

WATER BUDGETS

WATER BUDGET FOR EASTERN SNAKE RIVER PLAIN FOR 1934-80

Actual conditions	Without development	
Inflow:		
Snake River near Hite	4.96	5.10
Water yield from tributary basins	0.26	0.87
Recharge from precipitation on plain	60	60
Total inflow	10.82	11.57
Outflow:		
Snake River at King Hill	7.57	11.52
Evaporation from Snake River and reservoirs	20	05
Evapotranspiration of irrigation water	3.00	00
Total outflow	10.77	11.57
Change in ground-water storage	+ 0.05	0

WATER BUDGET FOR WESTERN SNAKE RIVER PLAIN FOR 1934-80

Actual conditions	Without development	
Inflow:		
Snake River at King Hill	7.57	11.52
Water yield from tributary basins	7.03	7.37
Recharge from precipitation on plain	05	05
Total inflow	14.65	18.94
Outflow:		
Snake River at Water	12.90	18.90
Diversion past Water	05	00
Evaporation from Snake River and reservoirs	10	05
Evapotranspiration of irrigation water	1.60	00
Total outflow	14.65	18.94
Change in ground-water storage	0	0

ANNUAL WATER BUDGETS FOR THE SNAKE RIVER PLAIN WERE DETERMINED FOR 1934-80

Flow from headwaters of the Snake River contributes about 50 percent of the water yield from mountainous areas surrounding the eastern Snake River Plain below King Hill. Another 23 percent is from Henry Fork of the Snake River. Tributaries from the north side of the plain, including Little Lost Rivers and Beth and Camas Creeks, contribute about 10 percent. These tributaries lose all their water as they enter the plain and never contribute flow to the Snake River. The Wood River basin contributes about 10 percent above 10 percent of direct precipitation on the western plain becomes ground-water recharge or runoff. Direct recharge to the plain is small; therefore, all 10 percent is considered to be recharge. Discharge of the Snake River at King Hill is assumed to occur for nearly all outflow from the eastern Snake River Plain except that which is consumptively used. More than 9 million acre-feet of water is diverted annually for irrigation on the eastern plain. Outflow by evapotranspiration of irrigation water (ground-water) has increased with time as irrigated acreage has increased. Since the 1950's, there was no irrigation development in the tributary valleys or on the plain, average annual flow in the Snake River would be 4 and 6 million acre-feet greater at King Hill and Water, respectively.

INFLOW TO EASTERN SNAKE RIVER PLAIN

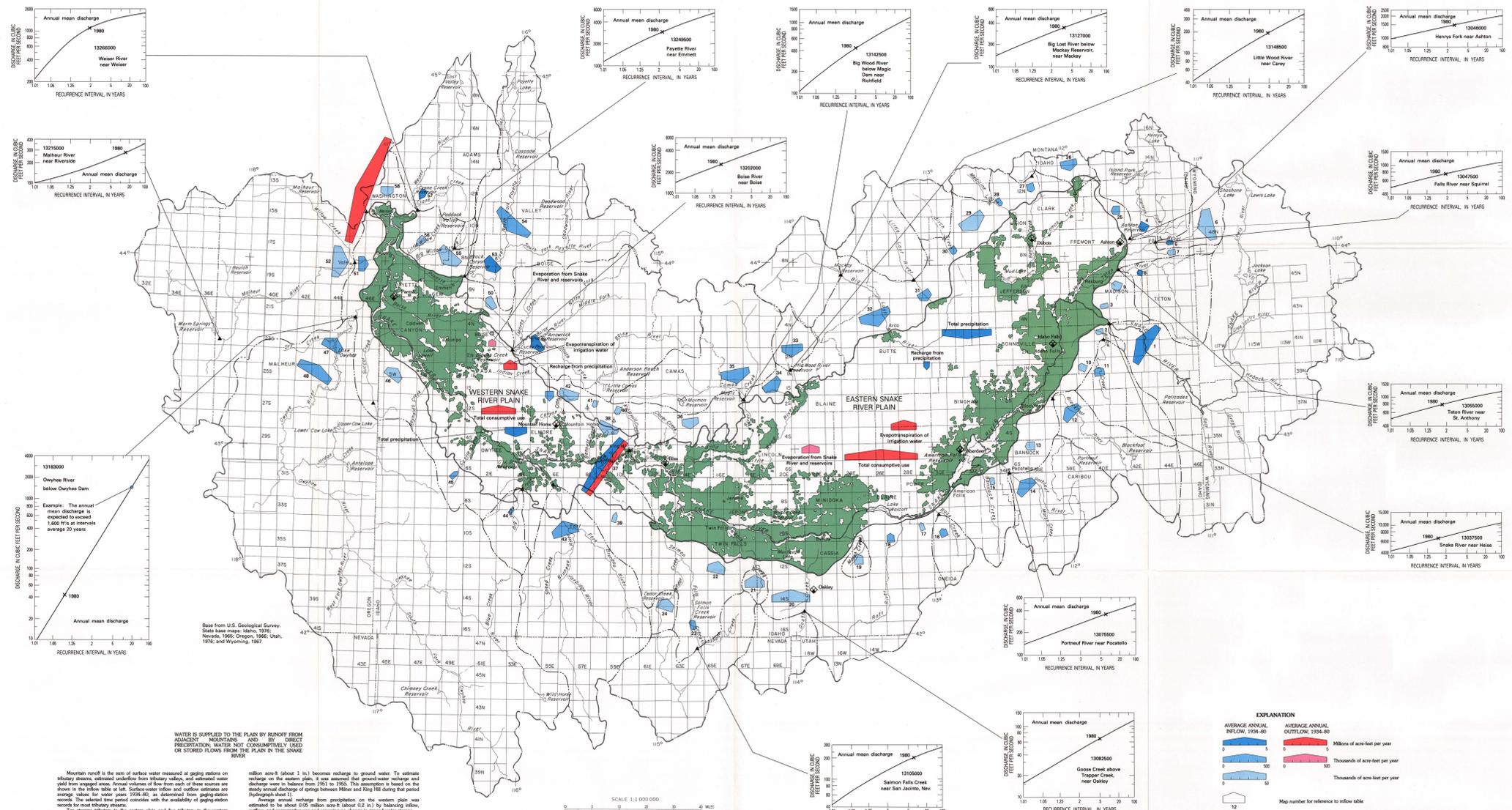
Map number	Gaging station (number) or contributing area	Period of record (water year)	Mean or annual mean discharge (in thousands of acre-feet)	Estimated annual discharge (in thousands of acre-feet)	Water yield from tributary basins (in thousands of acre-feet)	Water used between gaging station and irrigated area (in thousands of acre-feet)	Net water yield to plain (in thousands of acre-feet)	Water yield upstream of gage (in thousands of acre-feet)	Net water yield to plain (in thousands of acre-feet)
1*	Snake River near Hite (1302750)	1911-80	5,024	4,963	Negligible	0	4,963	142	5,100
2	Henry Fork	1928-80	5	5	6	6	6	6	6
3	Lyon Creek, Kelly Canyon, and adjacent area	1903-80	1,054	1,072	Negligible	0	1,072	37	1,099
4*	Henry Fork near Ashton (1324600)	1927-80	562	570	Negligible	5	568	1	611
5*	Fall River near Joseph (1302750)	1919-80	33	35	Negligible	0	35	0	611
6	Fall River downstream	1928-80	33	35	Negligible	0	35	0	611
7	Conant Creek basin	1934-80	586	584	Negligible	0	584	64	648
8*	Teton River near St. Anthony (1326500)	1900	11	10	Negligible	0	10	0	10
9	Muddy Creek near Reburg (1325200)	1980	11	10	Negligible	0	10	0	10
10	Beth Creek and adjacent area	1900	126	126	Negligible	0	126	9	135
11	Willow Creek near Reta (1308000)	1904	126	126	Negligible	0	126	9	135
12	Blackfoot River near Shady (1326600)	1923-80	253	253	Negligible	0	253	27	280
13	Lovick Creek, Rose Fork, Pocatello Creek, and adjacent areas	1913-80	194	193	Negligible	0	193	24	217
14*	Potholes River near Pocatello (1327500)	1913-80	194	193	Negligible	0	193	24	217
15	Michael, Barcroft, Sunbeam, and Water Creeks basins	1979-80	24	17	51	61	10	51	61
16	Rock Creek near American Falls (1327700)	1979-80	24	17	51	61	10	51	61
17	Fall Creek and adjacent area	1979-80	24	17	51	61	10	51	61
18	Raft River basin	1979-80	24	17	51	61	10	51	61
19	Mason Creek near Albion (1328200)	1967-74	16	10	10	10	10	10	10
20*	Goose Creek above Trepper Creek near Oakley (1328200)	1911-16	34	33	Negligible	11	44	2	46
21	Rock Creek near Rock Creek (1328200)	1923-22	25	24	Negligible	1	25	1	26
22	Ely, Cottonwood, and Deep Creeks and adjacent areas	1916-16	100	104	45	149	26	175	175
23*	Salmon Falls Creek near San Jacinto, Idaho (1328200)	1916-16	17	19	2	2	19	1	22
24	Cedar Creek near Rosamouth (1328200)	1916-16	17	19	2	2	19	1	22
25	Big Bend Ridge area draining to the west	1916-16	111	111	111	111	111	111	111
26	Camas Creek at Eighteen-Mile Ranch near Arden (1310500)	1946-53	63	63	151	214	9	223	223
27	Beaver Creek near Spencer (1313300)	1941-80	31	31	59	90	1	91	91
28	Madison Lodge Creek at Elk Ranch near Arden (1314000)	1941-69	30	30	8	38	4	42	42
29	Warm Springs, Deep, and Blue Creeks basins	1911-80	7	7	30	30	0	30	30
30	Beth Creek near Reno (1311900)	1951-43	56	61	7	64	74	74	74
31	Little Lost River near Howe (1312700)	1941-80	55	52	152	10	164	16	230
32*	Big Lost River near Mackay (1312700)	1905-80	219	228	72	145	110	335	35
33*	Little Wood River near Canby (1314800)	1928-42	109	114	18	15	147	3	150
34	Silver Creek at Sportman Acres near Prato (1315000)	1979-80	123	140	50	1	191	15	206
35*	Big Wood River below Owyhee Dam, Oregon (1314500)	1913-80	332	332	Negligible	11	363	57	420
36	Chester Creek near Reta (1314500)	1929-43	22	22	Negligible	5	27	1	28
Total water yield to the eastern Snake River Plain from tributary basins					10,215				10,922

INFLOW TO WESTERN SNAKE RIVER PLAIN

Map number	Gaging station (number) or contributing area	Period of record (water year)	Mean or annual mean discharge (in thousands of acre-feet)	Estimated annual discharge (in thousands of acre-feet)	Water yield from tributary basins (in thousands of acre-feet)	Water used between gaging station and irrigated area (in thousands of acre-feet)	Net water yield to plain (in thousands of acre-feet)	Water yield upstream of gage (in thousands of acre-feet)	Net water yield to plain (in thousands of acre-feet)
37	Snake River at King Hill (1313400)	1911-80	7,788	7,571	Negligible	0	7,571	11,520	11,520
38	King Hill, Cold Springs, Bartlett, and other small adjacent basins	1967-80	25	25	25	25	25	25	25
39	Salmon and Brown Creeks basins	1967-80	9	9	9	9	9	9	9
40	Little Canyon Creek at Steel Camp near Glenn Ferry (1315500)	1966-71	7	7	7	7	7	7	7
41	Bennett Creek near Bennett (1315500)	1939-45	5	5	5	5	5	5	5
42	Mountain House Frazier Canal near Mountain Home (1316500)	1946-69	23	23	5	2	33	33	33
43	Bennett River near Hot Springs (1316500)	1919-14	286	297	50	347	20	367	367
44	Big Losts Creek near Bruna (1316500)	1946-49	3	3	7	10	10	10	10
45	Shoody, Beth, Castle, Steiner, Balleh, Pyramid, Hartspring, Smead, and Jump Creeks basins	1967-80	23	19	Negligible	4	23	23	23
47*	Owyhee River below Owyhee Dam, Oregon (1317200)	1913-80	255	255	Negligible	0	255	44	299
48	South (1318200) and North (1318200) Owyhee Creeks near Arden	1962-80	435	435	Negligible	0	435	74	509
49	Boise River near Boise (1324000)	1898-1901	2,156	2,097	Negligible	28	2,069	28	2,125
50	Indian, Black, Day, and Willow Creeks basins	1966-76	15	15	15	15	15	15	15
51	Malheur River below Nevada Dam near Malheur (1325300)	1962-76	197	177	5	18	200	65	265
52	Neveda Canal near Vale, Ore. (1325300)	1928-41	38	38	Negligible	0	38	398	303
53	Payette River near Emmett (1326900)	1928-80	2,169	2,200	Negligible	0	2,200	127	2,327
54	Blackfoot River near Blackfoot (1326900)	1966-76	458	458	Negligible	0	458	458	458
55	Big Willow Creek near Emmett (1326900)	1963-80	17	17	Negligible	12	29	29	29
56	Little Willow Creek basin and adjacent areas	1966-76	12	12	Negligible	0	12	12	12
57	Water River near Water (1326900)	1916-1948	818	764	Negligible	0	764	47	811
58	Malheur River below Water Springs Reservoir near Bruna, Ore. (1327500)	1928-41	38	38	Negligible	0	38	398	303
Total water yield to the western Snake River Plain from upstream and tributary basins					14,605				18,890

Flow from headwaters of the Snake River contributes about 50 percent of the water yield from mountainous areas surrounding the eastern Snake River Plain below King Hill. Another 23 percent is from Henry Fork of the Snake River. Tributaries from the north side of the plain, including Little Lost Rivers and Beth and Camas Creeks, contribute about 10 percent. These tributaries lose all their water as they enter the plain and never contribute flow to the Snake River. The Wood River basin contributes about 10 percent above 10 percent of direct precipitation on the western plain becomes ground-water recharge or runoff. Direct recharge to the plain is small; therefore, all 10 percent is considered to be recharge. Discharge of the Snake River at King Hill is assumed to occur for nearly all outflow from the eastern Snake River Plain except that which is consumptively used. More than 9 million acre-feet of water is diverted annually for irrigation on the eastern plain. Outflow by evapotranspiration of irrigation water (ground-water) has increased with time as irrigated acreage has increased. Since the 1950's, there was no irrigation development in the tributary valleys or on the plain, average annual flow in the Snake River would be 4 and 6 million acre-feet greater at King Hill and Water, respectively.

*Gaging station used in inflow analysis.
†Records furnished by Oregon Water Resources Department.
‡Records at Malheur River below Water Springs Reservoir near Bruna, Ore. (1327500), were used for inflow analysis.
§Records furnished by U.S. Bureau of Reclamation.



WATER IS SUPPLIED TO THE PLAIN BY RUNOFF FROM ADJACENT MOUNTAINS AND DIRECT PRECIPITATION. WATER NOT CONSUMPTIVELY USED OR STORED FLOWS FROM THE PLAIN IN THE SNAKE RIVER.

Mountain runoff is the main source of surface water recharging the Snake River. Surface water, estimated underground from tributary valleys, and estimated water yield from irrigated areas are shown in the inflow table to the left. Surface water yield and outflow estimates are given only for those stations by the ratio of annual to average annual precipitation. The selected time period coincides with the availability of gaging-station records for most tributary systems.

The streams tributary to the eastern plain and the tributary to the western plain that have a combined drainage area of 10,215 to 10,922 square miles contribute about 90 percent of the annual water yield to the plain. Frequency curves of annual mean discharges for these streams indicate the variations of surface-water yield that can be expected. The periods of record used to develop the curves are shown in the table to the left.

The average annual volume of precipitation on the Snake River Plain is about 5.2 million acre-ft, of which about 5.8 million acre-ft falls on the eastern plain. These figures were derived from an isohyetal map of average annual precipitation (Thomas and others, 1963). Of the 5.8 million acre-ft on the eastern plain, 0.6 million acre-ft (about 10 percent) becomes recharge to ground water. To estimate recharge on the eastern plain, it was assumed that ground-water recharge and discharge were in balance from 1951 to 1965. This assumption is based on the steady annual discharge of springs between Hite and King Hill during that period (Hydrograph sheet 11).

Average annual recharge from precipitation on the western plain was estimated to be about 0.05 million acre-ft (about 0.2 in.) by balancing inflow, outflow, and consumption use and assuming a change in ground-water storage. Outflow includes the near discharge at King Hill, eastern plain, and at Water. Western plain and eastern plain consumption use is assumed to be the same as the average consumption use on the Snake River and other large surface-water basins in the Snake River Plain. Annual ground-water discharge in the Snake River Plain is estimated to be about 0.05 million acre-ft (about 0.2 in.) by balancing inflow, outflow, and consumption use and assuming a change in ground-water storage. Outflow includes the near discharge at King Hill, eastern plain, and at Water. Western plain and eastern plain consumption use is assumed to be the same as the average consumption use on the Snake River and other large surface-water basins in the Snake River Plain. 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