

Divisor	Dividend	Quotient
157,710,000	175,670,000	115.8%
	101,320,000	66.8
Annual	113,540,000	74.8
	165,970,000	109.4
	142,560,000	94.0
	138,960,000	91.6
92,460,000	109,000,000	117.9
	56,800,000	61.4
Period	67,400,000	72.9
	95,400,000	103.2
	89,500,000	96.8
	84,230,000	91.1

Columbia River
at
The Dalles

Clark Fork at Newport, Wash.

in thousands of acre-ft.

	1913-14	1914-15	1915-16	Total	Normal	
Year	17,083	15,005	27,427	59,515	19,838	100%
Period	11,145	8,378	19,080	38,503	12,834	64.7%

Percentage Relationships.

Year

Period

Snake River at Burbank, Wash.

acre-foot,

Year	36,300,000	26,000,000	48,500,000	110,800,000	36,933,333	100%
Period	21,260,000	13,620,000	30,810,000	65,690,000	21,896,667	59.3%

Percentage Relationships.

Year

Period

Columbia River at The Dalles

millions of acre-foot.

Year	135.41	106.34	172.81	414.56	138.19	100%
Period	80.70	55.14	108.40	244.24	81.41	58.9%

Percentage Relationships.

Year

Period

Divisor	Dividend	Quotient	
19,838	17,083	86.1%	Clark Fork at Newport, Wash.
Annual	15,005	75.6	
	27,427	138.3	
	12,834	64.7	
12,834	11,145	86.8	Snake River at Burbank, Wash.
Period	8,378	65.3	
	19,080	148.7	
36,933,333	36,300,000	98.3	Snake River at Burbank, Wash.
Annual	26,000,000	70.4	
	48,500,000	131.3	
	21,896,667	59.3	
21,896,667	21,250,000	97.1	Columbia River at The Dalles.
Period	13,620,000	62.2	
	30,810,000	140.7	
138.19	135.41	98.0	Columbia River at The Dalles.
Annual	106.34	77.0	
	172.81	125.1	
	81.41	58.9	
81.41	80.70	99.1	Columbia River at The Dalles.
Period	55.14	67.7	
	108.40	133.2	

Determinations :-

1. acre-feet in Upper Columbia

(a) Mean Annual Run-Off

(b) " for apr-july

2. Seas. Percentage

(a) Clarks Fork 1903-1909. apr-july.

~~(b)~~ (b) Columb. at Dalles 1903-1909
Annual and apr-july.

3. Additional Seas. Pctge
on Columbia.

4. work up normals for
1913-14, 1914-15, 1915-16
in up. Columb., Clarks Fk.,
Snake at Burbank, and
Columb. at Dalles and
compute seas pctge
of these years.

62.57

63.92

2.70
 2.59
2.52
 2.65

However, the driver in bank.
 The cancellation bet. the two other
 would come their way
 please to consider with cost
 other + with plan of car

19.71
 21.10
40.81
 20.41 7.71
 2.94 8.11
 2.86
5.80
 2.90
 2) 15.82
 7.91

3.30
 3.90
 3.57
7.41
 2) 3.71

4.75
 3.96
8.71
 2) 4.36
 4.17
 4.74
8.91
 2) 4.46

4.30
 5.42
9.72
 2) 4.86
 4.98
 5.51
10.49
 2) 5.25

10.26
 8.26
18.52
 2) 9.26
 14.50
 13.52
28.02
 2) 14.01
 20.05
 20.42
40.47
 2) 20.24

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
COOPERATING WITH
THE STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION AND DEVELOPMENT

WATER RESOURCES BRANCH

404-406 FEDERAL BUILDING, TACOMA, WASHINGTON.

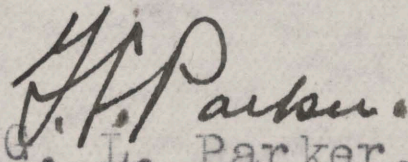
January 8, 1923.

Mr. J. E. Church, Jr.,
Mount Rose Observatory,
Reno, Nevada.

Dear Mr. Church:

Complying with a request by Mr. Fred F. Henshaw, District Engineer at Portland, there is being forwarded to you herewith blue prints of monthly and annual discharge of Snake River at Riparia and Burbank. You will note that the two records are simultaneous for a part of the time so that the one may be estimated from the other.

Very truly yours,


G. L. Parker,
District Engineer.

Enclosures.

Yearly discharge of Snake River at Riparia.

(150)

513

[DRAINAGE AREA. 102,000 SQUARE MILES.]

YEAR ENDING SEPTEMBER 30.	DISCHARGE IN SECOND-FEET.					RUN-OFF.		
	MAXIMUM DAY.	DAY.	MINIMUM.		ANNUAL MEAN.	ANNUAL MEAN PER SQUARE MILE.	INCHES.	ACRE-FEET.
			CALENDAR MONTH.					
			MEAN	MONTH.				
1916	230,000	15,200	20,700	Oct.	64,100	- - -	- - -	46,500,000
1917	256,000	16,200	18,500	Sept.	63,800	- - -	- - -	46,300,000
1918	216,000	15,000	17,400	Sept.	58,800	- - -	- - -	42,600,000
1919	167,000	10,900	11,800	Sept.	40,000	- - -	- - -	28,900,000
1920	148,000	- - -	15,900	Aug.	42,500	- - -	- - -	30,800,000
1921	270,000	16,700	18,900	Sep.	68,800	- - -	- - -	49,800,000
1922	233,000	14,500	15,600	Sep.	54,400	- - -	- - -	39,400,000

UNPUBLISHED RECORDS
SUBJECT TO REVISION.

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
WATER-RESOURCES BRANCH
SNAKE RIVER NEAR BURBANK, WASH.

File Washington
Number District

Discharge in second-feet.

Climatic year.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Mean for year.
	(Drainage area 109,000 square miles)												
1909												26,600	—
1910	28,100	47,800	40,800	37,500	34,400	165,000	164,000	159,000	78,900	25,200	13,900	15,400	67,600
1911	23,000	35,800	35,400	26,800	37,100	56,800	73,500	124,000	185,000	65,100	20,200	17,400	58,300
1912	26,300	29,400	26,400	35,600	49,900	41,400	100,000	184,000	209,000	59,500	23,700	28,700	67,600
1913	30,100	33,800	23,200	24,400	28,800	44,900	124,000	166,000	189,000	61,400	25,200	19,100	64,200
1914	29,500	32,300	24,800	32,900	33,400	65,100	92,900	130,000	96,700	32,400	14,000	17,100	50,100
1915	30,700	34,300	23,400	23,700	28,400	34,700	56,500	74,300	64,400	30,200	16,800	14,400	36,000
1916	21,100	24,200	27,700	27,100	51,500	89,500	114,000	133,000	164,000	99,000	28,400	22,800	66,800
1917	28,000	28,200	26,800	25,500	28,500	31,700							

Yearly discharge of Snake River near Burbank. (151)

512

(DRAINAGE AREA, 109,000[✓] SQUARE MILES.)

YEAR ENDING SEPTEMBER 30.	DISCHARGE IN SECOND-FEET.					RUN-OFF.		
	MAXIMUM DAY.	DAY.	MINIMUM.		ANNUAL MEAN.	ANNUAL MEAN PER SQUARE MILE.	INCHES.	ACRE-FEET.
			CALENDAR MONTH.					
			MEAN	MONTH.				
1910	252,000	11,800	15,900	Aug.	57,600	- - -	- - -	49,000,000
1911	242,000	15,600	17,400	Sept.	58,300	- - -	- - -	42,200,000
1912	289,000	15,000	23,700	Aug.	67,600	- - -	- - -	49,100,000
1913	298,000	15,500	19,100	Sept.	64,200	- - -	- - -	46,400,000
1914	175,000	13,000	14,000	Aug.	50,100	- - -	- - -	36,300,000
1915	122,000	13,000	14,400	Sept.	36,000	- - -	- - -	26,000,000
1916	248,000	- - -	21,100	Oct.	66,800	- - -	- - -	48,500,000
<i>Print</i>	<i>298,000</i>	<i>11,800</i>	<i>15,900</i>	<i>Aug. 1910</i>	<i>57,600</i>	<i>- - -</i>	<i>- - -</i>	<i>49,000,000</i>

Divisor
4,782,800

Dividend
4,017,800

Quotient
84.0%

Annual 1921-22

2,857,500

2,791,200

95.9

Period

Spokane River
at Spokane, Wash

Snake River
 AT Riparia

86,200

1945-16

			*
	20.70	■	
	23.90	■	
	27.10	■	
	26.50	■	
	50.50	■	
	68.20	■	
1	09.00	■	
1	28.00	■	
1	57.00	■	
	92.90	■	
	26.40	■	
	21.00	■	

751.20 *

769200*

1916-17

	25.40	■	
	26.60	■	
	25.20	■	
	23.00	■	
	25.60	■	
	29.40	■	
	97.40	■	
1	77.00	■	
2	01.00	■	
	93.50	■	
	22.20	■	
	18.50	■	

765.20 *

17-18

89,900 - -

	24.50	■	
	25.50	■	
	60.80	■	
	69.10	■	
	43.30	■	
	59.30	■	
	98.90	■	
1	10.00	■	
1	45.00	■	
	40.70	■	
	19.90	■	
	17.40	■	

714.40 *

705,400*

18-19

	25.40	■	
	27.00	■	
	22.20	■	
	24.40	■	
	26.00	■	
	41.90	■	
	96.80	■	
1	14.00	■	
	59.30	■	
	18.10	■	
	12.00	■	
	11.30	■	

478.90 *

16.50 ■
22.10 ■
24.40 ■
30.50 ■
29.20 ■
35.30 ■
56.40 ■
108.00 ■
114.00 ■
39.90 ■
15.90 ■
17.50 ■

19-20

510.20 *

29.70 ■
35.60 ■
32.30 ■
46.40 ■
48.60 ■
82.30 ■
98.60 ■
191.00 ■
179.00 ■
43.50 ■
19.70 ■
18.90 ■

~~82,200~~
~~20-21~~

825.60 *
100
825,500

22.20 ■
29.60 ■
39.30 ■
25.60 ■
25.30 ■
39.50 ■
81.40 ■
156.00 ■
164.00 ■
34.90 ■
18.60 ■
15.60 ■

21-22

652.50 *

20.70 ■
23.90 ■
44.60 *

Oct.

20.70 ■
25.40 ■
24.50 ■
25.40 ■
16.50 ■
29.70 ■

142.20 * ✓

Nov.

23.90 ■
26.60 ■
25.50 ■
27.00 ■
22.10 ■
35.60 ■

160.70 * ✓

Dec.

27.10 ■
25.20 ■
60.30 ■
22.20 ■
24.40 ■
32.30 ■

192.00 * ✓

26.50 ■
 23.00 ■
~~69.10 ■~~
~~24.40 ■~~
~~30.50 ■~~
~~29.20 ■~~
 48.60 ■
 251.30 *

26.50 ■
 23.00 ■
 Jan. 69.10 ■
 24.40 ■
 30.50 ■
 46.40 ■
 219.90 * ✓

50.50 ■
 25.60 ■
 Feb 43.30 ■
 26.00 ■
 29.20 ■
 48.60 ■
 223.20 * ✓

86.20 ■
 29.40 ■
 Mar 59.30 ■
 41.90 ■
 35.30 ■
 82,200 — 82.30 ■
 334.90 * ✓

334,800*

109.00 ■
 97.40 ■
 89.90 ■
 Apr. 96.80 ■
 56.40 ■
 98.60 ■
 548.10 * ✓

128.00 ■
 177.00 ■
 May 110.00 ■
 114.00 ■
 108.00 ■
 191.00 ■
 828.00 * ✓

~~157.00 ■~~
~~201.00 ■~~
~~145.00 ■~~
~~593.00 ■~~
 1096.00 *

157.00 ■
 201.00 ■
 June 145.00 ■
 59.30 ■
 114.00 ■
 179.00 ■
 855.30 * ✓

July

92.90 ■
40.70 ■
18.10 ■
39.90 ■
43.50 ■

235.10 *

93,900

329,000 ✓

26.40 ■
22.20 ■
19.90 ■
12.00 ■
15.90 ■
19.70 ■

Aug.

116.10 * ✓

21.00 ■
18.50 ■
17.40 ■
11.80 ■
17.50 ■
18.90 ■

Sept.

105.10 * ✓

DEPARTMENT OF THE INTERIOR
 UNITED STATES GEOLOGICAL SURVEY
 WATER-RESOURCES BRANCH

File { Washington _____
 Number { District _____

SNAKE RIVER AT RIPARIA, WASH.

Climatic year.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Mean for year.
<i>(Drainage area, 102,000 square miles)</i>													
1916	20700	23900	27100	26500	50500	86200	109000	128000	157000	92900	26400	21000	64100
1917	25400	26600	25200	23000	25600	29400	97400	177000	201000	93900	22200	18500	63800
1918	24500	25500	60800	69100	43300	59300	89900	110000	145000	40700	19900	17400	58800
1919	25400	27000	22200	24400	26000	41900	96800	114000	59300	18100	12000	11800	40000
1920	16500	22100	24400	30500	29200	35800	56400	108000	114000	39900	15900	17500	42500
1921	29700	35600	32300	46900	48600	82200	98600	191000	179000	43500	19700	18900	68800
1922	22200	29600	39300	25600	25800	39500	81400	156000	169000	34900	18600	15600	54400

UNPUBLISHED SERIES
 SUBJECT TO REVISION

Discharge in second feet.

DEPARTMENT OF THE INTERIOR
 UNITED STATES GEOLOGICAL SURVEY
 WATER-RESOURCES BRANCH
 SNAKE RIVER NEAR BURBANK, WASH.

File (Washington
 Number (District

Climatic year.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Mean for year.
	(Drainage area 109000 square miles)												
1909												26,600	—
1910	28,100	47,800	40,800	37,500	34,400	165,000	164,000	159,000	78,900	25,200	13,900	15,400	67,600
1911	23,000	35,800	35,400	26,800	37,100	56,800	73,500	124,000	185,000	65,100	20,200	17,400	58,300
1912	26,300	29,400	26,400	35,600	49,900	41,400	100,000	184,000	209,000	59,500	23,700	28,700	67,600
1913	30,100	33,800	23,200	24,400	28,800	44,900	124,000	166,000	189,000	61,400	25,200	19,100	64,200
1914	29,500	32,300	24,800	32,900	33,400	65,100	92,900	130,000	96,700	32,400	14,000	17,100	50,100
1915	30,700	34,300	23,400	23,700	28,400	34,700	56,500	74,300	64,400	30,200	16,800	14,400	36,000
1916	21,100	24,200	27,700	27,100	51,500	89,500	114,000	133,000	164,000	99,000	28,400	22,800	66,800
1917	28,000	28,200	26,800	25,500	28,500	31,700							

Discharge in second-feet.

Divisor	Dividend	Quotient
19,180	17,778	92.7%
12,790	14,643	114.5
Period	6,734	52.7
	7,727	60.4
	15,605	122.0
	15,314	119.7
	13,062	102.1
1921-22	12,720	99.5

Annual
1921-22

Clark Fork
at Newport, Wash

Divisor	Dividend	Quotient
4,782,800	2,741,200	57.3%
Annual	3,911,900	81.8
	6,075,600	127.0
	4,473,600	93.5
	4,035,000	84.4
	2,857,500	56.2
Apr-July Period	2,257,200	79.3
	3,416,200	119.6
	4,969,400	103.9
	2,511,400	87.9

Spokane River
at
Spokane, Wash.

1903-04 1904-05 1905-06 1906-07 1907-08 1908-09 1909-10 1910-11 1911-12 1912-13

Up. Columb. 52,521,112 A.F.
~~52,241,452 A.F.~~

Clams Fr. 111.2
 19,180,000 A.F.

[Spokane
 Snare
 45,517,832 A.F.]

Cal. at Dallas 115.8
 151,710,000 A.F.

Willamette 132.5
 Albany, Oregon

Spokane

Up. Columb. 31,236,617 A.F.
~~32,120,296 A.F.~~

Clams Fr. 114.5
 12,970,000 A.F.

[Spokane
 Snare
 28,467,954 A.F.]

Cal. at Dallas 117.9
 92,460,000 A.F.

Willamette 124.0

Spokane

~~107.6~~ ~~97.5~~ ~~97.5~~

107.6 97.5 97.5 126.1

107.7 92.7 107.9 101.9

101.6 89.5 87.6 89.6 101.6

96.7 77.9 101.5 98.6

Weighted 7 Hours

b.
 FR

95.7 92.2 100.9 133.1

90.6 94.8 117.0 114.4

94.9 87.7 90.4 110.4

62.0 79.0 100.8 133.3

Av. 8
 7

1911	1911-12	1912-13	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19	1919-20	1920-21	1921-22	
	97.5		103.7 103.2	93.6 93.1	112.9 112.3	93.7	104.5	101.3	93.1	113.5		
7.5	97.5	126.1	89.1	78.2	143.0	118.1	112.1	79.9	80.3	113.9	92.7	
7.7	107.9	101.9	79.7	57.1	$\begin{cases} 106.6 \text{ (Beulah)} \\ 109.6 \text{ (Piparia)} \\ \Sigma 108.1 \end{cases}$	109.1	100.5	68.3	72.7	117.7	93.0	
7.5	87.6 97.6	101.6	89.3	70.1		113.9	99.5	97.7	82.1	75.0	109.7	
		Weighted % } 91.7 98.6 } 7. Normal	81.4	av. 76.7	116.7	103.7	104.7	85.0	83.0	115.2		
7.9	101.5			61.2	132.5	98.6	100.6					
					$\frac{21216.2}{108.1}$							
			105.5 108.5	79.1 81.3	113.0 116.2	97.0	104.9	100.0	92.6	114.1		
		FR										
2	100.9	133.1	85.9	64.6	147.1	130.3	106.5	79.6	86.1	114.3	99.5	
4.8	117.0	114.4	74.7	47.8	$\begin{cases} 108.2 \text{ (Beulah)} \\ 110.5 \text{ (Piparia)} \\ (109.4) \end{cases}$	129.2	87.5 100.5	65.4 68.3	72.3	116.3	99.5	
7.7	90.4	110.4	87.3	59.6	117.2	111.5	89.4	81.0	72.6	109.6		
9.0	100.8	133.3 av.	$\frac{887}{91.3}$ 74.2	$\frac{638}{65.2}$ 70.4	119.1	116.8	115.5	165.0	98.4	82.8	83.4	115.0
							68.5					

	Normals	%	% W&E
Up. Col	52,521,112	44.80	44.8
Clarks' Fork	19,180,000	16.36	16.4
Snake	45,517,832	38.83	38.8
	<u>117,218,944</u>	<u>99.99</u>	<u>100.0</u>

~~Normal~~

% of sum
of 3 forks

117,219) 52521112 (44.80
468876
 563351

312366170 (42.98
290698284
 21667886

117,218,944) 191800000 (16.36
117218944
745810560
703313664
 42496896

72,674,571) 129700000 (17.85
72674571
570254290
508721997
 61532293

117,218,944) 455178320 (38.83+
351656832
1035214880
937751552
 97463328

72,674,571) 284679540 (39.17
218023713
666558270
654071139
 12487131

Apr. July	Normals	%	
Up Columbia	31,236,617	42.98	43.0
Clarks Fork	12,970,000	17.85	17.8
Snake	28,467,954	39.17	39.2
	<u>72,674,571</u>	<u>100.00</u>	<u>100.0</u>
		<u>% of sum of 3</u>	

~~Apr. July~~

INDIAN CREEK
NEAR CRESCENT MILLS
DRAINAGE AREA 740 SQ. MI.

	1905-6	1906-7	1907-8	1908-9	1909-10	1911-12	1912-13	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19
October	—	5,830	7,010	3,620	6,210	4,800	3,040	270	4,600	2,500	5,000	2,400	
November	—	7,800	8,270	5,620	21,200	7,200	8,030	6,130	5,590	4,980	7,100	4,600	
December	—	32,800	23,600	7,620	29,800	6,820	7,130	12,600	7,440	14,000	12,600	7,200	
January	53,400	31,000	27,400	179,000	—	10,100	8,920	127,000	109,000	31,500	8,600	7,100	
February	45,800	123,000	20,900	76,600	—	10,000	11,200	76,100	43,300	88,000	39,500	13,100	
March	123,000	180,000	60,800	73,800	—	15,700	18,300	184,000	56,800	173,000	35,800	50,000	
April	152,000	230,000	61,300	151,000	—	16,900	64,900	218,000	78,600	181,000	161,100		
May	110,000	130,000	40,600	124,000	—	36,300	41,800	119,000	108,000	83,600	116,800		
June	60,100	59,500	18,200	57,200	—	10,600	13,400	30,800	19,000	32,400	40,100		
July	13,900	14,800	4,450	14,800	—	2,690	5,250	7,130	4,670	8,850	7,400		
August	3,200	5,610	928	2,170	—	928	2,760	1,800	1,630	2,340	1,900		
September	3,450	5,290	1,350	2,200	—	2,220	1,990	2,550	1,980	2,530	1,800		
Total for Year	—	825,600	276,800	697,600	—	124,000	187,000	788,000	343,000	625,000	438,000		
March	123,000	180,000	60,800	73,800	—	15,700	18,300	184,000	56,800	173,000	35,800		
April	152,000	230,000	61,300	151,000	—	16,900	64,900	218,000	78,600	181,000	161,100		
May	110,000	130,000	40,600	124,000	—	36,300	41,800	119,000	108,000	83,600	116,800		
June	60,100	59,500	18,200	57,200	—	10,600	13,400	30,800	19,000	32,400	40,100		
July	13,900	14,800	4,450	14,800	—	2,690	5,250	7,130	4,670	8,850	7,400		
Total March-July	459,000	614,300	185,350	420,800	—	82,190	143,650	558,930	267,070	478,850	368,200		
" April-July	336,000	434,300	124,550	347,000	—	66,490	125,350	374,930	210,170	305,850	325,400		

LOCATION.--In the Sw $\frac{1}{4}$ Sec. 25, T. 26 N., R. 9 E., at the lower end of Indian Valley, about 2,000 feet below Arlington Bridge, and $1\frac{1}{2}$ miles below Crescent Mills, Plumas County. Spanish Creek enters 4 miles below the Station.

DRAINAGE AREA.--740 square miles.

RECORDS AVAILABLE.--January 1, 1906, to December 31, 1909; September 10, 1911 to March 31, 1918.

GAGE.--Vertical staff in three sections on right bank near observer's house, read by Eugene Cook. Same location and datum used throughout period of record, but lowest section was 0.46 foot too low from 1911 to August 12, 1915.

DISCHARGE MEASUREMENTS.--Made from cable 30 feet below gage or by wading.

CHANNEL AND CONTROL.--Bed composed of gravel and small boulders; fairly permanent. At low stages water is deep and sluggish at gage.

EXTREME OF DISCHARGE.--Maximum stage recorded during year, 10.4 feet at 5 p.m. March 20 (discharge, from extension of rating curve, about 7,040 second-feet.); minimum stage recorded, 0.68 foot, October 1-4 (discharge, 34 second-feet).

1906-1916: Maximum stage recorded, 20.2 feet at 6.30 a.m., crest of flood of March 19, 1907 (discharge, from extension of rating curve, about 11,700 second-feet); minimum stage recorded, 0.75 foot, August 9-15, 1908 (discharge, 12 second-feet).

* DIVERSIONS.--Water is diverted from Indian Creek for irrigation in Indian and Genesee Valleys

REGULATION.--None.

ACCURACY.--Stage-discharge relation changed below discharge 280 second-feet, March 20; unchanged above this stage since station was established. Rating curve before change fairly well defined below 4,000 second-feet; after change fairly well defined between 75 and 4,000 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying gage heights to rating table. Records good.

PERCENTAGE RELATIONSHIPS (EXCLUDING 1906-7)

MEAN EXCLUDING YEAR 1906-7	1905-6	1906-7	1907-8	1908-9	1909-10	1911-12	1912-13	1913-14	1914-15	1915-16	1916-17	1917-18
3,950 ¹² 0.91	---	---	177.5	91.6	157.2	121.5	77.0	68	116.5	63.3	126.6	60.8
7,870 ¹² 1.81	---	---	105.1	71.4	269.3	91.5	102.0	77.9	71.0	63.3	90.2	58.4
12,880 ¹² 2.96	---	---	183.2	59.2	231.4	53.0	55.4	97.8	57.8	108.7	97.8	55.9
46,590 ¹² 10.71	114.6	---	63.1	384.2	---	21.7	19.1	272.5	23.4	67.6	18.5	15.2
42,450 ¹² 9.76	107.9	---	49.2	180.4	---	23.6	26.4	179.3	102.0	207.3	93.1	30.9
79,120 ¹² 18.19	155.4	---	76.8	93.3	---	19.8	23.1	232.5	71.8	218.6	45.2	63.2
120,530 ⁹ 27.71	126.1	---	40.9	125.3	---	14.02	53.8	180.9	65.2	150.2	133.7	---
86,680 ⁹ 19.93	126.9	---	46.8	143.0	---	41.9	48.2	137.2	124.6	96.4	134.7	---
31,310 ⁹ 7.20	191.9	---	58.1	182.7	---	33.9	42.8	98.4	60.7	103.5	128.1	---
7,680 ⁹ 1.77	181.0	---	57.9	192.7	---	35.0	68.4	92.8	60.8	115.2	96.4	---
1,960 ⁹ .45	163.3	---	47.3	110.7	---	47.3	140.8	91.8	83.2	119.4	96.9	---
2,230 ⁹ .51	154.7	---	60.5	98.7	---	99.6	84.2	114.3	98.9	113.5	80.7	---
434,930 ⁸	---	---	63.6	160.4	---	28.5	43.0	181.2	78.9	142.7	100.7	---
328,600 ⁹	139.7	---	56.4	128.1	---	25.0	43.7	170.0	81.3	145.7	109.9	---
246,200 ⁹	136.5	---	50.6	140.9	---	27.0	50.9	152.3	85.4	124.2	132.2	---

PERCENTAGE RELATIONSHIPS (INCLUDING 1906-7)

MEAN INCLUDING YEAR 1906-07	1905-06	1906-07	1907-08	1908-09	1909-10	1911-12	1912-13	1913-14	1914-15	1915-16	1916-17	1917-18
4,120 ¹¹ 0.86	—	141.5	170.1	87.9	150.7	116.5	73.8	66	111.7	60.7	121.4	58.3
7,870 ¹¹ 1.65	—	99.1	105.1	71.4	269.4	91.5	102.0	77.9	71.0	63.3	90.2	58.4
14,690 ¹¹ 3.07	—	223.3	160.7	51.9	202.9	46.4	48.5	85.8	50.6	95.3	85.8	49.0
45,170 ¹¹ 9.44	118.2	68.6	65.1	396.2	—	22.4	19.7	281.1	24.1	69.7	19.0	15.7
49,772 ¹¹ 10.41	92.0	247.1	42.0	153.9	—	20.1	22.5	152.9	87.0	176.8	79.4	26.3
88,290 ¹¹ 18.45	139.3	203.8	68.9	83.6	—	17.8	20.7	208.4	64.3	195.9	40.5	56.6
131,480 ¹⁰ 27.48	115.6	174.9	46.6	114.8	—	12.9	49.4	165.8	57.8	137.7	122.5	—
91,010 ¹⁰ 19.03	120.8	142.8	44.61	136.2	—	39.9	45.9	130.7	118.6	91.9	128.3	—
34,130 ¹⁰ 7.14	176.1	174.3	53.3	167.6	—	31.1	39.3	90.2	55.7	94.9	117.5	—
8,400 ¹⁰ 1.76	165.4	176.2	53.0	176.2	—	32.0	62.5	84.9	55.6	105.4	88.1	—
2,330 ¹⁰ .49	137.3	240.8	39.8	93.1	—	39.8	118.5	77.3	70.0	100.4	81.5	—
2,540 ¹⁰ .53	135.8	208.3	53.1	86.6	—	87.4	78.3	100.4	78.0	99.6	70.9	—
478,300 ⁹	—	172.6	57.9	145.8	—	25.9	39.1	164.8	71.7	130.7	91.6	—
357,100 ¹⁰	128.5	172.0	51.9	117.8	—	23.0	40.2	156.5	74.8	134.1	101.1	—
265,000 ¹⁰	126.8	163.9	47.0	130.9	—	25.1	47.3	141.5	79.3	115.4	122.8	—

Figures in red indicate per cent that mean for each month represents of mean total for the years.

Weighted %	Total %	Annual							
		1913-14	1914-15	1915-16	1916-17	1917-18	1918-19	1919-20	1920-21
Up. Columb	44.8	46.2	41.7	50.3	42.0	46.8	45.4	41.7	50.9
Clarks	16.4	14.6	12.8	23.4	19.3	18.3	13.1	13.1	18.6
Snake	38.8	30.9	22.2	42.0	42.4	39.0	26.5	28.2	45.7
	100.0%	91.7	76.7	115.7	103.7	104.1	85.0	83.0	115.2

— april - july —

Weighted %	Total %	Annual							
		1913-14	1914-15	1915-16	1916-17	1917-18	1918-19	1919-20	1920-21
Up. Columb.	43.0	46.7	35.0	50.0	41.7	45.1	43.0	39.8	47.1
Clark	17.8	15.3	11.5	26.2	23.2	19.0	14.2	15.3	20.3
Snake	39.2	29.3	18.7	42.9	50.6	34.3	25.6	28.3	45.6
	100.0%	91.3	65.2	119.1	115.5	98.4	82.8	83.4	115.0

ABILITY OF LAKE TAHOE TO RECOVER
IF DRAWN DOWN.

Based on letters to Robert A. Allen, Assistant State
Engineer for

Clemens

SPOKANE RIVER AT SPOKANE, WASH.
 (Drainage Area 4000 sq. mi.)
 Corrections Applied for Conditions of Storage in Coeur d'Alene Lake

	1904-5	1905-6	1906-7	1907-8	1908-9	1909-10	1910-11	1911-12	1912-13	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19	1919-20	1920-21	Total	1921-22
October	87,700	177,900	96,100	117,300	109,700	97,800	136,900	91,900	120,500	113,900	104,700	86,400	106,300	95,200	98,700	78,000	166,600	188,5600	100,500
November	91,100	140,900	351,700	113,900	126,100	543,600	330,800	186,700	322,400	189,200	255,600	119,300	136,900	92,300	121,700	97,500	230,500	3450200	123,200
December	114,800	144,600	350,800	150,000	115,000	459,300	268,000	136,900	187,900	145,400	145,000	206,900	122,800	866,200	223,200	107,000	278,600	4022400	424,800
January	136,000	186,900	314,400	142,200	345,300	236,600	276,500	222,300	286,300	207,500	112,400	143,100	132,300	1,251,300	442,800	175,300	576,400	5187600	165,800
February	120,400	377,000	558,800	141,900	249,900	272,400	145,300	407,400	246,400	272,100	146,500	310,700	144,400	453,500	300,900	153,200	565,400	4816200	100,300
March	400,500	433,500	734,900	650,700	372,900	1,435,800	475,700	284,800	410,700	645,800	381,300	1,091,400	152,700	622,300	583,800	354,800	1,011,600	10043200	169,800
April	460,100	969,500	1,132,900	1,093,500	595,500	1,453,900	780,200	983,100	1,486,300	1,065,700	599,900	1,275,300	1,220,000	1,008,900	1,339,500	642,500	1,065,000	17171800	642,800
May	538,100	679,000	1,353,800	1,035,600	919,900	891,000	946,700	1,275,300	1,750,600	810,300	454,900	1,293,800	2,219,900	810,500	991,900	965,800	1,423,600	18360700	1,237,800
June	421,300	440,700	681,000	661,500	771,600	304,100	509,500	574,000	910,300	170,900	272,500	1,066,400	1,187,200	439,300	331,200	453,300	494,900	9689700	237,800
July	186,300	178,000	248,500	178,800	224,400	138,000	186,600	194,600	297,600	121,700	120,100	528,000	292,300	60,300	115,900	145,700	138,300	3355100	120,800
August	91,100	88,600	126,300	102,100	111,700	91,000	109,500	100,200	115,500	76,400	80,400	158,800	121,400	89,100	78,500	88,800	85,000	1714400	99,300
September	93,800	95,300	126,400	86,100	93,000	91,000	95,500	126,400	87,300	85,900	77,200	117,200	106,100	71,100	73,700	105,800	75,100	1610900	92,900
Annual	2,741,200	3,911,900	6,075,600	4,473,600	4,035,000	5,964,500	4,261,200	4,583,600	6,221,800	3,904,800	2,750,500	6,397,300	5,942,300	5,860,000	4,701,800	3,371,700	6,111,000	8,307,800	4,017,800
April	460,100	969,500	1,132,900	1,093,500	595,500	1,453,900	780,200	983,100	1,486,300	1,065,700	599,900	1,275,300	1,220,000	1,008,900	1,339,500	642,500	1,065,000		
May	538,100	679,000	1,353,800	1,035,600	919,900	891,000	946,700	1,275,300	1,750,600	810,300	454,900	1,293,800	2,219,900	810,500	991,900	965,800	1,423,600		
June	421,300	440,700	681,000	661,500	771,600	304,100	509,500	574,000	910,300	170,900	272,500	1,066,400	1,187,200	439,300	331,200	453,300	494,900		
July	186,300	178,000	248,500	178,800	224,400	138,000	186,600	194,600	297,600	121,700	120,100	528,000	292,300	60,300	115,900	145,700	138,300		
Period	1,605,800	2,267,200	3,416,200	2,969,400	2,511,400	2,787,000	2,423,000	3,027,000	4,444,800	2,168,600	1,447,400	4,163,500	4,919,400	2,319,000	2,778,500	2,207,300	3,121,800	48577300	2,741,200

Percentage Relationships

October																			
November																			
December																			
January																			
February																			
March																			
April																			
May																			
June																			
July																			
August																			
September																			
Annual	57.3	81.8	127.0	93.5	84.4	124.71	89.09	95.83	130.08	81.64	57.51	133.75	124.25	122.52	98.31	70.49	127.77		
Apr-July	56.2	79.3	119.6	103.9	87.9	91.53	84.79	105.93	155.54	75.89	50.66	145.70	172.16	81.12	97.23	77.25	109.25		

March-June 2,416,400 / 3,995,100

March-June
84.3%

SPOKANE RIVER AT SPOKANE, WASH.

(Drainage Area 4000 sq. mi.)

Corrections Applied for Conditions of Storage in Coeur d'Alene Lake

80,612,800

1912-13	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19	1919-20	1920-21	Total	1921-22	Normal 17-year	Per cent of Annual
20500	113,900	104,700	86,400	106,300	95,200	98,700	78,000	166,600	1885600	100,500	110,900	2.32
22,400	189,200	255,600	119,300	136,900	92,300	121,700	97,500	230,500	3450200	123,200	203000	4.24
187,900	145,400	145,000	206,900	122,800	866,200	223,200	107,000	278,600	4022400	424,800	236,600	4.94
286,300	207,500	112,400	143,100	132,300	1,251,300	442,800	175,300	576,400	5187600	165,800	305,200	6.38
246,400	272,100	146,500	310,700	144,400	453,500	300,900	153,200	565,400	4816200	100,300	283,300	5.92
19,700	645,800	381,300	1,091,400	152,700	622,300	583,800	354,800	1,011,600	10043200	169,800	590,800	12.35
86,300	1,065,700	599,900	1,275,300	1,220,000	1,008,900	1,339,500	642,500	1,065,000	17171800	642,800	1,010,100	21.12
150,600	810,300	454,900	1,293,800	2,219,900	810,500	991,900	965,800	1,423,600	18360700	1,239,800	1,080,000	22.58
910,300	170,900	272,500	1,066,400	1,187,200	439,300	331,200	453,300	494,900	9689700	237,800	570,000	11.92
297,600	121,700	120,100	528,000	292,300	60,300	115,900	145,700	138,300	3325100	120,800	197,400	4.13
115,500	76,400	80,400	158,800	121,400	89,100	78,500	88,800	85,000	1714400	99,300	100,800	2.11
87,300	85,900	77,200	117,200	106,100	71,100	73,700	107,800	75,100	1610900	92,900	94,800	1.77
									51309800	4017200		
221,800	3,904,800	2,750,500	6,397,300	5,942,300	5,869,000	4,701,800	3,371,700	6,111,000	8,307,800	4,017,800	4,782,800	100.00
86,300	1,065,700	599,900	1,275,300	1,220,000	1,008,900	1,339,500	642,500	1,065,000				
150,600	810,300	454,900	1,293,800	2,219,900	810,500	991,900	965,800	1,423,600				
910,300	170,900	272,500	1,066,400	1,187,200	439,300	331,200	453,300	494,900				
297,600	121,700	120,100	528,000	292,300	60,300	115,900	145,700	138,300				
44,800	2,168,600	1,447,400	4,163,500	4,919,400	2,319,000	2,778,500	2,207,300	3,121,800	48577300	2,741,200	2,857,500	59.75

Percentage Relationships

March-June 2,416,400 / 3,995,100

130.08	81.64	57.51	133.75	124.25	122.52	98.31	70.49	127.77
155.54	75.89	50.66	145.70	172.16	81.12	97.23	77.25	109.25

March-June
84.3%

Spokane River
at Spokane.

56
51

56

COLUMBIA RIVER at TRAIL, B. C.

Drainage Area 34,000 Sq. Mi.

	1912-13	1913-14	1914-15	1915-16	1916-17	Total	1916-17	1917-18	1918-19	1919-20	1920-21	1921-22	Total
October		2,880,000	3,030,000	2,350,000		8,260,000	2,601,000	3,290,000	3,296,000	2,134,000	4,359,000		23,940,000
November		1,920,000	2,730,000	2,080,000		6,730,000	1,732,000	1,761,000	2,053,000	1,297,000	2,422,000		15,995,000
December		1,390,000	1,880,000	1,560,000		4,830,000	1,205,000	1,666,000	1,586,000	965,000	1,765,000		12,017,000
January		1,270,000	1,220,000	1,000,000		3,490,000	867,000	1,216,000	1,224,000	935,000	1,377,000		7,609,000
February		933,000	911,000	788,000		2,632,000	689,000	1,155,000	1,172,000	739,000	1,189,000		7,576,000
March		1,090,000	1,060,000	1,410,000		3,560,000	652,000	1,131,000	996,000	719,000	1,396,000		8,454,000
April		2,610,000	2,710,000	2,680,000		8,000,000	1,029,000	2,469,000	2,047,000	916,000	2,178,000		16,639,000
May	5,310,000	7,670,000	6,760,000	6,110,000		20,560,000	4,870,000	6,948,000	6,579,000	4,566,000	7,194,000		50,707,000
June	15,600,000	11,300,000	7,320,000	11,400,000		30,020,000	11,782,000	11,901,000	11,603,000	8,688,000	14,578,000		80,572,000
July	11,100,000	12,300,000	8,610,000	16,100,000		37,910,000	12,605,000	11,437,000	11,006,000	14,757,000	11,683,000		90,498,000
August	7,690,000	6,890,000	8,120,000	8,360,000		23,370,000	7,071,000	6,949,000	7,317,000	8,854,000	7,809,000		61,370,000
September	4,970,000	3,910,000	4,560,000	5,160,000		13,630,000	4,082,000	4,516,000	4,302,000	4,243,000	3,642,000		34,415,000
Annual		54,200,000	48,900,000	59,000,000		162,100,000	49,200,000	54,900,000	53,200,000	48,900,000	59,600,000		427,900,000
April													
May													
June													
July													
Period		33,900,000	25,400,000	36,290,000		95,590,000	39,286,000	32,755,000	31,235,000	28,917,000	35,633,000		254,416,000

Columbia River
at
Trail, B.C.

Columbia R.
at Trail.

Total
by Monthly
Totals

*

2 3,9 4 0.0 0 ■

1 5,9 9 5.0 0 ■

1 2,0 1 7.0 0 ■

9,6 0 9.0 0 ■

7,5 7 6.0 0 ■

8,4 5 4.0 0 ■

1 6,6 3 9.0 0 ■

5 0,7 0 7.0 0 ■

8 8,5 7 2.0 0 ■

9 8,4 9 8.0 0 ■

6 1,3 7 0.0 0 ■

3 4,4 1 5.0 0 ■

4 2 7,7 9 2.0 0 *

Columbia R. at Trail, B.C.

Totals *

Oct. 2,880.00 ■
3,030.00 ■
2,350.00 ■
2,601.00 ■
3,290.00 ■
3,296.00 ■
2,134.00 ■
4,359.00 ■ ✓
23,940.00 *

Nov. 1,920.00 ■
2,730.00 ■
2,080.00 ■
1,732.00 ■
1,761.00 ■
2,053.00 ■
1,297.00 ■
2,422.00 ■
15,995.00 *

Dec. 1,390.00 ■
1,880.00 ■
1,560.00 ■
1,205.00 ■
1,666.00 ■
1,686.00 ■
965.00 ■
1,765.00 ■
12,117.00 *
100
12,017,000

Jan 1,270.00 ■
1,220.00 ■
1,000.00 ■
867.00 ■
1,716.00 ■
1,224.00 ■
935.00 ■
1,377.00 ■ ✓
9,609.00 *

Feb. 933.00 ■
911.00 ■
788.00 ■
689.00 ■
1,155.00 ■
1,172.00 ■
739.00 ■
1,189.00 ■ ✓
7,576.00 *

March 1,090.00 ■
1,060.00 ■
1,410.00 ■
652.00 ■
1,131.00 ■
996.00 ■
719.00 ■ ✓
1,396.00 ■
8,454.00 *

April 2,610.00 ■
2,710.00 ■
2,680.00 ■
1,029.00 ■
2,469.00 ■
2,047.00 ■
916.00 ■
2,178.00 ■ ✓
16,639.00 *

4,870, —
4,780
6,090,
May 7,690.00 ■
6,760.00 ■
6,110.00 ■
4,780.00 ■
6,948.00 ■
6,579.00 ■
4,556.00 ■
7,194.00 ■ ✓
50,617.00 *

90
50,707,000

June 1,130.00 ■
7,320.00 ■
1,140.00 ■
1,178.20 ■
1,190.10 ■
1,160.30 ■
8,688.00 ■
1,457.80 ■ ✓
88,572.00 *

July 1,230.00 ■
8,610.00 ■
1,610.00 ■
1,260.50 ■
1,143.70 ■
1,100.60 ■
1,475.70 ■
1,168.30 ■ ✓
98,498.00 *

Aug.

6,890.00	0.00	0.00	0.00
8,120.00	0.00	0.00	0.00
8,360.00	0.00	0.00	0.00
7,071.00	0.00	0.00	0.00
6,949.00	0.00	0.00	0.00
7,317.00	0.00	0.00	0.00
8,854.00	0.00	0.00	0.00
7,809.00	0.00	0.00	0.00

61,370.00 *

Sept.

3,910.00	0.00	0.00	0.00
4,560.00	0.00	0.00	0.00
5,160.00	0.00	0.00	0.00
4,082.00	0.00	0.00	0.00
4,516.00	0.00	0.00	0.00
4,302.00	0.00	0.00	0.00
4,243.00	0.00	0.00	0.00
3,642.00	0.00	0.00	0.00

34,415.00 *

Annual
by
Years

54,200.00	0.00	0.00	0.00
48,900.00	0.00	0.00	0.00
59,000.00	0.00	0.00	0.00
49,200.00	0.00	0.00	0.00
54,900.00	0.00	0.00	0.00
53,200.00	0.00	0.00	0.00
48,900.00	0.00	0.00	0.00
59,600.00	0.00	0.00	0.00

427,900.00 *

Periods

1916-17

1029.00	0.00	0.00	0.00
4,870.00	0.00	0.00	0.00
11782.00	0.00	0.00	0.00
12,605.00	0.00	0.00	0.00

30,286.00 *

1917-18

2,469.00	0.00	0.00	0.00
6,948.00	0.00	0.00	0.00
11901.00	0.00	0.00	0.00
11,437.00	0.00	0.00	0.00

32,755.00 *

1918-19

2,047.00	0.00	0.00	0.00
6,579.00	0.00	0.00	0.00
11603.00	0.00	0.00	0.00
11006.00	0.00	0.00	0.00

31,235.00 *

1919-20

916.00	0.00	0.00	0.00
4,556.00	0.00	0.00	0.00
8,688.00	0.00	0.00	0.00
14,757.00	0.00	0.00	0.00

28,917.00 *

1920-21

2,178.00	0.00	0.00	0.00
7,194.00	0.00	0.00	0.00
14,578.00	0.00	0.00	0.00
11,683.00	0.00	0.00	0.00

35,633.00 *

Total

Periods

33,900.00	0.00	0.00	0.00
25,400.00	0.00	0.00	0.00
36,290.00	0.00	0.00	0.00
30,286.00	0.00	0.00	0.00
32,755.00	0.00	0.00	0.00
31,235.00	0.00	0.00	0.00
28,917.00	0.00	0.00	0.00
35,633.00	0.00	0.00	0.00

254,416.00 *

Divisor 8	Dividend 23,940,000	Quotient 2,992,500
	15,995,000	1,999,375
	12,017,000	1,502,125
	9,609,000	1,201,125

Columbia R.
at
Trail, B.C.

Normals

7,576,000	947,000
8,454,000	1,056,750
16,639,000	2,079,875
50,707,000	6,338,375
88,572,000	11,071,500
98,498,000	12,312,250
61,370,000	7,671,250
34,415,000	4,301,875
427,900,000	53,487,500
254,416,000	31,802,000

Divisor 1.0181	Dividend 31,820,000	Quotient 31,236,617 Corr. Period Normal
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31,236,617	33,900,000	108.5%
	25,400,000	81.3
	36,290,000	116.2
	30,286,000	97.0

Period	32,755,000	104.9
	31,235,000	100.0
	28,917,000	92.6
	35,633,000	114.1

427,900,000	23,940,000	5.59%
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Monthly
%
of year

15,995,000	3.74
12,017,000	2.81
9,609,000	2.25
7,576,000	1.77
8,454,000	1.98
16,639,000	3.89
50,707,000	11.85
88,572,000	20.70
98,498,000	23.02
61,370,000	14.34
34,415,000	8.04

Period

254,416,000	59.46
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1.0184

53,487,500	52,521,112 Corr. Ann. Normal
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52,521,112

54,200,000	103.2%
48,900,000	93.1
59,000,000	112.3
49,200,000	93.7

Annual

54,900,000	104.5
53,200,000	101.3
48,900,000	93.1
59,600,000	113.5

Columbia River at
Trail, B.C.

Changing Sec-Ft. to Acre-Ft.

Both in thousands

Mult.	Mult.	Prod.
1.98347	28	55.537
	30	59.504
	31	61.488
61.488 in thousands Oct.	42.3	2,600.9
	53.5	3,289.6
	53.6	3,295.8
	34.7	2,133.6
	70.9	4,359.5
61.488 Dec.	22.6	1,389.6
	19.6	1,205.2
	27.1	1,666.3
	25.8	1,586.4
	15.7	965.4
	28.7	1,764.7
61.488 Jan.	14.1	867.0
	27.9	1,715.5
	19.9	1,223.6
	15.2	934.6
	22.4	1,377.3
" March	10.6	651.8
	18.4	1,131.4
	16.2	996.1
	11.7	719.4
	22.7	1,395.8
" May	79.2	4,869.8
	113.0	6,948.1
	107.0	6,579.2
	74.1	4,556.3
	117.0	7,194.1
" July	205.0	12,605.0
	186.0	11,436.8
	179.0	11,006.4
	240.0	14,757.1
	190.0	11,682.7
" Aug.	115.0	7,071.1
	113.0	6,948.9
	119.0	7,317.1
	144.0	8,854.3
	127.0	7,809.0

Mult.	Mult.	Product.
55.538	12.4	688.7
	20.8	1,155.2
Feb.	21.1	1,171.9
	13.3	738.7
	21.4	1,188.5

1. 983471

Mult.	Mult. can	Product.
1. 983471	30	59,504
59.504	29.1	1,731.5
Nov.	29.6	1,761.3
1917-21	34.5	2,052.8
Thousands	21.8	1,297.1
	40.7	2,421.8
59.504	17.3	1,029.4
April	41.5	2,469.4
	34.4	2,046.9
	15.4	916.3
	36.6	2,177.8
59.504.	198	11,781.7
June	200	11,900.8
	195	11,603.2
	146	8,687.5
	245	14,578.4
59.504	68.6	4,081.9
Sept.	75.9	4,516.3
	72.5	4,302.1
	71.3	4,242.6
	61.2	3,641.6

Columbia River at Trail
 Changing Sec-ft. to Acre-ft.

Errors
Columbia at Trail, B.C.

Annual

Apr - July

+
43.00
18.11
12.14
13.91

+ 87.16
- 72.48

8 | +14.68
+ 1.835

-
10.93
21.77
20.09
19.69

- 72.48

+
47.11
30.39
6.52
14.29

+ 98.26
- 83.77

8 | +14.49
+ 1.811

-
14.07
35.41
20.42
13.87

- 83.77

COLUMBIA RIVER AT THE DALLES OREGON
(Drainage Area 237,000 sq.mi.)

Run off expressed in millions of acre feet.

	1878-79	1879-80	1880-81	1881-82	1882-83	1883-84	1884-85	1885-86	1886-87	1887-88	1888-89	1889-90	1890-91	1891-92	1892-93	1893-94	1894-95	1895-96	1896-97	1897-98	1898-99
October	5.52	6.76	8.06	6.76	6.76	5.58	8.18	7.50	5.28	7.01	6.27	5.38	5.48	5.43	6.82	7.50	8.18	5.93	5.49	5.97	5.99
November	4.97	5.08	6.19	6.66	5.62	4.42	8.03	6.13	4.15	5.95	5.55	4.61	4.62	6.43	5.84	8.45	8.09	4.68	7.26	6.78	4.97
December	5.60	5.25	4.96	5.31	7.44	4.52	4.96	6.33	4.63	6.10	5.26	3.97	4.28	6.14	5.29	10.20	7.01	4.63	10.00	8.67	4.21
January	4.05	6.05	6.58	4.82	5.36	4.42	5.74	6.21	6.09	4.93	4.08	3.16	4.05	4.86	4.78	8.92	6.27	5.55	7.07	6.95	6.00
February	4.84	4.44	11.70	3.70	4.86	4.14	9.11	9.89	4.18	8.28	3.54	6.50	3.48	4.20	4.55	6.33	5.22	5.33	6.78	8.16	6.00
March	11.10	4.62	13.60	5.88	10.90	6.46	11.60	7.50	10.80	7.38	5.45	7.38	4.53	7.81	4.37	10.00	7.32	8.24	6.70	9.04	6.52
April	21.40	8.98	23.00	13.60	11.70	12.10	15.40	12.40	15.40	11.20	9.04	11.40	8.15	9.10	10.10	19.20	10.80	10.70	17.80	12.00	11.40
May	24.30	24.80	26.20	20.70	24.80	24.80	22.90	21.00	25.90	22.30	15.60	34.40	21.00	18.30	27.10	35.40	23.10	16.50	38.40	25.80	19.00
June	36.40	41.50	32.50	45.80	31.80	38.60	26.50	34.30	48.10	30.60	15.90	26.00	25.00	32.40	35.50	57.70	22.70	40.40	32.10	35.90	38.00
July	30.80	48.80	26.50	29.30	24.40	24.80	20.90	21.60	36.00	20.80	11.30	20.00	18.80	27.50	28.60	34.00	21.40	39.30	22.90	24.50	37.80
August	16.90	23.70	15.00	16.20	12.40	15.70	12.50	12.40	17.80	13.10	9.16	11.90	12.60	12.90	16.80	16.70	12.70	15.70	12.90	14.60	18.90
September	9.16	11.80	8.39	8.93	7.50	9.88	9.22	7.44	10.20	9.10	5.74	7.20	7.86	8.63	8.93	10.40	7.68	9.34	8.15	8.51	11.50
Annual	175.04	191.78	182.68	167.66	153.54	155.42	155.04	152.70	188.53	146.75	96.89	141.90	119.85	143.70	158.68	224.80	140.47	166.30	175.55	166.92	170.40
April	21.40	8.98	23.00	13.60	11.70	12.10	15.40	12.40	15.40	11.20	9.04	11.40	8.15	9.10	10.10	19.20	10.80	10.70	17.80	12.00	11.40
May	24.30	24.80	26.20	20.70	24.80	24.80	22.90	21.00	25.90	22.30	15.60	34.40	21.00	18.30	27.10	35.40	23.10	16.50	38.40	25.80	19.00
June	36.40	41.50	32.50	45.80	31.80	38.60	26.50	34.30	48.10	30.60	15.90	26.00	25.00	32.40	35.50	57.70	22.70	40.40	32.10	35.90	38.00
July	30.80	48.80	26.50	29.30	24.40	24.80	20.90	21.60	36.00	20.80	11.30	20.00	18.80	27.50	28.60	34.00	21.40	39.30	22.90	24.50	37.80
Period	112.90	124.08	108.20	109.40	92.70	100.30	85.70	89.30	125.40	84.90	51.84	91.80	72.95	87.30	101.30	146.30	78.00	106.90	111.20	98.20	106.20

Percentage Relationships

Annual

Apr-July

1900-01	1901-02	1902-03	1903-04	1904-05	1905-06	1906-07	1907-08	1908-09	1909-10	1910-11	1911-12	1912-13	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19	1919-20	1920-21
7.01	5.28	5.14	9.53	5.21	6.33	5.64	7.13	5.56	6.21	6.27	5.22	5.48	6.76	6.46	4.75	6.21	6.21	6.33	4.43	8.18
7.44	4.99	5.05	7.91	4.32	4.70	8.09	5.24	5.24	7.62	7.20	4.65	5.55	6.01	7.20	5.02	5.03	4.59	5.06	3.93	6.60
8.48	5.69	5.21	7.50	4.41	4.14	7.56	5.43	4.81	8.67	6.95	4.29	4.88	5.08	5.50	5.26	4.56	7.93	4.64	4.00	6.02
7.93	5.43	7.19	6.12	4.09	3.90	6.46	4.62	6.58	6.64	4.86	4.97	4.61	5.86	4.32	4.35	4.09	13.30	5.04	4.84	7.69
6.78	5.61	4.87	5.75	3.49	4.26	8.78	3.81	5.72	5.13	4.40	6.33	4.24	4.99	3.95	7.65	3.79	7.33	5.11	4.42	7.16
11.50	6.76	5.99	10.30	6.52	5.67	10.30	7.13	6.64	16.70	6.40	5.04	6.03	9.22	5.17	12.20	4.30	7.81	6.52	4.79	11.90
9.82	8.51	11.40	20.10	7.80	12.10	13.90	10.90	8.93	19.20	9.16	10.80	13.60	13.00	9.94	15.90	10.60	12.40	12.70	7.02	13.00
26.40	22.00	19.00	31.20	12.70	18.40	23.30	21.20	14.20	30.30	18.80	22.90	23.10	23.10	15.60	24.00	24.00	21.20	20.70	15.50	27.70
30.70	32.00	40.60	33.30	21.20	19.80	31.70	32.00	35.20	23.60	29.90	31.10	41.30	25.20	15.80	31.70	39.10	28.30	24.00	21.50	39.30
20.90	25.00	26.20	24.40	15.10	17.10	26.50	25.40	25.90	14.60	23.20	18.80	24.10	19.40	13.80	36.80	29.40	20.80	17.50	23.10	21.30
13.50	14.20	13.30	12.30	10.80	10.30	14.10	12.50	12.50	9.84	11.50	11.10	12.90	10.30	11.40	15.90	12.50	11.20	10.40	13.20	11.20
7.85	7.44	8.87	7.26	5.68	6.84	9.64	7.20	7.68	5.55	7.14	7.68	8.39	6.49	7.26	9.28	7.32	7.20	6.49	7.14	6.43
158.31	142.91	152.82	175.67	101.32	113.54	165.97	142.56	138.96	154.06	135.78	132.88	154.18	135.41	106.34	172.81	150.90	148.27	124.49	113.87	166.48
9.82	8.51	11.40	20.10	7.80	12.10	13.90	10.90	8.93	19.20	9.16	10.80	13.60	13.00	9.94	15.90	10.60	12.40	12.70	7.02	13.00
26.40	22.00	19.00	31.20	12.70	18.40	23.30	21.20	14.20	30.30	18.80	22.90	23.10	23.10	15.60	24.00	24.00	21.20	20.70	15.50	27.70
30.70	32.00	40.60	33.30	21.20	19.80	31.70	32.00	35.20	23.60	29.90	31.10	41.30	25.20	15.80	31.70	39.10	28.30	24.00	21.50	39.30
20.90	25.00	26.20	24.40	15.10	17.10	26.50	25.40	25.90	14.60	23.20	18.80	24.10	19.40	13.80	36.80	29.40	20.80	17.50	23.10	21.30
87.82	87.51	97.20	109.00	56.80	67.40	95.40	89.50	84.23	87.70	81.06	83.60	102.10	80.70	55.14	108.40	103.10	82.70	74.90	67.12	101.30
			115.8	66.8	74.8	109.4	94.0	91.6	101.55	89.50	87.59	101.63	89.26	70.09	113.91	97.47	97.72	82.06	74.96	109.74
			117.9	61.4	72.9	103.2	96.8	91.1	94.85	87.66	90.42	110.42	87.28	59.63	117.24	111.51	89.44	81.01	72.59	109.56

Total	Normal (43 yrs)	Per Cent Annual
273.74	6,370,000	4.20
253.66	5,900,000	3.89
255.42	5,940,000	3.92
249.19	5,800,000	3.82
245.79	5,720,000	3.77
345.59	8,040,000	5.30
541.85	12,600,000	8.31
995.30	23,200,000	15.29
1378.50	32,060,000	21.13
1059.20	24,600,000	16.22
577.00	13,400,000	8.83
348.48	8,100,000	5.34
6523.72	<u>151,710,000</u>	<u>100.00</u>
	12,600,000	
	23,200,000	
	32,060,000	
	24,600,000	
3975.85	<u>92,460,000</u>	<u>60.95</u>

—
Columbia River
at The Dalles
—

Clark Fork (Columbia River) at Newport Wash.
 Corrected for natural storage in Lake Pend Oreille
 Thousands of acre feet.

Meta-line (?)
 * at Metabone Falls
 but equivalent to Newport.

	1903-04	1904-05	1905-06	1906-07	1907-08	1908-09	1909-10	1910-11	1911-12	1912-13	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19	1919-20	1920-21	1921-22*	Normal	% of Normal	
Oct	965	529	610	533	847	0	654	635	615	816	700	812	696	875	588	621	329	864	649	649	3.38	
Nov	925	510	565	1,160	722	725	1,147	1,141	581	1,014	826	1,271	695	728	526	607	400	797	796	796	4.15	
Dec	986	487	510	1,960	830	540	1,365	1,055	506	879	639	848	710	620	867	587	325	809	646	646	3.37	
Jan	734	475	477	1,000	607	0	922	667	574	631	769	607	424	526	2,085	693	393	820	689	689	3.59	
Feb	601	393	508	833	539	583	552	539	621	631	559	501	725	530	901	612	488	881	613	613	3.19	
Mar	879	684	588	1,085	794	790	2,181	811	524	756	978	709	1,729	526	1,045	791	545	1,352	932	932	4.86	
Apr	2,621	842	1,355	2,034	1,849	1,179	3,195	1,450	1,692	2,104	1,980	1,490	2,700	1,418	2,168	1,686	3,319	4,741	3,721	3,721	19.40	
May	4,930	1,558	2,490	4,207	4,029	2,522	4,534	3,440	4,082	4,197	3,835	2,445	4,256	4,535	4,240	3,610	4,330	5,851	4,755	4,755	24.79	
June	4,623	2,880	2,439	5,454	6,582	6,061	3,172	4,428	4,826	7,635	3,391	2,463	5,907	6,782	5,050	3,711	2,657	2,306	2,685	2,685	14.00	
July	2,469	1,454	1,443	3,910	2,854	3,300	1,506	2,644	2,488	3,323	1,939	1,980	6,217	4,171	2,358	1,315	1,040	931	1,174	1,174	6.12	
Aug	980	681	720	2,505	1,159	1,331	808	1,143	1,252	1,409	874	1,173	2,068	1,334	1,086	644	713	590	710	710	3.70	
Sept	619	502	561	1,025	677	736	593	742	930	798	593	706	1,270	709	594	449						67.62
Year	21,332	10,995	12,266	24,806	21,489	17,769	20,629	18,695	18,691	24,193	17,083	15,005	27,427	22,754	21,508	15,326	15,403	21,848	19,780	19,780	100.0	
Apr	2,621	842	1,355	2,034	1,849	1,179	3,195	1,450	1,692	2,104	1,980	1,490	2,700	1,418	2,168	1,686	3,319	4,741	3,721	3,721		
May	4,930	1,558	2,490	4,207	4,029	2,522	4,534	3,440	4,082	4,197	3,835	2,445	4,256	4,535	4,240	3,610	4,330	5,851	4,755	4,755		
June	4,623	2,880	2,439	5,454	6,582	6,061	3,172	4,428	4,826	7,635	3,391	2,463	5,907	6,782	5,050	3,711	2,657	2,306	2,685	2,685		
July	2,469	1,454	1,443	3,910	2,854	3,300	1,506	2,644	2,488	3,323	1,939	1,980	6,217	4,171	2,358	1,315	1,040	931	1,174	1,174		
Apr-July	14,643	6,734	7,727	15,605	15,314	13,062	12,407	11,962	13,088	17,259	11,145	8,378	19,080	16,906	13,816	10,322	11,170	14,824	12,970	12,970	67.62	
Year	111.22	57.33	63.95	129.33	112.04	92.63	107.55	97.47	97.45	126.14	89.07	78.23	143.00	118.11	112.14	79.91	80.31	113.91	92.7	92.7		
Apr-July	114.5	52.7	60.4	122.0	119.7	102.1	95.66	92.23	100.91	133.07	85.93	64.59	147.11	130.34	106.52	79.58	86.13	114.29	99.5	99.5		

Percentage Relationships

SNAKE RIVER at RIPARIA, WASH.

second-feet

	1915-16	1916-17	1917-18	1918-19	1919-20	1920-21	1921-22	Totals 6 yrs.
October	20,700	25,400	25,500	25,400	16,500	29,700	22,200	142,200
November	23,900	26,600	25,500	27,000	22,100	35,600	29,600	160,700
December	27,100	25,200	61,800	22,200	24,400	32,300	39,300	192,000
January	26,500	23,000	61,100	24,400	30,500	46,400	25,600	219,900
February	50,500	25,600	4,300	26,000	29,200	48,600	25,800	223,200
March	86,200	29,400	51,300	41,900	35,800	82,200	39,500	334,800
April	109,000	97,400	81,900	96,800	56,400	98,600	81,400	548,100
May	128,000	177,000	111,000	114,000	108,000	191,000	156,000	828,000
June	157,000	201,000	145,000	59,300	114,000	179,000	164,000	855,300
July	92,900	93,900	41,700	18,100	39,900	43,500	34,900	329,000
August	26,400	22,200	11,900	12,000	15,900	19,700	18,600	116,100
September	21,000	18,500	11,400	11,800	17,500	18,900	15,600	105,100
Annual	769,200	765,200	705,400	478,900	510,200	825,500	652,500	4,054,400
April								
May								
June								
July								
Period	486,900	569,300	385,600	288,200	318,300	512,100	436,300	2,560,400

Snake River

at

Riparia, Wash.

Errors - on Snake R.

Riparia Station

Annual

+ 13.9	- 0.5
9.7	- 2.3
	- 17.9
	- 25.0
<hr/>	
+ 23.6	- 45.7
	23.6
	<hr/>
	6) - 22.1
	<hr/>
	- 3.68

April - July

+ 17.2	- 10.6
11.5	19.0
9.6	27.4
<hr/>	
+ 38.3	- 57.0
	38.3
	<hr/>
	6) - 18.7
	<hr/>
	- 3.12

Snake River

at Riparia, Wash.

.00*

in Acre-ft.

Normals^(?)

Apr.-July

Period

54,356.90

84,853.44

84,822.95

33,715.72

257,749.01*

Year

20,659.76

15,936.96

54,356.90

84,822.95

10,423.32

14,572.66

19,676.16

22,535.35

34,310.30

84,853.44

33,715.72

11,897.93

407,761.45*

Snake River
at
Riparia, Wash.

Totals of
Periods .00*

1915-16
109.00
128.00
157.00
92.90

486.90*

1916-17
97.40
177.00
201.00
93.90

569.30*

1917-18
89.90
110.00
145.00
40.70

385.60*

1918-19
96.80
114.00
59.30
18.10

288.20*

1919-20
56.40
108.00
114.00
39.90

318.30*

1920-21
98.60
191.00
179.00
43.50

512.10*

1921-22
81.40
156.00
164.00
34.90

436.30*

Total
548.10
828.00
855.30
329.00

2,560.40*

4,706,900
652,500

4,054,400

769.20
765.20
705.40
478.90
510.20
825.50

652.50

4,706.90*

142.20
160.70
192.00
219.90
223.20
334.80
548.10
828.00
855.30
329.00
116.10
105.10

4,054.40*

.00*

2,996,700
436,300

2,560,400

486.90
569.30
385.60
288.20
318.30
512.10
436.30

2,996.70*

Divisor	Dividend	Quotient
6	142,200	23,700 Oct
	160,700	26,783 Nov 30
	192,000	32,000 Dec
	219,900	36,650 Jan
	223,200	37,200 Feb 28
	334,800	55,800 Mar
	548,100	91,350 Apr 30
	828,000	138,000 May
	855,300	142,550 June 30
	329,000	54,833 July
116,100	19,350 Aug	
105,100	17,517 Sept 30	
	4,054,400	675,733
	2,560,400	426,733
Means. in second feet	142,200	3.51%
	160,700	3.96
	192,000	4.74
	219,900	5.42
	223,200	5.51
	334,800	8.26
	548,100	13.52
	828,000	20.42
	855,300	21.10
	329,000	8.11
116,100	2.86	
105,100	2.59	
		100.00

Per Cent of Total of Year	4,054,400	142,200	3.51%
		160,700	3.96
		192,000	4.74
		219,900	5.42
		223,200	5.51
		334,800	8.26
		548,100	13.52
		828,000	20.42
		855,300	21.10
		329,000	8.11
		116,100	2.86
		105,100	2.59
			100.00

Mult.	Mult.	Prod.
1.98347	28	55.537
	30	59.504
	31	61.488

55.537	37,200	2,085,976	Feb.
59.504	26,783	1,593,696	Nov.
acraft,	91,350	5,435,690	Apr.
	142,550	8,482,295	June
	17,517	1,042,332	Sept.
61.488	23,700	1,457,266	Oct.
	32,000	1,967,616	Dec.
	36,650	2,253,535	Jan.
	55,800	3,431,030	March
	138,000	8,485,344	May
	54,833	3,371,572	July
	19,350	1,189,793	Aug.

Divisor	Dividend	Quotient
.9632	675,733	701,550 <i>corrected normal Feb</i>
701,550	769,200	109.6%
	765,200	109.1
Annual	705,400	100.5
	478,900	68.3
	519,200	72.7
	825,500	117.7
	652,500	93.0
.9688	426,733	440,476 <i>corrected normal Period</i>
440,476	486,900	110.5%
	569,300	129.2
Period	385,600	87.5
	288,200	65.4
	318,300	72.3
	512,100	116.3
	436,300	99.1

SNAKE RIVER near BURBANK, WASHINGTON.
(Drainage Area 108,600 Sq. Mi.)

	1909-10	1910-11	1911-12	1912-13	1913-14	1914-15	1915-16	1916-17	Total	Mean	Percent of Total for year
October	1,730,000	1,410,000	1,620,000	1,850,000	1,810,000	1,890,000	1,300,000	1,220,000	11,610,000		
November	2,840,000	2,130,000	1,750,000	2,010,000	1,920,000	2,040,000	1,440,000	1,680,000	14,130,000		
December	2,510,000	2,180,000	1,620,000	1,430,000	1,520,000	1,440,000	1,700,000	1,650,000	12,400,000		
January	2,310,000	1,650,000	2,190,000	1,500,000	2,020,000	1,460,000	1,670,000	1,570,000	12,800,000		
February	1,910,000	2,060,000	2,820,000	1,600,000	1,850,000	1,580,000	2,960,000	1,580,000	14,830,000		
March	10,100,000	3,490,000	2,550,000	2,760,000	4,000,000	2,130,000	5,500,000	1,950,000	30,530,000		
April	9,760,000	4,370,000	5,950,000	7,380,000	5,530,000	3,360,000	6,780,000	10,200,000	43,130,000		
May	9,780,000	7,620,000	11,300,000	10,200,000	7,990,000	4,570,000	8,180,000		59,640,000		
June	4,690,000	11,000,000	12,400,000	11,200,000	5,750,000	3,830,000	9,760,000		58,630,000		
July	1,550,000	4,000,000	3,660,000	3,780,000	1,990,000	1,860,000	6,090,000		22,730,000		
August	855,000	1,240,000	1,460,000	1,550,000	861,000	1,030,000	1,750,000		8,746,000		
September	966,000	1,040,000	1,700,000	1,140,000	1,020,000	857,000	1,360,000		8,043,000		
Annual	49,000,000	42,200,000	49,100,000	46,400,000	36,300,000	26,000,000	48,500,000		297,500,000		
April											
May											
June											
July											
Period	25,780,000	26,990,000	33,310,000	32,560,000	21,260,000	13,620,000	30,810,000		184,330,000		

Add these as shown

Snake River
at
Burbank, Wash.

Correction for Varmals
at Burbank on Snare

		<u>Annual</u>		<u>April-July</u>
1909-10	+	1.6	-10.5	+10.4
1910-11		1.6	-12.4	-5.1
1911-12		13.9	-10.7	+17.2
1912-13			-29.9	12.3
1913-14		+17.1	-63.5	9.6
1914-15				12.7
1915-16				40.4
				+27.6
				-80.1
				-52.5
				-7.5%

	$\begin{array}{r} \hline 7 \overline{) -46.4} \\ \hline \end{array}$		$\begin{array}{r} \hline 7 \overline{) -52.5} \\ \hline \end{array}$
Error is	6.63%	Error is	-7.5%

Factor of correction based on %s at The Dallas is . Annual + 6.6% Apr-July + 7.5%
i.e. divide apparent normal or mean for 1909-16 by .934 for Annual and by .925 for Apr-July.

Divisor	Dividend	Quotient
7	11,610,000	1,658,571
	14,130,000	2,018,571
	12,400,000	1,771,429
	12,800,000	1,828,571
Means	14,830,000	2,118,571
	30,530,000	4,361,429
	43,130,000	6,161,429
	59,640,000	8,520,000
	58,630,000	8,375,714
	22,930,000	3,275,714
	8,746,000	1,249,429
	8,043,000	1,149,000
	297,500,000	42,500,000
	184,330,000	26,332,857

Divisor	Dividend	Quotient
.925	26,332,857	28,467,954
Period	25,780,000	90.6
	26,990,000	94.8
	33,310,000	117.0
	32,560,000	114.4
	21,200,000	74.7
	13,620,000	47.8
	30,810,000	108.2

297,500,000	Dividend	Quotient
Percent of Year	11,610,000	3.90%
	14,130,000	4.75
	12,400,000	4.17
	12,800,000	4.30
	14,830,000	4.98
	30,530,000	10.26
	43,130,000	14.50
	59,640,000	20.05
	58,630,000	19.71
	22,930,000	7.71
8,746,000	2.94	
8,043,000	2.70	

mean = 64.52%

.9337	42,500,000	Corr. Mean
		45,517,832
Annual	49,000,000	107.7
	42,200,000	92.7
	49,100,000	107.9
	46,400,000	101.9
	36,300,000	79.7
	26,000,000	57.1
	48,500,000	106.6

Snake River
at
Burbank, Wash.
Corr. Means
45,517,832 (Annual)
28,467,954 (Period)