DISTRIBUTION OF RUNOFF

Surface-water-data collection sites on the Columbia Plateau are listed in table 2. Forty-two of these streamflow sites (shown on this sheet) were used to define a regional relation between precipitation and runoff. Analyses of relations which also accounted for such factors as average altitude of basin, average slope of streambed, snowfall amounts, and drainage area did not significantly improve the relation between precipitation and runoff.

The 42 sites were chosen on the basis of the period of record, the ability to define the precipitation within a basin, the spatial distribution of data, and the lack of effects from upstream water use; that is, length of record, lack of basin transfer of water, lack of diversion for irrigation, and lack of irrigation return flows were all considered in the selection of the 42 collection sites. In areas of low precipitation, all gaging stations including those with records as short as 6 years were used for the analyses due to the paucity of data. All precipitation records used in the analysis are for the period 1956-1977, whereas the period for streamflow records varies.

The mean annual precipitation for each of the 42 drainage areas above the gaging station was estimated from the precipitation map and U.S. Weather Bureau (1964, 1965) data. The stations then were divided into two groups according to the mean annual precipitation for the basin. Using estimated mean annual precipitation values and the mean annual runoff from the gaging-station record, a relation between precipitation and runoff was determined for each group. These relations, shown graphically in figure 3, are as follows:

Mean annual precipitation of less than or equal to 17.9 inches:

$$RO = 0.107(P-6.03) \qquad SE = 0.25,\ R = 0.73$$

Mean annual precipitation of greater than 17.9 inches:

$$RO = 1.01(P-16.64) \qquad SE = 1.59,\ R = 0.98$$

where

RO = mean annual runoff, in inches per year;
P = mean annual precipitation, in inches per year;
SE = standard error, in inches per year; and
R = correlation coefficient.

These relations intersect at $P = 17.9$ inches, and the first relation accounts for the fact that mean annual precipitation is greater than 6 inches per year throughout the study area. Eight isopleth values then were defined on the basis of the spatial distribution of precipitation and the standard error of estimate of the relations. These isopleth values were used in one of the above relations to define an isohyetal value to use as a guide for drawing the isopleths. The resulting isopleths were moved in some areas when it was appropriate to account for small basin runoff. The resulting runoff map represents the long-term runoff distribution in the study area; that is, the water flowing in the stream channels. The map is meant to show the generalized regional spatial distribution of mean annual runoff, and it should not be used to predict runoff for any ungaged basin. This is especially true in the drier central part of the plateau, where there may be no runoff for many years or none at all.

The time distribution of the runoff is significantly different from that of precipitation because of the storage of precipitation as snow over much of the study area. Most of the lowland runoff occurs from January through March (fig. 4) with the largest amounts produced from snowmelt with concurrent warm rains on frozen ground. In the mountainous areas with higher precipitation and generally colder air temperatures, the runoff is less affected by warm rains. In these areas with higher elevations, most of the snowmelt is delayed due to the colder air temperatures, and thus the largest runoff usually occurs from March through June (fig. 5).

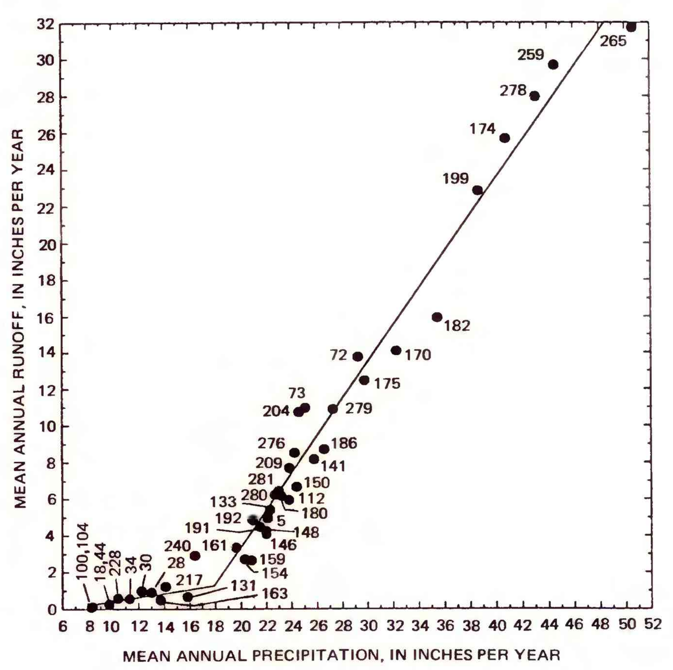
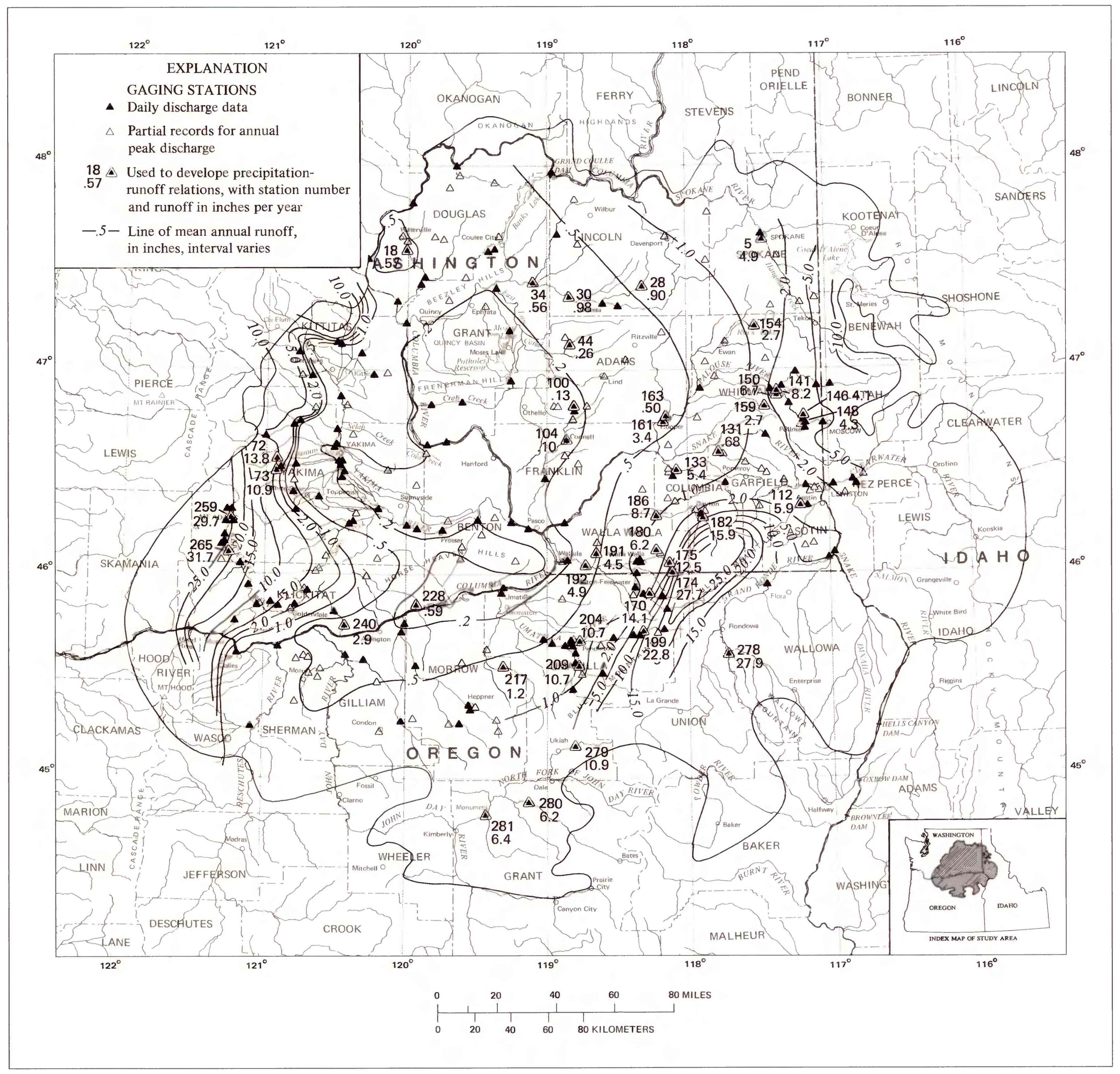


FIGURE 3.--Relation between annual precipitation and annual runoff.

DISTRIBUTION OF RUNOFF



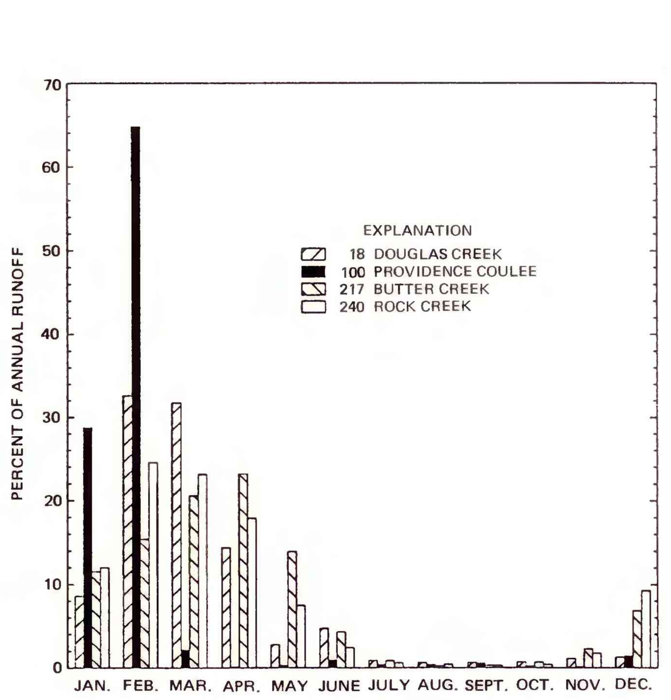


FIGURE 4.--Monthly runoff at four gaging stations during a 22-year period (1956-77) representing runoff from the drier part of the study area.

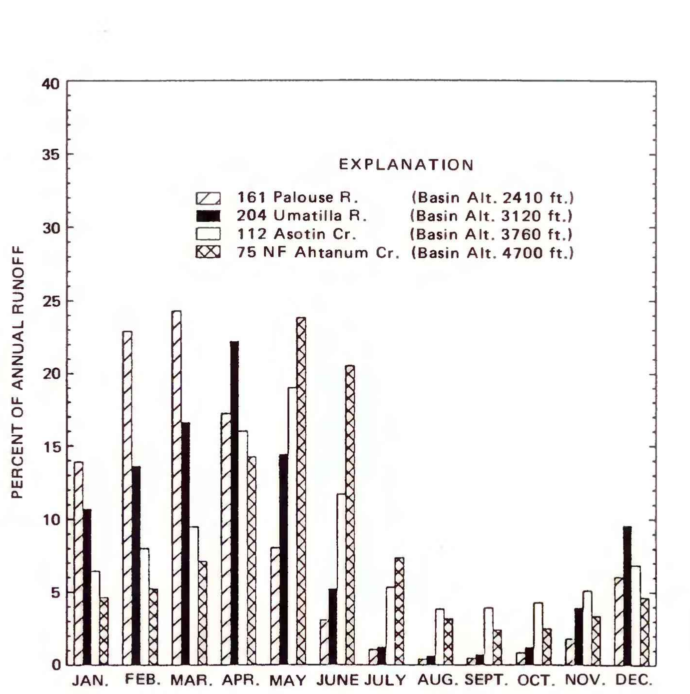


FIGURE 5.- Typical timing of the runoff during a 22-year period (1956-77) at four gaging stations showing the effect of basin altitude.

Table 2. -- Surface-water data collection sites on the Columbia Plateau.

GAGING STATION REFERENCE NO., STATION NO, AND NAME			DRAINAGE AREA (SQUARE MILES)	LONGITUDE LATITUDE (DEGREES)		YEARS OF DISCHARGE RECORDS	
				LONGITUDE	LATITUDE	DAILY VALUES	ANNUAL PEAKS
1	12422500	SPOKANE RIVER AT SPOKANE, WA	4,290	117.4481	47.6594	1891-	
2	12423550	HANGMAN CREEK TRIB NR LATAH, WA	2.18	117.1783	47.3211		1961-73
3	12423700	SF ROCK CREEK TRIB NR FAIRFIELD, WA	.59	117.0683	47.3483		1962-76
4	12423900	STEVENS CREEK TRIB NR MORAN, WA	2.02	117.3492	47.5597		1954-73
5	12424000	HANGMAN CREEK AT SPOKANE, WA	689	117.4486	47.6528	1948-	
6	12433300	SPRING CREEK TRIB NR REARDON, WA	1.14	117.8586	47.7469		1954-73
7	12433580	HAWK CREEK AT DAVENPORT, WA	23.2	118.1358	47.6586		1957;59;63-73
8	12436500	COLUMBIA RIVER AT GRAND COULEE DAM, WA	74,700	118.9817	47.9656	1928-	
9	12437930	E.F. FOSTER CREEK AT LEAHY, WA	35.4	119.3806	47.9125		1959;1963-77
10	12437950	E.F. FOSTER CREEK TR NR BRIDGEPORT, WA	4.75	119.6306	47.9500		1957-77
11	12437960	W.F. FOSTER CREEK NR BRIDGEPORT, WA	28.0	119.7139	47.8847		1957;1963-77
12	12438000	COLUMBIA RIVER AT BRIDGEPORT, WA	75,700	119.6642	48.0067	1952-	
13	12450700	COLUMBIA RIVER BELOW WELLS DAM, WA	86,100	119.8656	47.9467	1967-	
14	12453700	COLUMBIA RIVER AT ROCKY REACH DAM, WA	87,800	120.3011	47.5244	1960-	
15	12462600	COLUMBIA RIVER BELOW ROCK ISLAND DAM, WA	89,400	120.0800	47.3325	1962-	
16	12462700	MOSES CREEK AT WATERVILLE, WA	3.48	120.0542	47.6492		1954-
17	12462800	MOSES CREEK AT DOUGLAS, WA	15.4	120.0075	47.6175		1955;1957-
18	12463000	DOUGLAS CREEK NR ALSTOWN, WA	99.9	120.0139	47.5833	1949-55;1963-68	1956-60
19	12463500	DOUGLAS CREEK NR PALISADES, WA	206	119.8750	47.4667	1949-52	
20	12463600	RATTLESNAKE CREEK TRIB NR SOAP LAKE, WA	2.22	119.5958	47.4417		1959;1961-
21	12463700	MCCARTENEY CREEK TR NR FARMER, WA	0.4	119.7439	47.6300		1960;1962-76
22	12463800	PINE CANYON CREEK TR NR FARMER, WA	1.10	119.8139	47.6475		1960;1962-76
23	12464000	DOUGLAS CREEK AT PALISADES, WA	844	119.9333	47.4167	1951-55	
24	12464500	COLUMBIA R AT TRINIDAD, WA	90,500	120.0139	47.2250	1913-63	
25	12464600	SCHNEBLY COULEE TR NR VANTAGE, WA	0.82	120.1444	46.9622		1955-74
26	12464650	S.F. CRAB CR TR AT WAUKON, WA	0.68	117.8533	47.5367		1954-73
27	12464780	CRAB CR AB SYLVAN LK NR LAMONA, WA	542	118.4986	47.3092	1972-74	1975-79
28	12464800	COAL CREEK AT MOHLER, WA	64.7	118.3178	47.4069	1963-74	1975-79
29	12464810	CRAB CREEK BLW SYLVAN LAKE NR ODESSA, WA	686	118.6067	47.3217	1972-74	1975-76
30	12465000	CRAB CREEK AT IRBY, WA	1,042	118.8489	47.3605	1942-	
31	12465100	CONNAWAI CREEK TR NR GOVAN, WA	0.25	118.7611	47.6161		1958-77
32	12465300	BROADAX DRAW TR NR WILBUR, WA	1.22	118.7611	47.8400		1955-74
33	12465400	WILSON CR BL CORBETT DRAW NR ALMIRA, WA	327	118.9294	47.6631	1969-71	1972-79
34	12465500	WILSON CREEK AT WILSON CREEK, WA	427	119.1028	47.4305	1951-73	1974-79
35	12466500	CRAB CREEK AT ADRIAN, WA	2,058	119.3750	47.3889	1909-12	
36	12467000	CRAB CREEK NR MOSES LAKE, WA	2,228	119.2647	47.1894	1942-	
37	12467400	HAYNES CANYON NR COULEE CITY, WA	2.7	119.3561	47.6461		1959-76
38	12467500	PARK CREEK NR COULEE CITY, WA	400	119.3833	47.5889	1942-45	
39	12468500	PARK CR BLW PARK LAKE NR COULEE CITY, WA	317	119.4256	47.5728	1945-68	
40	12470300	IRON SPRING CR NR WINCHESTER, WA	1.57	119.7033	47.3333		1959-76
41	12470500	ROCKY FORD CREEK NR EPHRATA, WA	458	119.4442	47.3100	1909-11;1942-	
42	12471100	PAHA COULEE TR NR RITZVILLE, WA	8.52	118.4239	47.0508		1962-76
43	12471200	LIND COULEE TR NR LIND, WA	0.21	118.5986	47.9561		1956;1961-77
44	12471270	FARRIER COULEE NR SCHRAG, WA	42.0	118.8380	47.1258	1963-74	1975-79
45	12471300	WEBER COULEE TR NR RUFF, WA	0.95	118.8722	47.1403		1959-72
46	12471500	CRAB CREEK NR WARDEN, WA	4,470	119.2556	46.9500	1909-12;1942-65	
47	12472500	CRAB CREEK NR SMYRNA, WA	4,500	119.6069	46.8430	1942-59	
48	12472600	CRAB CREEK NR BEVERLY, WA	4,842	119.8300	46.8300	1959-	
49	12472800	COLUMBIA R BLW PRIEST RAPIDS DAM, WA	96,000	119.8636	46.6289	1917-	
50	12472900	COLUMBIA R AT VERNITA BR NR PRIEST RAPIDS, WA	96,000	119.7317	46.6428		
51	12473700	KANSAS NO. 2 NR CUNNINGHMAM, WA	6.06	118.9256	46.8239		1955-70
52	12473710	KANSAS NO. 2 TR NR CUNNINGHAM, WA	3.31	118.9431	46.8239		1956,1971-77
53	12482000	TANEUM CREEK NR THORP, WA	74.3	120.7778	47.0861	1909-10;1911-12	
54	12483300	S.F. MANASTASH CR TR NR ELLENSBURG, WA	2.12	120.7614	46.9611		1955-74
55	12483500	MANASTASH CREEK NR ELLENSBURG, WA	74.5	120.6944	46.9667	1909-14	
56	12483600	WILSON CREEK NR ELLENSBURG, WA	13.6	120.4930	47.1264	1956-60	
57	12483800	NANEUM CREEK NR ELLENSBURG, WA	69.5	120.4797	47.1269	1957-71;1972-78	
58	12484200	JOHNSON CANYON TR NR KITTITAS, WA	0.65	120.2403	46.9781		1956-75
59	12484300	COOKE CREEK NR ELLENSBURG, WA	18.6	120.0444	47.0944	1957-60	
60	12484500	YAKIMA RIVER AT UMTANUM, WA	1,594	120.4789	46.8628	1906-	
61	12484600	MCPHERSON CANYON CREEK AT WYMER, WA	5.48	120.4533	46.8342		1952;1955-77
62	12485700	SELAH CREEK TR NR YAKIMA, WA	0.68	120.3889	46.6761		1955-74
63	12485900	PINE CANYON NR SELAH, WA	2.26	120.6711	46.8197		1961-76
64	12486000	WENAS CREEK NR SELAH, WA	192	120.4958	47.7000	1909	
65	12487000	YAKIMA R AT SELAH GAP NR N YAKIMA, WA	2,135	120.5186	46.6311	1897;1904;1911-12	
66	12492500	TIETON R AT HDWKS T CNL NR NACHES, WA	239	121.0000	46.6711	1906-78	
67	12493000	TIETON R AB AND BLW OAK CR NR NACHES, WA	296	120.8055	46.7250	1902-13	
68	12494000	NACHES R BLW TIETON R NR NACHES, WA	941	120.7681	46.7456	1905;1908-79	
69	12499000	NACHES RIVER NR NORTH YAKIMA, WA	1,110	120.5194	46.6283	1896-1915	
70	12500400	FIREWATER CANYON NR MOXEE CITY, WA	7.30	120.1436	46.5039		1963-77
71	12500450	YAKIMA R ABV AHTANUM CR AT UNION GAP, WA	3,479	120.4661	46.5344	1966-	
72	12500500	N.F. AHTANUM CREEK NR TAMPICO, WA	68.9	120.9194	46.5611	1907-78	1979
73	12501000	S.F.AHTANUM CR AT CONRAD RNCH, TAMPICO, WA	24.8	120.9100	46.5092	1915-78	
74	12501500	S.F. AHTANUM CR NR TAMPICO, WA	28.5	120.8889	46.5194	1908-14	
75	12502000	AHTANUM CR AT NARROWS NR TAMPICO, WA	119	120.8000	46.5278	1908-13;1960-68	
76	12502500	AHTANUM CR AT UNION GAP, WA	173	120.4722	46.5356	1904;07-08;09; 1910-14;51-53;60-	
77	12503000	YAKIMA RIVER AT UNION GAP, WA	3,652	120.4694	46.5305	1896-1914;63-64	
78	12505000	YAKIMA RIVER NR PARKER, WA	3,660	120.4417	46.4972	1908-78	
79	12506000	TOPPENISH CREEK NR FT. SIMCOE, WA	122	120.7869	46.3111	1909-24	
80	12506500	SIMCOE CR BLW SPRING C NR FT. SIMCOE, WA	81.5	120.8083	46.3944	1909-23	
81	12506800	NO. MEDICINE CR NR WHITE SWAN, WA	1.53	120.8025	46.4481		1974-77
82	12507000	TOPPENISH CR NR WHITE SWAN, WA	370	120.6194	46.3750	1909-11	
83	12507300	TOPPENISH CR TR NR TOPPENISH, WA	1.24	120.3583	46.2919		1955-74
84	12507500	TOPPENISH CREEK AT ALFALFA, WA	625	120.2167	46.3139	1909-12	
85	12507600	SHINANDO CR TR NR GOLDENDALE, WA	0.38	120.6422	46.0047		1955-74
86	12507650	SHINANDO CR NR GOLDENDALE, WA	7.94	120.6306	46.0194		1953;1955-59
87	12507660	SATUS CREEK TR NR TOPPENISH, WA	8.54	120.5492	46.0908		1953;56;61;63
88	12508000	SATUS CREEK NR TOPPENISH, WA	271	120.4111	46.2389	1908-13	
89	12508500	SATUS CREEK BLW DRY CR NR TOPPENISH, WA	434	120.3778	46.2500	1913-24	
90	12508800	YAKIMA RIVER TR NR SUNNYSIDE, WA	1.91	119.9397	46.4222		1954-73
91	12508990	YAKIMA RIVER AT MABTON, WA	5,359	119.9983	46.2314	1970-	
92	12509000	YAKIMA RIVER NR MABTON, WA	5,400	119.9194	46.2167	1911-14	
93	12509500	YAKIMA RIVER NR PROSSER, WA	5,440	119.7500	46.2167	1904-6;1913-33	
94	12509800	SNIPES CREEK TR NR BENTON CITY, WA	5.18	119.6583	46.3375		1965,1967-77
95	12510500	YAKIMA RIVER AT KIONA, WA	5,615	119.4769	46.2536	1895;1896-1915;33	
96	12510600	WEBBER CANYON CREEK NR KIONA, WA	2.88	119.4564	46.1869		1955-74
97	12510620	COLD CREEK TR NR PRIEST RAPIDS, WA	0.89	119.8622	46.5939		1967-75
98	12510700	YAKIMA RIVER TR NR KIONA, WA	3.35	119.3878	46.2647		1955-74
99	12512000	YAKIMA RIVER NR RICHLAND, WA	6,120	119.2583	46.2528	1906;1907-8;09-11	
100	12512500	PROV. COULEE AT CUNNINGHAM, WA	27.8	118.8075	46.8217	1952-77	
101	12512550	PROVIDENCE COULEE NR CUNNINGHAM, WA	52.1	118.8153	46.8031	1978-	
102	12512600	HATTON COULEE TR NO. 2 NR CUNNINGHAM, WA	2.44	118.6969	46.8233		1961-76
103	12512700	HATTON COULEE TR NR HATTON, WA	3.71	118.7989	46.7639		1956-75
104	12513000	ESQUATZEL COULEE AT CONNELL, WA	234	118.8675	46.6586	1953-	
105	12513300	DUNNIGAN COULEE NR CONNELL, WA	27.1	118.8572	46.5775		1956;1963-77
106	12513500	ESQUATZEL COULEE AT ELTOPIA, WA	551	119.0111	46.4625	1953-79	
107	12514000	COLUMBIA RIVER AT PASCO, WA	104,000	119.1342	46.2278	1963-66	
108	13333000	GRANDE RONDE RIVER AT TROY, OR	3,275	117.4483	45.9464	1944-	
109	13334000	GRANDE RONDE RIVER AT ZINDEL, WA	3,950	117.0044	46.0703	1904-12	
110	13334300	SNAKE RIVER NR ANATONE, WA	92,960	116.9767	46.0972	1958-	
111	13334400	MILL CREEK AT ANATONE, WA	2.74	117.1308	46.1344		1971-77
112	13334500	ASOTIN CR (AT SHELMANS RNCH) NR ASOTIN, WA	156	117.2056	46.3278	1904-6;1910-11;28-59	
113	13334700	ASOTIN CR BLW KEARNEY GULCH NR ASOTIN, WA	170	117.1508	46.3247	1959-	
114	13334900	PINTLER CREEK NR ANATONE, WA	0.86	117.1655	46.1330		1971-77
115	13335200	CRITCHFIELD DRAW NR CLARKSTOWN, WA	1.80	117.0853	46.3744		1959-76
116	13341500	ARROW GULCH NR ARROW, ID	2.80	116.7694	46.4722		1961-65
117	13342450	LAPWAI CREEK AT LAPWAI, ID	235	116.8042	46.4267	1974-	
118	13342500	CLEARWATER RIVER AT SPALDING, ID	9,570	116.8264	46.4486	1925-	
119	13343000	CLEARWATER RIVER NR LEWISTON, ID	9,640	116.9667	46.4333	1925-27	
120	13343010	LINDSEY CREEK TRIB NO. 4 NR LEWISTON, ID	2.96	116.5578	46.3694		1973-81
121	13343400	DRY CREEK NR CLARKSTON, WA	2.34	117.1375	46.3861		1955-58
122	13343450	DRY CR AT MOUTH NR CLARKSTON, WA	6.83	117.1058	46.4075		1963-77
123	13343500	SNAKE RIVER NR CLARKSTOWN, WA	103,200	117.1642	46.4281	1915-72	
124	13343510	ALPOWA CREEK AT PEOLA, WA	0.5	117.4911	46.3175		1972-77
125	13343520	CLAYTON GULCH NR ALPOWA, WA	5.60	117.2933	46.4478		1961-76
126	13343600	SNAKE RIVER BLW. LOWER GRANITE DAM, WA	103,500	117.4439	46.6678	1978-	
127	13343620	S.F. DEADMAN CR TR NR PATAHA, WA	0.54	117.4133	46.4792		1961-76
128	13343660	SMITH GULCH TR NR PATAHA, WA	1.85	117.4450	46.4900		1955-74
129	13343700	BEN DAY GULCH TR NR POMEROY, WA	0.78	117.5903	46.5389		1961-69
130	13343790	MEADOW CREEK TR NR CENTRAL FERRY, WA	1.63	117.7475	46.5850		1970-78
131	13343800	MEADOW CREEK NR CENTRAL FERRY, WA	66.2	117.7817	46.5975	1963-74	1975-78
132	13344000	TUCANNON RIVER NR POMEROY, WA	160	117.7472	46.4417	1913-15;1924-30	
133	13344500	TUCANNON RIVER NR STARBUCK, WA	431	118.0653	46.5047	1914-17;1928-31;1958-	
134	13344506	KELLOGG CREEK TR NO 2 NR STARBUCK, WA	2.95	118.1131	46.4794		1970-78
135	13344508	KELLOGG CREEK TR NR STARBUCK, WA	6.0	118.1306	46.5008		1965-69
136	13344510	KELLOGG CREEK AT STARBUCK, WA	35.3	118.1297	46.5131		1963-65
137	13345000	PALOUSE RIVER NR POTLATCH, ID	317	116.9500	45.9153	1915-19;1966-	
138	13345300	PALOUSE RIVER AT PALOUSE, WA	360	117.0700	46.9100	1973-80	
139	13345500	PALOUSE RIVER AT ELBERTON, WA	406	117.2194	46.9806	1904	
140	13346000	PALOUSE RIVER NR COLFAX, WA	491	117.3194	46.9250	1955-64	
141	13346100	PALOUSE RIVER AT COLFAX, WA	497	117.3555	46.8972	1963-73;1976-79	1974-75
142	13346500	S.F. PALOUSE R AB PARDAISE CR NR PULLMAN, WA	84.4	117.1653	46.7056	1934-40	
143	13346750	PARADISE CREEK NR MOSCOW, ID	17.7	117.0233	46.7319	1972	1974-
144	13347000	PARADISE CREEK NR PULLMAN, WA	34.5	117.1583	46.7194	1934-38.	
145	13347500	DRY FK, S.F. PALOUSE R AT PULLMAN, WA	7.28	117.1861	46.7236	1934-38	
146	13348000	S.F. PALOUSE RIVER AT PULLMAN, WA	132	117.1800	46.7325	1934-42;1959-	
147	13348400	MISSOURI FLAT CREEK TR NR PULLMAN, WA	0.88	117.1669	46.7644		1955-74
148	13348500	MISSOURI FLAT CREEK AT PULLMAN, WA	27.1	117.1797	46.7331	1934-40;1960-79	
149	13349000	FOURMILE CREEK AT SHAWNEE, WA	571.6	117.2722	46.8319	1934-40	
150	13349210	PALOUSE RIVER BLW S.F. AT COLFAX, WA	796	117.3667	46.8897	1963-73;1976-	1974-75
151	13349300	PALOUSE RIVER TRIBUTARY AT COLFAX, WA	2.10	117.3830	46.8894		1955-
152	13349309	PALOUSE RIVER TRIBUTARY AT WINONA, WA	2.94	117.8033	46.9603		1967-77
153	13349350	HARDMAN DRAW TR NR PLAZA, WA	1.64	117.3872	47.3100		1955-74
154	13349400	PINE CREEK AT PINE CITY, WA	302	117.5039	47.2067	1961-75	1976-79
155	13349500	ROCK CREEK NR EWAN, WA	523	117.7239	47.1394	1903-5;1914-17	1959;63;65-75
156	13349670	PLEASANT VALLEY CR TR NR THORNTON, WA	0.77	117.4386	47.0417		1967-77
157	13349800	IMBLER CREEK TR NR LAMONT, WA	1.33	117.8822	47.1642		1967-77
158	13350000	PALOUSE RIVER NR WINONA, WA	2,056	117.9278	46.9097	1914-17	
159	13350500	UNION FLAT CREEK NR COLFAX, WA	189	117.4311	46.8103	1953-71	1972-79
160	13350800	WILLOW CREEK TR NR LACROSSE, WA	0.95	117.9189	46.7572		1967-77
161	13351000	PALOUSE RIVER AT HOOPER, WA	2,500	118.1478	46.7586	1897-1916;1951-	
162	13352200	COW CREEK TR NR RITZVILLE, WA	1.51	118.1919	47.1772		1951;1955-73
163	13352500	COW CREEK AT HOOPER, WA	679	118.1461	46.7628	1951-53;1962-70	1971-79
164	13352550	STEWART CANYON TR NR RIPARIA, WA	1.27	118.1281	46.6392		1958-75
165	13353000	SNAKE RIVER BLW ICE HARBOR DAM, WA	108,500	118.8786	46.2481	1909-17;1962-	
166	13353050	SMITH CANYON TR NR CONNELL, WA	1.80	118.7650	46.5411		1955-77
167	14010000	SOUTH FORK WALLA WALLA RIVER NR MILTON, OR	63.0	118.1689	45.8300	1903;1906-17;1931-	
168	14010500	SO FK WALLA WALLA R NR MILTON, OR	80	118.2833	45.8833	1903-06;1930-45	
169	14010800	NF WALLA WALLA R NR MILTON FREEWATER, OR	34.4	118.1850	45.8850	1969-	
170	14011000	NO FK WALLA WALLA RIVER NR MILTON, OR	43.8	118.2819	45.9022	1930-69	
171	14011500	WALLA WALLA RIVER NR MILTON, OR	130	118.3333	45.9000	1905-06;1918-29	
172	14012000	WALLA WALLA RIVER AT MILTON, OR	155	118.3667	45.9167	1903-05	
173	14012500	WALLA WALLA RIVER BELOW FREEWATER, OR	160	118.3833	45.9833	1941-48	
174	14013000	MILL CREEK NR WALLA WALLA, WA	59.6	118.1175	46.0080	1913-17;38-76;79-	1977-79
175	14013500	BLUE CREEK NR WALLA WALLA, WA	15.6	118.1361	46.0583	1939-71	
176	14014000	YELLOWHAWK CREEK AT WALLA WALLA, WA		118.2819	46.0722	1941-52	
177	14014500	GARRISON CREEK AT WALLA WALLA, WA		118.2861	46.0736	1941-52	
178	14015000	MILL CREEK AT WALLA WALLA, WA	95.7	118.2725	46.0764	1941-	
179	14015900	SPRING CREEK TR NR WALLA WALLA, WA	1.94	118.1892	46.1042		1955-74
180	14016000	DRY CREEK NR WALLA WALLA, WA	48.4	118.2361	46.1222	1949-67	
181	14016080	DRY CREEK TRIB NR MILTON-FREEWATER, OR	1.22	118.3911	45.8847		1967-
182	14016500	E.F. TOUCHET RIVER NR DAYTON, WA	102	117.9014	46.2792	1941-51;56-64;66-68	
183	14016600	HATLEY CREEK NR DAYTON, WA	4.12	117.8936	46.2811		1955-74
184	14016610	E.F. TOUCHET R BLW HATLEY CR NR DAYTON, WA	106	117.9014	46.2792	1964-66	
185	14016650	DAVIS HOLLOW CREEK NR DAYTON, WA	3.01	117.9528	46.3000		1956-75
186	14017000	TOUCHET RIVER AT BOLLES, WA	361	118.2203	46.2744	1924-29;1951-	
187	14017040	THORN HOLLOW NR DAYTON, WA	2.68	118.0653	46.3472		1962-76
188	14017070	E.F. MCKAY CREEK NR HUNTSVILLE, WA	4.92	118.1325	46.3631		1963-77
189	14017200	BADGER HOLLOW NR CLYDE, WA	4.16	118.3378	46.4158		1955-74
190	14017490	TOUCHET R TRIB NR LOWDEN, WA	4.70	118.6403	46.1528		1975-77
191	14017500	TOUCHET RIVER NR TOUCHET, WA	733	118.6833	46.0417	1941-55	1956-59;1965
192	14018500	WALLA WALLA RIVER NR TOUCHET, WA	1,657	118.7286	46.0278	1951-	
193	14019000	WALLA WALLA RIVER NR WALLULA, WA	1,750	118.8583	46.0667		1924-25
194	14019100	WALLA WALLA RIVER TR NR WALLULA, WA	0.80	118.8828	46.0533	1955-77	
195	14019120	NF COLD SPRINGS CANYON TRIB AT HOLDMAN, OR	2.86	118.9194	45.8778		1967-81
196	14019200	COLUMBIA RIVER AT MCNARY DAM, NR UMATILLA, OR	214,000	119.2958	45.9347	1950-	
197	14019400	ELBOW CREEK NR BINGHAM SPRINGS, OR	0.68	118.1983	45.7125		1965-79
198	14019500	NF UMATILLA RIVER NR GIBBON, OR	31	118.1833	45.7333	1912-15;1940-43	
199	14020000	UMATILLA RIVER AB MEACHAM CR NR GIBBON, OR	131	118.3222	45.7197	1933-	
200	14020300	MEACHAM CREEK AT GIBBON, OR	176	118.3555	45.6889	1975-	
201	14020500	UMATILLA RIVER AT GIBBON, OR	310	118.3833	45.7000	1896-99;1907-12;1968-	
202	14020700	UMATILLA RIVER NR CAYUSE, OR	384	118.5208	45.6825	1968-75	
203	14020800	MISSION CREEK AT ST. ANDREWS MISSION, OR	4.45	118.6217	45.6347		1958;1963-79
204	14021000	UMATILLA RIVER AT PENDLETON, OR	637	118.7917	45.6722	1891-92;1903-05;1934-	
205	14021600	NELSON CREEK AT PENDLETON, OR	2.56	118.8067	45.6822		1958-79
206	14022000	UMATILLA R AB MCKAY CR NR PENDLETON, OR	700	118.8333	45.6722	1921-34	
207	14022200	NORTH FORK MCKAY CREEK NR PILOT ROCK, OR	48.6	118.6158	45.5067	1973-	
208	14022300	LITTLE MCKAY CREEK NR PILOT ROCK, OR	5.18	118.7444	45.5000		1958-59
209	14022500	MCKAY CREEK NR PILOT ROCK, OR	180	118.7733	45.5492	1921;1926-29;1929-	
210	14023500	MCKAY CREEK NR PENDLETON, OR	186	118.7986	45.6094	1918-	
211	14024020	MCKAY CREEK AT MOUTH NR PENDLETON, OR	190	118.8361	45.6667	1903-04;1922-24	
212	14024200	EAST BIRCH CREEK NR PILOT ROCK, OR	69.7	118.8200	45.4319	1967-73	
213	14024500	BIRCH CREEK NR PILOT ROCK, OR	240	118.7972	45.5667	1919-26	
214	14025000	BIRCH CREEK AT RIETH, OR	291	118.8792	45.6528	1921-23;1927	
215	14025500	UMATILLA RIVER NR YOAKUM, OR	1,260	118.9694	45.6611	1915-36	
216	14026000	UMATILLA RIVER AT YOAKUM, OR	1,280	119.0333	45.6778	1903-17;1921-33;1934-	
217	14032000	BUTTER CREEK NR PINE CITY, OR	291	119.3111	45.5444	1928-	
218	14032100	BUTTER CREEK TRIB NR PINE CITY, OR	1.50	119.4139	45.6417		1948;1963-76
219	14033500	UMATILLA R NR UMATILLA, OR	2,290	119.3258	45.9031	1903-	
220	14034040	BOFER CANYON TR NR KENNEWICK, WA	1.53	119.2228	46.0617		1967-77
221	14034100	FOUR MILE CANYON NR PLYMOUTH, WA	81.2	119.2228	45.9694		1962-69
222	14034240	LITTLE JUNIPER CANYON NR PINE CITY, OR	4.87	119.6000	45.5589		1968-79
223	14034250	GLADE CR TRIB NR BICKLETON, WA	0.5	120.2064	46.0686		1961-76
224	14034270	E.B.GLADE CR NR PROSSER, WA	50.3	119.6028	46.0764		1962-77
225	14034280	E.B.GLADE CR TRIB NR PROSSER, WA	0.96	119.6028	46.1275		1962-75
226	14034320	DEAD CANYON CR TR NR ALDERDALE, WA	0.62	119.9081	45.9200		1955-74
227	14034325	ALDER CREEK NR BICKLETON, WA	8.35	120.2753	45.9969		1963-77
228	14034350	ALDER CREEK AT ALDERDALE, WA	197	119.9250	45.8417	1962-68;1980-	
229	14034370	WILLOW CREEK TRIB NR HEPPNER, OR	1.11	119.3333	45.2278		1958-79
230	14034380	NF WILLOW CREEK NR HEPPNER, OR	10.0	119.3500	45.2750		1958-64
231	14034470	WILLOW CREEK ABV WILLOW CR LAKE, NR HEPPNER, OR	67.6	119.5147	45.3408	1983-	
232	14034480	BALM FORK NR HEPPNER, OR	24.0	119.5400	45.3322	1982	
233	14034500	WILLOW CREEK AT HEPPNER, OR	87.0	119.5489	45.3506	1951-	
234	14034800	RHEA CREEK NR HEPPNER, OR	120	119.6228	45.2614	1960-	
235	14034830	CASON CANYON AT RUGGS, OR	2.21	119.6847	45.2639		1967-79
236	14035000	WILLOW CREEK NR MORGAN, OR	630	119.9250	45.5417	1921;1928-31	
237	14035500	WILLOW CREEK AB EIGHTMILE CR NR ARLINGTON, OR	680	120.0333	45.7111	1905	
238	14036000	WILLOW CREEK NR ARLINGTON, OR	850	120.0097	45.7533	1906;1960-79	
239	14036500	ROCK CR NR GOLDENDALE, WA	120	120.5028	45.8028	1911-13	
240	14036600	ROCK CR NR ROOSEVELT, WA	213	120.4344	45.7486	1962-68	
241	14047300	CONDON CANYON TRIB NR CONDON, OR	1.03	120.1722	45.2083		1963-67;1972
242	14047390	ROCK CREEK AB WHYTE PARK NR CONDON, OR	297	120.0208	45.2647	1975-82	
243	14047450	WF DRY FORK CREEK NR GOOSEBERRY, OR	0.81	119.9647	45.2867		1967-79
244	14047470	JUNIPER CANYON NR MIKKALO, OR	1.84	120.1983	45.4642		1972-82
245	14047500	ROCK CREEK AT ROCK CREEK, OR	500	120.2972	45.5722	1905;1911	
246	14048000	JOHN DAY R AT MCDONALD FERRY, OR	7,580	120.4083	45.5878	1904-	
247	14048020	GRASS VALLEY CANYON NR GRASS VALLEY, OR	8.15	120.7742	45.3736		1957-79
248	14048040	GORDON HOLLOW AT DE MOSS SPRINGS, OR	8.86	120.6819	45.5139		1959-81
249	14048060	HAY CANYON NR DE MOSS SPRINGS, OR	23.8	120.6139	45.4889		1959-65
250	14048080	BUCK CANYON NR KLONDIKE, OR	3.42	120.5972	45.5264		1953;1959-65
251	14048300	SPANISH HOLLOW AT WASCO, OR	8.05	120.6944	45.5889		1959-79
252	14048310	SPANISH HOLLOW TRIB AT WASCO, OR	6.13	120.7153	45.5917		1967-79
253	14048350	FULTON CANYON TRIB NR WASCO, OR	6.75	120.7597	45.5847		1959-66
254	14101500	WHITE RIVER BELOW TYGH VALLEY, OR	417	121.0939	45.2417	1917-	
255	14103000	DESCHUTES RIVER AT MOODY, NR BIGGS OR	10,500	120.9014	45.6222	1897-99;1906-	
256	14105700	COLUMBIA RIVER AT THE DALLES, OR	237,000	121.1722	45.6075	1878-	
257	14106000	KLICKITAT R ABV PEARL CR NR GLENWOOD, WA	130	121.2583	46.3139	1910;1916	
258	14106500	PEARL CREEK NR GLENWOOD, WA	4.31	121.2639	46.3139	1916	
259	14107000	KLICKITAT RIVER ABV W.F. NR GLENWOOD, WA	151	121.2439	46.2650	1944-77	1978
260	14107500	SWAMP CREEK NR GLENWOOD, WA	10.4	121.2333	46.2556	1916	
261	14108000	W.F. KLICKITAT R NR GLENWOOD, WA	87.0	121.2722	46.2583	1910;16;44-48;53-54	
262	14108500	CUNNINGHAM CREEK NR GLENWOOD, WA	15.4	121.2889	46.1778	1916	
263	14109000	BIG MUDDY CREEK NR GLENWOOD, WA	23.3	121.2925	46.1517	1916-18;1944-49	
264	14109500	COUGAR CREEK NR GLENWOOD, WA	3.34	121.3000	46.1422	1916	
265	14110000	KLICKITAT RIVER NR GLENWOOD, WA	360	121.2583	46.0889	1905-08;1909-71	1972-79
266	14110500	INDIAN FORD SPRINGS NO 1 NR GLENWOOD, WA		121.1805	46.0417	1946-48	
267	14070110	MEDLEY CANYON CREEK NR GLENWOOD, WA	1.26	121.3036	45.9464		1970-77
268	14111500	KLICKITAT R BLW GLENWOOD, WA	758	121.1175	45.9369	1914	
269	14111700	BUTLER CREEK NR GOLDENDALE, WA	11.6	120.7047	45.9131	1964-68	
270	14111800	W PRONG LITTLE KLICKITAT R NR GOLDENNDALE, WA	10.4	120.7197	45.9250		1961-75
271	14112000	LITTLE KLICKITAT RIVER NR GOLDENDALE, WA	83.5	120.7950	45.8444	1910-12;46-51;57-70	1971-78
272	14112200	LITTLE KLICKITAT R TR NR GOLDENDALE, WA	0.71	120.7972	45.8375		1961-
273	14112300	SPRING CREEK NR BLOCKHOUSE, WA	2.75	120.9042	45.8403	1964-68	
274	14112400	MILL CREEK NR BLOCKHOUSE, WA	26.9	120.9636	45.8594	1964-72	1973-78
275	14112490	BOWMAN CREEK NR WAHKIACUS, WA	60.1	121.0408	45.8489		1961;65;74-75
276	14112500	LITTLE KLICKITAT RIVER NR WAHKIACUS, WA	280	121.0575	45.8428	1944-	
277	14113000	KLICKITAT RIVER NR PITT, WA	1,297	121.2089	45.7567	1909-12;1928-	
278	13331500	MINAM RIVER AT MINAM, OR	240	117.7256	45.6200	1912-1914,1965-	
279	14042500	CAMAS CREEK NR UKIAH, OR	121	118.8194	45.1569	1915-17,1922-23,1942-	
280	14044000	MF JOHN DAY RIVER AT RITTER, OR	515	119.1403	44.8889	1929-	
281	14046000	NF JOHN DAY RIVER AT MONUMENT, OR	2,520	119.4306	44.8139	1925-	

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By
L. M. Nelson

1991