.5	13.0	.....	.....	2.1	3.7
15	.....	19.0	.....	15.0	1.2	38.0	9.5	.....	.....	2.1	7.3
16	.....	17.3	.....	11.3	1.2	21.5	6.5	.....	.....	1.8	6.9
17	4.4	.....	.....	9.5	1.2	26.5	5.5	.....	.....	1.8	6.9
18	3.8	.....	9.2	8.0	1.2	19.2	5.5	.....	6.6	1.8	7.3
19	2.7	.....	.....	8.0	1.2	17.0	5.5	.....	4.8	1.8	6.0
20	.....	.....	.....	6.5	1.0	15.0	6.5	.....	4.1	1.8	5.4
21	3.8	.....	.....	5.5	11.3	6.5	.....	.....	3.7	7.3	5.3
22	8.1	.....	.....	4.5	5.5	5.5	.....	.....	3.7	6.6	4.3
23	5.7	.....	.....	3.5	2.0	4.5	.....	.....	3.1	4.8	3.9
24	7.8	.....	.....	2.5	2.0	3.5	.....	.....	3.1	3.7	3.7
25	19.9	.....	.....	2.5	2.5	2.5	.....	.....	3.1	3.7	3.4
26	20.8	7.8	.....	92.5	9.5	2.5	.....	.....	3.1	5.1	3.4
27	17.3	7.8	.....	2.0	9.5	2.5	.....	.....	3.1	5.4	3.4
28	.....	.....	.....	1.5	4.5	2.5	.....	.....	3.1	4.8	3.4
29	.....	.....	.....	1.5	3.5	2.5	.....	.....	2.5	4.1	3.4
30	.....	.....	.....	1.5	2.5	2.5	.....	.....	2.5	4.1	3.4
31	.....	.....	.....	.....	2.0	3.5	.....	.....	.....	3.7	3.7
Mean	.....	.....	.....	9.1	3.1	6.8	5.3	.....	3.6	3.3	4.1
Mean per square mile	.....	.....	.....	.587	.180	.40	.308	.....	.433	.398	.494
Run-off (depth in inches on drainage area)	.....	.....	.....	.41	.21	.46	.23	.....	.17	.46	.57

[a] The discharge curve is well defined for all stages.

Miscellaneous measurements in Seventymile River drainage basin for 1911.

Date.	Stream and locality.	Drainage area, square miles.	Discharge in second-feet.	Discharge in second-feet per square mile.
June 19	Mogul Creek at mouth	64.4	120.3	1.87
21	Nugget Creek at mouth	2.7	.9	.33
25	....do	2.7	.4	.15
25	Deep Creek at mouth	4.8	.8	.17
25	Granite Fork at mouth	138.0	194.7	1.41
26	Barney Creek at mouth	.....	.8	.....
26	Washington Creek at mouth	14.6	2.2	.15
26	Broken Neck Creek at mouth	2.9	1.3	.45
27	Curtis Bar Creek at mouth	1.7	1.3	.76
27	Rock Creek at bridge	7.3	.6	.08
30	....do	7.3	.4	.06
July 1	Mogul Creek at mouth	64.4	69.9	1.08
2	Bryant Creek at trail	21.4	57.5	2.69
5	Rock Creek at bridge	7.3	.9	.12
5	Curtis Bar Creek at mouth	1.7	.95	.56
6	Broken Neck Creek at mouth	2.9	.60	.21
7	Granite Fork at mouth	138.0	40.2	.30
7	Seventymile River above Granite Fork	207.0	53.2	.25
8	Barney Canal below forks	.....	.8	.....
9	Barney Creek or Right Fork	.....	.45	.....
11	Mogul Creek at mouth	64.4	120.3	1.87
11	Washington Creek at mouth	14.6	3.53	.24
11	Broken Neck Creek at mouth	2.9	1.10	.40
13	Curtis Bar Creek at mouth	1.7	1.80	1.06
13	Bryant Creek at trail	21.4	50.40	2.35
13	Rock Creek at bridge	7.3	1.20	.16

EAGLE DISTRICT.

LOCATION OF AREA.

The name Eagle district as used in this report denotes the area adjacent to the town of Eagle. The streams included in this area are Mission Creek, with its tributaries, and Yukon River at Eagle. The entire district has been topographically mapped, and considerable mining has been done within it.

Below is given a list showing the locations at which gaging stations were maintained in 1911 in the Eagle district:

Mission Creek drainage basin:
- Mission Creek above Oregon Creek.
- Mission Creek above Excelsior Creek.
- Mission Creek below Excelsior Creek.
- Mission Creek above American Creek.
- Excelsior Creek at mouth.
- Wolf Creek at Swanson dam.
- American Creek at claim "No. 8 above."
- American Creek at United States pumping plant.
- Discovery Fork of American Creek below Star Gulch.

MISSION CREEK DRAINAGE BASIN.

The Mission Creek basin lies between the Fortymile and Seventymile basins and contains approximately 170 square miles. Mission Creek enters the Yukon at the town of Eagle and is about 30 miles long. The water of the creek comes mainly from the eastern slope of the Glacier Mountains, and American Creek is also an impor-

tant tributary. Mission Creek has a precipitous fall throughout its length, and at some flood periods the stream is very hard to cross. In the last 9 miles of its course the creek follows the base of the high ridge that extends westward from the Yukon at Eagle.

American Creek, which rises in the high ridges bounding the extreme northern part of the area of Fortymile River, is the largest tributary of Mission Creek and enters that stream from the south about a mile above its mouth. It flows northeastward and is about 10 miles in length. Discovery Fork is the main branch of American Creek and joins it about 8 miles above the mouth. American Creek and its branches flow through narrow V-shaped canyons. The stream has a high grade and is rapidly eroding its floor. The placers of American Creek and Discovery Fork have yielded considerable gold, chiefly to small operators. Wolf Creek is a small but swift stream entering Mission Creek from the south about 4 miles above its mouth.

Daily discharge, in second-feet, of Mission and Wolf creeks for 1911.

Day.	Mission Creek above Oregon Creek.[a] [Drainage area, 20 square miles.]				Wolf Creek above Swanson dam.[b] [Drainage area, 19.5 square miles.]			
	June.	July.	Aug.	Sept.	June.	July.	Aug.	Sept.
1	.....	18.0	12.0	12.0	.....	7.5	5.0	.....
2	.....	18.0	11.5	14.0	.....	5.0	5.0	.....
3	.....	17.0	11.0	16.0	.....	7.5	3.5	.....
4	.....	17.0	10.0	18.0	.....	7.5	.....	.....
5	.....	27.5	10.0	20.5	.....	5.0	.....	.....
6	.....	20.5	9.0	20.5	.....	5.0	.....	.....
7	.....	17.0	9.0	20.5	.....	5.0	.....	.....
8	.....	14.0	9.0	22.0	.....	5.0	.....	.....
9	.....	12.0	9.0	24.0	.....	5.0	.....	.....
10	.....	11.5	9.0	22.0	.....	3.5	.....	.....
11	.....	11.5	20.5	20.5	.....	3.5	.....	.....
12	.....	11.5	17.0	19.0	.....	3.5	.....	22.5
13	.....	11.5	14.0	18.0	.....	3.5	.....	.....
14	.....	11.5	20.5	18.0	.....	3.5	.....	.....
15	.....	11.0	20.5	17.0	.....	3.5	.....	.....
16	.....	11.0	20.5	.....	.....	3.5	.....	.....
17	81.0	10.0	24.0	.....	.....	2.0	.....	.....
18	52.5	10.0	22.0	.....	.....	2.0	.....	.....
19	52.5	10.0	20.0	.....	.....	2.0	.....	.....
20	44.0	9.0	18.0	.....	.....	2.0	.....	.....
21	36.0	15.0	17.0	.....	.....	4.3	.....	.....
22	30.0	20.5	15.5	.....	.....	8.8	.....	.....
23	24.0	17.0	14.0	.....	.....	6.2	.....	.....
24	22.0	14.0	14.0	.....	.....	4.2	.....	.....
25	20.5	17.0	9.0	.....	.....	13.0	.....	.....
26	22.0	20.5	9.0	.....	.....	44.7	.....	.....
27	24.0	17.0	10.0	.....	.....	26.0	.....	.....
28	24.0	17.0	10.0	.....	.....	19.0	.....	.....
29	20.5	15.5	11.0	.....	.....	11.5	.....	.....
30	18.0	14.0	11.0	.....	.....	7.5	.....	.....
31	.....	13.0	12.0	.....	7.5	7.5	.....	.....
Mean	33.6	14.8	13.8	18.8	.....	7.7	4.5	.....
Mean per square mile	1.68	.740	.690	9.40	.....	.395	.231	.....
Run-off (depth in inches on drainage area)	.87	.85	.80	.52	.....	.46	.03	.....

[a] The discharges for this station are only approximate.
[b] The rating curve is well defined for all stages.

Daily discharge, in second-feet, of American Creek and branches for 1911.

Day.	Discovery Fork of American Creek below Star Gulch.[a] [Drainage area, 14.8 square miles.]					American Creek at claim "No. 8 above."[a] [Drainage area, 24.1 square miles.]				American Creek at United States pumping plant.[a] [Drainage area, 67.3 square miles.]	
	June.	July.	Aug.	Sept.	Oct.	June.	July.	Aug.	Sept.	June.	July.
1	.....	3.9	7.2	6.6	5.8	.....	11.5	6.5	.....	.....	30
2	.....	3.9	7.2	5.8	4.3	.....	10.8	5.5	18.7	.....	20
3	.....	3.8	7.2	5.4	4.6	.....	8.5	5.0	.....	.....	26
4	.....	3.7	7.2	5.0	4.3	.....	6.5	4.5	.....	.....	23
5	.....	5.2	7.2	5.0	4.3	.....	12.0	4.0	.....	.....	30
6	.....	4.3	7.2	5.0	4.3	.....	21.4	3.5	.....	.....	38
7	.....	3.9	7.2	5.0	3.9	.....	16.1	3.0	10.8	.....	38
8	.....	3.9	3.9	5.0	3.9	.....	13.0	3.0	.....	.....	23
9	.....	3.8	3.8	5.0	3.9	.....	13.0	2.6	.....	.....	26
10	.....	3.7	4.1	5.0	3.9	.....	10.8	6.0	.....	.....	20
11	.....	3.9	5.8	7.1	4.3	.....	10.8	10.8	.....	.....	23
12	.....	3.8	5.2	12.0	4.3	.....	8.6	10.8	.....	.....	18
13	.....	3.7	5.2	9.5	4.6	.....	8.0	10.8	.....	185	23
14	18.0	3.8	5.2	8.3	5.0	.....	7.0	10.8	.....	160	26
15	17.1	3.7	6.0	7.0	5.0	61.7	6.5	10.8	.....	138	18
16	14.8	3.7	6.0	6.2	4.6	57.3	5.0	10.5	.....	138	18
17	13.1	3.7	8.3	5.8	4.6	57.3	4.0	68.3	.....	119	18
18	13.1	3.7	7.3	5.8	4.3	49.3	3.0	33.4	.....	119	23
19	9.8	3.7	6.4	5.8	4.3	41.3	2.6	25.0	.....	100	18
20	9.8	3.7	5.8	5.0	4.3	36.0	2.6	16.1	.....	57	23
21	8.8	3.9	5.4	5.0	3.9	32.0	4.0	10.0	.....	46	18
22	7.7	5.0	5.2	5.0	3.7	27.0	4.0	8.0	.....	38	30
23	5.4	4.3	5.2	5.0	.....	25.0	10.0	7.0	.....	38	26
24	5.0	6.5	5.0	5.4	.....	23.0	20.0	7.0	.....	30	23
25	4.8	9.3	4.8	5.4	.....	21.4	33.4	7.0	.....	30	38
26	5.6	13.0	4.8	5.4	.....	18.7	49.0	6.5	.....	23	70
27	4.3	10.1	5.4	5.4	.....	16.1	27.0	.....	.....	26	70
28	5.0	7.7	5.4	5.8	.....	21.4	21.4	.....	.....	26	70
29	4.6	5.8	5.4	5.8	.....	18.7	16.0	.....	.....	30	46
30	4.3	5.2	5.0	5.8	.....	16.0	10.0	.....	.....	26	26
31	.....	4.6	7.7	.....	.....	.....	8.6	.....	.....	.....	20
Mean	8.9	4.9	5.9	6.0	4.4	32.6	12.4	11.4	.....	74	30
Mean per square mile	.602	.331	.398	.406	.297	1.35	.515	.473	.....	1.10	.446
Run-off (depth in inches on drainage area)	.38	.38	.46	.45	.24	.80	.59	.46	.....	.73	.51

[a] Records are believed to be reliable within 6 per cent.

Miscellaneous measurements in Mission Creek drainage basin for 1911.

Date.	Stream and locality.	Drainage area.	Discharge.	Discharge per square mile.
		Sq. miles.	*Sec.-ft.*	*Sec.-ft.*
June 27	Mission Creek above Excelsior	93.1	89.76	0.96
27	Excelsior Creek at mouth	31.1	20.05	.64
27	Wolf Creek at crossing	28.4	7.50	.26
July 2	Mission Creek below Excelsior	93.1	66.20	.71
31	Mission Creek above American Creek	168.0	107.20	.64
Aug. 13	Mission Creek below Excelsior	124.0	100.0	.80

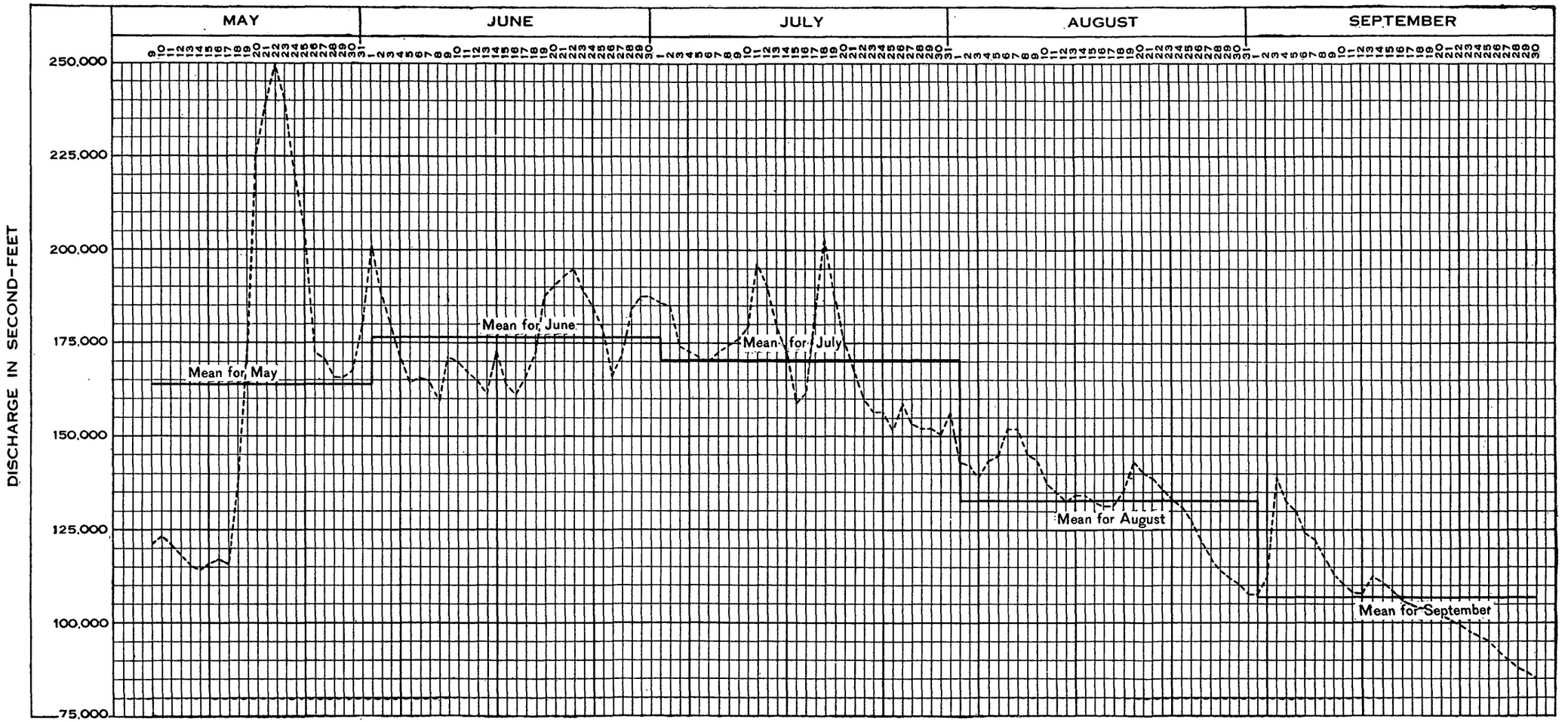
YUKON RIVER AT EAGLE.

A daily record of the flow of the Yukon at Eagle has been kept for the open season of 1911. It extends from May 9 to October 1 and is probably the most reliable as well as the longest record yet obtained on this river. The Yukon has two distinct seasons, which are known as the "open" and the "closed" season. In the former, which extends from about May 20 to October 20, the river is open, or free from ice. By the "closed" season is meant that period when the river is filled with floating ice or covered with a solid sheet of ice, as it is from about October 20 to May 20. During the closed season the watershed of the river becomes frozen, and in March and the early part of April the flow of the Yukon is obtained mainly from open springs and from lakes. As a result the river reaches its minimum stage during this period. By the end of April the sun is high enough to thaw the drainage area, and the water from melting snow and ice causes the river to rise very rapidly. About the 10th of May the river usually reaches a stage so high that the ice begins to move, and after a run of ice extending over ten days the river is practically clear. The maximum stage of the river occurs at the end of May and has no doubt at times reached a discharge of approximately 330,000 second-feet at Eagle. In 1911 the crest, or maximum discharge, occurred May 22 and was 249,000 second-feet. On April 24 the river was measured at Eagle and gave a discharge of 10,100 second-feet, which is believed to be about the minimum for the year, and it is reasonable to assume that this result will represent very closely the minimum at Eagle from year to year.

Mr. William Ogilvie, a Canadian engineer, has estimated the flow of the Yukon at the international boundary, which is about 12 miles south of Eagle, upstream. In December, 1895, he estimated the winter flow as about 96,000 second-feet, the mean summer flow as 135,000 second-feet, and the flow at flood stages as 180,000 to 225,000 second-feet. These data serve for a comparison with the results obtained at Eagle during 1911. In the table herewith the mean summer flow is shown to be not far from 135,000 second feet, but Mr. Ogilvie's figures for the winter flow are shown to be too large, and his estimates of flood stages too small.

Other measurements of flow have been made on the Yukon, but these can not serve to indicate the flow at Eagle. At the mouth of the Yukon the average flow, as estimated by the Coast and Geodetic Survey, is about 436,000 second-feet, and below the Lewis and Pelly the average flow is given by Canadian engineers as 67,000 second-feet.

A hydrograph of the daily flow of the Yukon at Eagle from May 9 to October 1, 1911, is given on Plate XII, and the following table shows the mean monthly discharge and run-off per square mile:



HYDROGRAPH SHOWING DAILY DISCHARGE OF YUKON RIVER AT EAGLE.

Daily discharge, in second-feet, of Yukon River at Eagle for 1911.[a]

[Drainage area, 122,000 square miles.[b]]

Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	.....	201,400	186,000	143,800	107,500
2	.....	.....	187,500	184,500	142,600	112,000
3	.....	.....	180,000	174,400	139,000	139,000
4	.....	.....	171,600	173,000	142,600	133,000
5	.....	.....	164,600	171,600	145,000	130,600
6	.....	.....	166,000	170,200	152,000	124,000
7	.....	.....	164,600	173,000	152,000	122,000
8	.....	.....	159,000	174,400	145,000	117,000
9	.....	121,000	171,600	175,800	143,800	113,000
10	.....	123,000	170,200	178,600	137,800	111,100
11	.....	121,000	167,400	196,600	135,400	107,500
12	.....	118,000	166,000	190,500	133,000	107,500
13	.....	116,000	161,800	178,600	134,200	112,000
14	.....	114,000	173,000	173,000	134,200	111,100
15	.....	116,000	164,600	159,000	133,000	108,400
16	.....	117,000	161,800	161,800	131,800	106,600
17	.....	116,000	166,000	184,500	131,800	104,800
18	.....	133,000	173,000	203,000	135,400	103,000
19	.....	175,800	187,500	187,500	142,600	103,000
20	.....	225,400	190,500	175,800	140,200	101,200
21	.....	238,200	193,500	167,400	139,000	100,300
22	.....	249,400	195,000	159,000	135,400	99,400
23	.....	243,000	189,000	156,600	133,000	97,700
24	10,100	220,600	184,500	156,600	131,800	96,900
25	.....	206,200	178,600	152,000	127,000	95,300
26	.....	173,000	166,000	159,000	122,000	93,000
27	.....	171,600	173,000	153,400	117,000	90,000
28	.....	166,000	184,500	152,000	114,000	88,000
29	.....	166,000	187,500	152,000	112,000	87,000
30	.....	167,400	187,500	150,600	111,100	86,000
31	.....	180,000	.....	156,200	107,500	.....
Mean	.....	164,300	176,200	170,600	133,700	106,900
Mean per square mile	.....	1.35	1.44	1.40	1.10	.876
Run-off (depth in inches on drainage area)	.....	1.15	1.61	1.61	1.27	.98

[a] The rating curve for this station is well defined for all stages. All hydraulic data in May, 1911, were secured by ice floats.

[b] Approximate and subject to revision.

PLACER MINING IN THE FAIRBANKS AND CIRCLE DISTRICTS.

By C. E. Ellsworth.

FAIRBANKS DISTRICT.

GENERAL CONDITIONS.

Slow but steady progress is being made in the Fairbanks district toward placer mining by more improved methods and on a larger scale. The only important improvement made in 1911 consisted of the installation of a dredge on Fairbanks Creek, the first to be operated in the district. Plans are reported to be under way for installing more dredges in the near future in places where conditions favor their employment.

The value of the gold production of the Fairbanks district in 1911 is estimated to be approximately $4,500,000; the value in 1910 was $6,100,000. The decrease is due mainly to the fact that most of the bonanzas of the camp have been worked out, and the major part of the mining during the last year was therefore confined to relatively low-grade deposits. A stampede to Ruby Creek caused a shortage of men in June and July, when some of the larger operators closed down their plants. The usual lack of water prevailed, producing conditions that were probably worse than in 1910. It is estimated that the number of men engaged in mining varied from about 800 during the dull period in the winter to a maximum of nearly 2,000 at the height of the summer season, and the number of claims being worked varied from 75 to 125. The winter mining operations are believed to have produced about $1,000,000 worth of gold.

PRODUCTIVE CREEKS.

GOLDSTREAM BASIN.

Goldstream Creek was probably the largest producer in the Fairbanks district during the winter of 1910–11 and the summer of 1911. Although many of the large producing mines of earlier years have been worked out, the tracing of the pay streaks has continued with marked success, particularly along the left limit bench claims above and below Fox Creek. Several new workable deposits have been found, some of which are of relatively high grade. It is estimated that 12 claims employing 85 men were worked in the winter of 1911,

and during the height of the summer season there were probably 300 men engaged in mining on 20 claims.

On Engineer Creek during the winter 11 claims furnished work for 160 men, and in the summer 10 claims employed a maximum of 360 men. Most of the operations were large, several mines at times during the summer employing as many as 100 men.

Pedro Creek, on which, in 1901, gold was first discovered in the Fairbanks district, had a prosperous year. In the winter very little beyond prospecting was done, but in the summer 10 or 12 plants of various capacities furnished employment for about 200 men. Several steam scrapers were operated successfully on the creek. Considerable ground on Pedro Creek is owned by a dredging company, and it is expected that by the end of the season of 1912 a machine will be in operation.

From 50 to 60 men were engaged in mining on Gilmore Creek most of the year. Open-cut methods were chiefly employed in the summer, but the winter operations were, of course, entirely underground. The mines on First Chance Creek, which have been small producers for several years, did better in 1911. During the winter 14 men were engaged in drift mining on First Chance, and 4 men worked at open-cut mining during the summer.

Good prospects were found on Allen Creek, a small tributary of Goldstream.

CHATANIKA RIVER BASIN.

Cleary Creek showed a marked decrease in operations in 1911, particularly along the middle and upper parts of the stream, which have produced much gold in the past. Farther down, in the vicinity of Chatanika, several large outfits, employing from 20 to 50 men, were working continuously during the summer. In the winter the work was confined mainly to blocking out ground in preparation for the open season, when water would be available for washing the gravel as fast as hoisted. The Cleary Creek pay streak has been traced well out into the Chatanika Flats, and although the ground is deep and expensive to work, the flats promise to show considerable activity for several years. From 25 to 30 outfits were mining along Cleary Creek and the Chatanika Flats throughout the year, employing from 100 to 125 men in the winter and from 300 to 350 men in the summer.

Encouraging results have been obtained on Wolf Creek, where from 10 to 15 men were engaged in mining most of the year. Some mining was done on Chatham Creek also.

The production of Dome Creek for the last year probably exceeded that of 1910. Several small outfits were working between "No. 13 above" and "No. 7 below," but the increase in production was due to the rich gravel found on the Niggerhead Association claim, near

the mouth of the creek. The pay streak is said to be several hundred feet wide and to average about 3 feet in depth. Most of the prospecting was done with a churn drill.

Very little mining was done on upper Vault Creek, the principal producing claims on this stream being the Alabama, Oregon, Sierra, and Isabel associations, which are situated in the Chatanika Flats, near the mouth of the creek. The operators believe that the Vault pay streak joins that of Dome Creek on the Alabama Association claim. An average of about 75 men were engaged in mining on the creek during the year.

On Treasure Creek 4 outfits employing 25 to 30 men were working in the winter, and during the summer 10 men were mining on 3 claims.

On Little Eldorado Creek the gold is very irregularly distributed, and considerable loss was suffered last year before that fact became known. In 1911, however, the operators were more successful; more placers will probably be found as prospecting continues. From 8 to 10 claims were worked during the year, employing in all from 75 to 175 men.

The hydraulic plant on Homestake Creek was put into operation as early in the season as climatic conditions would permit and the work was carried on with fair success during the period when the melting of ice and snow furnished a sufficient supply of water. The rainfall, however, was very light and the plant remained idle for a considerable part of the season.

FISH CREEK BASIN.

Fairbanks Creek continues to be one of the important producers of the district, and its production for 1911 will probably exceed that of 1910. From 10 to 15 outfits were working between "No. 10 above" and "No. 11 below," and about 150 men were employed On "No. 2 below" a new discovery seems to have been made. The gold is so different in appearance from any that has been found before on the creek that the operators believed they have found an entirely new pay streak. Latest reports indicate that the pay streak is over 200 feet wide. The gold is very coarse, and some of the ground is said to contain as much as $2 to $3 to the pan.

On "No. 8 above" a dredge was installed in the summer by the Alaska Exploration Co. The dredge had been operated on Stewart River, in Yukon Territory. In July it was taken by river to Chena, where it was dismantled into parts that could be handled and was shipped by train to Gilmore, thence it was hauled on wagons over the divide to its present location, where it was reconstructed and put in operation September 11. It is of the Risdon make and has 3½ cubic foot close-connected buckets and a 40-foot ladder. The scow

measures 32 by 90 feet and draws 3½ feet of water. The gross weight of the machine is 300 tons. The cost of moving, dismantling, and reconstructing was reported to have been $30,000. The motive power is steam, wood being used for fuel. Considerable delay was caused by the breaking of links in the bucket chain, and late in October the dredge was closed down for the season. New links will be shipped over the trail, so that operations may be resumed early in the spring.

Considerable mining was done on Fish Creek, but the ground is said to be of lower grade than last year's results had led many of the operators to expect. During the summer 6 steam plants with self-dumping hoists were in operation and about 50 men were employed. Between 75 and 100 men wintered along the creek, but the work done was mostly prospecting.

On Last Chance Creek 4 or 5 men were mining by open-cut methods on one claim during the summer.

A pay streak is said to have been located on Pearl Creek, which is the tributary to Fish Creek from the right opposite "No. 7 below."

CRIPPLE CREEK BASIN.

Mining operations on Ester Creek continued to decline during the past year, and many of the richer claims are now worked out. Several new discoveries have been made, however, and the outlook for next season's mining seems fairly good. Commercial placers have been found on the second and third tiers left limit bench claims, and the known area of occurrence continues to increase as prospecting proceeds.

Eva Creek, which is a small tributary of Ester Creek from the left limit, opposite "No. 5 below," has been prospected extensively, and rich gravel is reported to have been found.

On the right limit of Ready Bullion one plant was working by open-cut methods; all other work was by drifting.

Some mining was done on St. Patrick Creek, but nothing was done on Cripple Creek proper. It is estimated that about 35 men were mining in the basin during the winter and about 500 in the summer.

BEAVER CREEK BASIN.

No more discoveries were made in the Beaver Creek region, although about 25 men were prospecting in the basin during the winter. Discovery claim, on Ophir Creek, is said to contain workable placers, and mining will probably be done there during the winter of 1911–12. Some very coarse gold has been found on the right limit bench claim of Nome Creek opposite the mouth of Ophir Creek, and one man continued prospecting by open-cut methods through the summer,

when there was sufficient water. Only 4 or 5 men remained in the basin after the opening of the summer season.

CHENA RIVER BASIN.

Two or three outfits were mining on Smallwood Creek. The depth to bedrock is about 125 feet, and the pay streak ranges from 20 to 120 feet in width. The reported values are about $1 per square foot of bedrock, and the gold is rather coarse. On "No. 4 below" a nugget valued at $50 was found. About 10 men were engaged in mining during the summer.

It is reported that a company has been organized for dredging and hydraulicking on Middle Fork of Big Chena River in the vicinity of Palmer and Shamrock creeks, and that work would begin there in the fall of 1911. Another outfit was prospecting with a churn drill along the headwaters of the Big Chena.

SALCHAKET-TENDERFOOT REGION.

Mining continued in the Salchaket and Tenderfoot regions on about the same scale as in preceding years. Details of the operations are lacking, as the writer was not able to visit this field.

CIRCLE PRECINCT.

GENERAL CONDITIONS.

The value of the gold production of the Circle precinct in 1911 is estimated at approximately $350,000, which exceeds that of any year since 1898. The increase was due entirely to the improved methods employed. Five hydraulic plants were in operation during the whole or a part of the summer, and, although the water supply was insufficient during the greater part of the season, hydraulic methods, where intelligently applied, have proved to be superior to the hand methods that they have in part supplanted.

PRODUCTIVE CREEKS.

MASTODON CREEK.

Mastodon Creek was, as usual, the largest producer of the district. It is estimated that during the winter there were 7 producing claims employing 14 men and during the following summer from 8 to 10 outfits employing from 50 to 60 men. Three hydraulic plants were installed in the course of the year. The largest one, situated near the mouth of the creek, was put in operation in May. The water supply was derived from both Mastodon and Independence creeks and was carried in 18 to 26 inch riveted steel pipes. On the Mastodon Creek branch 9,000 feet of pipe was used, and a working head of 245 feet was obtained. From Independence Creek the water

was carried 4,000 feet by pipe, and a head of 95 feet was available. A hydraulic elevator with a 10-inch throat was installed to elevate the gravels in the creek bottom. The two upper plants, one on claim "No. 14 above" and one on claim "No. 23 above," were smaller and were used mainly to strip the ground and prepare it for other methods of recovering the gold. At the plant on "No. 14 above," a Ruble elevator was reported to have been used with considerable success.

MAMMOTH CREEK.

The hydraulic plant on claim "No. 7 below" on Mammoth Creek was operated until about the middle of July, when it was moved to a location just above the mouth of Miller Creek where work was resumed later. About 10 men were employed in operating the plant, and it is understood that when the water supply was sufficient the results were satisfactory. The Porcupine branch of the Bonanza Creek ditch was completed in July, and throughout the summer several men were employed in repairing and enlarging the main ditch.

EAGLE CREEK.

Notwithstanding the severe shortage of water on Eagle Creek, the hydraulic plant moved a large body of gravel and demonstrated conclusively what could be accomplished by this means even under the most adverse conditions. Two shifts of 4 men each were ordinarily employed.

Some mining was done with pick and shovel on Mastodon Fork of Eagle Creek.

DEADWOOD AND SWITCH CREEKS.

No new developments were made on Deadwood Creek, and the production was probably about the same as in 1910. About 30 men were engaged in mining during both winter and summer. Considerable prospecting with a churn drill was done below where the creek emerges from the foothills, to determine the feasibility of dredging in that vicinity, but none of the results are known.

On Switch Creek 2 or 3 outfits employing from 1 to 3 men each were mining from time to time during the year.

OTHER CREEKS.

On Independence Creek 2 outfits employing 6 men were mining in the summer. No winter work was done on the creek. Mining was also done on Half Dollar and Greenhorn creeks. About 10 men were working by various methods along the bars of Birch Creek, and the prevailing low water was particularly favorable to them.

WATER SUPPLY OF THE FAIRBANKS, SALCHAKET, AND CIRCLE DISTRICTS.

By C. E. ELLSWORTH.

INTRODUCTION.

Since 1907 water-supply investigations have been carried on in the Yukon-Tanana region by the United States Geological Survey, and each year the essential results have been published in the general progress report for Alaska in as brief form as the proper use of such data would permit.

The following report is a continuation of those already published, and only such matter is quoted or in part republished as is considered necessary to make this report in itself of working value to engineers and mine operators.

The thanks of the writer are due to many residents of the country for their kindly cooperation. He also wishes to acknowledge special indebtedness to the following gage observers: Messrs. George L. Dalby, Jack Hendricks, William Hugel, Alfred Johnson, Frank Miller, Dan Nickelson, John Olsen, J. R. Parkin, Charles H. Rogers, Louis Schmidt, H. A. Stade, Mrs. F. Warren, and Messrs. Robert Warren and James Woods.

DATA AND METHODS.

The methods of carrying on the work and collecting the data were essentially the same as those used for similar work elsewhere in the United States, but were adapted to the special conditions found in Alaska.

In the consideration of industrial or mining enterprises which use the water of streams it is necessary to know the total amount of water flowing in the stream, the daily distribution of the flow, and the conditions affecting the flow. Several terms are used—such as second-foot, miner's inch, and gallons per minute—to describe the quantity of water flowing in a stream, the one selected depending on the use to be made of the data.

"Second-foot" is in most general use for all classes of work, and from it the quantity expressed in other terms may be obtained. It is an abbreviation of cubic foot per second, and may be defined as the

quantity of water flowing per second in a stream 1 foot wide and 1 foot deep at the rate of 1 foot per second. It should be noted that it is a *rate* of flow, and to obtain the actual quantity of water it is necessary to multiply it by the time.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly, as regards both time and area.

"Run-off, depth in inches on drainage area," is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is expressed in depth in inches.

The "miner's inch," the unit used in connection with placer mining, also expresses a rate of flow and is applied to water flowing through an orifice of a given size with a given head. The head and size of the orifice differ in different localities, thus making it a most indefinite and unsatisfactory unit. Owing to the confusion arising from its use, it has been defined by law in several States. The California miner's inch is in most common use in the United States and was defined by an act approved March 23, 1901, as follows: "The standard miner's inch of water shall be equivalent or equal to 1½ cubic feet of water per minute, measured through any aperture or orifice." This miner's inch corresponds to the so-called "6-inch pressure" and is one-fortieth of a second-foot.

The determination of the quantity of water flowing past a certain section of a stream at a given time is termed a "discharge measurement." The quantity is the product of two factors—the mean velocity and the area of the cross section. The mean velocity is a function of surface slope, wetted perimeter, roughness of bed, and the channel conditions at, above, and below the gaging station. The area depends on the contour of the bed and the fluctuations of the surface. The two principal ways of measuring the velocity of a stream are by floats and current meters.

All measurements by the engineers of the Survey were made with the current meter except those on Yukon River at Eagle (see pp. 30–31), but as float measurements can readily be made by the prospector the method is described below.

The floats in common use are the surface, subsurface, and tube or rod floats. A corked bottle with a flag in the top and weighted at the bottom makes one of the most satisfactory surface floats, as it is affected but little by wind. In flood measurements good results can be obtained by observing the velocity of floating cakes of ice or débris. In all surface-float measurements the observed velocity must be multiplied by 0.85 to 0.90 to reduce it to the mean velocity. The subsur-

face and tube or rod floats are intended to give directly the mean velocity in the vertical. Tubes give excellent results when the channel conditions are good, as in canals.

In measuring velocity by a float, observation is made of the time taken by the float to pass over the "run"—a selected stretch of river or creek from 50 to 200 feet long. In each discharge measurement a large number of velocity determinations are made at different points across the stream, and from these observations the mean velocity for the whole section is determined.

The area used in float measurements is the mean of the areas at the two ends of the run and at several intermediate sections.

PRECIPITATION.

Such records as are available for 1911 indicate that the precipitation throughout the Yukon-Tanana region did not vary far from the normal. In many localities its distribution was very unfavorable for mining. Most streams reached a lower stage than had before been recorded, although the average for the summer was about normal. On some streams the month in which the minimum flow occurred shows a mean run-off in excess of the average.

Most of the stations at which the most reliable and longest records have been kept are located at a considerably lower elevation than the mines. The Chicken Creek, Discovery Fork, and Crooked Creek stations probably represent very closely the average meteorologic conditions that prevail in the mining districts, and when several years' records shall have been obtained the data collected at the lower stations will be of greater value for comparison.

The following table gives the monthly precipitation at all points in the Yukon-Tanana region where records have been kept subsequent to 1903. Such scattered records as were kept previous to 1903 have been compiled by Abbe.[1]

Monthly precipitation, in inches, at stations in Yukon-Tanana region, 1903–1911.

[Rainfall or melted snow is given in the first line; snowfall in the second line.]

Station.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Central	1906	0.56	0.06	0.65	0.47	0.86	4.91	4.82	1.85	0.52	0.70	0.80	0.35	15.95
		6.1	1.0	1.4	4.7	2.0	.....	.....	.....	.....	7.0	8.0	4.0	34.2
Do	1907	1.04	.42	2.57	.93	.57	2.21	1.40	.....	.....	.....	.....	.....	.....
		10.0	4.0	4.0	8.0	1.5	.....	.....	.....	.....	.....	.....	.....	.....
Circle	1906	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.75	.....
		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9.5	.....
Do	1907	1.02	.57	.28	.15	.29	.....	1.36	2.79	1.73	.....	.....	.63	.....
		8.5	7.8	3.25	.....	.....	.....	.....	.....	.....	.....	.....	8.2	.....
Do	1908	1.23	.25	.76	1.45	.29	.20	.87	1.08	2.21	.40	.75	1.11	10.60
		9.2	2.5	6.8	8.0	.....	.....	.....	.....	.....	3.0	8.5	11.2	51.2
Do	1909	.44	.47	.17	.75	.60	2.24	3.25	1.02	.....	.....	.....	.....	.....
		4.5	5.2	1.0	3.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
Charity Creek	1908	.....	.....	.....	.11	.27	1.33	2.80	2.33	2.28	.20	.....	.....	.....
		.....	.....	.....	.....	.....	.....	.....	.....	.....	3.0	.....	.....	.....

[1] Abbe, Cleveland, jr., Prof. Paper U. S. Geol. Survey No. 45, 1906, pp. 189–200.

Monthly precipitation, in inches, at stations in Yukon-Tanana region, 1903–1911—Con.

Station.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Chicken Creek[a]	1911	.....	.....	.....	.....	.....	0 45	1.08	0.68	1.02	0.50	0.09	0.09	.....
Cleary	1907	.....	.....	.....	.....	.....	.84	2.55	2.88	3.82	.....	.....	.....	.....
Crooked Creek[b]	1911	.....	.....	.....	.....	.....	.....	2.52	2.18	1.30	.....	.....	.....	.....
Discovery Fork[c]	1911	.....	.....	.....	.....	.....	1.24	2.36	2.33	1.15	.....	.....	.....	.....
Eagle Creek	1908	.....	.....	.....	.....	.....	.....	.....	2.99	.....	.....	.....	.....	.....
Fairbanks	1904	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.10	2.00	.....
Do	1905	0.92	0.50	0.05	0.20	.....	.....	.....	2.63	.86	.....	1.20	.60	.....
		9.1	5.0	.5	2.0	.....	.....	.....	.....	.....	.....	12.0	5.1	.....
Do	1908	1.75	.37	.33	.10	0 36	1.05	2.82	1.50	.25	.30	.65	1.15	10.63
		17.5	3.7	3.3	1.0	.....	.....	.....	.....	.....	.6	6.5	11.5	44.1
Do	1907	3.30	.86	2.42	.03	.35	1.47	1.51	1.81	3.58	2.44	.35	.59	18.71
		33.0	8.6	24.2	.3	.....	.....	.....	.....	.....	24.4	3.5	5.9	99.9
Do	1908	.42	.21	1.10	.11	.52	.96	.73	.71	1.57	.47	.51	.65	7.96
		4.2	2.1	11.0	.8	.....	.....	.....	.....	.....	.....	.....	8.1	26.2
Do	1909	.90	.08	.05	.66	.38	1.64	1.90	1.73	.39	.80	.52	.80	9.85
Do	1910	.70	.14	.02	.36	.39	2.16	.46	1.09	1.91	.66	.50	.76	9.75
Do	1911	1.50	.80	.06	.....	.12	.....	.....	2.30	1.60	.22	.29	1.23	.....
Faith Creek	1907	.....	.....	.....	.....	.....	.....	1.87	3.00	2.97	.....	.....	.....	.....
Fort Egbert	1903	.58	.81	.54	.12	1.38	.57	2.40	.97	2.97	.....	.....	.....	.....
Do	1905	.....	.....	.....	.....	.33	1.95	1.52	2.72	3.38	2.96	.93	.68	.....
Do	1906	.....	.14	2.19	.00	.54	.51	2.54	1.28	.01	1.71	.51	.07	.....
		.....	1.0	11.0	.....	.....	.....	.....	.....	.....	.46	8.5	1.0	.....
Do	1907	1.45	.21	0	.25	.40	1.89	1.43	1.98	1.45	1.12	.40	.31	10.94
		2.0	2.0	0	.15	.55	.....	.....	.....	.....	13.0	4.0	.....	.....
Do	1908	.12	.25	.75	.10	1.02	2.16	2.47	1.02	1.48	.18	.82	1.09	11.46
		3.0	2.5	7.5	1.0	.....	.....	.....	.....	.....	6.0	7.0	11.0	38.0
Do	1909	.16	.07	.11	.34	.28	2.35	1.77	.95	.88	.81	.30	.26	8.28
		2.0	1.0	1.0	2.0	.....	.....	.....	.....	6.1	11.7	3.0	.....	.....
Do	1910	.83	.01	.53	.25	.28	1.05	2.28	2.63	2.98	.69	.25	.30	12.08
Do	1911	.27	.24	.39	.97	2.87	1.26	2.36	2.65	1.21	.13	.29	.80	13.44
Fort Gibbon	1903	.37	.73	1.14	.23	.16	.38	1.76	.....	.48	.22	.33	Tr.	.....
Do	1904	.08	.55	.35	.09	.22	.33	1.95	3.80	.35	.39	.07	.70	8.88
Do	1905	.37	.47	Tr.	.32	.84	1.50	4.90	3.02	.59	.50	1.10	.18	13.79
Do	1906	.65	.20	.30	Tr.	1.00	.....	.....	.....	.....	[d].50	.99	.27	.....
		6.0	2.0	3.0	.....	.....	.....	.....	.....	.....	[d]5.0	9.9	2.7	.....
Do	1907	1.26	.....	.53	0	.30	.....	2.58	2.31	2.32	1.22	.03	.31	.....
		12.6	.....	5.0	0	.....	.....	.....	.....	4.0	12.0	1.5	.....	.....
Do	1908	.23	.26	.90	0	1.16	.....	.96	1.13	1.60	.45	.08	.60	.....
		4.0	6.0	17.0	0	.....	.....	.....	.....	2.25	6.0	.....	6.5	.....
Do	1909	.05	.10	.37	.39	1.51	.77	1.49	2.27	.90	.49	.46	.80	9.60
		.5	.5	.....	2.2	.....	.....	.....	.....	.....	4.8	4.6	8.0	20.6
Do	1910	1.23	.08	.60	.28	.69	.57	1.79	2.26	.74	.38	.....	.59	.....
Do	1911	.94	1.63	.38	.77	1.53	.27	1.41	2.19	1.53	.44	.16	.....	.....
Hot Springs	1909	.....	.....	.....	.....	.....	.....	1.76	3.19	.25	.44	1.10	2.26	.....
		.....	.....	.....	.....	.....	.....	.....	.....	.....	4.4	11.0	22.6	.....
Do	1910	1.64	.03	.60	.20	.34	.76	[e]2.16	.....	1.32	.....	.....	.....	.....
		16.4	.3	6.0	2.0	3.4	.....	.....	.....	.....	.....	.....	.....	.....
Kechumstuk	1904	.....	.....	.....	.....	1.80	.83	2.23	.94	.64	.30	.03	.23	.....
Do	1905	.90	.10	.05	.40	.20	1.58	.40	1.48	2.16	1.18	.36	.20	9.01
Do	1906	.36	.05	.06	.27	1.69	1.61	3.25	2.51	.51	.31	.29	.20	11.11
		4.0	.5	1.0	5.0	.....	.....	.....	.....	.....	4.3	.5	3.0	18.3
Do	1907	.12	.20	.27	Tr.	1.30	2.03	1.60	2.14	.49	.72	.40	.....	.....
		2.0	3.0	4.0	.....	12.0	.....	.....	.....	2.0	9.0	4.0	.....	.....
Do	1908	0	0	.41	.40	1.78	1.77	2.30	2.22	1.35	.....	.90	.20	.....
		0	0	5.0	4.0	.....	.....	.....	.....	.....	.....	9.0	2.0	.....
Do	1909	0	.30	.10	.20	0	3.66	3.39	.....	.....	.....	.....	.....	.....
		0	.5	1.0	.....	0	.....	.....	.....	.....	.....	.....	.....	.....
Miller House	1909	.....	.....	.....	.....	.....	.....	2.98	1.26	.60	.93	.30	.30	.....
		.....	.....	.....	.....	.....	.....	.....	.....	4.0	8.0	3.0	3.0	.....
Do	1910	.....	.....	.....	.20	.....	1.94	2.37	.30	1.03	.....	.....	.....	.....
North Fork	1905	.....	.....	.....	.....	.....	.....	.....	1.91	1.86	.....	.50	.20	.....
Do	1906	.70	.50	.10	.80	1.98	2.74	2.69	1.01	.72	.42	.55	.38	12.59
		7.0	5.0	1.0	8.0	.....	.....	.....	.....	.....	3.2	4.5	4.5	33.2
Do	1907	.69	.28	.27	Tr.	1.34	1.92	1.57	3.19	2.0	1.40	.20	.....	.....
		15.5	3.0	3.0	.....	4.0	.....	.....	.....	5.0	12.0	2.0	.....	.....
Do	1908	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
		5.0	Tr.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Poker Creek	1907	.....	.....	.....	.....	.....	.....	.....	1.40	3.70	1.70	.25	1.09	.....
		.....	.....	.....	.....	.....	.....	.....	.....	.....	24.0	3.3	6.8	.....
Do	1908	.....	1.32	.....	.42	.58	1.80	2.02	.99	2.45	.75	.35	.61	.....
		.....	10.5	.....	5.0	.....	.....	.....	.....	4.5	6.9	4.4	12.6	.....
Do	1909	.68	.09	.03	.42	1.11	1.22	2.01	2.01	.....	.....	.....	.....	.....
		8.8	2.0	.5	8.0	2.5	.....	.....	.....	.....	.....	.....	.....	.....
Rampart	1905	.....	.....	.....	.....	.....	1.33	1.99	2.19	1.70	1.20	1.43	.33	.....
Do	1906	.63	.08	.17	.04	.40	.15	1.86	2.40	.59	.61	.95	.33	8.21
		7.2	2.0	1.8	.5	.....	.....	.....	.....	.....	.....	10.2	3.5	25.2
Do	1907	1.17	.44	1.17	.02	.44	1.64	2.29	3.38	2.52	.65	.55	1.26	15.53
		12.0	4.5	12.8	2.5	.....	.....	.....	.....	.....	.....	6.3	.....	.....

[a] Fortymile district.
[b] Seventymile district.
[c] Eagle district.
[d] October 7 to 31.
[e] July 16 to 31.

Monthly precipitation, in inches, at stations in Yukon-Tanana region, 1903–1911—Con.

Station.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Rampart	1908	1.08	0 52	0.81	0.58	0.82	1.38	1.13	0.46	1.56	0.39	0.73	1.14	10.60
		11.5	6.9	8.1	.....	.....	.....	.....	.....	.....	5.1	3.6	16.8	52.0
Do	1909	.09	.10	.37	.51	1.04	.85	2.01	1.41	.36	1.14	.35	1.99	10.22
		1.4	1.2	6.2	5.6	.....	.....	.....	.....	1.5	14.4	3.6	20.2	54.1
Do	1910	.84	.08	.36	.07	.20	.98	.71	.62	.43	.45	.26	.32	5.32
		11.1	.8	4.7	1.0	.....	.....	.....	.....	.....	6.0	3.5	5.0	32.1
Do	1911	1.05	2.20	.31	.75	.48	.34	.43	1.12	.79	.57	.21	.....	.....
Summit road house	1907	.....	.....	.....	.....	.....	.....	2.71	3.27	[a]3.33	.....	.....	.....	.....
Tanana Crossing	1904	.....	.....	.....	.....	.76	.....	.78	.89	1.06	.15	.10	.90	.....
Do	1905	.24	.08	.18	.00	.14	.....	.37	2.95	.....	1.40	.60	.....	.....
Do	1906	.30	.00	Tr.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

[a] September 1 to 22.

WATER POWER.

The records of stream flow gathered at points showing the greatest possibility for water-power development have been briefly summarized in the table below. In comparing the columns showing days of deficient discharge for several years on any stream, allowance should be made for the difference in the length of periods and also for the part of the season covered by the records. Ordinarily the longer the period the greater will be the number of days of deficient discharge for any given number of horsepower and the less favorable will be the comparison with some other year in which the records extend over a shorter length of time. Also the days of deficient discharge will be a greater percentage of the total number of days if the observations include only the low-water months.

The table gives the horsepower (80 per cent efficiency) per foot of fall that may be developed at different rates of discharge and show the number of days on which the discharge and the corresponding horsepower were respectively less than the amounts given in the columns for "discharge" and "horsepower."

Estimated discharge and horsepower for Chatanika River and Birch Creek for 1907–1911.

Discharge in second-feet.	Horsepower (80 per cent efficiency per foot fall).	Days of deficient discharge.										
		Chatanika River below Faith Creek.				Chatanika River below Poker Creek.					Birch Creek below Clums Fork.	
		June 21 to Sept. 30, 1907.	July 13 to Sept. 30, 1908.	May 25 to Sept. 25, 1910.	May 24 to Sept. 24, 1911.	June 20 to Oct. 14, 1907.	May 16 to Oct. 21, 1908.	May 9 to Oct. 5, 1909.	May 17 to Oct. 29, 1910.	May 6 to Nov. 5, 1911.	June 8 to Sept. 30, 1910.	June 9 to Sept. 28, 1911.
22	2	.....	.....	.....	0	.....	.....	.....	.....	.....	.....	.....
28	2.5	.....	.....	.....	6	.....	.....	.....	.....	.....	.....	.....
33	3	0	.....	.....	14	.....	.....	.....	.....	.....	.....	.....
44	4	13	.....	0	22	.....	.....	.....	.....	.....	.....	0
55	5	16	.....	14	25	.....	.....	.....	.....	.....	.....	3
66	6	29	.....	29	36	.....	.....	.....	.....	.....	.....	8
77	7	39	0	34	45	.....	.....	.....	.....	0	.....	10
88	8	47	2	37	54	.....	.....	0	0	4	.....	13
99	9	52	4	39	62	.....	.....	2	2	11	.....	19
110	10	56	19	45	67	.....	.....	5	3	24	0	20
132	12	69	35	47	71	.....	.....	17	22	30	5	28
154	14	73	57	54	74	0	.....	26	40	41	8	31
176	16	77	58	64	76	5	0	27	49	44	12	34
198	18	78	65	69	77	17	5	39	55	59	14	38
220	20	82	66	79	79	27	27	46	60	66	15	53

FAIRBANKS DISTRICT.

DESCRIPTION.

The Fairbanks district extends about 60 miles to the north of Fairbanks and is from 40 to 50 miles wide. The greater part of it lies in the lower Tanana basin, but a portion to the northwest drains directly to the Yukon. Generally speaking, the district embraces three divisions—a low, broad alluvial plain, a moderately high dissected plateau, and a mountain mass.

The low, broad plain forms the bottom lands of the lower Tanana Valley, which in this section is divided into several parts by the Tanana and its slough like channels. The main slough starts near the mouth of Salcha River, about 30 miles above Fairbanks, and diverts a portion of the Tanana waters. Its course is northward along the foothills of the plateau, and it receives Chena River about 9 miles above Fairbanks. The plain is swampy and is well covered with timber along the banks of the streams. In the vicinity of Fairbanks it has a general elevation of about 500 feet above sea level.

The plateau is drained by streams tributary to Tanana River which flow through rather broad, unsymmetrical valleys, chiefly extending in a northeast-southwest direction. Their bottom lands range in elevation from 500 to over 2,000 feet above sea level, and the dividing ridges are in general 1,000 to 3,000 feet above the stream beds. That portion of the plateau discussed in this report is drained principally by Little Chena and Chatanika rivers. The upper region of

these drainage basins is crosscut by a zigzag range, which separates the Yukon from the Tanana drainage.

The mountain mass north of this plateau forms what might be termed the apex of the divide between the Tanana and the Yukon drainage basins; its highest points reach altitudes 4,000 to 5,000 feet above sea level, and its corrugated slopes are drained principally by tributaries of Yukon River.

All drainage areas tributary to the Tanana are similar in character. The streams have little slope except near their source and flow over wide gravelly beds in shifting and tortuous courses, keeping to one side of the valley. Most of the channels have rather steep banks that form approaches to broad, level bottom lands which extend 1,000 to 4,000 feet or more before they meet the abrupt slopes of the dividing ridges. The drainage basins are 4 to 15 miles wide and are cut up by small tributary streams that flow through deep and narrow ravines.

A large portion of the area is covered with a thick turf, known as tundra, which is wet, spongy, and mossy and ranges in thickness from 6 inches to 2 feet. In some localities this is meadow-like, producing a rank growth of grass and a variety of beautiful wild flowers. Ground ice is found beneath this tundra in many places, particularly on the northern slopes, where the scanty soil supports little timber or other vegetation. The soil of the southern slopes is for the most part clay, underlain by a mica schist which affords suitable ground for ditch construction. When stripped of its mossy covering and exposed to the sun it thaws rapidly, so that the plow and scraper can be used to advantage.

Above altitudes of 2,000 to 2,200 feet practically the only vegetation is a scrubby bushy growth which attains a height of 2 to 4 feet. In general the country below this altitude is timbered by spruce and birch, with scattered patches of tamarack and willow along the banks of the smaller streams. The timber increases in density and size toward the river bottoms, where the prevailing growth is spruce, much of which attains a diameter of 18 to 24 inches.

The Fairbanks mining district lies between Little Chena and Chatanika rivers. It embraces an area of about 500 square miles and extends 30 miles north of Fairbanks, which is situated on Chena Slough nearly 12 miles above its confluence with the Tanana. Most of the producing creeks rise in a high rocky ridge, of which Pedro Dome, with an elevation of about 2,500 feet, is the center. At least half of the mines are located at an elevation of over 800 feet, and 25 per cent are over 1,000 feet above sea level.

GAGING STATIONS AND MEASURING POINTS.

The following list gives the locations at which gaging stations were maintained or discharge measurements made in 1911 in the Fairbanks district:

Gaging stations and measuring points in the Tanana River basin, Fairbanks district, 1911.

Chena River drainage basin:
- Chena River above Little Chena River.
- Little Chena River below Fish Creek.
- Fish Creek below Solo Creek.
- Fish Creek at mouth.
- Bear Creek at road crossing.
- Miller Creek at mouth.

Chatanika River drainage basin:
- Chatanika River below Faith Creek.
- Chatanika River below Poker Creek.
- McManus Creek at mouth.
- Smith Creek above Pool Creek.
- Pool Creek at mouth.
- Faith Creek at mouth.
- Charity Creek above Homestake Creek.
- Homestake Creek at mouth.
- Hope Creek at mouth.
- Sourdough Creek 1 mile above mouth.
- Poker Creek above Caribou Creek.
- Caribou Creek at mouth.

Beaver Creek drainage basin:
- Beaver Creek above Roy Creek.
- Big Champion Creek at mouth.
- Little Champion Creek at mouth.
- Nome Creek below Moose Creek.
- Moose Creek above Ophir Creek.
- Ophir at Discovery claim.
- Roy Creek 5 miles above mouth.
- Roy Creek 2 miles above mouth.
- Bryan Creek 2 miles above mouth.
- Trail Creek 2 miles above mouth.

CHENA RIVER DRAINAGE BASIN.

Chena River drains the area lying between Chatanika River on the north, Birch Creek on the east, and Salcha River on the south. It has a length of about 100 miles and flows slightly south of west to the lowlands of the Tanana Valley, where it empties its waters into Chena Slough. The principal tributaries are West Fork and Little Chena River from the north and South Fork from the south.

Little Chena River and its tributaries Sorrels and Fish creeks drain the southern slope of the divide between Chatanika and Chena rivers from the headwaters of Smith and Flat creeks to Pedro Dome, a distance of about 25 miles. The drainage basin is irregular in shape and

is crossed by a network of small, ramifying streams with precipitous slopes in their upper courses. The upper portion of the main stream is also steep, having a fall of 100 to 150 feet to the mile, but this slope decreases rather abruptly to about 18 feet to the mile in the vicinity of Elliott and Fish creeks.

Above Fish Creek the Little Chena flows through a rather broad, unsymmetrical valley, but below that stream it takes the center of a deep, rather narrow channel for about 10 miles, to Anaconda Creek, an important tributary which enters from the left. Below this point the valley gradually widens again until the stream reaches the lowlands tributary to Chena River, with which it unites 6 or 8 miles above the confluence of Chena Slough.

The principal tributaries of Fish Creek are Bear, Fairbanks, and Miller creeks.

Daily discharge, in second-feet, of Chena River and Fish Creek, 1911.

Day.	Chena River above Little Chena River.[a] [Drainage area, 1,440 square miles.]					Fish Creek below Solo Creek.[b] [Drainage area, 21.5 square miles.]			
	June.	July.	Aug.	Sept.	Oct.	June.	July.	Aug.	Sept.
1	.....	1,220	529	1,210	1,340	.....	29	5.3	28
2	.....	1,640	507	1,230	1,360	.....	30	5.1	42
3	.....	1,740	472	1,440	1,240	.....	26	5.3	25
4	.....	1,690	465	1,520	1,210	.....	36	4.3	22
5	.....	2,690	465	1,440	1,150	.....	39	4.3	18.8
6	.....	2,450	465	1,360	1,100	.....	27	3.9	18.4
7	.....	1,940	465	1,290	1,000	.....	24	3.9	16.2
8	.....	2,030	453	1,220	970	.....	24	8.5	16.2
9	.....	1,790	450	1,160	883	.....	12.3	7.1	15.5
10	.....	1,570	450	1,030	858	.....	10.3	18.0	16.0
11	.....	1,310	450	1,000	808	.....	21	27	16.2
12	.....	1,200	619	958	783	.....	26	16.6	16.2
13	.....	1,120	1,510	1,020	755	.....	14.4	16.6	15.0
14	.....	1,060	1,400	1,050	764	.....	13.4	.....	14.4
15	.....	1,020	1,500	1,050	718	.....	10.3	.....	.....
16	.....	964	4,550	1,000	718	.....	10.3	50	.....
17	.....	873	6,120	1,030	650	.....	8.5	44	.....
18	.....	812	5,610	947	634	.....	8.5	40	.....
19	.....	783	5,360	936	634	.....	7.6	34	.....
20	.....	727	4,340	910	611	18.8	6.8	28	.....
21	.....	691	3,420	883	588	18.8	6.8	22	.....
22	2,170	691	2,840	883	569	16.6	6.8	19.3	.....
23	2,020	675	2,420	873	536	12.3	6.0	18.8	.....
24	1,860	658	2,210	803	536	11.3	6.0	15.5	.....
25	1,720	634	1,810	822	536	10.3	5.3	15.5	.....
26	1,540	611	1,640	981	514	9.4	5.3	14.4	.....
27	1,430	588	1,500	1,020	522	6.8	6.0	14.4	.....
28	1,310	573	1,410	1,140	500	6.8	6.8	14.4	.....
29	1,220	573	1,410	1,270	500	6.8	6.0	14.0	.....
30	1,110	566	1,360	1,370	.....	21.0	5.3	14.0	.....
31	.....	554	1,270	.....	.....	.....	5.3	14.0	.....
Mean	1,600	1,140	1,850	1,090	793	12.6	14.5	.....	20.0
Mean per square mile	1.11	.792	1.29	.757	.551	.586	.674	.....	.930
Run-off (depth in inches on drainage area)	.37	.91	1.49	.84	.59	.24	.78	.....	.24

[a] The discharges of Chena River are only approximate.
[b] The discharges of Fish Creek are based on a fairly well defined rating curve.

Miscellaneous measurements in Chena River drainage basin, 1911.

Date.	Stream and locality.	Drainage area.	Discharge.	Discharge per square mile.
		Sq.miles.	*Sec.-ft.*	*Sec.-ft.*
Aug. 6	Little Chena River below Fish Creek	22.8	32	0.14
6	Fish Creek at mouth	90.2	15.3	.17
6	Bear Creek at road crossing	12.8	2.8	.22
6	Miller Creek at mouth	16.7	1.5	.090

CHATANIKA RIVER DRAINAGE BASIN.

Chatanika River is formed by the junction of Faith and McManus creeks, which drain the high ridge constituting the divide between the lower Tanana and Yukon basins. The river flows southwestward in a winding course through a long and rather narrow valley and unites with the Tolovana from the east about 30 miles above the confluence of that stream with the Tanana. Its course lies mostly to the west side of the valley, which is from half a mile to 7 miles wide and about 80 miles long. The drainage area of the river above its mouth is approximately 1,300 square miles.

Below the junction of Faith and McManus creeks the stream has a shifting, gravelly bottom. In low and medium stages it flows in a series of pools and rapids in a channel 75 to 200 feet wide; during the high-water period it may spread through several channels covering a width of 100 to 400 feet. This high-water channel is usually well defined by steep, alluvial banks ranging from 8 to 10 feet in height.

Below Poker Creek, a tributary from the right about 40 miles downstream from the junction of Faith and McManus creeks, the valley widens and the bottom lands become marshy and swampy. From the left the Chatanika receives Cleary, Eldorado, Dome, and Vault creeks and other less important streams from the mining district proper. Below these tributaries the valley narrows to a gorgelike channel, which it follows for about 10 miles; below this the dividing ridges disappear and the stream meanders through the low swampy grounds north of Tanana River. About 10 miles from its mouth Goldstream Creek, its largest tributary, joins it from the left.

The average elevation of the divides in the upper drainage area of the Chatanika is between 3,000 and 4,000 feet above sea level, and the altitude of the ridges bounding the valley on the east and west is about 2,000 feet. Below an altitude of 1,800 to 2,000 feet the slopes are heavily timbered.

The tributary streams from the right are short and precipitous, flowing through V-shaped valleys; those from the left have less precipitous courses and broader valleys and gradually lose themselves in the rather broad expanse of swamplike bottom lands.

Smith Creek is the principal tributary of McManus Creek and enters it from the south about a mile above Faith Creek. Pool Creek joins Smith Creek from the east about a mile above McManus Creek.

Monthly discharge of Chatanika River, 1907–1911.

Chatanika River Below Faith Creek.

[Drainage area, 132 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Mean per square mile.	
1907.					
July 17–31	96	55	67.8	0.514	0.28
August	205	72	125	.947	1.09
September	1,990	119	342	2.59	2.89
The period, 76 days	1,990	55	178	1.31	4.26
1908.					
May 12–20	1,340	320	598	4.53	1.85
July 13–31	200	82	131	.992	.70
August	270	95	137	1.04	1.20
September	530	102	208	1.58	1.76
The period, 89 days	1,340	82	241	1.82	5.51
1910.					
May 25–31	683	320	473	3.58	.93
June	2,000	118	377	2.86	3.19
July	293	48	86.1	.652	.75
August	1,010	49	197	1.49	1.72
Sept. 1–25	430	141	233	1.77	1.65
The period, 124 days	2,000	48	235	1.78	8.24
1911.					
May 24–31	1,010	408	691	5.23	1.56
June	836	140	441	3.33	3.72
July	334	28	101	.765	.88
August	1,280	24	146	1.11	1.27
Sept. 1–24	125	53	79.8	.604	.54
The period, 124 days	1,280	24	228	1.73	7.97

Chatanika River Below Poker Creek.

[Drainage area, 456 square miles.]

1907.					
June 20–30	250	192	228	0.500	0.20
July	283	167	211	.463	.53
August	1,160	216	428	.939	1.08
September	3,160	300	954	2.09	2.33
Oct. 1–14	860	232	506	1.11	.47
The period, 117 days	3,160	167	496	1.08	4.61
1908.					
May 16–31	4,120	1,730	2,730	5.99	3.56
June	2,280	283	984	2.16	2.41
July	942	204	332	.728	.84
August	455	192	284	.623	.72
September	1,160	266	461	1.01	1.12
Oct. 1–21	342	179	234	.513	.40
The period 159 days	4,120	179	699	1.53	9.05

Monthly discharge of Châtanika River, 1907–1911—Continued.

Chatanika River Below Poker Creek—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Mean per square mile.	
1909.					
May 9–31	3,620	474	1,870	4.10	3.51
June	1,220	152	416	.912	1.02
July	833	219	414	.910	1.05
August	1,740	179	530	1.16	1.34
September	219	130	151	.331	.37
Oct. 1–5	110	92	103	.226	.04
The period, 150 days	3,620	92	598	1.31	7.33
1910.					
May 17–31	1,900	600	944	2.07	1.16
June	3,260	248	686	1.50	1.67
July	822	104	196	.430	.50
August	2,720	95	481	1.05	1.21
September	1,410	298	553	1.21	1.35
Oct. 1–29	352	123	208	.456	.49
The period, 166 days	3,260	95	472	1.04	6.38
1911.					
May 6–31	3,500	1,170	2,550	5.59	5.41
June	1,760	283	818	1.79	2.00
July	566	109	276	.605	.70
August	1,740	88	372	.816	.94
September	422	147	262	.575	.64
October	330	87	167	.366	.42
Nov. 1–5	101	87	94.8	.208	.04
The period, 184 days	3,500	87	677	1.48	10.15

Daily discharge, in second-feet, of Chatanika River, 1911.[a]

Day.	Chatanika River below Poker Creek. [Drainage area, 456 square miles.]							Chatanika River below Faith Creek. [Drainage area, 132 square miles.]				
	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	May.	June.	July.	Aug.	Sept.
1	.....	1,760	379	104	323	330	87	.....	795	250	28	90
2	.....	1,100	566	101	338	300	87	.....	518	290	28	125
3	.....	1,330	467	94	422	267	98	.....	612	334	28	113
4	.....	1,170	413	91	370	245	101	.....	645	226	24	113
5	.....	1,200	379	88	319	245	101	.....	518	239	24	101
6	3,100	1,200	379	88	308	212	.....	.....	836	239	24	97
7	3,000	1,320	338	88	273	207	.....	.....	612	232	24	90
8	3,480	831	422	97	260	207	.....	.....	434	140	24	90
9	3,500	850	319	101	241	207	.....	.....	357	109	26	80
10	2,560	786	379	120	235	196	.....	.....	311	87	40	80
11	2,160	609	387	170	235	191	.....	.....	290	68	90	80
12	2,120	582	467	220	251	181	.....	.....	200	87	70	80
13	2,200	666	293	201	241	181	.....	.....	460	75	53	76
14	2,560	626	308	229	235	181	.....	.....	549	68	58	70
15	3,020	768	373	1,040	229	181	.....	.....	612	57	1,280	61
16	2,800	1,180	267	1,740	212	181	.....	.....	732	57	436	70
17	2,940	1,060	315	1,140	201	181	.....	.....	756	57	436	70
18	3,280	1,110	221	1,120	194	147	.....	.....	434	57	327	61
19	3,300	1,240	194	799	194	104	.....	.....	580	54	232	61
20	3,420	1,020	169	577	191	121	.....	.....	489	43	177	53
21	3,260	812	147	467	194	127	.....	.....	450	40	147	61
22	2,680	593	147	387	194	104	.....	.....	334	38	125	61
23	2,300	467	147	346	176	101	.....	.....	334	34	113	61
24	2,220	379	140	308	158	101	.....	408	277	34	101	70
25	2,220	379	136	283	147	101	.....	716	232	30	101	.....

[a] The discharges at these stations are based on well-defined rating-curves.

Daily discharge, in second-feet, of Chatanika River, 1911—Continued.

Day.	Chatanika River below Poker Creek. [Drainage area, 456 square miles.]							Chatanika River below Faith Creek. [Drainage area, 132 square miles.]				
	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	May.	June.	July.	Aug.	Sept.
26	2,300	330	136	267	273	101	.....	1,010	200	34	90	.....
27	1,980	300	136	267	338	114	.....	922	200	34	90	.....
28	1,780	293	147	267	379	101	.....	549	169	30	90	.....
29	1,670	283	140	260	379	101	.....	680	140	28	80	.....
30	1,390	308	121	235	358	87	.....	489	154	28	80	.....
31	1,170	.....	109	235	.....	87	.....	756	.....	28	80	.....
Mean	2,550	818	276	372	262	167	94.8	691	441	101	146	.....
Mean per square mile	5.59	1.79	.605	.816	.575	.366	.208	5.23	3.33	.765	1.11	.....
Run-off (depth in inches on drainage area)	5.41	2.00	.70	.94	.64	.42	.04	1.56	3.72	.88	1.27	.....

Daily discharge, in second-feet, of McManus and Faith creeks, 1911.[a]

Day.	McManus Creek at mouth. [Drainage area, 80 square miles.]					Faith Creek at mouth. [Drainage area, 51 square miles.]			
	May.	June.	July.	Aug.	Sept.	June.	July.	Aug.	Sept.
1	.....	322	94	12.0	34	.....	139	17.0	39
2	.....	368	140	12.0	60	.....	115	17.0	49
3	.....	368	170	12.0	53	.....	167	17.0	43
4	.....	322	107	12.0	48	.....	105	15.2	43
5	.....	322	152	12.0	44	.....	81	14.0	37
6	.....	414	152	12.0	39	.....	74	14.0	43
7	.....	278	133	12.0	39	.....	81	14.0	43
8	.....	255	67	12.0	39	.....	65	14.0	43
9	.....	233	44	12.0	30	.....	59	14.0	37
10	.....	190	30	15.0	30	.....	47	20	37
11	.....	190	27	24	34	.....	37	62	37
12	.....	233	44	19.6	30	.....	43	49	37
13	.....	255	34	17.0	24	.....	39	37	35
14	.....	211	27	19.6	24	.....	35	39	32
15	.....	220	24	354	24	.....	32	750	32
16	.....	255	27	203	30	422	35	243	32
17	.....	264	24	203	30	444	35	243	32
18	.....	233	24	140	27	313	35	153	30
19	.....	233	24	94	24	355	32	99	28
20	.....	190	17.0	78	24	313	28	81	28
21	.....	163	17.0	60	24	293	26	65	28
22	.....	140	17.0	48	24	218	24	56	28
23	.....	107	17.0	44	24	200	24	52	30
24	508	94	17.0	39	30	167	22	49	32
25	602	72	15.0	39	.....	139	20	49	.....
26	626	72	17.0	39	.....	115	20	43	.....
27	508	67	17.0	39	.....	120	20	43	.....
28	438	48	15.0	39	.....	95	18.8	43	.....
29	438	48	12.0	30	.....	77	17.0	37	.....
30	322	67	12.0	30	.....	81	17.0	37	.....
31	438	.....	12.0	30	.....	.....	17.0	37	.....
Mean	485	208	49.3	55.2	32.9	223	48.7	78.2	35.6
Mean per square mile	6.06	2.60	.617	.690	.411	4.37	.955	1.53	.698
Run-off (depth in inches on drainage area)	1.80	3.00	.71	.80	.38	2.44	1.10	1.76	.61

[a] The discharges at these stations are based on well-defined rating curves.

Daily discharge, in second-feet, of Smith and Pool creeks, 1911.

Day.	Smith Creek above[a] Pool Creek. [Drainage area, 17.0 square miles.]				Pool Creek at mouth.[b] [Drainage area, 14.0 square miles.]			
	June.	July.	Aug.	Sept.	June.	July.	Aug.	Sept.
1	.....	16.8	2.1	6.2	.....	32.0	1.5	7.0
2	.....	16.8	2.1	7.5	.....	38.0	1.5	9.0
3	.....	28.0	1.4	6.2	.....	38.0	1.5	7.2
4	.....	24.0	2.1	6.2	.....	32.0	1.5	7.2
5	.....	28.0	2.1	6.2	.....	45.0	1.5	5.6
6	.....	18.6	2.1	6.2	.....	32.0	1.5	9.0
7	.....	24.0	2.1	6.2	.....	45.0	1.5	9.0
8	.....	16.8	2.1	6.2	.....	32.0	1.5	7.2
9	.....	8.9	2.1	6.2	.....	17.7	1.5	7.2
10	.....	6.2	2.8	4.9	.....	15.4	2.8	5.6
11	.....	6.2	2.8	4.9	.....	9.0	2.8	5.6
12	.....	6.2	2.8	4.9	.....	8.0	2.8	5.6
13	.....	4.9	2.8	3.8	.....	7.0	2.8	4.0
14	.....	4.9	3.8	2.8	.....	6.0	4.0	4.0
15	.....	4.9	50.0	4.9	.....	5.6	77.0	7.2
16	16.8	4.9	26.0	4.9	35.0	4.0	38.0	7.2
17	24.0	3.8	28.0	.....	38.0	4.0	41.0	.....
18	16.8	3.8	16.8	.....	32.0	4.0	23.0	.....
19	16.8	3.8	13.5	.....	32.0	4.0	17.6	.....
20	13.5	3.8	10.3	.....	26.0	4.0	13.1	.....
21	13.5	2.8	8.9	.....	20.0	4.0	10.9	.....
22	10.3	2.8	8.9	.....	15.4	4.0	10.9	.....
23	7.5	2.8	7.5	.....	20.0	2.8	9.0	.....
24	8.9	2.8	6.2	.....	20.0	2.8	7.2	.....
25	7.5	2.8	6.2	.....	17.7	2.8	7.2	.....
26	6.2	2.8	4.9	.....	20.0	2.8	5.6	.....
27	4.9	2.1	6.2	.....	17.7	1.5	7.2	.....
28	4.9	2.1	4.9	.....	15.4	1.5	7.2	.....
29	4.9	2.1	4.9	.....	15.4	1.5	7.2	.....
30	11.9	2.1	4.9	.....	26.0	1.5	7.2	.....
31	.....	2.1	4.9	.....	.....	1.5	7.2	.....
Mean	11.2	8.47	7.94	5.51	23.4	13.2	10.5	6.74
Mean per square mile	.659	.498	.467	.324	1.67	.943	.750	.481
Run-off (depth in inches on drainage area)	.37	.57	.54	.20	.93	1.09	.86	.29

[a] The discharges of Smith Creek below 25 second-feet are well defined.

[b] The discharges of Pool Creek prior to July 15 are based on one discharge measurement and comparative hydrographs with Smith Creek and are only approximate. Subsequent to July 15 they are well defined below 10 second-feet.

Miscellaneous measurements in Chatanika River drainage basin, 1911.

Date.	Stream and locality.	Drainage area.	Discharge.	Discharge per square mile.
		Sq. miles.	*Sec.-ft.*	*Sec.-ft.*
June 14	Charity Creek above Homestake Creek	.....	35.0	.....
July 16	.....do	.....	5.5	.....
Aug. 3	.....do	.....	2.1	.....
June 14	Homestake Creek at mouth	5.6	42.0	7.50
July 16	.....do	5.6	2.4	.43
Aug. 3	.....do	5.6	1.1	.20
July 16	Hope Creek at mouth	20.3	10.1	.50
Aug. 3	.....do	20.3	4.5	.22
July 14	Sourdough Creek 1 mile above mouth	15.1	4.5	.30
9	Poker Creek above Caribou Creek	24.5	7.4	.30
9	Caribou Creek at mouth	17.8	3.1	.17
June 19	Chatanika ditch at Poker Creek road crossing	.....	24.0	.....
30	.....do	.....	21.0	.....
July 1	.....do	.....	20.0	.....
8	.....do	.....	26.0	.....
8	.....do	.....	23.0	.....
Aug. 7	.....do	.....	16.8	.....

BEAVER CREEK DRAINAGE BASIN.

Beaver Creek drains an area of 5,360 square miles lying north of Chatanika River between Preacher Creek on the east and Tolovana River and Hess Creek on the west. It joins the Yukon from the south about 40 miles below Birch Creek and nearly opposite Hosiana River. It is formed by the junction of Big Champion and Little Champion creeks, whose headwaters interlock with those of Preacher Creek. It flows westward for about 25 miles, when it makes a right-angle turn around the southern extremity of the White Mountains and gradually assumes a northeasterly course, which it follows until it leaves the foothills and enters the flats of the Yukon, where it makes an abrupt turn to the northwest and meanders in a tortuous course to its mouth.

The average fall between Nome Creek and Fossil Creek is about 12 feet to the mile. The principal tributaries, named in order downstream, are Roy, Bryan, Brigham, Fossil, Willow, and Mascot creeks on the right limit and Nome, Trail, Wickersham, and Victoria creeks on the left limit.

Ophir Creek is the largest branch of Nome Creek and enters it from the south about a mile above Beaver Creek.

Daily discharge, in second-feet, of Nome Creek above Ophir Creek, 1911.[a]

[Drainage area, 76 square miles.]

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	.....	17.9	39	21	23.0	93.0	.....
2	.....	17.0	79	22	35.0	66.0	.....
3	.....	16.5	98	23	27.0	55.0	.....
4	.....	15.1	74	24	30.0	47.0	.....
5	.....	15.1	.....	25	25.0	39.0	.....
6	.....	14.2	.....	26	23.0	36.0	.....
7	.....	14.0	.....	27	25.0	36.0	.....
8	.....	14.0	.....	28	37.0	39.0	.....
9	.....	15.0	.....	29	26.0	35.0	.....
10	.....	18.8	.....	30	22.0	39.0	.....
				31	18.8	37.0	.....
11	.....	50.0	.....				
12	.....	45.0	.....	Mean	30.6	95.4	.....
13	45.0	30.0	.....	Mean per square mile	.403	1.26	.....
14	39.0	32.0	37	Run-off (depth in inches on drainage area)	.28	1.45	.....
15	33.0	538.0	36				
16	35.0	499.0	35				
17	45.0	394.0	.....				
18	40.0	328.0	.....				
19	28.0	220.0	.....				
20	25.0	142.0	.....				

[a] The discharges of Nome Creek below 60 second-feet are well defined.

Miscellaneous measurements in Beaver Creek drainage basin, 1911.

Date.	Stream and locality.	Drainage area.	Discharge.	Discharge per square mile.
		Sq. miles.	*Sec.-ft.*	*Sec.-ft.*
July 10	Beaver Creek above Roy Creek	357	328	0.92
11	Big Champion Creek at mouth	122	137	1.12
11	Little Champion Creek at mouth	67	58	.87
14	Nome Creek below Moose Creek	24.9	19.2	.77
9	Ophir Creek at Discovery claim	22.1	5.5	.25
10	.....do	22.1	4.6	.21
11	.....do	22.1	13.8	.62
12	.....do	22.1	57	2.58
12	.....do	22.1	47	2.13
13	.....do	22.1	28	1.27
Aug. 9	.....do	22.1	.81	.037
July 11	Roy Creek 5 miles above mouth	5.8	3.8	.66
10	Roy Creek 2 miles above mouth	16.5	6.6	.40
10	Bryan Creek 2 miles above mouth	60.6	64	1.06
10	Trail Creek 2 miles above mouth	37.0	7.9	.21

SALCHAKET DISTRICT.

DESCRIPTION.

The Tanana precinct, which includes the Salchaket district, embraces the area drained by the Tanana and its tributaries from and including Salcha River to a point on Tanana River south of Lake Mansfield. The larger streams included in this area are Salcha, Goodpaster, Volkmar, and Healy rivers from the north and Delta River from the south.

TANANA RIVER DRAINAGE BASIN.

Tanana River rises near the international boundary line and flows in a general northwesterly direction for about 440 miles to its junction with Yukon River at Fort Gibbon.

The river in general follows the north side of the valley and is one maze of channels and islands. At McCartys, just above the mouth of Delta River, which is 95 miles from Fairbanks by the Government road, it flows in three channels except at extreme low water, when the middle one is dry. During the summer of 1909 the Alaska Road Commission installed ferries on the right and left channels and bridged the center one.

Salcha River rises opposite the head of South Fork of Birch Creek, about 25 miles from the Yukon. The average fall of the river from the Splits to the mouth is 10 feet to the mile, and from a point about 2 miles from the summit of the divide at the headwaters it averages 19 feet to the mile. At the mouth, which is 40 miles from Fairbanks, a ferry, post office, store, and road house are located and good accommodations are at hand for the traveler. Redmond Creek enters the Salcha from the south about 15 miles above the mouth. Junction and Mosquito creeks, which join to form Redmond Creek, drain an area 6 to 8 miles north of the Tanana and parallel to it.

Little Salcha River, which is tributary to the Tanana from the east, enters the river at a point midway between the town of Salchaket and the Salcha telegraph station.

Miscellaneous measurements in Salchaket district, 1911.

Date.	Stream and locality.	Drainage area.	Discharge.	Discharge per square mile.
		Sq. miles.	*Sec.-ft.*	*Sec.-ft.*
June 25	Salcha River at Salchaket	2,170	3,910	1.80
26	.....do	2,170	2,950	1.36
27	.....do	2,170	2,890	1.33

CIRCLE PRECINCT.

DESCRIPTION.

The area north of the Yukon-Tanana divide between longitude 143° 40′ and 146° 50′ is known as the Birch Creek district of the Circle precinct. Generally speaking, it consists of two geographic divisions—a low, broad alluvial plain and a dissected plateau.

The northwestern portion of the low, broad plain forms the bottom lands of the Yukon Flats north of Crazy Mountains; the southeastern portion is an irregular area surrounded by a low ridge along the Yukon, the Crazy Mountains, and the range of hills 20 to 40 miles farther south. This portion is cut by Birch and Crooked creeks; it is well timbered along these streams and contains large areas of meadow-like swamp land that furnish forage for both summer and winter use.

The plateau division, whose longer diameter trends east and west, lies between two distinct ridges—the eastern extensions of the White Mountains. The ridge to the south is high and barren and forms the main Yukon-Tanana divide; that to the north is lower, irregular, and barren, and separates the upper tributaries of the Birch Creek basin from the lower, and is itself divided by the deep canyon-like gorge through which Birch Creek flows on its way to the Yukon.

At elevations of 2,000 feet or more above sea level the country is as a rule barren and rocky; below this altitude, especially in the flats where Birch and Crooked creeks join, considerable timber is found.

GAGING STATIONS AND MEASURING POINTS.

The following list gives the locations at which gaging stations were maintained or discharge measurements made in 1911 in the Circle district:

Gaging stations and measuring points in Circle district, 1911.

Birch Creek drainage basin:
- Birch Creek below Clums Fork.
- Birch Creek above Sheep Creek.
- Birch Creek at Fourteenmile House.
- Clums Fork at mouth.
- Wolf Creek 1 mile above mouth.
- Buckley Bar Creek at mouth.
- Sheep Creek at mouth.
- South Fork of Birch Creek above Big Windy Creek.
- South Fork of Birch Creek below Big Windy Creek.
- Big Windy Creek at mouth.
- North Fork of Birch Creek drainage basin:
  - North Fork of Birch Creek above Twelvemile Creek.
  - North Fork of Birch Creek below Twelvemile Creek.
  - Ptarmigan Creek at mouth.
  - Golddust Creek at mouth.
  - Butte Creek at mouth.
  - Bear Creek at mouth.
  - Twelvemile Creek below South Fork.
  - North Fork of Twelvemile Creek at mouth.

Crooked Creek drainage basin:
- Crooked Creek at Central House.
- Porcupine Creek above ditch intake.
- Porcupine Creek below Bonanza Creek.
- Bonanza Creek below ditch intake.
- Bonanza Creek ditch at intake.
- Bonanza Creek ditch below Porcupine Creek ditch.
- Mammoth Creek above Miller Creek.
- Independence Creek at Claim "No. 9 above."
- Miller Creek at mouth.
- Boulder Creek at road crossing.
- Deadwood Creek above Switch Creek.

BIRCH CREEK DRAINAGE BASIN.

Birch Creek flows into Yukon River at a point almost exactly on the Arctic Circle and about 25 miles directly west of Fort Yukon. Its mouth is about 5 miles west of the confluence of Chandalar River with the Yukon.

The drainage comes almost entirely from the south and west through a complex system of watercourses, and in outline the basin is extremely unsymmetrical. The headwaters interlock with those of Little Chena and Chatanika rivers and flow eastward for about 60 miles to the junction of the South Fork, where the stream makes an abrupt turn northward. About 12 miles beyond this point it leaves

the mountainous country and enters the lowlands of the Yukon, through which it sluggishly meanders for over 100 miles, roughly paralleling the Yukon at a distance varying from 10 to 20 miles.

The principal tributaries from the south and east are Clums Fork and South Fork. From the north and west the North Fork and Harrison, Crooked, and Preacher creeks are the chief branches. The headwaters of the South Fork rise opposite those of Salcha and Charley rivers.

Monthly discharge of Birch Creek at Fourteenmile House for 1908 to 1911.

[Drainage area, 2,150 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Mean per square mile.	
1908.					
June 26–30	1,190	1,020	1,090	0.507	0.09
July	2,630	847	1,140	.530	.61
August	1,620	825	1,080	.502	.58
Sept. 1–29	6,070	900	2,150	1.00	1.08
The period, 96 days	6,070	825	1,423	1.48	2.36
1909.					
May 15–31	9,970	3,320	5,930	2.76	1.74
June	8,640	1,800	3,410	1.59	1.77
July	8,280	960	2,200	1.02	1.18
August	3,020	974	1,830	.851	.98
September	960	730	799	.372	.42
Oct. 1–2	792	792	792	.368	.03
The period, 141 days	9,970	730	2,510	1.17	6.12
1910.					
May 13–31	6,620	3,200	4,790	2.23	1.58
June	6,000	1,100	2,500	1.16	1.29
July	5,400	551	1,430	.665	.77
August	1,880	432	950	.442	.51
September	3,280	1,040	1,620	.753	.84
Oct. 1–6	1,140	1,080	1,090	.507	.11
The period, 147 days	6,620	432	2,010	.935	5.10
1911.					
May 15–31	15,300	4,120	8,190	3.81	2.41
June	9,490	1,010	3,740	1.74	1.94
July	3,260	262	987	.459	.53
August	2,060	208	609	.283	.33
September	587	418	501	.233	.26
Oct. 1–23	614	198	379	.176	.15
The period, 162 days	15,300	208	2,050	.953	5.62

Daily discharge, in second-feet, of Birch Creek, 1911.

Day.	Birch Creek below Clums Fork.[a] [Drainage area, 600 square miles.]				Birch Creek above Sheep Creek.[b] [Drainage area, 873 square miles.]				Birch Creek at Fourteenmile House.[c] [Drainage area, 2,150 square miles.]					
	June.	July.	Aug.	Sept.	June.	July.	Aug.	Sept.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	541	62	205	4,030	722	102	230	.....	9,490	1,140	246	472	454
2	.....	1,120	60	228	3,150	1,190	99	250	.....	7,380	1,310	246	510	520
3	.....	1,530	55	272	3,630	2,330	93	275	.....	6,070	2,330	236	510	560
4	.....	1,220	55	280	3,310	1,630	102	292	.....	5,780	3,260	230	510	587
5	.....	1,080	55	261	3,490	1,510	93	264	.....	5,600	2,720	230	510	614
6	.....	733	50	205	3,630	1,040	90	247	.....	6,200	2,720	224	510	571
7	.....	1,080	50	208	3,730	1,240	84	242	.....	6,870	2,180	216	510	520
8	.....	691	50	205	2,590	916	82	220	.....	4,980	2,180	202	510	454
9	1,590	428	80	198	2,660	563	87	210	.....	4,080	1,570	202	510	384
10	1,550	341	90	192	2,200	366	96	205	.....	3,660	1,230	208	472	343
11	1,260	312	147	215	1,770	304	150	247	.....	3,090	994	224	440	290
12	1,300	500	182	261	1,730	379	195	304	.....	2,930	937	269	418	269
13	1,480	320	211	290	2,410	316	230	316	.....	2,930	834	367	463	280
14	1,410	232	235	290	2,050	269	300	328	.....	3,030	672	375	550	256
15	1,690	215	604	261	2,320	220	900	310	4,160	3,090	643	384	535	256
16	1,640	182	1,370	235	2,530	195	1,920	304	4,520	3,710	603	1,200	486	327
17	1,860	162	1,010	162	2,430	195	1,370	286	8,450	3,710	535	2,060	463	409
18	2,270	147	878	125	3,630	185	1,290	280	11,900	4,980	487	1,900	440	384
19	1,660	131	691	120	2,560	166	880	252	15,300	5,150	454	1,620	454	343
20	1,320	115	520	110	2,050	148	898	247	14,600	3,750	427	1,260	501	269
21	1,000	110	405	115	1,470	134	519	230	12,000	2,820	409	1,080	520	224
22	845	108	312	125	1,170	130	419	210	8,800	2,260	367	972	550	202
23	733	98	272	147	988	124	346	195	5,720	1,840	335	800	587	198
24	721	90	239	170	952	111	292	236	4,120	1,640	327	685	571	.....
25	615	90	215	192	782	105	280	269	5,480	1,600	305	550	550	.....
26	476	93	215	261	610	111	247	304	9,630	1,380	297	510	520	.....
27	578	90	210	450	705	111	236	497	10,500	1,140	280	486	535	.....
28	628	86	208	500	722	105	242	617	7,590	1,100	280	486	501	.....
29	451	86	208	.....	610	118	236	689	6,520	1,070	262	486	472	.....
30	526	72	205	.....	705	111	230	657	5,600	1,010	262	463	454	.....
31	.....	68	208	.....	.....	108	230	.....	4,320	.....	262	463	.....	.....
Mean	1,160	389	295	224	2,150	486	398	307	8,190	3,740	987	609	501	379
Mean per square mile.	1.93	0.648	0.492	0.373	2.46	0.557	0.456	0.352	3.81	1.74	0.459	0.283	0.233	0.176
Run-off (depth in inches on drainage area)	1.58	.75	.57	.39	2.74	.64	.53	.39	2.41	1.94	.53	.33	.26	.15

[a] The discharges are based on a well-defined rating curve below 800 second-feet.
[b] These discharges are based on a rating curve that is well defined for all stages.
[c] The rating curve for this station is fairly well defined below 8,000 second-feet.

Miscellaneous measurements in Birch Creek drainage basin, 1911.

Date.	Stream and locality.	Drainage area.	Discharge.	Discharge per square mile.
		Sq. miles.	*Sec.-ft.*	*Sec.-ft.*
Aug. 1	Clums Fork at mouth	172	24	0.14
July 30	Wolf Creek, 1 mile above mouth	50.8	4.2	.083
27	South Fork of Birch Creek above Big Windy Creek	217	24	.11
27	South Fork of Birch Creek below Big Windy Creek	320	53	.17
27	Big Windy Creek at mouth	99.2	26	.26

NOTE.—The above measurements probably indicate about the lowest run-off for the season.

Daily discharge, in second-feet, of Buckley Bar and Sheep creeks, 1911.

Day.	Buckley Bar Creek at mouth.[a] [Drainage area, 10.6 square miles.]				Sheep Creek at mouth. [Drainage area, 46.7 square miles.]			
	June.	July.	Aug.	Sept.	June.	July.	Aug.	Sept.
1	.....	1.0	0.34	0.78	.....	.....	.....	8.2
2	25	1.1	.34	.76	101	.....	.....	.....
3	14.5	9.4	.34	.74	.....	.....	2.5	.....
4	12.2	6.5	.32	.74	.....	.....	.....	.....
5	11.1	4.6	.32	.74	.....	.....	2.0	.....
6	11.4	3.2	.32	.74	.....	38	.....	.....
7	8.2	2.8	.33	.76	.....	.....	.....	.....
8	6.2	2.4	.34	.78	[b] 208	.....	.....	.....
9	5.4	1.7	.32	.80	78	.....	.....	7.6
10	4.2	1.2	.34	.82	.....	.....	.....	.....
11	3.6	1.1	.34	.83	53	.....	9.8	.....
12	3.1	1.2	.34	.96	.....	.....	.....	.....
13	3.6	1.0	.34	1.2	.....	.....	8.2	.....
14	3.6	.92	.34	1.2	.....	.....	10.2	12.7
15	3.4	.88	.92	1.2	.....	8.2	34	.....
16	2.8	.74	2.0	1.2	.....	.....	.....	12.2
17	6.2	.74	1.9	1.1	.....	.....	.....	.....
18	12.5	.70	1.8	1.1	[b] 255	.....	.....	.....
19	7.9	.65	1.6	1.0	.....	.....	50	23
20	5.4	.65	1.4	1.0	.....	5.1	.....	.....
21	3.1	.65	1.1	.....	.....	.....	.....	.....
22	2.7	.65	.90	.....	.....	.....	.....	.....
23	2.2	.62	.83	.....	.....	.....	16.0	.....
24	1.9	.59	.78	.....	51	.....	.....	.....
25	1.6	.52	.76	.....	.....	.....	.....	.....
26	1.4	.52	.74	.....	.....	.....	.....	.....
27	1.4	.46	.70	.....	.....	4.0	.....	15.1
28	1.4	.39	.72	.....	26	.....	.....	.....
29	1.1	.36	.74	.....	.....	.....	10.2	.....
30	1.1	.36	.83	.....	.....	3.3	.....	12.2
31	.....	.36	.78	.....	.....	.....	.....	.....
Mean	5.61	1.55	.780	.922	.....	.....	.....	.....
Mean per square mile	.529	.146	.074	.087	.....	.....	.....	.....
Run-off (depth in inches on drainage area)	.59	.17	.09	.10	.....	.....	.....	.....

[a] These discharges are well defined for all stages. [b] Approximate.

NORTH FORK OF BIRCH CREEK DRAINAGE BASIN.

Eagle and Ptarmigan creeks, whose headwaters are opposite those of Crooked Creek, join to form North Fork of Birch Creek. Below the junction North Fork takes a southwestward course for about 7 miles, to the mouth of Twelvemile Creek, where it turns abruptly to the south and follows that direction for about 8 miles. Here its waters unite with those of Harrington Fork to form Birch Creek proper, which flows east to its confluence with South Fork, a distance of approximately 45 miles.

Beginning at the head, the main tributaries from the north are Fish, Bear, and Twelvemile creeks. From the south, in the same order, Golddust and Butte creeks are the only important streams.

Daily discharge, in second-feet, of North Fork of Birch Creek, 1911.

Day.	North Fork of Birch Creek above Twelvemile Creek.[a] [Drainage area, 88 square miles.]				North Fork of Birch Creek below Twelvemile Creek.[b] [Drainage area, 141 square miles.]			
	June.	July.	Aug.	Sept.	June.	July.	Aug.	Sept.
1	.....	550.0	14.0	24	.....	900	20.0	33
2	.....	388.0	12.0	31	.....	630	19.6	39
3	.....	210.0	12.0	39	.....	290	19.6	40
4	.....	263.0	12.0	48	.....	310	19.6	41
5	.....	161.0	12.0	44	.....	240	19.0	42
6	.....	331.0	10.0	44	.....	420	19.0	44
7	.....	161.0	12.0	35	.....	290	20.0	43
8	.....	91.0	12.0	28	.....	160	20.0	41
9	.....	58.0	14.0	28	.....	100	20.0	39
10	.....	53.0	14.0	24	.....	80	20.0	43
11	.....	53.0	14.0	31	.....	66	23.0	56
12	223	53.0	14.0	35	544	65	20.0	60
13	388	35.0	14.0	35	627	54	21.0	60
14	475	35.0	14.0	39	602	45	24.0	65
15	505	35.0	58.0	39	704	45	72.0	54
16	431	35.0	83.0	39	744	41	144.0	56
17	460	24.0	83.0	31	842	35	130.0	48
18	431	24.0	70.0	31	684	34	132.0	44
19	402	24.0	64.0	28	550	32	120.0	41
20	340	21.0	58.0	28	401	32	110.0	37
21	280	18.3	53.0	28	350	30	90.0	39
22	270	21.0	48.0	24	276	27	80.0	37
23	260	18.3	44.0	31	272	26	70.0	39
24	200	16.2	39.0	35	251	24	60.0	40
25	180	16.2	31.0	35	199	23	50.0	41
26	170	16.2	28.0	31	176	23	40.0	54
27	240	16.2	24.0	35	287	24	34.0	75
28	160	16.2	24.0	31	182	22	32.0	81
29	110	14.0	24.0	.....	125	22	32.0	75
30	170	14.0	18.3	.....	199	21	31.0	74
31	.....	14.0	18.3	.....	.....	21	30.0	.....
Mean	300	89.9	30.6	33.2	422	133	49.7	49.4
Mean per square mile	3.41	1.02	.348	.377	2.99	.943	.352	.350
Run-off (depth in inches on drainage area)	2.41	1.18	.40	.39	2.11	1.09	.41	.40

[a] Discharges well defined below 250 second-feet.
[b] Discharges fairly well defined for all stages.

Miscellaneous measurements in North Fork of Birch Creek drainage basin, 1911.

Date.	Stream and locality.	Drainage area.	Discharge.	Discharge per square mile.
		Sq. miles.	*Sec.-ft.*	*Sec.-ft.*
July 18	Ptarmigan Creek at mouth	19.0	4.6	0.24
18	Golddust Creek at mouth	9.5	3.6	.38
18	Butte Creek at mouth	9.2	3.5	.38
18	Bear Creek at mouth	12.4	4.3	.35
July 17	Twelvemile Creek below South Fork	22.6	5.9	.26
Aug. 3	.....do	22.6	4.3[a]	.19
14	.....do	22.6	4.8	.21
July 17	North Fork of Twelvemile Creek at mouth	22.9	5.5	.24
Aug. 3	.....do	22.9	2.6[a]	.11
14	.....do	22.9	7.5	.33

[a] Probably about the minimum for the season.

CROOKED CREEK DRAINAGE BASIN.

Crooked Creek, which is formed by the junction of Mammoth and Porcupine creeks, meanders through a rather broad valley for about 30 miles and discharges its waters into Birch Creek about 10 miles above the Fourteenmile House. Not far below the Central House the valley loses its identity in the flats of Birch Creek.

Mastodon and Independence creeks unite to form Mammoth Creek, which receives Miller Creek about 2 miles below this junction from the west. The total length of Mammoth Creek is less than 4 miles.

Deadwood and Boulder creeks are tributaries from the south, below and above the Central House, respectively. They follow parallel courses about 3 miles apart, with a length of about 18 miles.

Albert Creek, the principal tributary from the north, drains the southern slope of the Crazy Mountains.

Daily discharge, in second-feet, of Crooked, Independence, and Miller creeks, 1911.

Day.	Crooked Creek at Central House.[a] [Drainage area, 161 square miles.]				Independence Creek at Claim "No. 9 above."[b] [Drainage area, 8.6 square miles.]				Miller Creek at mouth.[c] [Drainage area, 10.5 square miles.]			
	May.	June.	July.	Aug.	June.	July.	Aug.	Sept.	June.	July.	Aug.	Sept.
1	.....	416	111	5.3	.....	54.0	1.6	3.6	.....	8.5	0.9	0.9
2	.....	332	200	5.0	.....	164.0	1.6	4.1	.....	14.7	.9	.9
3	.....	292	695	5.0	.....	58.0	1.6	3.1	.....	44.0	.9	.9
4	.....	273	591	4.8	.....	170.0	1.3	2.6	.....	44.0	.9	.9
5	.....	304	560	4.5	.....	71.0	1.3	2.6	.....	26.0	.9	.9
6	.....	481	374	4.5	39.0	32.0	1.3	2.2	.....	14.7	.9	.9
7	.....	374	353	4.5	48.0	11.8	1.3	1.9	26.0	8.5	.9	.9
8	.....	229	218	4.5	45.0	7.8	1.3	1.6	26.0	8.5	.9	.....
9	.....	292	174	4.5	35.0	5.3	1.3	1.3	26.0	5.3	.9	.....
10	.....	243	104	4.5	28.0	3.6	1.9	2.2	14.7	3.0	.9	.....
11	.....	194	68	4.5	21.0	3.1	1.9	3.6	14.7	3.0	.9	.....
12	.....	184	68	4.5	42.0	4.1	1.9	.....	14.7	5.3	.9	.....
13	.....	273	68	4.5	35.0	3.1	1.9	.....	26.0	3.0	.9	.....
14	.....	265	51	4.5	48.0	3.1	2.2	.....	14.7	3.0	.9	.....
15	.....	281	38	4.5	63.0	2.6	4.1	.....	26.0	3.0	.9	.....
16	.....	266	36	23.0	79.0	2.6	3.1	.....	26.0	3.0	3.0	.....
17	.....	273	38	26.0	140.0	2.6	3.1	.....	26.0	3.0	5.3	.....
18	.....	416	38	30.0	119.0	2.6	2.6	.....	44.0	3.0	5.3	.....
19	.....	353	32	20.0	71.0	2.6	2.6	.....	26.0	1.6	5.3	.....
20	.....	266	32	23.0	42.0	2.6	2.2	.....	14.7	1.6	3.0	.....
21	.....	218	30	23.0	35.0	2.6	2.2	.....	23	1.6	3.0	.....
22	.....	200	30	23.0	23.0	2.2	2.2	.....	14.7	1.6	3.0	.....
23	.....	174	24	17.0	26.0	2.2	2.2	.....	14.7	1.6	.9	.....
24	.....	174	12.2	14.6	28.0	2.2	1.9	.....	14.7	1.6	.9	.....
25	.....	146	10.0	12.2	21.0	2.2	1.9	.....	14.7	1.6	.9	.....
26	.....	128	10.0	12.2	14.7	1.9	1.9	.....	11.3	1.2	.9	.....
27	.....	128	8.1	12.2	10.6	1.9	1.9	.....	8.5	1.2	.9	.....
28	.....	120	8.1	10.4	6.7	1.9	2.6	.....	8.5	1.2	.9	.....
29	312	115	8.5	12.2	51.0	1.6	2.6	.....	8.5	.9	.9	.....
30	266	111	6.5	10.4	30.0	1.6	2.6	.....	14.7	.9	.9	.....
31	254	.....	6.2	8.5	.....	1.6	3.1	.....	.....	.9	.9	.....
Mean	277	251	129	11.2	44.0	20.3	2.10	2.62	19.1	7.13	1.60	.90
Mean per square mile	1.72	1.56	.801	.070	5.12	2.36	.244	.305	1.82	.679	.152	.086
Run-off (depth in inches on drainage area).	.19	1.74	.92	.08	4.43	2.72	.28	.12	1.62	.78	.18	.02

[a] The rating curve for Crooked Creek is well defined below 300 second-feet.
[b] Discharges fairly well defined below 50 second-feet.
[c] Rating curve well defined for all stages.

Daily discharge, in second-feet, of Porcupine, Bonanza, and Deadwood creeks, 1911.

Day.	Porcupine Creek below Bonanza Creek.[a] [Drainage area, 39.9 square miles.]				Bonanza Creek above ditch intake.[b] [Drainage area, 7.9 square miles.]				Deadwood Creek above Switch Creek.[c] [Drainage area, 21.3 square miles.]			
	June.	July.	Aug.	Sept.	June.	July.	Aug.	Sept.	June.	July.	Aug.	Sept.
1	.....	175.0	3.2	3.0	.....	34.0	2.0	2.0	50.0	23.0	1.6	1.6
2	.....	148.0	3.0	3.1	.....	35.0	2.0	2.1	61.0	30.0	1.6	1.4
3	.....	184.0	3.4	3.3	.....	47.0	2.0	2.3	56.0	48.0	1.6	1.2
4	.....	172.0	3.0	3.4	.....	40.0	2.0	2.4	72.0	35.0	1.6	1.2
5	89	168.0	2.7	3.4	41.0	41.0	1.7	2.4	70.0	35.0	1.4	1.2
6	142	139.0	2.7	4.1	36.0	34.0	1.7	2.4	95.0	30.0	1.2	1.2
7	107	129.0	2.6	3.8	34.0	32.0	1.6	2.4	50.0	26.0	1.4	1.2
8	94	73.0	2.4	3.7	30.0	24.0	1.6	2.3	50.0	17.2	1.6	1.2
9	91	41.0	2.3	3.5	34.0	13.7	1.5	2.3	50.0	13.5	1.8	1.2
10	71	24.0	2.5	3.7	28.0	10.0	1.5	2.3	45.0	7.5	1.5	1.2
11	57	27.0	2.1	5.0	20.0	8.9	1.5	3.3	40.0	6.2	1.2	1.2
12	61	32.0	2.0	4.7	24.0	8.5	1.4	3.3	40.0	5.4	1.2	1.2
13	95	23.0	2.4	5.2	34.0	6.5	1.4	3.5	45.0	5.4	1.2	1.2
14	92	16.7	3.0	.....	33.0	5.8	2.0	.....	50.0	5.4	2.2	1.2
15	128	12.6	3.6	.....	38.0	5.2	2.2	.....	61.0	4.8	3.3	1.2
16	119	7.4	4.5	.....	36.0	5.0	3.2	.....	50.0	4.1	4.6	1.2
17	121	9.2	8.7	.....	40.0	4.8	4.0	.....	30.0	6.7	4.1	1.2
18	120	8.4	20.0	.....	36.0	4.4	4.2	.....	48.0	5.4	3.3	1.2
19	121	5.3	13.0	.....	36.0	3.9	3.2	.....	50.0	4.1	3.0	1.2
20	84	5.9	8.7	.....	30.0	3.5	3.0	.....	30.0	3.7	2.7	1.2
21	81	7.0	3.9	.....	32.0	3.3	2.5	.....	26.0	3.3	2.4	1.2
22	69	6.6	3.8	.....	28.0	3.1	2.4	.....	21.0	3.3	2.1	1.2
23	72	6.1	3.4	.....	28.0	3.1	2.4	.....	21.0	3.3	1.8	1.2
24	66	7.0	3.3	.....	29.0	3.0	2.3	.....	21.0	3.1	1.6	1.2
25	51	6.9	3.2	.....	23.0	2.9	2.2	.....	17.2	2.9	1.4	1.2
26	45	6.8	3.1	.....	20.0	2.8	2.1	.....	13.5	2.2	1.2	1.2
27	52	6.4	3.1	.....	22.0	2.7	2.1	.....	13.5	2.7	1.4	1.6
28	36	6.5	2.7	.....	15.2	2.5	2.1	.....	10.5	2.3	1.6	1.6
29	45	5.0	3.1	.....	17.0	2.3	2.1	.....	10.5	1.9	1.4	1.6
30	76	3.6	3.1	.....	22.0	2.2	2.1	.....	13.5	1.6	1.2	1.6
31	.....	3.1	3.1	.....	.....	2.1	2.1	.....	.....	1.6	1.4	1.6
Mean	84.0	47.3	4.25	3.84	29.5	12.8	2.20	2.54	40.4	11.1	1.92	1.27
Mean per square mile	2.11	1.19	.107	.096	3.73	1.62	.278	.322	1.90	.521	.090	.060
Run-off (depth in inches on drainage area).	2.04	1.37	.123	.046	3.61	1.87	.32	.16	2.12	.60	.10	.07

[a] These discharges include water diverted by ditch and are well defined below 60 second-feet.
[b] Approximate.
[c] Discharges fairly well defined below 50 second-feet.

Daily discharge, in second-feet, of Bonanza Creek ditch, 1911.

Day.	Bonanza Creek ditch at intake.				Bonanza Creek ditch at outlet. [a]			
	June.	July.	Aug.	Sept.	June.	July.	Aug.	Sept.
1	.....	27.0	1.7	1.7	.....	28.0	0	3.0
2	.....	30.0	1.7	1.8	.....	39.0	0	3.0
3	.....	22.0	1.7	2.0	.....	33.0	0	3.0
4	.....	28.0	1.7	2.1	.....	36.0	0	3.0
5	22.0	37.0	1.4	2.1	.....	35.0	0	3.0
6	24.0	33.0	1.4	2.1	36.0	33.0	0	3.0
7	26.0	31.0	1.3	2.1	33.0	34.0	0	3.0
8	24.0	23.0	1.3	2.0	33.0	20.0	0	3.0
9	27.0	13.2	1.2	2.0	32.0	16.5	0	3.0
10	25.0	9.5	1.2	2.0	33.0	11.2	0	3.0
11	19.1	8.4	1.2	3.0	28.0	11.2	0	.....
12	21.0	8.0	1.1	3.0	27.0	6.6	0	.....
13	29.0	6.1	1.1	3.2	34.0	6.1	0	.....
14	28.0	5.5	1.7	.....	34.0	4.0	0	.....
15	30.0	4.9	1.9	.....	37.0	3.7	0	.....
16	31.0	4.7	2.8	.....	35.0	8.0	0	.....
17	30.0	4.5	3.6	.....	36.0	3.7	0	.....
18	32.0	4.1	3.8	.....	37.0	6.6	0	.....
19	32.0	3.6	2.8	.....	36.0	4.9	0	.....
20	29.0	3.2	2.7	.....	34.0	0	0	.....
21	29.0	3.0	2.2	.....	34.0	0	4.0	.....
22	27.0	2.8	2.1	.....	33.0	0	3.0	.....
23	27.0	2.8	2.1	.....	28.0	0	3.0	.....
24	28.0	2.7	2.0	.....	28.0	0	3.0	.....
25	22.0	2.6	1.9	.....	24.0	0	3.0	.....
26	19.1	2.5	1.8	.....	18.6	0	2.3	.....
27	21.0	2.4	1.8	.....	18.6	0	2.3	.....
28	14.5	2.2	1.8	.....	14.0	0	3.0	.....
29	16.3	2.0	1.8	.....	13.5	0	3.0	.....
30	21.0	1.9	1.8	.....	30.0	0	3.0	.....
31	.....	1.8	1.8	.....	.....	0	3.0	.....
Mean	25.2	10.8	1.88	2.24	29.9	11.0	1.05	3.00

[a] Water turned out of lower section of ditch from July 20 to Aug. 20.

NOTE.—The above discharges are only approximate because of insufficient measurements to determine the effect of various changes made in channel conditions.

Miscellaneous measurements in Crooked Creek drainage basin, 1911.

Date.	Stream and locality.	Drainage area.	Discharge.	Discharge per square mile.
		Sq. miles.	*Sec.-ft.*	*Sec.-ft.*
July 20	Porcupine Creek above ditch intake	17.8	2.7	0.15
20	Bonanza Creek ditch below Porcupine ditch	.....	3.3	.....
Aug. 16	.....do	.....	3.6	.....
July 19	Mammoth Creek above Miller Creek	27.0	12.4	.46
22	.....do	27.0	7.1	.26
Aug. 15	.....do	27.0	3.1	.11
July 23	Boulder Creek at road crossing	38.8	1.9	.049