Estimates of Recharge from Runoff at the Hanford Site, Washington

By Richard S. Dinicola

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CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
inch (in.)	25.4	millimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
acre	4,047	square meter
square mile (mi^2)	2.590	square kilometer
acre-foot (acre-ft)	1,233	cubic meter
acre-foot per year (acre-ft/yr)	1,233	cubic meter per year
inch per hour (in/hr)	2.54	centimeter per hour
inch per year (in/yr)	2.54	centimeter per year
cubic foot per second (ft^3/s)	0.02832	cubic meter per second
miles per hour (mi/hr)	0.477	meters per second

Temperature: To correct temperature given in this report in degrees Fahrenheit (°F) to degrees Celsius (°C), use the following equation: $^{o}C = 5/9(^{o}F-32)$.

Sea Level: In this report "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)--a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

Altitude: In this report "altitude" is measured in feet above or below sea level.

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ABSTRACT

Recharge from runoff was estimated using a short-term data collection effort in combination with a numerical simulation model of runoff and recharge. The hydrologic data collected during October 1990 through May 1993 was used to construct and test numerical models with the Hydrological Simulation Program-FORTRAN (HSPF) computer code. The numerical models were then used to estimate long-term average rates of runoff and recharge using 36 years of historical climate data.

HSPF parameter values were estimated from physiographic data, channel geometry data, theoretical hydraulic formulas, and information derived from other investigations. Selected parameter values were calibrated to observed hydrologic data--including both recent streamflow data and historical peak-discharge estimates--but many other parameter values, as well as the complete numerical models, could not be fully calibrated and tested because no substantial runoff occurred during the investigation. It was determined through trial and error that no combination of model parameters could accurately simulate both the recent streamflow data and the historical peak-flow data, so the final values were set to simulate a plausible upper limit for runoff and recharge.

Average annual runoff simulated for the 74.5-square-mile Cold Creek Basin and the 148-square-mile Dry Creek Basin was 517 acre-feet and 976 acre-feet, respectively. Average annual recharge from runoff simulated for Cold Creek Basin and Dry Creek Basin were 429 acre-feet and 829 acre-feet, respectively. Sixteen percent of the runoff was infiltrated but subsequently lost to evapotranspiration from channel sediments and from runout-zone soils. Simulated recharge from runoff within the boundaries of the Hanford Site was 868 acre-feet per year, and simulated recharge from runoff for all areas that likely contribute water directly to the uppermost unconfined aquifer beneath the Hanford Site was 1,175 acre-feet per year. The latter estimate is 160 percent greater than the previously published recharge from runoff estimate. Estimated recharge from runoff at the Hanford Site is 16 percent, 13 percent, and 6 percent as large as three previously published estimates of direct recharge from precipitation over the area. The accuracy of the recharge from runoff estimates could not be quantified with available data, but a qualitative assessment indicates that the runoff estimates are reasonable and of the correct order of magnitude.

INTRODUCTION

A variety of radioactive and other hazardous wastes have been released into the environment at the U.S. Department of Energy's Hanford Site in south-central Washington (fig. 1). Some of those wastes have migrated to ground water in the uppermost unconfined aquifer underlying the site (U.S. Congress, Office of Technology Assessment, 1991), which discharges primarily to the Columbia River (Delaney and others, 1991). The rate at which ground water and its contaminants are transported from the aquifer to the Columbia River is greatly influenced by the west to east head gradient in the aquifer, which itself is influenced by the quantity and spatial distribution of ground-water recharge.

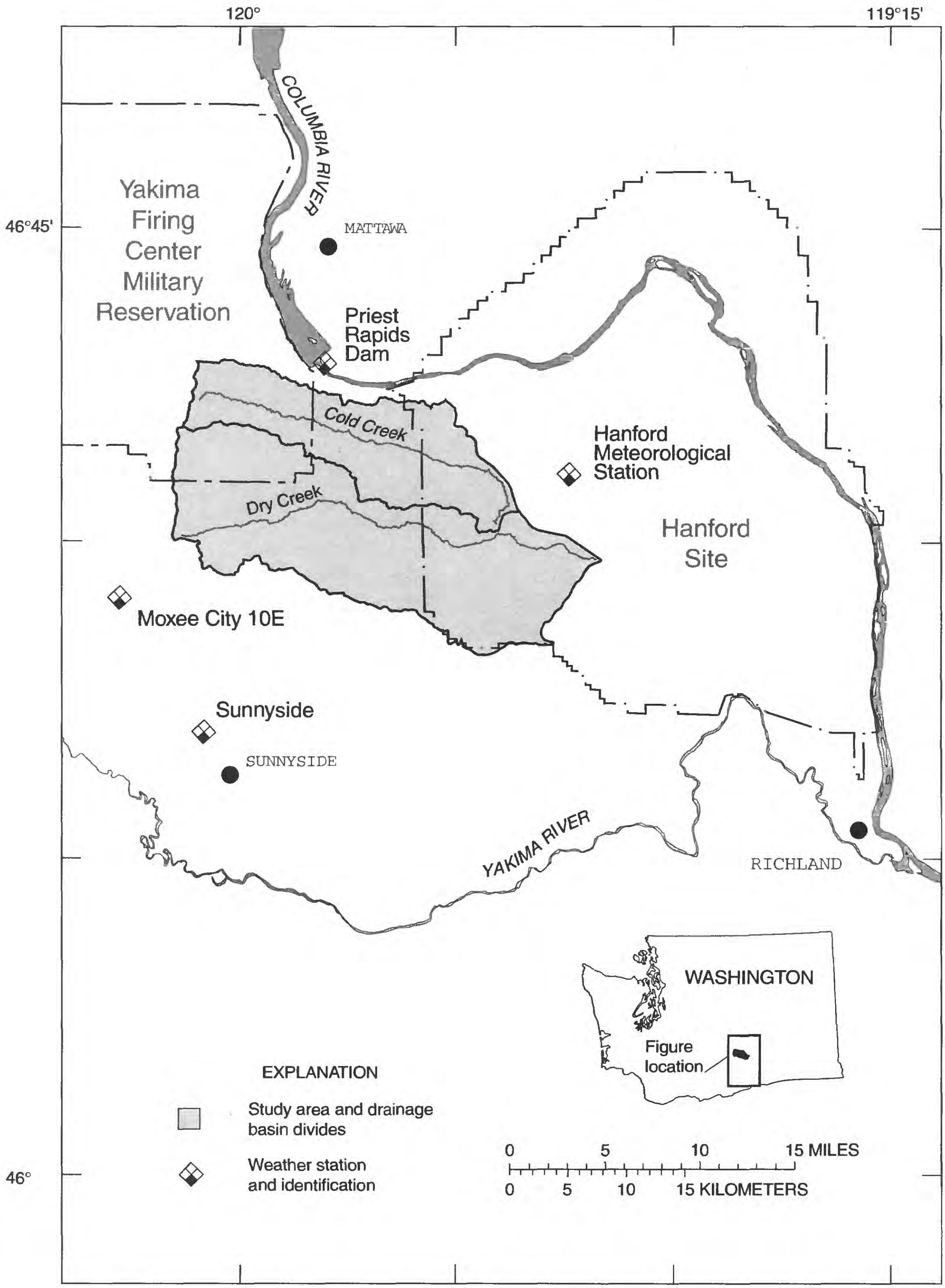

Figure 1. Location of study area and weather stations.

Recharge to the uppermost unconfined aquifer is from both artificial and natural sources. Artificial recharge, which is primarily from industrial wastewater, is well documented (Jacobson and Freshley, 1990). Natural recharge from direct infiltration and percolation of rainfall and snowmelt has been estimated for several specific locations on the Hanford Site (Gee and others, 1992; Gee, 1987; Prych, 1994; Rockhold and others, 1995) and for the Hanford Site as a whole (Bauer and Vaccaro, 1990; Jacobson and Freshley, 1990; Fayer and Walters, 1995). A second source of natural recharge--referred to in this report as recharge from runoff--is not well documented and has been only coarsely approximated at 450 acre-feet per year (Newcomb and others, 1972).

Recharge from runoff is ground-water recharge that results from infiltration and percolation of surface runoff. Recharge from runoff that contributes to the uppermost unconfined aquifer beneath the Hanford Site is thought to result primarily from infiltration and percolation of storm runoff generated in nearby Cold Creek and Dry Creek drainage basins. Such recharge may be of particular importance with regard to contaminant transport to the Columbia River because it occurs to the west of the Hanford Site and helps maintain the head gradient that slopes towards the river.

There is a need to better estimate the amount of recharge from runoff at the Hanford Site. There are many technical difficulties in measuring such recharge directly, so improved recharge estimates will likely result from improved estimates of runoff. There is essentially no historic runoff data for the Hanford Site. Historic peak discharges measured in nearby streams provide little indication of associated runoff volumes. It is unknown whether historic runoff volumes measured in nearby Esquatzel Coulee Basin (located about 40 miles to the east of the Hanford Site) are representative of runoff at the Hanford Site because of differences in climate, physiography, and land-use. Because the annual variation in runoff in the semiarid study area is extreme, it would require tens of years to obtain the runoff data needed to improve the current published estimate of recharge from runoff.

For this investigation, recharge from runoff was estimated using a short-term data collection effort, long-term historic climate data, and a numerical simulation model of runoff and recharge. The short-term hydrologic data was used to construct and test a numerical model, which in turn was used to estimate long-term average rates of runoff and recharge using historical climate data.

Purpose and Scope

The purpose of this investigation was to estimate the long-term average runoff from Cold Creek and Dry Creek Basins, and to estimate the long-term average recharge from runoff at the Hanford Site. This report documents the construction and application of the numerical models used to simulate runoff and recharge, and presents estimates of recharge from runoff for the period 1958 through 1993. Unfortunately, no substantial runoff occurred in the study area during the period of this investigation, so the numerical models were calibrated and tested with only limited data. However, the runoff and recharge estimates presented are thought to be improvements over the existing estimates and their accuracy, although not quantifiable, is discussed in qualitative terms in this report.

Description of the Study Area

The 222-square-mile study area is located in south-central Washington (fig. 1). The physiography is characterized by two synclinal basins bordered by three narrow east-trending anticlines. The basins open to the east onto a broad plain composed of sediments from the Columbia River. The entire area is underlain by basalt. The basalt is exposed or at a shallow depth on ridges in the western parts of Cold Creek Basin, but it is blanketed by a deep layer of loess and alluvial or glaciofluvial sediments in Dry Creek valley and in the lowland plain of the Hanford Site. Altitudes range from below 600 feet on the eastern plain to over 4,000 feet on the western ridge tops. Slopes are gentle in the valleys and on the plain, but they are often steeper than 45 degrees on the ridges.

Most soils in the area formed in loess, although some soils on the ridges formed in residuum and colluvium derived from basalt. Soils are deep to very deep on moderate or gentle slopes in the lowlands and grade to very shallow on the steep ridges. The deeper soils are predominately silt loams, with some fine sands or loamy fine sands, and the shallower soils are predominately gravelly or cobbly loams. The soils in the area are generally well drained and have moderately high water-holding capacities.

The semiarid climate in the area is characterized by hot, dry summers and cold, moist winters. Average annual precipitation for 1912 through 1980 ranges from 6.3 inches at the Hanford Meteorological Station (HMS) (Stone and others, 1983) to greater than 11 inches at high elevations. Over 50 percent of the precipitation falls from November through February, and about 40 percent of that falls as snow. Only 10 percent of the annual precipitation falls from July through September. On average, daily precipitation at the HMS equals or exceeds 0.10 inches only 23 days per year, and it exceeds 1.00 inch only about once every 18 years. Average annual air temperature at the HMS is 53°F; it is coldest during January (29°F) and is hottest during July (64°F). Relative humidity at the HMS is low during the summer months (32 to 42 percent), and moderate during the winter months (56 to 80 percent). Windspeeds at the HMS are highest during the spring months (9 miles per hour), and lowest during the winter months (7 miles per hour). Daily average total solar radiation at the HMS ranges from 89 langleys in December to 647 langleys in July.

Natural vegetation in the study area consists of shrub-steppe plant communities composed of winter and summer annual grasses and perennial grasses and shrubs (Rickard and Vaughn, 1988). Because of the mixture of shallow-rooted grasses, such as poa and cheatgrass, and deep-rooted shrubs, such as sagebrush and rabbitbrush, this desert vegetation is efficient in utilizing soil water. All of the vegetation suffers summer water stress, but with the exception of the winter annuals, it generally survives the summer months by utilizing summer rains and water stored at depth from winter precipitation. There are also some small, natural riparian communities near perennial springs and seeps. Approximately 86 percent of the study area is covered with natural vegetation, and the remainder has been converted to dryland wheat (13 percent) and irrigated grapes, apples, or alfalfa (1 percent).

As is typical for semiarid environments, the majority of precipitation falling on the study area is lost to evapotranspiration. Bauer and Vaccaro (1990) estimated about 81 to 94 percent of average annual precipitation in the study area is lost through evapotranspiration. The lower value is for areas with thin and stony soils. Gee (1992) found that nearly 100 percent of precipitation was evapotranspired from sites with fine-textured soils and deep-rooted shrubs, but only 65 percent was evapotranspired from a site with sandy soil and shallow-rooted grasses.

Cold Creek and Dry Creek are ephemeral streams that drain the two synclinal valleys in the study area. During periods of runoff, which are uncommon, these streams flow eastward onto the alluvium underlying the Hanford Site where they eventually disappear from the surface by infiltration into the sediments. Topographically, the Cold Creek Valley continues south-eastwardly to the Yakima River, and Dry Creek drains to the Cold Creek Valley. Historically, however, streamflow in Cold Creek has been entirely infiltrated before reaching the mouth of Dry Creek Valley, and streamflow in Dry Creek has been entirely infiltrated soon after reaching the Cold Creek Valley and well upslope from the Yakima River. There are many small, perennial springs and seeps throughout the study area whose discharges are quickly lost to infiltration and evaporation. The most significant of these is Rattlesnake Springs near the mouth of Dry Creek Valley, and the unnamed valley-bottom seeps along the upper two-thirds of Cold Creek. Dry Creek flows perennially for a few miles below Rattlesnake Springs. The upper reach of Cold Creek does not flow perennially in most years, but the established, lush riparian zone suggests that water is usually available at shallow depth.

Approach

The approach used to estimate recharge from runoff was to construct numerical models to simulate rainfall-runoff and recharge processes and to apply those models using historical climate data as input. Specific tasks included (1) collect short-term and assemble long-term climatic and hydrologic data, (2) develop a conceptual model of study area hydrology to guide the construction of numerical models, (3) construct numerical models with the Hydrological Simulation Program - FORTRAN (HSPF) computer code, (4) estimate or calibrate numerical model parameters, (5) synthesize long-term climate records for the study basins by adjusting long-term data observed at nearby weather stations to represent study area climate, and (6) apply the numerical models to estimate long-term average values for runoff and recharge from runoff. The resulting runoff estimates were compared to historic streamflow data from Esquatzel Coulee Basin as a qualitative check for reasonableness, and the resulting recharge estimates were compared to other recharge estimates for the aquifer of interest to demonstrate the relative importance of recharge from runoff.

CLIMATIC AND HYDROLOGIC DATA

Short-term climatic data were collected by the U.S. Geological Survey in the study area during the period October 1990 through May 1993, and long-term data were obtained from the Hanford Meteorological Station (HMS) and three National Weather Service stations for the period October 1957 through May 1993. Those data were used to synthesize long-term climate records for the study basins by correlating the short-term, study-area data with the long-term data from nearby sites. Additional climatic data--including soil temperature and snow depth--were obtained from the HMS and the National Weather Service site at Pullman, Washington. Those data were used to calibrate and assess the frozen-ground and the snow accumulation and melt components of the numerical models.

Hydrologic data--including streamflow and soil moisture--were collected by the USGS in the study area from October 1990 through May 1993. Those data were used to calibrate the streamflow generation and channel infiltration components of the numerical models. Additional hydrologic data--including evapotranspiration and streamflow data--from sites both within and near the study area were obtained from various published reports. Those data were used to calibrate the evapotranspiration component of the numerical models and to assess the simulation results.

Climatic Data

Within the study area, 15-minute increment precipitation data were collected at five sites (fig. 2) using weighing-bucket type recording gages with a rated accuracy of +/-0.06 inches. All five gages were fitted with alter-type wind screens. Total precipitation data were collected approximately monthly at 17 sites using storage-type precipitation gages; those gages were not fitted with wind screens. Both the recording and storage gages were maintained for winter operation. A list of precipitation data collection stations and their locations is in table 1. A summary of the precipitation data collected from September 1990 through June 1993 is in table 2.

Other 15-minute increment meteorological data were collected in the study area at the Cold Creek micrometeorological station (MET in fig. 2). Air temperature, relative humidity, solar radiation, windspeed, and soil temperature data were collected using a thermistor, a relative humidity sensor, a button-type pyranometer, a 3-cup anemometer, and buried thermistors, respectively. A summary of the meteorological data collected for the period October 1990 through May 1993 is in table 3.

Climatic data were obtained for stations outside the study area for October 1957 through May 1993. They include hourly-increment precipitation, air temperature, dew-point temperature, solar radiation, and windspeed data from the HMS, and daily precipitation data from National Weather Service stations at Sunnyside, Moxee City 10 E, and Priest Rapids Dam (table 1 and fig. 1). A summary of the meteorological data is included in table 3, and monthly precipitation data for the period September 1990 through June 1993 is in table 2.

Daily soil temperature and snow depth data for January 1970 through May 1993 were obtained from the National Weather Service station at Pullman, Washington, located about 120 miles west of the study area, and daily snow depth data for water years 1977-90 were obtained for the HMS. Those data are described in the "Numerical Models of Runoff and Recharge from Runoff" section of this report.

Hydrologic Data

Fifteen-minute increment streamflow data were collected at four gaging stations (fig. 2 and tables 4 and 5) in Cold Creek and Dry Creek Basins. Water-measurement structures were built at three of the stations to allow for more accurate discharge calculations. Broad-crested v-notch weirs (Brakensiek and others, 1979) were constructed for the sites in upper Cold Creek (12510618) and lower Dry Creek (12510655), and an 8-foot trapezoidal supercritical-flow flume (Kilpatrick and Schneider, 1983) was constructed for the site in lower Cold Creek (12510625). Existing culverts under a state highway were used as control structures for the measurement of discharge at the upper Dry Creek site (12510650). Monthly and annual peak-discharge and total streamflow data for the period October 1990 through May 1993 are in table 4. Daily streamflow data have been published elsewhere (Miles and others, 1992, 1993, and 1994).

Miscellaneous soil moisture measurements were made at four sites in Cold Creek and Dry Creek stream channels; all the sites were located in downstream reaches underlain by alluvium (fig. 2). Vertical profiles of soil-moisture were made by lowering a neutron soil-moisture probe into 15- to 30-foot-deep access tubes. Measurements were initially made in 2-inch diameter steel tubes installed in augered holes, but data collected during runoff suggested that most of the downward water flux was due to preferential flow in the backfilled zones around the tubes. A second set of 5-inch diameter steel tubes was installed with an air-percussion drill-rig (the technique did not require backfilling) that greatly reduced preferential flow problems. Data from the 2-inch tubes were considered unreliable and are not presented. Applicable soil-moisture data from one of the 5-inch tubes (C2) are presented in figure 3 and the "Conceptual Model of Runoff and Recharge from Runoff" section of this report.

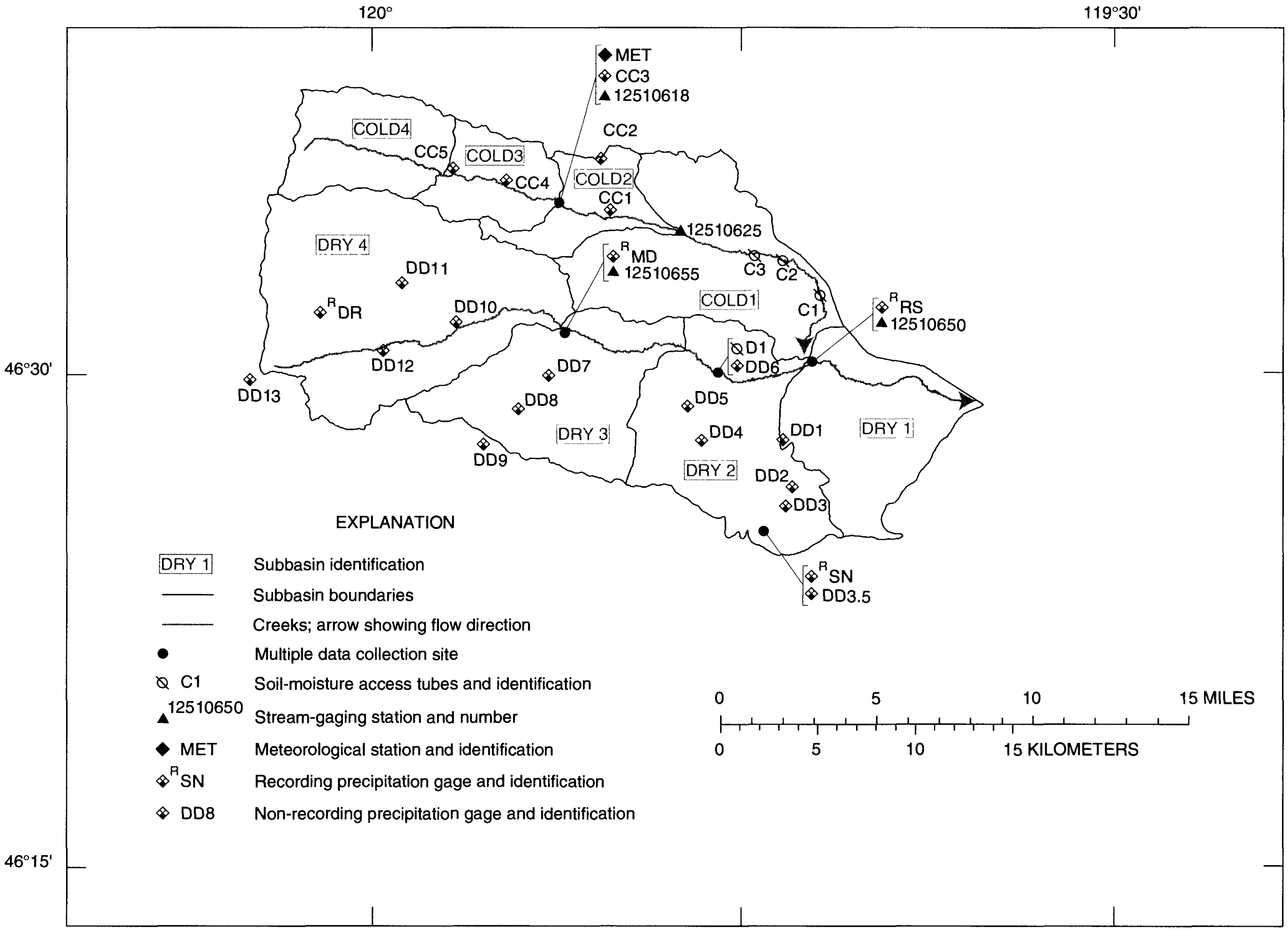

Figure 2. Location of data collection sites and subbasins in the study area.

Table 1.--*Precipitation data collection stations*

[Gage operators: USGS, United States Geological Survey; PNL, Pacific Northwest Laboratory; NWS, National Weather Service]

Station code	Station name	Gage operator and type	Station location (latitude - longitude)		Altitude (feet)
DD1	Old Field	USGS non-recording	46°28'15"	119°43'13"	1,060
DD2	Snively1	USGS non-recording	46°26'56"	119°42'52"	1,600
DD3	Snively2	USGS non-recording	46°26'06"	119°43'00"	1,920
DD3.5	Check	USGS non-recording	46°25'30"	119°44'04"	2,600
DD4	Bennett	USGS non-recording	46°28'19"	119°46'35"	1,200
DD5	Boundary	USGS non-recording	46°29'12"	119°47'05"	1,020
DD6	Neutron	USGS non-recording	46°30'04"	119°45'54"	820
DD7	Roberts	USGS non-recording	46°30'16"	119°53'03"	1,280
DD8	Midway	USGS non-recording	46°29'24"	119°54'27"	1,700
DD9	Pass	USGS non-recording	46°28'22"	119°55'52"	2,300
DD10	Bus	USGS non-recording	46°31'34"	119°56'48"	1,440
DD12	Meeboer	USGS non-recording	46°31'11"	119°59'50"	1,640
DD13	Apples	USGS non-recording	46°30'22"	120°05'21"	1,800
CC1	Grapes	USGS non-recording	46°34'51"	119°50'12"	1,280
CC2	Emerson	USGS non-recording	46°36'32"	119°50'40"	2,100
CC3	Met	USGS non-recording	46°35'11"	119°52'26"	1,460
CC4	Gate	USGS non-recording	46°35'52"	119°54'52"	1,760
RS	Rattlesnake	USGS recording	46°30'23"	119°41'54"	690
SN	Snively	USGS recording	46°25'30"	119°44'04"	2,600
MD	Middle Dry	USGS recording	46°31'29"	119°52'19"	1,130
DR	Desert Rose	USGS recording	46°32'14"	120°02'28"	2,040
HMS	Hanford Met. Station	PNL recording	46°34'00"	119°36'00"	733
MOX	Moxee City 10 E	NWS recording	46°31'00"	120°10'00"	1,551
PRD	Priest Rapids Dam	NWS recording	46°39'00"	119°54'00"	459
SUN	Sunnyside	NWS recording	46°19'00"	120°00'00"	747

Table 2.--*Summary of precipitation data collected in and near the study area for the period September 26, 1990, through June 21, 1993*

[Station codes are described in table 1; precipitation values are in inches; --, missing data; +, an observation was missed, but the precipitation amount is included in the next observation; WY, the total precipitation for the appoximate water year designated; , annual total is equal to or greater than the shown amount]

Observation date	Station code																							
	DD1	DD2	DD3	DD3.5	DD4	DD5	DD6	DD7	DD8	DD9	DD10	DD12	DD13	CC1	CC2	CC3	CC4	RS	SN	MD	DR	HMS	MOX	PRD	SUN
11/06	0.85	1.08	1.07	1.22	0.82	0.81	--	0.67	0.84	0.82	0.70	0.64	0.55	0.58	0.64	0.63	0.66	0.00	--	--	--	0.80	0.51	--	0.66
12/04	0.12	0.18	0.19	0.23	0.12	0.15	--	--	0.09	0.03	0.02	0.03	0.03	0.03	0.04	0.04	0.05	0.55	--	--	--	0.00	0.03	0.00	0.00
1/03	0.65	1.09	0.90	--	94	0.74	0.60	0.51	0.67	0.75	0.53	0.58	0.49	0.59	0.58	0.72	0.87	0.65	--	--	--	0.71	0.44	0.41	0.41
2/07	0.71	0.93	0.89	1.98	1.05	0.78	0.67	0.83	0.93	0.80	0.70	0.80	0.67	0.40	0.45	0.65	0.72	0.35	0.88	0.40	0.46	0.40	0.44	--	0.46
3/05	0.66	0.95	1.09	1.21	0.94	0.90	0.86	0.94	1.19	0.93	1.09	1.07	0.97	0.76	0.67	0.84	0.89	0.38	0.97	0.65	0.65	0.57	0.92	0.60	--
4/03	0.78	0.98	0.85	0.86	0.76	0.60	0.60	0.67	0.65	0.73	0.61	0.61	0.52	0.64	0.66	0.76	1.06	0.43	0.78	0.39	0.24	0.68	0.46	0.52	--
5/06	--	0.57	0.74	0.90	0.48	0.39	0.21	0.40	0.35	0.40	0.33	0.37	--	0.49	0.30	0.40	0.39	0.30	0.93	0.28	0.22	0.44	0.54	0.41	0.33
6/05	0.25	0.36	0.43	0.73	0.48	0.37	0.45	0.58	0.54	0.58	1.18	1.07	1.04	1.33	1.16	1.36	0.94	0.73	0.90	1.08	1.05	0.98	0.73	0.64	0.81
6/14	0.49	0.51	0.51	0.53	0.51	0.51	0.56	0.58	0.54	0.58	+	+	+	+	+	+	+	0.24	0.20	0.01	0.00	0.14	0.65	0.57	0.39
7/10	0.59	0.93	1.21	1.26	1.03	1.32	0.73	0.77	2.03	0.53	1.52	1.61	1.39	1.30	1.03	1.18	1.71	0.61	1.30	1.56	2.30	0.81	3.28	1.68	1.37
7/30	0.11	0.11	0.11	0.16	--	0.13	0.10	0.18	0.22	0.27	0.17	0.19	0.15	0.22	0.25	0.24	0.24	0.03	0.07	0.09	0.01	0.17	0.22	0.16	0.34
9/03	0.10	0.09	0.09	0.15	0.14	0.08	0.07	0.25	0.30	0.19	0.20	0.36	0.27	0.17	0.08	0.19	0.24	0.03	0.00	0.03	0.23	0.19	0.14	0.01	0.11
9/30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WY91	≥5.31	7.78	8.08	≥9.23	≥7.27	6.78	≥4.85	≥6.38	8.35	6.61	7.05	7.33	≥6.08	6.51	5.86	7.01	7.77	4.30	≥6.03	≥4.49	≥5.16	5.89	8.36	≥5.00	≥4.88
11/07	--	1.98	2.20	2.06	1.71	1.33	1.13	1.92	1.70	1.51	1.03	0.93	0.83	1.32	1.04	1.52	2.27	0.91	2.16	1.09	0.57	0.98	0.87	0.82	1.46
12/16	1.88	2.29	2.32	2.30	2.33	2.15	1.80	1.38	1.85	1.84	1.98	1.86	1.42	1.35	1.53	1.48	1.82	0.99	2.10	1.28	1.18	1.12	1.44	0.68	1.32
1/07	0.79	0.90	0.80	0.72	0.78	0.82	0.70	0.70	0.80	0.65	0.47	0.40	0.33	0.56	0.85	0.53	0.74	0.62	0.74	0.51	0.30	0.46	0.28	0.41	0.48
1/27	0.17	0.31	0.32	0.30	0.26	0.26	0.27	0.22	0.25	0.26	0.43	0.40	0.22	0.36	0.45	0.40	0.47	0.14	0.39	0.28	0.14	0.21	0.15	0.12	0.18
3/04	1.76	2.04	1.95	1.93	2.01	1.89	1.50	1.68	1.67	1.40	1.29	1.40	1.07	1.01	0.24	1.06	0.16	0.97	1.55	0.93	0.69	1.04	1.25	1.09	1.13
4/01	0.05	0.07	0.07	0.07	0.03	--	0.12	0.15	0.11	0.01	0.01	0.04	0.04	--	0.06	0.06	0.06	0.00	0.01	0.02	0.00	0.03	0.10	0.12	0.00
5/06	--	--	--	1.54	0.60	0.78	0.52	0.88	0.92	0.78	1.32	1.39	0.89	0.52	1.35	1.27	1.10	0.76	1.65	0.83	1.07	0.94	1.34	1.02	1.27
5/26	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/30	0.79	0.94	--	--	0.72	--	0.67	0.66	0.96	0.76	0.85	0.68	0.73	0.52	--	0.82	--	1.14	1.64	1.12	1.01	1.14	1.28	1.00	1.20
8/04	0.39	--	--	--	0.40	--	0.48	0.43	0.47	0.50	0.50	0.53	0.52	--	0.82	--	0.74	0.17	0.76	0.38	0.78	0.38	1.42	0.70	0.55
10/06	0.61	0.61	0.59	--	0.58	--	0.60	0.50	0.54	0.51	0.53	0.51	0.51	0.25	--	0.31	0.61	0.58	0.88	0.62	0.32	0.47	0.96	0.35	0.57
WY92	≥6.45	≥9.14	≥8.25	≥8.92	9.42	≥7.23	7.79	8.52	9.28	8.22	8.41	8.14	6.56	≥5.89	≥6.34	≥7.45	≥7.97	6.28	11.88	7.06	6.06	6.77	9.09	5.29	8.16
11/13	0.90	1.11	1.34	--	1.19	0.85	0.86	1.14	1.23	1.12	1.12	1.14	1.25	1.03	1.23	1.12	1.34	1.00	1.29	1.09	1.05	0.98	1.10	1.34	1.53
12/23	2.43	2.55	2.58	--	2.53	2.40	2.03	2.70	2.35	1.83	1.94	1.86	1.90	1.87	2.40	1.95	2.33	1.77	2.82	1.75	1.17	1.79	1.30	1.17	1.24
2/02	2.05	2.05	2.14	--	2.24	2.14	2.00	1.48	1.49	1.34	0.90	0.78	0.63	1.56	1.90	1.86	2.46	2.21	--	1.36	0.79	2.03	0.93	1.03	1.40
3/09	1.35	1.72	1.57	--	1.45	1.40	1.33	1.14	1.30	0.93	0.65	0.69	0.70	1.26	1.36	1.26	1.70	1.06	1.63	0.78	0.49	1.46	0.79	0.35	1.02
4/01	1.07	1.19	1.14	--	0.99	1.01	0.78	0.83	0.97	0.85	0.73	0.60	0.52	0.53	0.85	0.62	0.77	0.66	1.43	0.66	0.33	0.48	0.32	0.65	0.73
5/14	0.55	0.86	0.95	--	--	0.52	0.21	0.51	0.69	0.54	0.55	0.52	0.51	0.51	--	0.40	0.71	0.35	--	0.60	0.46	0.76	0.88	0.62	0.81
6/21	--	0.89	0.94	--	0.51	0.51	0.53	0.50	1.75	0.62	1.27	0.50	0.62	0.51	--	0.77	0.60	0.29	1.08	0.44	0.40	--	1.08	0.68	0.50
WY93	≥8.35	10.37	10.66	--	≥8.91	8.83	7.74	8.30	9.78	7.23	7.16	6.09	6.13	7.27	≥7.77	7.98	9.91	7.34	≥8.25	6.68	4.69	≥7.50	6.40	5.84	7.23

Table 3.--*Summary of monthly mean climatic data for the study area*

[CCMS, Cold Creek Meteorological Station; HMS, Hanford Meteorological Station; HMS-LT, Long-Term averages for the Hanford Meteorological Station for period of record shown; --, long-term averages are shown in the rows for water year 1991 only]

Date	Air Temperature (degrees F)			Windspeed (miles per hour)			Dew Point (degrees F)			Solar Radiation (langleys)		
	CCMS	HMS	HMS-LT 1912-80	CCMS	HMS	HMS-LT 1945-80	CCMS	HMS	HMS-LT 1950-80	CCMS	HMS	HMS-LT 1955-80
OCT 1990	50.6	52.4	53.0	6.4	8.8	6.6	33.8	35.3	36	238	240	262
NOV 1990	44.8	46.3	39.8	5.8	10.6	6.1	33.3	33.6	31	143	132	129
DEC 1990	24.2	24.7	32.7	5.0	7.3	6.1	17.2	17.2	27	101	88	89
JAN 1991	29.4	28.9	29.3	4.6	5.4	6.4	22.7	22.4	23	122	114	115
FEB 1991	44.5	44.6	36.3	5.5	6.8	7.1	34.2	33.5	28	207	184	195
MAR 1991	42.0	44.1	45.1	6.3	8.0	8.5	30.0	29.2	28	303	302	333
APR 1991	52.2	54.6	53.1	7.3	10.5	9.0	29.0	31.0	31	479	447	464
MAY 1991	58.3	60.9	61.5	7.3	9.8	8.9	34.3	37.4	36	493	482	566
JUNE 1991	62.6	65.7	69.3	7.0	9.0	9.2	40.7	43.2	41	540	521	629
JULY 1991	76.1	78.6	76.4	7.6	9.6	8.7	38.1	45.9	43	661	635	647
AUG 1991	77.2	78.3	74.3	6.8	8.8	8.0	38.8	47.4	43	547	537	549
SEP 1991	69.9	70.0	65.2	7.3	7.9	7.5	28.9	40.2	40	457	432	414
OCT 1991	53.0	53.0	--	6.2	7.3	--	23.3	31.0	--	275	262	--
NOV 1991	36.9	41.2	--	4.4	6.7	--	31.1	34.3	--	102	96	--
DEC 1991	36.7	37.9	--	4.6	6.3	--	30.6	32.3	--	93	80	--
JAN 1992	35.9	37.6	--	4.2	6.0	--	30.7	31.8	--	91	84	--
FEB 1992	40.6	42.1	--	4.5	5.8	--	35.6	36.7	--	147	139	--
MAR 1992	50.6	51.6	--	6.3	6.7	--	34.0	35.3	--	338	341	--
APR 1992	52.8	56.3	--	6.2	8.9	--	34.9	37.1	--	428	416	--
MAY 1992	66.2	68.4	--	7.5	9.3	--	25.9	35.1	--	627	607	--
JUNE 1992	74.6	77.0	--	7.1	9.6	--	32.8	44.2	--	626	596	--
JULY 1992	74.6	76.8	--	7.2	9.0	--	38.4	48.6	--	568	546	--
AUG 1992	76.0	77.3	--	6.7	8.4	--	28.8	44.1	--	540	508	--
SEP 1992	63.0	64.6	--	7.0	9.0	--	31.4	41.0	--	393	365	--
OCT 1992	54.6	55.5	--	5.8	6.5	--	31.3	37.6	--	234	217	--
NOV 1992	38.0	41.0	--	4.3	5.8	--	31.6	34.3	--	111	107	--
DEC 1992	29.1	30.1	--	5.9	6.9	--	22.5	24.0	--	100	88	--
JAN 1993	24.2	25.3	--	5.1	6.0	--	19.0	20.9	--	113	101	--
FEB 1993	29.5	31.0	--	5.3	5.9	--	20.6	23.4	--	199	172	--
MAR 1993	40.8	42.9	--	5.1	6.7	--	29.7	32.2	--	277	250	--
APR 1993	49.7	52.6	--	5.6	8.9	--	33.4	36.4	--	406	380	--
MAY 1993	64.5	66.7	--	6.2	9.3	--	33.4	43.1	--	561	509	--
Average	50.7	52.4	--	6.0	7.9	--	30.6	35.1	--	330	313	--

Table 4.--*Monthly and annual peak-discharge and total-streamflow data for the study area, October 1990-May 1993* [Max.Q, maximum instantaneous discharge; Total, monthly or annual total volume of streamflow; ft^3/s, cubic feet per second; ac-ft, acre-feet; e, estimated]

	Discharge							
	Upper Cold Creek Station 12510618		Lower Cold Creek Station 12510625		Upper Dry Creek Station 12510650		Lower Dry Creek Station 12510655	
Date	Max.Q (cfs)	Total (ac-ft)	Max.Q (cfs)	Total (ac-ft)	Max.Q (cfs)	Total (ac-ft)	Max.Q (cfs)	Total (ac-ft)
1990 OCT	0	0	0	0	0	0	0.46	23
1990 NOV	0	0	0	0	0	0	0.55	29
1990 DEC	0	0	0	0	0	0	0.56 e	32 e
1991 JAN	0	0	0	0	0	0	74	41
1991 FEB	0	0	0	0	0	0	0.62	29
1991 MAR	0	0	0	0	0	0	0.53	26
1991 APR	0	0	0	0	0	0	0.51	26
1991 MAY	0	0	0	0	0	0	0.49	26
1991 JUN	0	0	170	5.7	5.0 e	9.9 e	12	32
1991 JUL	0	0	0	0	0	0	0.62	30
1991 AUG	0	0	0	0	0	0	0.46	26
1991 SEP	0	0	0	0	0	0	0.44	24
WY 1991	0	0	170	5.7	5.0 e	9.9 e	74	345 e
1991 OCT	0	0	0	0	0	0	0.48	24
1991 NOV	0	0	2.6	0.20	0	0	0.43	24
1991 DEC	0	0	0	0	0	0	0.46 e	27 e
1992 JAN	0	0	0	0	0	0	0.49 e	29 e
1992 FEB	0	0	0	0	0	0	0.49	26
1992 MAR	0	0	0	0	0	00	0.49	27
1992 APR	10	0.30	0.75	0.02	0	0	0.52	28
1992 MAY	0	0	0	0	0	0	0.50	27
1992 JUN	0	0	0.01	0.02	0	0	0.46	21
1992 JUL	0	0	0	0	0	0	0.49	28
1992 AUG	0	0	0	0	0	0	0.43 e	23 e
1992 SEP	0	0	0	0	0	0	0.41 e	23 e
WY 1992	10	0.30	2.6	0.24	0	0	0.52	308 e
1992 OCT	0	0	0	0	0	0	0.43 e	24 e
1992 NOV	0	0	0	0	0	0	0.43	23
1992 DEC	0	0	0 e	0 e	0	0	0.44	24
1993 JAN	0	0	0 e	0 e	0	0	0.44	20
1993 FEB	0	0	5.3	0.60 e	0	0	0.40 e	21 e
1993 MAR	15	38	4.2	0.90	0	0	0.49	28
1993 APR	0.69	27	0	0	0	0	0.49	27
1993 MAY	0.48	18	0	0	0	0	0.50	28
OCT-MAY 1993	15	84.1	5.3 e	1.50 e	0	0	0.50	195 e

Table 5.--*Stream-gaging stations in or near the study area*

[CSG, crest-stage gage; mi^2, square miles; SG, stream-gaging station; nr, near; stations in **bold** were operated only for this investigation]

Station number	Station name	Station location (latitude - longitude)	Drainage area (mi^2)	Period of record (years)	Notes
12464600	Schnebly Coulee Tributary nr Vantage	46°57'44" 120°08'47"	0.82	1955-74	CSG
12473700	Kansas No.2 nr Cunningham	46°49'26" 118°56'35"	6.06	1955-70	CSG
12473710	Kansas No.2 Tributary nr Cunningham	46°49'26" 118°56'35"	3.31	1971-77	CSG
12484200	Johnson Canyon Tributary nr Kittitas	46°58'41" 120°14'24"	0.65	1956-75	CSG
12484600	McPherson Canyon Cr at Wymer	46°50'03" 120°27'12"	5.48	1952;1955-77	CSG
12485700	Selah Creek Tributary nr Yakima	46°40'34" 120°23'20"	0.68	1955-74	CSG
12500400	Firewater Canyon nr Moxee City	46°30'14" 120°08'37"	7.30	1963-77	CSG
12507300	Toppenish Creek Tributary nr Toppenish	46°17'31" 120°21'30"	1.24	1955-74	CSG
12508800	Yakima River Tributary nr Sunnyside	46°25'20" 119°56'23"	1.91	1954-73	CSG
12509800	Snipes Creek Tributary nr Benton City	46°20'15" 119°39'30"	5.18	1965-77	CSG
12510600	Webber Canyon nr Kiona	46°11'13" 119°27'23"	2.88	1955-74	CSG
12510618	**Cold Cr at County Line nr Priest Rapids Dam**	**46°35'10" 119°52'27"**	**28.7**	**1991-94**	**SG**
12510620	Cold Creek Tributary nr Priest Rapids Dam	46°35'38" 119°51'44"	0.89	1967-75	CSG
12510625	**Cold Cr at Highway 24 nr Priest Rapids Dam**	**46°37'14" 119°47'17"**	**39.3**	**1991-94**	**SG**
12510650	**Dry Cr at Highway 241 nr Priest Rapids Dam**	**46°31'29" 119°52'24"**	**56.9**	**1991-94**	**SG**
12510655	**Dry Cr nr Rattlesnake Sp nr Priest Rapids Dam**	**46°30'28" 119°41'53"**	**121**	**1991-94**	**SG**
12510700	Yakima River Tributary nr Kiona	46°15'53" 119°23'16"	3.35	1955-74	CSG
12512500	Providence Coulee at Cunningham	46°49'20" 118°48'36"	27.8	1953-77	SG
12512550	Providence Coulee nr Cunningham	46°48'11" 118°48'55"	52.1	1978-	SG
12512600	Hatton Coulee Tributary No. 2 nr Cunningham	46°49'24" 118°41'49"	2.44	1961-76	CSG
12512700	Hatton Coulee Tributary nr Hatton	46°45'50" 118°47'56"	3.71	1956-75	CSG
12513000	Esquatzel Coulee at Connell	46°39'49" 118°51'44"	234	1953-	SG
12513300	Dunnigan Coulee nr Connell	46°49'20" 118°48'36"	27.1	1956;1963-77	CSG
12513500	Esquatzel Coulee at Eltopia	46°27'45" 119°00'40"	551	1953-70	SG
13353050	Smith Canyon Tributary nr Connell	46°27'45" 119°00'40"	1.80	1955-77	CSG

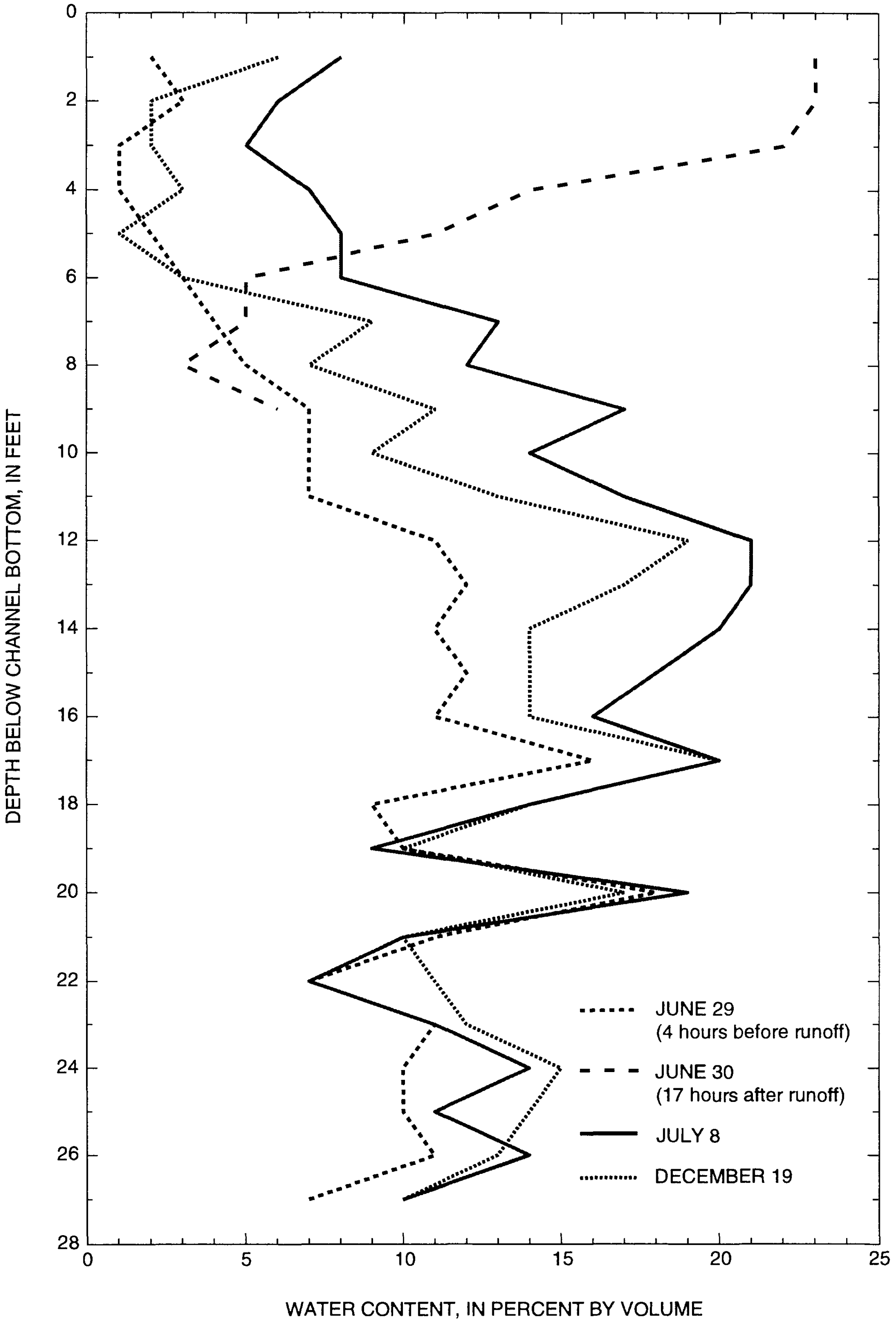

Figure 3. Soil moisture at site C2 before and after the June 29, 1991 runoff in lower Cold Creek.

Evapotranspiration data collected by Tomlinson (1994) and Gee and others (1992) during June 1990 through September 1991 at two sites in the study area were obtained. Both sites were located on the lower slopes of the Rattlesnake Hills in the eastern portion of Dry Creek Basin. At Tomlinson's Snively Basin site, daily evapotranspiration from a mixed-grass-covered plot was calculated using micrometeorological data and the Bowen-ratio method. At Gee and others' Benson Springs site, daily evapotranspiration from a bunchgrass-covered plot was calculated using data from a weighing-type monolith lysimeter. The evapotranspiration data are presented in the "Estimation and Calibration of Parameter Values" section of this report.

Streamflow data collected since 1957 at 21 stations in and around the study area (table 5) were assembled (Williams and Pearson, 1985). Seventeen of the stations gaged small tributary basins (0.65 to 7.30 square miles) where only instantaneous peak-flows were determined. The remaining four stations gaged larger areas (27.8 to 551 square miles) in the Esquatzel Coulee Basin where both peak-flow and daily streamflow data were collected with recording stream gages. Annual streamflow data from three of the recording stream-gaging stations in the Esquatzel Coulee Basin are summarized in table 6.

CONCEPTUAL MODEL OF RUNOFF AND RECHARGE FROM RUNOFF

This conceptual model describes, in general terms, runoff generation and recharge from runoff in the study area. It was used to guide the construction of numerical models and the estimation of parameter values. The conceptual model was devised from hydrologic and climatic data collected for this study, as well as from previously published data and results from this and other semiarid areas.

Runoff Generation

Runoff in the study area is uncommon and is primarily generated by winter precipitation, often augmented with snowmelt and probably enhanced by frozen ground. Nearly all runoff recorded at the stations listed in table 5 occurred from late December through March. Probable causes of selected winter runoff are presented in the literature. Peak streamflows of 350 and 190 cubic feet per second (ft^3/s) at Rattlesnake Springs in Dry Creek Basin in January of 1969 and 1970 were both attributed to rapid snowmelt on frozen soil (Harr, 1971). Substantial runoff at unspecified locations on the Hanford Site in February 1985 were attributed to a warm "chinook" wind, gusting to 43 miles per hour, which melted most of an 8-inch snowpack in less than one day (Gee and others, 1992). Floods of January 1974 in southern Washington were attributed to rapid melting of above-normal snowpacks, rainfall, and frozen soils (Longfield, 1974), and the floods of 1956 in the Esquatzel Coulee area (Anderson and Bodhaine, 1956) were attributed to heavy rain falling on frozen soils covered by varying amounts of snow.

The effect that frozen soils have on runoff generation in the study area is not well documented. The frozen-soils information presented in the previously referenced runoff reports was anecdotal, and it is possible that high rainfall and snowmelt intensities may have been the sole cause of runoff. Soil freezing was monitored at the meteorological station in Cold Creek Basin during this investigation, but the paucity of runoff precluded an assessment of the effects of frozen soils on runoff generation. Many reports documenting the hydrologic significance of frozen soils in other seasonally cold regions are summarized by Fox (1992) and by Gray and Prowse (1992). Infiltration into dry, frozen soils or soils frozen to depths less than about 6 inches may not be significantly different from infiltration into unfrozen soils, but infiltration may be greatly impaired in soils that have a high moisture content when frozen or in soils that are frozen at depths greater than 12 inches. The moisture and thermal regimes of soils in the study area during past periods of runoff is largely unknown. In general, soil-moisture contents during winter presumably range from very low to very high, and subsoil temperatures below freezing have been recorded at the HMS many times during December, January, and February.

Although there were periods of heavy rainfall, melting snowpacks, and frozen soils during the data collection period for this investigation, the combination of these factors needed to generate large volumes of runoff did not occur. Record snowfall in the region during the winter of 1992-93 did result in sustained runoff from snowmelt in the upper Cold Creek Basin (table 4), but the volume of runoff was minor in relation to probable historic runoff. Those data and historical data support the hypothesis that runoff generation in the study area is not well correlated to annual precipitation. Comparison of peak-discharge data for stations listed in table 5 with annual precipitation at the HMS showed poor correlation between above average precipitation and widespread runoff in the region.

Table 6.--*Total streamflow at selected stream-gaging stations in the Esquatzel Coulee Basin for water years 1958-93*

[ac-ft, acre-feet; ac-ft/mi^2, acre-feet per square mile of drainage area; missing record denoted by "."; Average, average annual runoff for period of record shown]

Water year	Total streamflow					
	Station 12513000		Station 12512500		Station 12512550	
	ac-ft	ac-ft/mi^2	ac-ft	ac-ft/mi^2	ac-ft	ac-ft/mi^2
1958	0	0	0	0	.	.
1959	19	0.01	54	1.9	.	.
1960	0	0	0	0	.	.
1961	0	0	0	0	.	.
1962	0	0	0	0	.	.
1963	102	0.44	21	0.76	.	.
1964	0	0	3	0.11	.	.
1965	218	0.93	47	1.7	.	.
1966	0	0	0	0	.	.
1967	0	0	0	0	.	.
1968	0	0	0	0	.	.
1969	7,260	31	1,360	49	.	.
1970	3,710	16	789	28	.	.
1971	999	4.3	275	9.9	.	.
1972	168	0.72	39	1.4	.	.
1973	43	0.18	66	2.4	.	.
1974	143	0.61	44	1.6	.	.
1975	459	2.0	89	3.2	.	.
1976	36	0.15	8.9	0.32	.	.
1977	0.10	0	.	0	.	.
1978	0.40	0	.	.	4.4	0.08
1979	3,460	14.8	.	.	1,150	22
1980	2,950	12.6	.	.	823	16
1981	0	0	.	.	0	0
1982	1,036	4.4	.	.	437	8.4
1983	7.5	0.03	.	.	5.1	0.10
1984	2,210	9.46	.	.	898	17
1985	7,650	33	.	.	1,837	35
1986	281	1.2	.	.	235	4.5
1987	71	0.30	.	.	21	0.40
1988	175	0.75	.	.	159	3.0
1989	1,770	7.6	.	.	411	7.9
1990	0	0	.	.	0	0
1991	0	0	.	.	19	0.37
1992	0	0	.	.	0	0
1993	2,560	11	.	.	583	11
Average	982	4.2	140	5.0	411	7.9

As is typical of many arid to semiarid regions, runoff is infrequent in the study area. The historical peak-discharge data shows that for water years 1957 through 1977--the period when most of the stream-gaging stations were operational--runoff occurred, on average, about once every two years. Relatively substantial runoff was observed about once every four years. Runoff was also uncommon for the duration of this investigation; it was recorded four times from October 1990 through May 1993 (table 4), and it was relatively insubstantial. The largest peak discharge per unit area was 1.6 $ft^3/s/mi^2$ at station 12510625 during June 1991, and the largest annual runoff volume per unit area (excluding spring-fed discharge at station 12510655) was 3.5 acre-ft/mi^2 at station 12510618 during the 1993 water year. For comparison, unit-area peak discharges and annual runoff volumes of greater than 10 $ft^3/s/mi^2$ and 10 acre-ft/mi^2, respectively, are not uncommon in the region (Williams and Pearson, 1985).

Recharge from Runoff

All runoff in the study area is ultimately lost to evaporation or infiltration. Cold Creek and Dry Creek channels decrease in size downstream from the lower stream-gaging stations until they eventually become indistinct in terminal runout zones. Although there are no topographic barriers between the runout zones and the Yakima River, there is no geomorphic or botanical evidence to indicate that unchannelized flow from Cold and Dry Creek Basins proceeds downstream beyond these zones. Given that runoff is primarily generated during winter months when evaporation rates are low, it is unlikely that much runoff is lost to evaporation.

It is likely that most of the runoff that infiltrates into alluvial channels eventually percolates and recharges the uppermost unconfined aquifer beneath the Hanford Site. The alluvial channels in the study area are mostly nonvegetated and are underlain by coarse sediments with low water-holding capacity. Thus, transpiration is negligible, and little water is held near the surface for evaporation. Soil moisture data from before and after minor runoff in lower Cold Creek (fig. 3) suggest that even during summer, rapid percolation through channel sediments does indeed occur. Evapotranspiration of infiltrated runoff is likely greater in the terminal runout zones that are vegetated and are underlain by fine sands and redeposited silt loams, than in the nonvegetated channels. Although Gee and others (1992) found no evidence for direct recharge from precipitation alone in vegetated areas underlain by silt loams at the Hanford Site, the addition of large volumes of runoff water over such sites would likely lead to percolation below the zone of active evapotranspiration. Contrary to that conclusion, Scanlon (1994) found that percolated water from episodic infiltration in Hueco Bolson, Texas, did not necessarily recharge ground water, even after percolating to depths greater than 40 feet. Under west Texas climate conditions, the water was subjected to long-term upward liquid and vapor flow. However, Scanlon hypothesized that downward flow is more prevalent at the Hanford Site because underlying sediments are coarser and infiltration is common during winter, when temperatures and evapotranspiration are lowest.

Runoff and recharge characteristics differ between upper Cold Creek and upper Dry Creek Basins because of differences in basin physiography. Upper Cold Creek Basin is v-shaped with steep slopes covered by thin, stony soils, and the narrow valley is nearly devoid of alluvial fill. Thus, runoff flows quickly downstream and does not infiltrate into the channel bottom until it reaches a point approximately 1 mile upstream from the lower Cold Creek stream gage (station 12510625) where the alluvial valley begins. Upper Dry Creek Basin is wide, the steep sides are separated from the main stream channel by gentle slopes with deep soils, and the valley is underlain with alluvium. Thus, runoff can infiltrate into both the tributary and the mainstream channel bottoms. The lower sections of Cold Creek and Dry Creek Basins are similar--steep slopes with shallow soils drain to gentler slopes with deeper soils and valleys underlain by extensive alluvial deposits.

Recharge from Spring Discharge

Some discharge from ephemeral springs along upper Cold Creek and perennial springs along lower Dry Creek is subsequently infiltrated and probably contributes to recharge at the Hanford Site. A shallow ground-water flow system in the bedrock underlying upper Cold Creek Basin is the likely source of ephemeral spring discharge. Springs and seeps along the upper Cold Creek channel were observed to discharge to the stream from March through July of 1993, and anecdotal information from area residents suggest that such discharges are common following particularly wet winters. The springs did not discharge to the surface during the previous two drier years, but the established, lush riparian vegetation growing along upper Cold Creek indicates that shallow ground water is regularly available. The 1993 spring-fed discharge disappeared from the surface soon after flowing onto the alluvial fill in lower Cold Creek valley, which is also where the lush riparian zone abruptly ends.

No such springs or riparian zones are present along upper Dry Creek, but it is believed that the discharge from Rattlesnake Springs in lower Dry Creek Basin is from a localized perched aquifer (Price and Harr, 1970; and Brown, 1970). The perennial springs discharge into Dry Creek immediately upstream from the lower stream gage (station 12510655). Annual average discharges from Rattlesnake Springs for the 1991-93 water years were relatively constant at 0.48, 0.42, and 0.41 ft^3/s, respectively; Price and Harr (1970) reported an annual average discharge of 0.47 ft^3/s. Discharge was not well correlated with annual precipitation. Monthly mean discharges varied from 0.58 to 0.33 ft^3/s, but the seasonal variation was not consistent from year to year. These data suggest that discharge from Rattlesnake Springs does not vary with recent ground-water recharge; Price and Harr (1970) reached the same conclusion. Surface water in Dry Creek was visible in the channel for 0.9 to 1.7 miles downstream of the springs, depending on discharge. The lush riparian zone below Rattlesnake Springs thins out abruptly between 1 and 2 miles downstream of the springs, indicating that shallow ground water is not present outside of the immediate vicinity of the springs.

NUMERICAL MODELS OF RUNOFF AND RECHARGE FROM RUNOFF

Numerical models were used to estimate long-term average runoff and recharge for the study area. The models, one for Cold Creek Basin and one for Dry Creek Basin, were constructed using the Hydrological Simulation Program - FORTRAN (HSPF-Version 9) computer program.

The Hydrological Simulation Program - FORTRAN (HSPF)

HSPF was selected because it could simulate most of the important hydrologic processes in the conceptual model of runoff and recharge, including snow accumulation and melt, infiltration of runoff into channel bottoms and runout zones, evapotranspiration and percolation of infiltrated runoff, and ephemeral or perennial discharge of ground water. HSPF could not directly simulate frozen ground or its effect on runoff. However, a separate procedure was used to estimate the times of frozen ground, and an HSPF routine allowed adjustment of infiltration-related parameter values to account for frozen-ground effects.

HSPF is a continuous-type precipitation-runoff program; it simulates and updates hydrologic fluxes and storages during each user-specified time step (1 hour for this investigation) over the entire time span of a simulation. The program is documented in the HSPF users manual (U.S. Environmental Protection Agency, 1984).

HSPF represents a drainage basin with land segments and reaches; the former represent land areas and the latter represent stream channels. Land segments and reaches are connected with a network routine in HSPF to represent the geometry of a drainage basin as a whole.

HSPF uses a mass-balance approach, or water budget, to account for all inflows, outflows and changes in storage for both land segments and reaches. Inflows may be precipitation; snowmelt; and overland flow, interflow, ground-water flow, or streamflow from other land segments or reaches. Outflows may be evapotranspiration (including sublimation of snow); overland flow, interflow, ground-water flow, or streamflow; and recharge to regional ground-water systems (inactive ground water). Changes in storage can be in any of the numerous defined storage components of the water budget, such as a snowpack, soil moisture, or ground water. HSPF requires records of precipitation and estimates of potential evapotranspiration (PET) to drive the nonsnow-related water budget computations, and it requires additional records of air temperature, dew point, solar radiation, and wind speed to simulate snow accumulation and melt.

A land segment in HSPF represents a parcel of land that has distinct and relatively uniform hydrologic characteristics and climate. Those characteristics are commonly inferred from soil type, vegetation, and topography. HSPF represents the hydrologic characteristics of land segments with process-related parameters in the water-budget formulations. The process-related parameters represent properties relevant to the movement or storage of water in land segments (table 7). Many of the process-related parameters cannot be measured directly, so their values are estimated from available physiographic data and then refined through calibration. The water-budget formulation for land segments is described in detail in the HSPF users manual (U.S. Environmental Protection Agency, 1984, pages 158-176).

A reach in HSPF represents a segment of a surface-water drainage network that has relatively uniform hydraulic properties. HSPF represents the hydraulic characteristics of a given reach of stream channel or any other

Table 7.--*Definitions and descriptions of process-related parameters in the HSPF program*

Parameter	Definition and Description
AGWETP	Active ground-water evapotranspiration (ET) index; represents the fraction of PET that can be met from plants transpiring water directly from the saturated zone.
AGWRC	Active ground-water recession coefficient; governs the rate at which ground water is discharged from a land segment. When there is no inflow to ground-water storage, it is equal to the ratio of the rate of discharge 'today' to the rate of discharge 'yesterday'.
BASETP	Baseflow evapotranspiration index; represents the fraction of PET that can be met from riparian plants transpiring discharged ground water.
CEPSC	Interception storage capacity; represents the maximum amount of intercepted precipitation that can be stored on vegetation.
DEEPFR	Deep fraction of ground-water index; represents the fraction of ground-water recharge that will enter the deep (inactive) ground-water system and be lost from the basin of interest.
INFEXP	Infiltration equation exponent; it is the exponent in the infiltration equation that governs the rate of decrease of infiltration with increasing soil moisture.
INFILD	Infiltration difference; the ratio of the maximum to the mean infiltration rates within a land segment. It is used to represent the amount of variation in soil properties within a land-segment type.
INFILT	Infiltration index; governs the partitioning of water incident on the soil surface into either potential direct runoff or lower-zone soil moisture.
INTFW	Interflow index; governs the partitioning of potential direct runoff into either interflow (shallow-subsurface flow), overland flow, or upper-zone soil moisture storage.
IRC	Interflow recession coefficient; governs the rate at which interflow is discharged from a land segment.
KVARY	"K" variation; governs, in combination with AGWRC, the rate at which ground water is discharged from a land segment. It affects this discharge when there is inflow to ground-water storage.
LSUR	Length of the surface overland-flow plane; represents the average length of the overland flow plane for a land segment.
LZETP	Lower-zone evapotranspiration; represents the fraction of PET that can be met by plants transpiring water from the lower soil zone.
LZSN	Lower-zone storage - nominal; represents the soil-moisture storage ability of the lower soil zone.
NSUR	"N" value of the surface; represents the average Manning's roughness coefficient of a land segment.
SLSUR	Slope of the surface; represents the average slope of a land segment.
UZSN	Upper-zone storage - nominal; represents the storage ability in depressions and surface layers of a land segment.

conveyance feature in flow tables (FTABLES), which define the discharge from the downstream end of a reach as a function of the volume in the reach. These FTABLES can generally be derived using various theoretical flow equations in combination with some measurable reach characteristics, such as cross section, roughness, slope, and length. A water budget for a reach is calculated by first adding the inflows to the storage of a reach, and then apportioning stored water to channel infiltration or downstream flow according to the FTABLE.

HSPF represents drainage basin geometry as a connected series of land segments and reaches. For this investigation, individual land segments with similar characteristics but different locations in a basin were grouped into land-segment types and a single set of process-related parameter values was determined for each land-segment type. For example, all moderately sloping, north-facing, sagebrush-covered parcels with deep silt-loam soils were included in a single land-segment type. A complex mosaic of slopes, aspects, vegetation, and soils was thus represented with relatively few land-segment types. Reaches were not grouped, so a separate FTABLE was calculated for each reach. The land area draining to a given reach was defined as a subbasin, and the areal extent of land segments within each subbasin was specified in the network routine of HSPF.

The connections between land segments and reaches are also specified in the network routine of HSPF. Outflows calculated for any land segment or reach--such as overland flow or stream discharge--can be routed to any other land segment or reach so a variety of connections between land segments and reaches can be represented. For this investigation, it was necessary to represent the alluvium beneath stream channels as land segments so storage and evaporation of infiltrated water could be simulated. Infiltration of runoff into the alluvium was simulated by routing some streamflow to the underlying land segment where the water was then apportioned between storage, evaporation, and percolation according to the water-budget calculations.

Simulation of Frozen Soils

Simulation of the occurrence and infiltration properties of frozen ground were critical for realistic simulation of runoff, but HSPF does not explicitly simulate soil freezing and thawing. Therefore, estimated dates of soil freezing and thawing were determined using a separate procedure, and the effects that freezing had on infiltration was simulated by adjusting and resetting the value of the INFILT parameter in HSPF, a parameter that directly controls the simulation of infiltration and runoff.

Dates of soil freezing and thawing were estimated using a method developed and tested by Cary and others (1978) in eastern Washington. The method considers only the net daily heat flow across the soil surface. It is applicable when the top foot of soil has cooled to near 0°C; at that time, almost all further heat loss comes from freezing water because the latent heat of freezing is much greater than the heat capacity of soil. Thus, the daily heat flow into or out of the soil may be interpreted as freezing or thawing of water. When the sum of the daily heat flows is negative, ice must be present in the soil, and when it is positive, the soil is unfrozen. This concept may be stated as

$$M = \left(\sum_{n=1}^{n} G_n + up_n \right) \qquad (1)$$

where M is the net daily heat flow in watts per square meter, n indicates the day beginning with the soil temperature near 0°C, G_n is the daily average soil heat flux downward across the soil surface, and up_n is daily average soil heat flux upward from subsoil layers into the zone susceptible to freezing. When M is less than zero, it is assumed that the soil is frozen, and when M is equal to or greater than zero, it is assumed that the soil is not frozen.

Values of up_n, which are typically small, are estimated by the empirical relation

$$up_n = 2.5 \sin (J + 80) \quad , \qquad (2)$$

where J is the Julian date. Cary and others (1978) report that the equation gave values of mean daily upward soil heat flux that followed the experimental measurements reasonably well. Values of Gn are estimated by the semi-empirical relation

$$G_n = \frac{k}{l}\left(T_a - \frac{T_{a-1}}{B}\right)\left(1 - \frac{I_2}{I_2 + N}\right) \quad , \qquad (3)$$

where k is the average soil thermal conductivity (watts per meter per degree Celsius) over length l (meters), Ta is the average daily air temperature (degrees Celsius), $Ta\text{-}1$ is the average daily air temperature of the previous day, B is a proportionality constant, I_2 is the depth of snow cover in meters, and N is a calibration constant. The summation calculation for M begins approximately with the autumn day when the soil temperature is near 0°C. For each consecutive day through the winter, values for up_n are calculated from equation (2) and values for Gn are calculated from equation (3) using average daily air temperature and snow cover data. Approximate values for the quantity k/l and the coefficients B and N are presented in Cary and others (1978), although those values can be refined through calibration to observed data. A snowpack cannot have a temperature greater than 0°C, so the upper limit of Ta is set equal to 0°C when snow cover is present. Because the method assumes the soil is always near 0°C when it is not frozen, the upper limit of $Ta\text{-}1$, which is a surrogate for average soil temperature in equation (3), is also set to 0°C.

Daily values of air temperature and snow cover--as well as parameter-value estimates of the quantity k/l and the coefficients B and N--are required to obtain daily solutions for equations (1) and (3). For this investigation, the necessary parameter values were calibrated by starting with a set of values from Cary and others (1978) and adjusting those values using observed daily air temperature, snow depth, and soil temperature data from the National Weather Service station at Pullman, Washington, for 1970 through 1993. The Pullman data were used for calibration because no equivalent data sets were available for sites within the study area. The resulting parameter values were considered to be transferrable to the study area because the silt-loam soils at the Pullman station are similar to the predominant soil type in the study area. The calibration involved calculation of daily values of M from the observed air temperature and snow depth data according to the procedure previously described and adjustment of parameter values to get good agreement between simulated and observed frozen soil. Observed frozen soil was indicated when the soil temperature at 2-inch depth was less than 0°C, and simulated frozen soil (at a 2-inch depth) was indicated when M was less than -25 watts per square meter.

The final calibrated parameter values ($k/l = 25$, $B = 1$, and $N = 0.025$) resulted in correct frozen-soil predictions for the Pullman site 83 percent of the time. The method incorrectly predicted frozen soil 5 percent of the days when the soil temperature was greater than 0°C, and it incorrectly predicted thawed soil 12 percent of the days when the soil temperature was less than or equal to 0°C.

The calibrated method was tested for study area conditions using observed air and soil temperature data, and HSPF simulated snow depth for the Cold Creek meteorological station. The method correctly predicted frozen soil 92 percent of the time for the winter months (November through March) of 1990 through 1993, but the method predicted the final 1993 thaw 4 days after the thaw was observed. Although such results are reasonable, the few days with incorrect simulations may have resulted in large errors in the simulation of runoff. Frozen ground generally has a significant effect on runoff during only a few days each winter when rainfall and snowmelt intensities are great enough to produce significant runoff. Thus, if frozen-soil conditions were incorrectly simulated on those few critical days, runoff simulation errors could be large.

Model Construction

To construct numerical models for Cold Creek and Dry Creek Basins, physiographic data was used to apportion land area to land-segment types and to divide surface-water drainage networks into reaches; basin geometry was defined by establishing links between land segments and reaches; parameter values for land segments and reaches were estimated from physiographic data, channel geometry data, and theoretical hydraulic formulas; and selected parameter values were calibrated to observed data.

Land Segments

Land segments were defined on the basis of soil type, vegetation type, slope, aspect, altitude, and geographic location. Land-segment types were defined as a group of land segments with the same soils and vegetation, but subject to different climate. A unique set of HSPF parameter values was determined for each land-segment type, so the spatial distribution of land-segment types represented the spatial distribution of study area physiography. Likewise, unique climatic data were assigned to all land segments with a given slope, aspect, altitude and general geographic location, thus representing the spatial distribution of climatic data. It was not computationally feasible to represent the entire continuum of physical and climatic characteristics found in the study area, so simplified classification schemes for soil, vegetation, topography, and geography were utilized.

All soils in the study area were classified into one of four categories, based on total depth and available water capacity (AWC). The original soils data--obtained from T.A. Zimmerman (Pacific Northwest Laboratory, written commun., 1985)--were classified into five depth-AWC groups for coarsely-mapped areas on the Yakima Firing Range, and into 17 groups for all other areas. All of those groups were combined to create the four categories for this investigation. Those categories, their areally-weighted average depths and AWCs, and their areal extent in the study area are shown in table 8.

Table 8.--*Soil categories and their average depth, average available water capacity, and areal extents in the study area*
[AWC, available water capacity]

Soil category	Average depth (feet)	Average AWC (inches per inch)	Areal extent (percent of total study area)
Shallow-low AWC	1.5	0.13	36
Shallow-high AWC	1.7	0.20	8
Deep-low AWC	4.4	0.12	14
Deep-high AWC	4.0	0.19	42

Five vegetation types--or land uses--were defined for the study area. The original land use data--also obtained from T.A. Zimmerman (Pacific Northwest Laboratory, written commun., 1985)--were classified into five suitable categories. Because a sixth category, commercial, included less than one-tenth of one percent of the study area, those areas were reclassified as grasslands. The vegetation categories and their areal extent in the study area are shown in table 9.

Table 9.--*Vegetation categories and their areal extents in the study area*
[<, less than]

Vegetation category	Areal extent (percent of total study area)
Sagebrush	35
Bare sand	<1
Irrigated agriculture	<1
Grasslands	51
Dryland wheat	13

Topographic classification was based on slope, aspect, and altitude. Three slope categories, two aspect categories, and four altitude categories were defined from digital elevation model data with a grid spacing of 30 by 30 meters. Slope and aspect categories and their areal extents in the study area are shown in table 10; altitude categories and their areal extents in the study area are shown in table 11.

Combining the 13 defined soil-vegetation groups with 84 defined climate zones--based on slope, aspect, altitude and geographic location--resulted in a total of 274 land-segment types for the study area. A few additional land segments were defined to represent the alluvium beneath stream channels.

Table 10.--*Slope and aspect categories and their areal extent in the study area*
[>, greater than]

Slope/ aspect category	Slope range (degrees)	Aspect	Areal extent (percent of total study area)
Mild	0 - 4	north	19
Mild	0 - 4	south	17
Moderate	> 4 - 10	north	19
Moderate	> 4 - 10	south	22
Steep	> 10	north	15
Steep	> 10	south	8

Table 11.--*Altitude categories and their areal extent in the study area*

Altitude category	Altitude range (feet)	Areal extent (percent of total study area)
1	512 - 1,312	19
2	1,313 - 2,297	42
3	2,298 - 3,281	31
4	3,282 - 4,193	8

Geographic location was characterized by defining eight subbasins for the study area, four each in Cold Creek and Dry Creek Basins. Subbasin boundaries are shown on figure 2, and subbasin sizes are shown in table 12.

Table 12.--*Subbasin drainage areas in the study area*

Subasin name	Drainage area (square miles)
COLD4	17.0
COLD3	11.6
COLD2	10.7
COLD1	35.2
Cold Creek Basin total	74.5
DRY4	56.9
DRY3	29.6
DRY2	34.7
DRY1	26.7
Dry Creek Basin total	147.9

Reaches

The reaches defined for the study basins represent only the general hydraulic characteristics of the drainage networks; small-scale variations in characteristics were not represented. The beginning and end points of reaches, called nodes in HSPF, were defined at all points where specific flow information was desired, such as at the four stream-gaging station sites and at the point where Dry Creek crosses the Hanford Site boundary. Those nodes were required because inflows and outflows from reaches are calculated only at defined nodes in the HSPF program. Nodes were also defined at the upstream boundary of the alluvial channel deposits in Cold Creek to delineate that location where channel infiltration begins, at the Rattlesnake Springs location to allow simulation of ground-water discharge to Dry Creek, and at two points that delineate a reach where dispersed seeps and springs discharge to upper Cold Creek.

A total of 10 surface-water reaches, five in each basin, were defined for the study area. One additional reach was defined to represent the shallow ground-water flow system beneath upper Cold Creek Basin.

Basin Geometry

Basin geometry was represented by defining the hydraulic links between land segments and reaches, including links representing channel infiltration areas and terminal runout zones. The geometry of Cold Creek and Dry Creek Basins, as represented in the numerical models, is shown as schematic diagrams in figures 4 and 5.

Runoff from land segments was routed to the nearest surface-water reach, and direct recharge from land segments was routed either to the regional ground-water flow system or to a ground-water reach representing the shallow ground-water flow system underlying the upper Cold Creek Basin (subbasins COLD4, COLD3, and COLD2). In those subbasins, direct recharge was routed to the ground-water reach so it could be allocated between the regional ground-water flow system and ephemeral ground-water discharge into stream channels; this was done because the standard ground-water algorithms in HSPF do not allow simulation of ephemeral ground-water discharge. Also, in the Dry Creek Basin model, a constant amount of ground-water discharge was routed to the reach that represents Rattlesnake Springs (D4)--the actual source of ground water to Rattlesnake Springs is not known, so no specific source was identified in the model. Discharge to those springs was assumed to be constant throughout the period of simulation and not affected by seasonal variations in ground-water recharge, so a separate ground-water reach was not needed to represent the source of the spring water. For all other areas represented in the models, direct recharge from land segments was assumed to recharge the regional ground-water system and was not routed to any channel reaches in the study area.

Streamflow in all channel reaches was routed either downstream or to below-channel land segments as infiltrated runoff. All streamflow in upper Cold Creek Basin (reaches C1, C2, and C3) was routed to the next downstream reach; no infiltration was simulated for those non-alluvial channels. All streamflow from reach D4 in the Dry Creek model was also routed downstream; no infiltration was simulated because ground water is discharged to Rattlesnake Springs in this reach. Streamflow in all other reaches was first apportioned to meet the channel infiltration demand, and any remaining flow was routed downstream. Water apportioned to channel infiltration was routed to below-channel land segments. Those segments were used to simulate the storage and evapotranspiration of infiltrated runoff from alluvial sediments, which the standard HSPF channel-routing algorithms do not

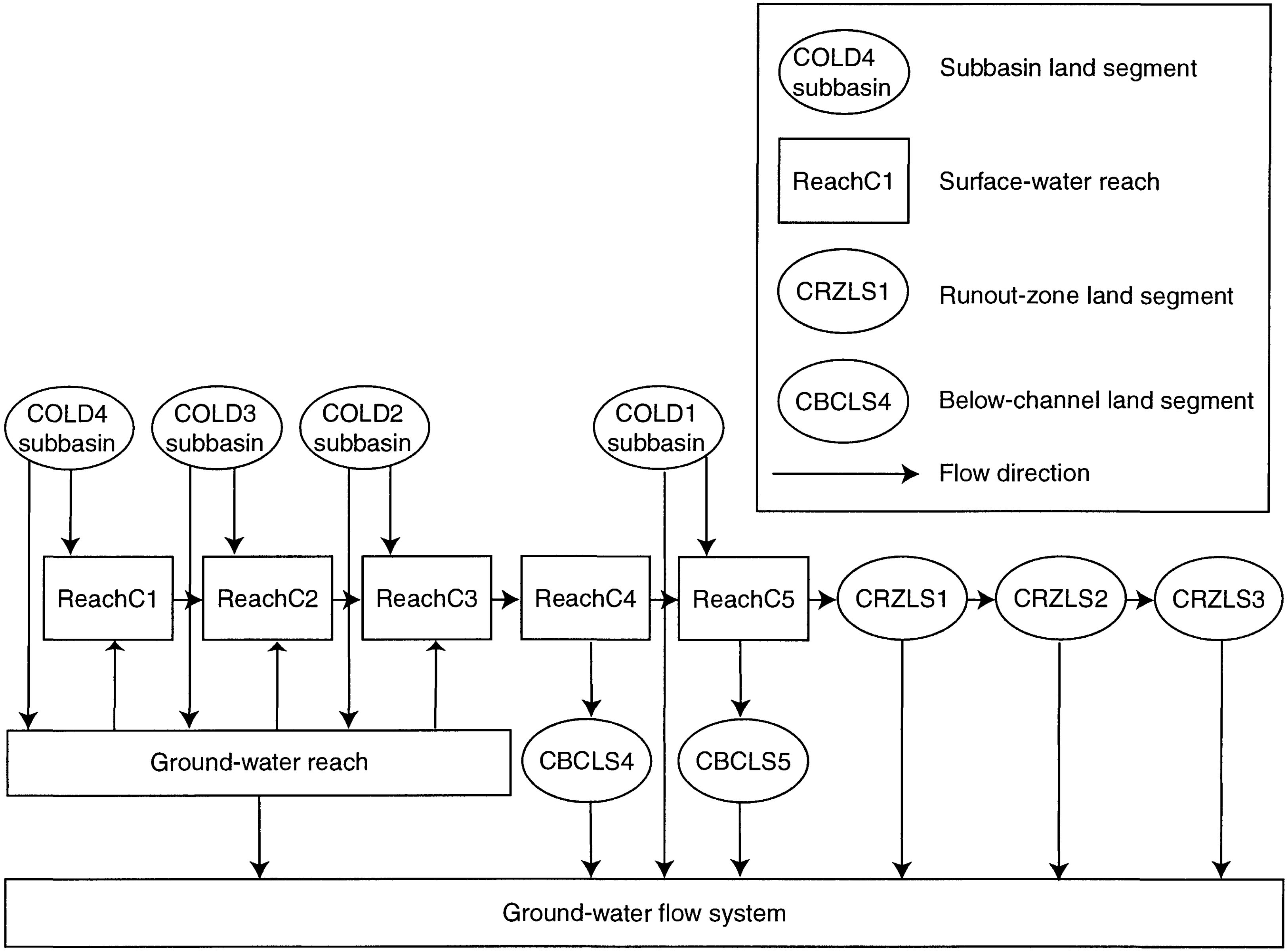

Figure 4. Schematic diagram showing linkages between land segments and reaches in the numerical model for Cold Creek Basin.

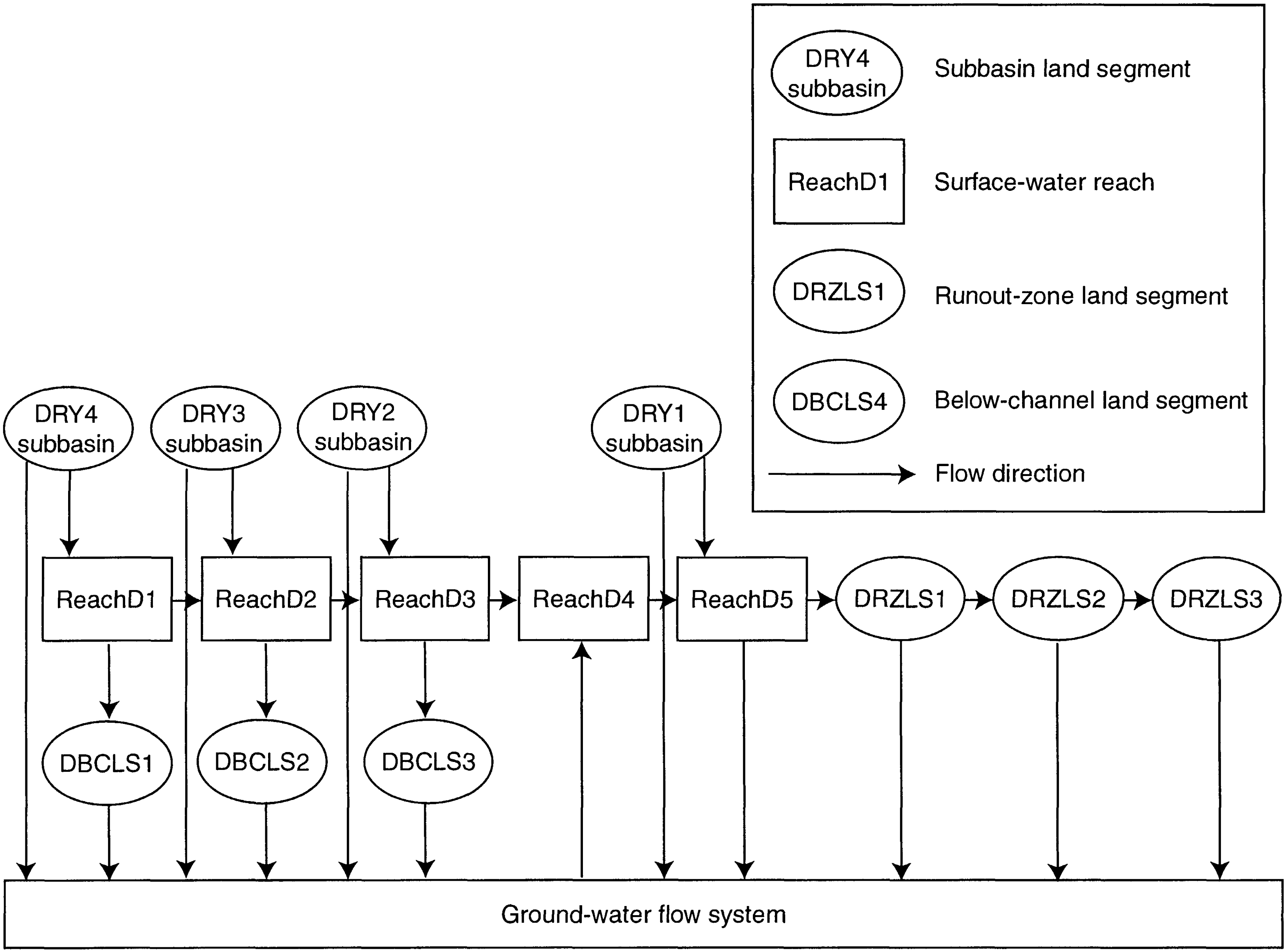

Figure 5. Schematic diagram showing linkages between land segments and reaches in the numerical model for Dry Creek Basin.

simulate. Water that was neither stored in nor evapotranspired from below-channel land segments was considered a source of recharge from runoff.

All streamflow remaining in the furthest downstream reaches defined for Cold Creek and Dry Creek (C5 and D5, respectively) was routed to a series of runout-zone land segments designed to simulate variable areas of inundation that would result from variable volumes of runoff. The runout zones for Cold Creek and Dry Creek were each represented by a series of three land segments. Streamflow onto the first segment was first apportioned to infiltration, and any remaining flow was routed downstream to the second segment. Streamflow onto the second segment was treated likewise, but streamflow onto the third and final segment was all apportioned to infiltration. For all segments, the infiltrated water was further apportioned between evapotranspiration and percolation, and the latter was considered to be a source of recharge from runoff.

Estimation and Calibration of Parameter Values

Parameter values were estimated from physiographic data, channel geometry data, theoretical hydraulic formulas, and information derived from other investigations. Selected values were calibrated to observed hydrologic data, but many other parameter values--as well as the complete numerical models--could not be calibrated and tested over the full range of expected climate conditions. Because it is not technically sound to quantify calibration errors on the basis of limited available data, a qualitative discussion of model sensitivity and errors is presented. Additional hydrologic data would be needed to further assess model calibration and performance.

Land-Segment Parameters

Land-segment parameters are related to snow accumulation and melt, evapotranspiration, runoff timing, and infiltration. All parameter values for the various land-segment types are listed in the HSPF input files in Appendixes 1 through 7.

Snow accumulation and melt parameters

Most parameter values related to snow accumulation and melt on land segments were estimated from published reports on snow hydrology. A sensitivity analysis showed that simulated snow accumulation and melt was most sensitive to the coefficient that adjusts measured snowfall to account for undercatch of snow by the gage (SNOWCF), and to two empirical parameters--the sublimation adjustment coefficient (SNOEVP) and the condensation/convection melt coefficient (CCFACT). The value for SNOWCF was set at 1.25, which assumes the precipitation gages catch only 80 percent of actual snowfall. That value was estimated from a graph of windspeed and snowfall catch efficiency (Goodison and McKay, 1978) using the average winter windspeeds at the HMS of about 2 meters per second. The values for SNOEVP and CCFACT were calibrated to daily snow depth data from the HMS for water years 1977-90. The simulated and observed snow depths for two selected winters with above average snowfall (figure 6) are indicative of the calibration results. The model simulated the ephemeral occurrence of snowcover quite well, but it simulated the absolute snowdepth less accurately. Snow-water equivalent data were not available for the calibration.

Evapotranspiration parameters

Parameter values related to evapotranspiration from land segments were estimated using information from previous investigations in the study area. Monthly values for interception storage capacity (CEPSC) and lower zone evapotranspiration index (LZETP) were extracted from Bauer and Vaccaro's Deep Percolation Model for eastern Washington (1987) and from an unpublished recharge model produced for the Basalt Waste Isolation Project (C.R. Cole, Pacific Northwest Laboratory, written commun., 1984). Values for the lower soil-zone storage capacity indices (LZSN) were estimated from soil-water storage capacity data compiled by T.A. Zimmerman (Pacific Northwest Laboratory, written commun., 1985). Parameter values related to evapotranspiration from below-channel land segments were set to represent sand and cobble materials with sparse vegetal cover on the basis of the author's experience with HSPF.

Simulation of total evapotranspiration from grass covered land segments was assessed using calculated evapotranspiration data for the period June 1990-September 1991 from two experimental sites in Dry Creek Basin (Tomlinson, 1994; G.W. Gee, Pacific Northwest Laboratory, written commun., 1993; S.A. Tomlinson, U.S. Geological Survey, written commun., 1995). Instrumentation that allowed estimation of evapotranspiration using the Bowen-ratio method was in place at one site, and a weighing lysimeter was in place at the second site. Both sites were grass covered. Total ET was simulated with HSPF for the two sites using appropriate climate data for

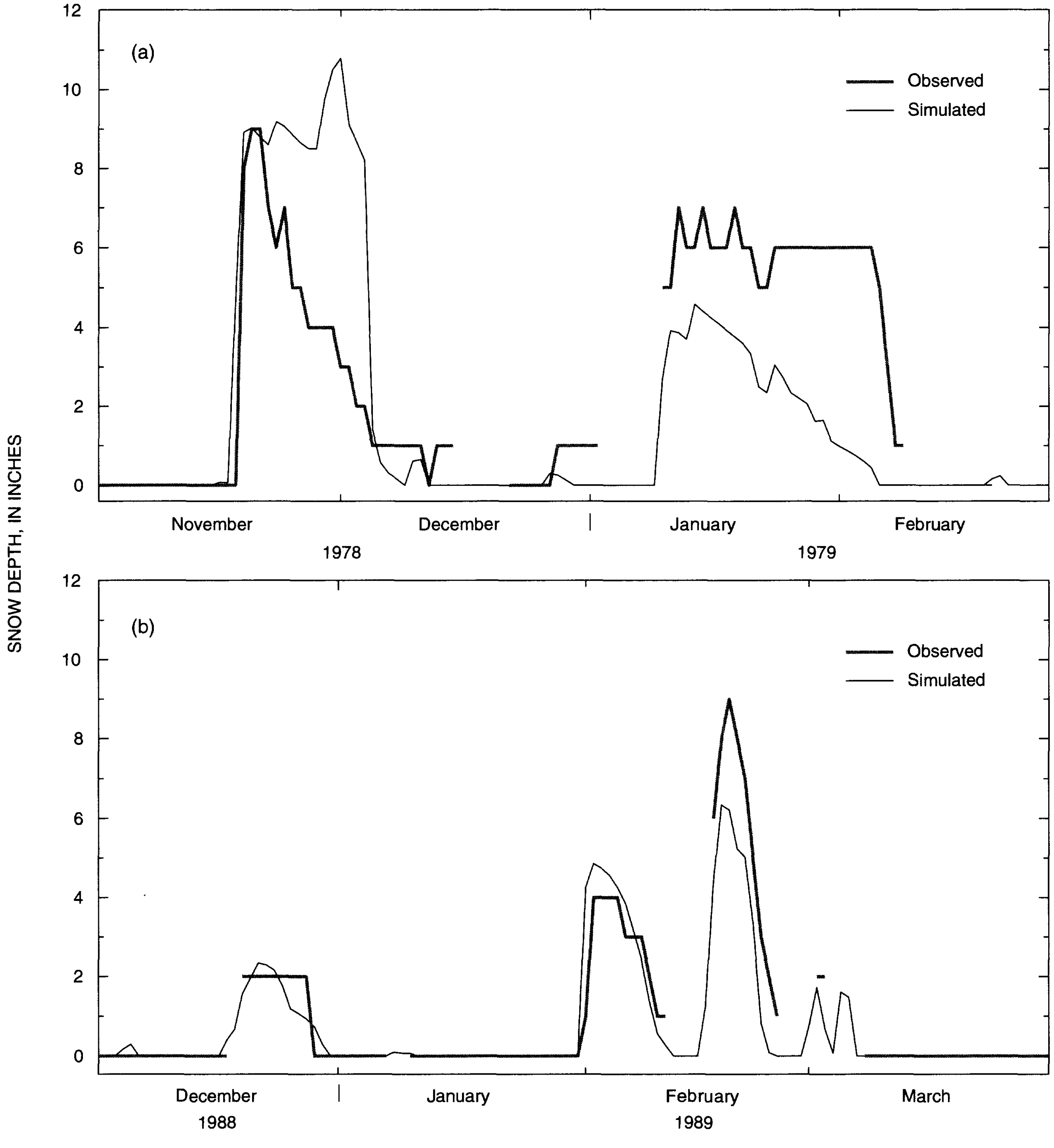

Figure 6. Observed and simulated snow depth at the Hanford Meteorological Station for (a) November 1978 to February 1979, and (b) December 1988 to March 1989.

the defined climate zones of the experimental sites. The calculated data and the HSPF simulation results from three different values for the LZSN parameter are shown in figure 7. The three parameter values included the original estimated value for grass-covered land segments underlain by deep soils with high available-water capacities, and values reflecting soil available-moisture capacities 20 percent greater than and less than the original estimated value. All three parameter values resulted in reasonable evapotranspiration simulations at both sites. Runoff--particularly winter runoff--is only slightly affected by evapotranspiration through the influence of ET on antecedent soil-moisture conditions, so the original estimates for all three evapotranspiration parameter values (LZSN, CEPSC, and LZETP) for grass-covered land segments appeared to be fully adequate for this investigation. Data were not available to assess the adequacy of parameter values for other land segment types.

Runoff-timing parameters

Parameter values that primarily control only the timing of runoff--average length, slope, and roughness of overland flow planes (LSUR, SLSUR, and NSUR respectively), the interflow index (INTFW), and upper soil-zone storage capacity index (UZSN)-- were estimated directly from field or map measurements or from the author's experience. There were no available data to calibrate or assess the validity of those values, but their influence on simulated runoff and recharge volumes is minor.

Infiltration parameters

Parameter values related to infiltration into both frozen and thawed soils (the infiltration index INFILT and the infiltration-equation exponent INFEXP) were determined through calibration to available streamflow data after all other model parameter values were either estimated or calibrated. A sensitivity analysis, wherein changes in simulated runoff relative to changes in model parameter values were assessed, showed that simulated runoff is most sensitive to the values for INFILT and INFEXP. Continuous records of streamflow observed during October 1990 through May 1993 (table 4) and four instantaneous peak-discharge estimates of historic flows (table 13) were used for calibration. The available data were not ideal for calibration; no substantial runoff occurred during the period October 1990-May 1993, when continuous records of streamflow were collected and no runoff volume data were available with the historic peak-discharge data. However, the peak discharge data were used anyway because they are somewhat indicative of the magnitude of historic runoff.

The same values for INFILT and INFEXP were assigned to all land segment types. This simplification was justified because actual infiltration characteristics are likely similar for the fine-textured soils that cover most of the study area and because the observed streamflow data were not adequate to realistically ascertain subtle differences. Simulated infiltration still did vary between land segments because of the variation in previously assigned available-water capacity and evapotranspiration related parameter values.

To calibrate INFILT and INFEXP, values were adjusted for thawed conditions to simulate no significant runoff during the October 1990-May 1993 (as was observed). Then, values were adjusted for frozen-soil conditions to simulate substantial runoff to coincide with the four historical peak discharges while still simulating little or no runoff for October 1991-May 1993. Accurate simulation of 1990-93 runoff volumes was given much greater emphasis than accurate simulation of historical peak flows because peak flows in the study area are not well correlated with runoff volumes. For example, peak discharges associated with recent runoff were greatly affected by sudden releases of runoff from temporary storage behind tumbleweed- and sediment-choked culverts and channels. Thus, a small volume of runoff often resulted in a large peak discharge. The observed data were not available to simulate those random storages and releases of runoff.

The final calibrated parameters resulted in simulated historical peak discharges that were consistently less than observed (table 13). No storm runoff was simulated for January 13, 1969, when runoff was observed in lower Dry Creek. The model did predict frozen ground throughout the basin, but air temperatures were below freezing from January 12 through February 3, so all precipitation was simulated as snowfall and essentially no snow was melted. A peak discharge of only 31 ft^3/s was simulated for January 14, 1970, when runoff was observed in lower Dry Creek. Rapid snowmelt was simulated for that day, but most of that was held in the deep, dry snowpack and was not available for runoff. Sustained, above freezing temperatures and rainfall did result in significant simulated runoff for the following week; a peak discharge of 345 ft^3/s was simulated for January 24, 1970 . A peak discharge of only 156 ft^3/s was simulated for January 16, 1971, in upper Dry Creek; the observed peak discharge was 2,280 ft^3/s. The model predicted frozen ground

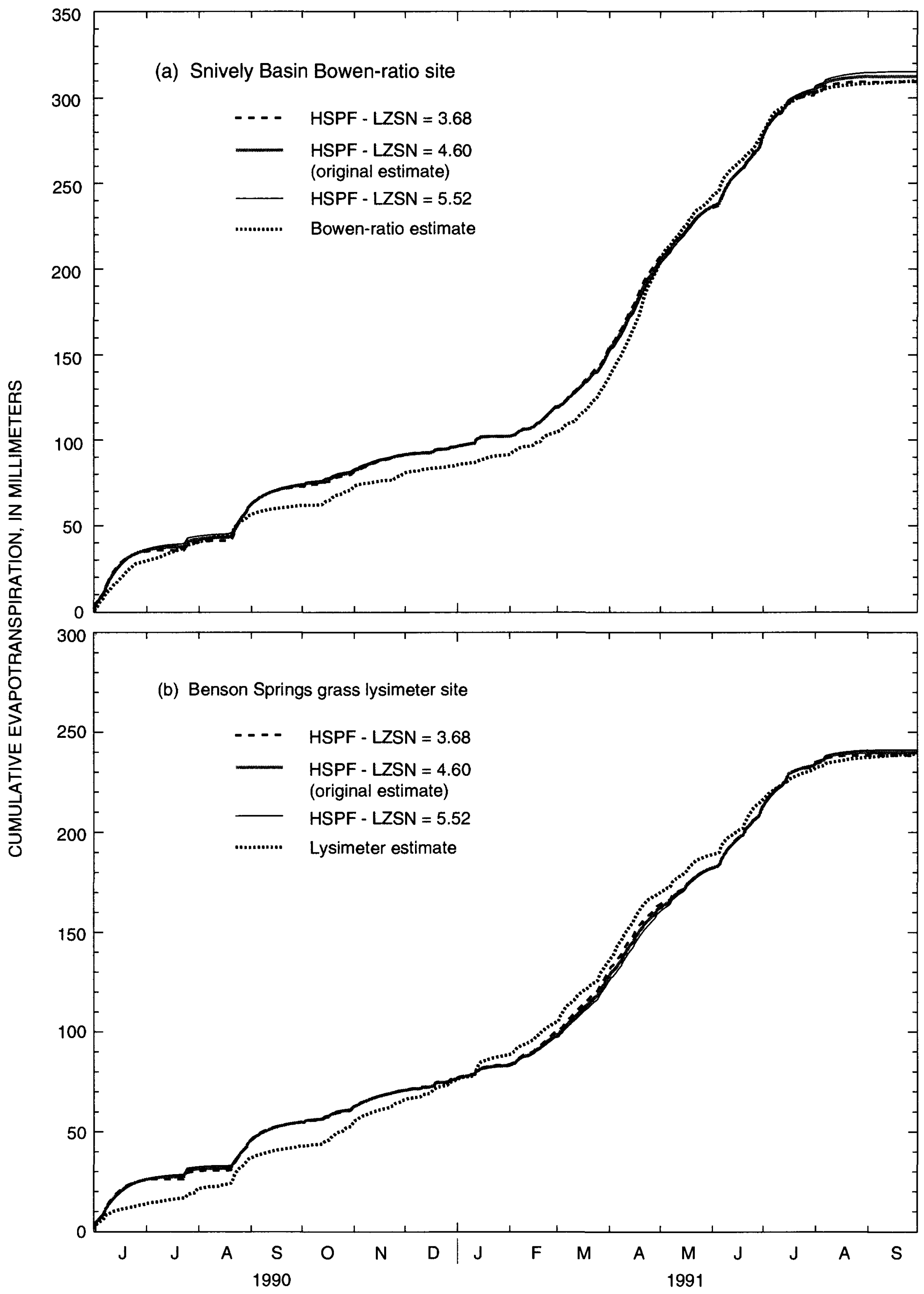

Figure 7. Simulated and calculated evapotranspiration estimates for (a) the Snively Basin Bowen-ratio site, and (b) the Benson Springs grass lysimeter site. HSPF - LZSN refers to the value of the lower-zone nominal storage capacity parameter used to get these results from the HSPF simulation model.

Table 13.--*Observed data and simulated peak discharges and runoff volumes from the calibrated numerical models*

[Max.Q, maximum instantaneous discharge; ft^3/s, cubic feet per second; acre-ft, acre-feet; e, estimated; missing data denoted by "."; na, not applicable]

Date	Upper Cold Creek Station 12510618 Max.Q (ft^3/s)	Upper Cold Creek Station 12510618 Total (acre-ft)	Lower Cold Creek Station 12510625 Max.Q (ft^3/s)	Lower Cold Creek Station 12510625 Total (acre-ft)	Upper Dry Creek Station 12510650 Max.Q (ft^3/s)	Upper Dry Creek Station 12510650 Total (acre-ft)	Lower Dry Creek Station 12510655 Max.Q (ft^3/s)	Lower Dry Creek Station 12510655 Total (acre-ft)
				Observed Discharge				
01/13/1969	.	.	.	.	.	.	190	.
01/14/1970	.	.	.	.	.	.	350	.
01/16/1971	.	.	.	.	2,280	.	.	.
03/06/1989	.	.	244	.	.	.	.	.
WY 1991	0	0	170	5.7	5.0 e	9.9 e	74.0	345 e
WY 1992	10.0	0.30	2.6	0.24	0	0	0.52	308 e
Oct-May 1993	14.6	83.8	5.3 e	1.50 e	0	0	0.50	195 e
1991-93 Total	na	101	na	7.5 e	na	9.9 e	na	848 e
				Simulated Discharge				
01/13/1969	na	na	na	na	na	na	0.45	na
01/14/1970	na	na	na	na	na	na	31.[1]	na
01/16/1971	na	na	na	na	156	na	na	na
03/06/1989	na	na	103	na	na	na	na	na
WY 1991	7.8	13.9	0	0	0.61	0.10	0.45	309
WY 1992	3.0	14.0	0	0	0	0	0.45	309
Oct-May 1993	41.1	160	51.6	54.5	0	0	205	341
1991-93 Total	na	188	na	54.5	na	0.10	na	957

[1] A peak discharge of 345 ft^3/s was simulated for January 24, 1970.

throughout most of the basin, but the input precipitation and simulated snowmelt were not enough to generate a peak discharge as large as the observed peak. Even when model parameter values were adjusted so that infiltration was essentially zero, the simulated peak discharge was still an order of magnitude less than the observed value; such results indicate that the actual precipitation that led to runoff during that time was not represented in the input climatic data. The model correctly simulated frozen ground and snowmelt runoff for March 6, 1989, but the simulated peak discharge in lower Cold Creek was 58 percent less than that observed. When parameter values were adjusted to simulate essentially no infiltration, the peak discharge was still 25 percent less than observed.

Although most of the observed low-volume runoff for water years 1991-93 was poorly simulated (figs. 8-9 and table 13), the final calibrated parameters correctly simulated the lack of substantial runoff during the period. No storm runoff was simulated for January 12 or June 20, 1991, in lower Dry Creek (fig. 9). The January 12 runoff resulted from the rapid melting of snow that had accumulated as drifts in the incised stream channels. Redistribution of snow by wind was not considered in the models, so they simulated the melting of a thin, dispersed snowpack that did not result in runoff. The June 20 runoff was a result of a localized intense precipitation that was not represented in the precipitation data used for the simulations. No runoff was simulated for June 29, 1991, in lower Cold

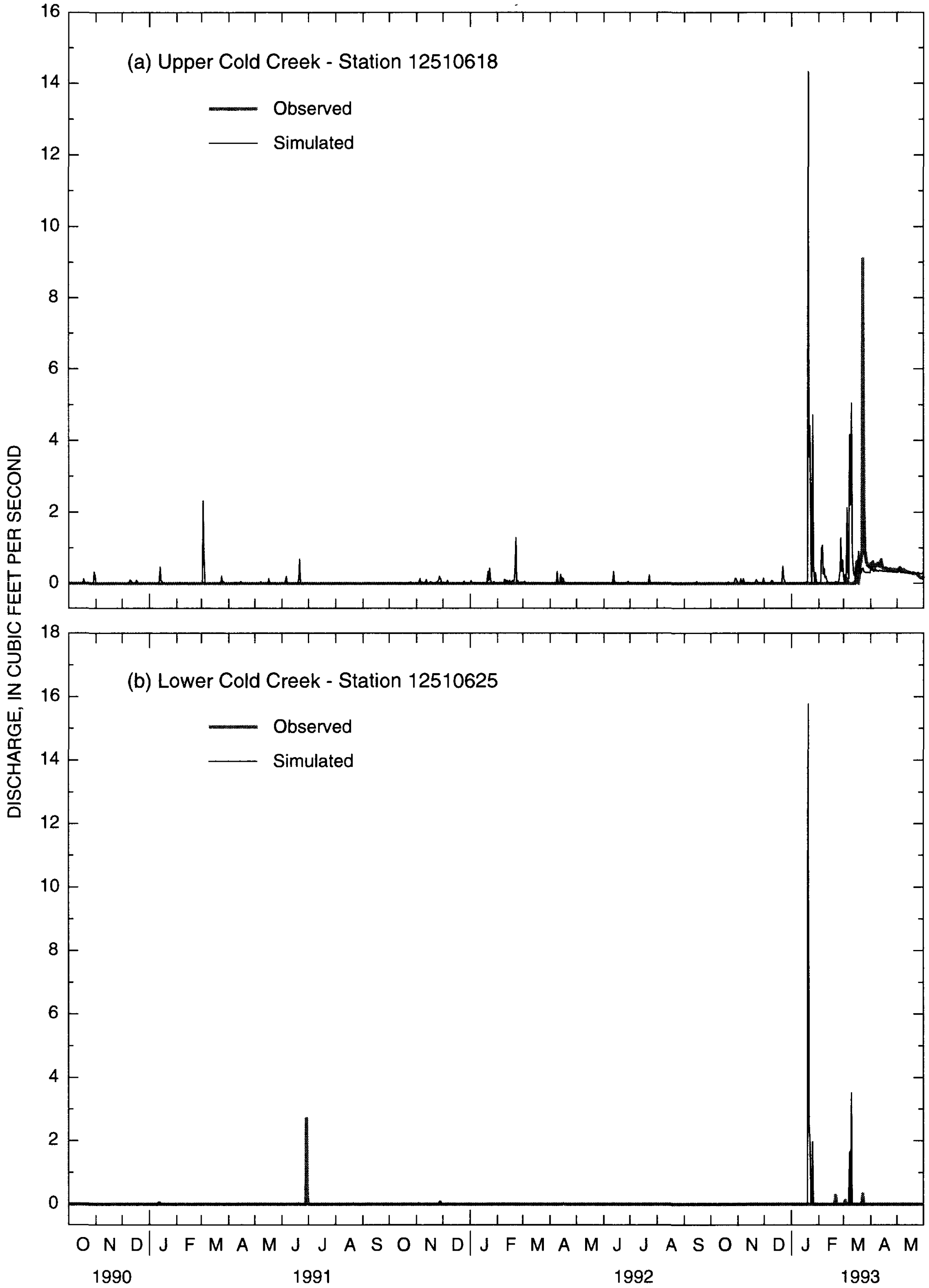

Figure 8. Observed and simulated daily mean discharge for October 1990 to May 1993, for (a) Upper Cold Creek Basin, and (b) Lower Cold Creek Basin.

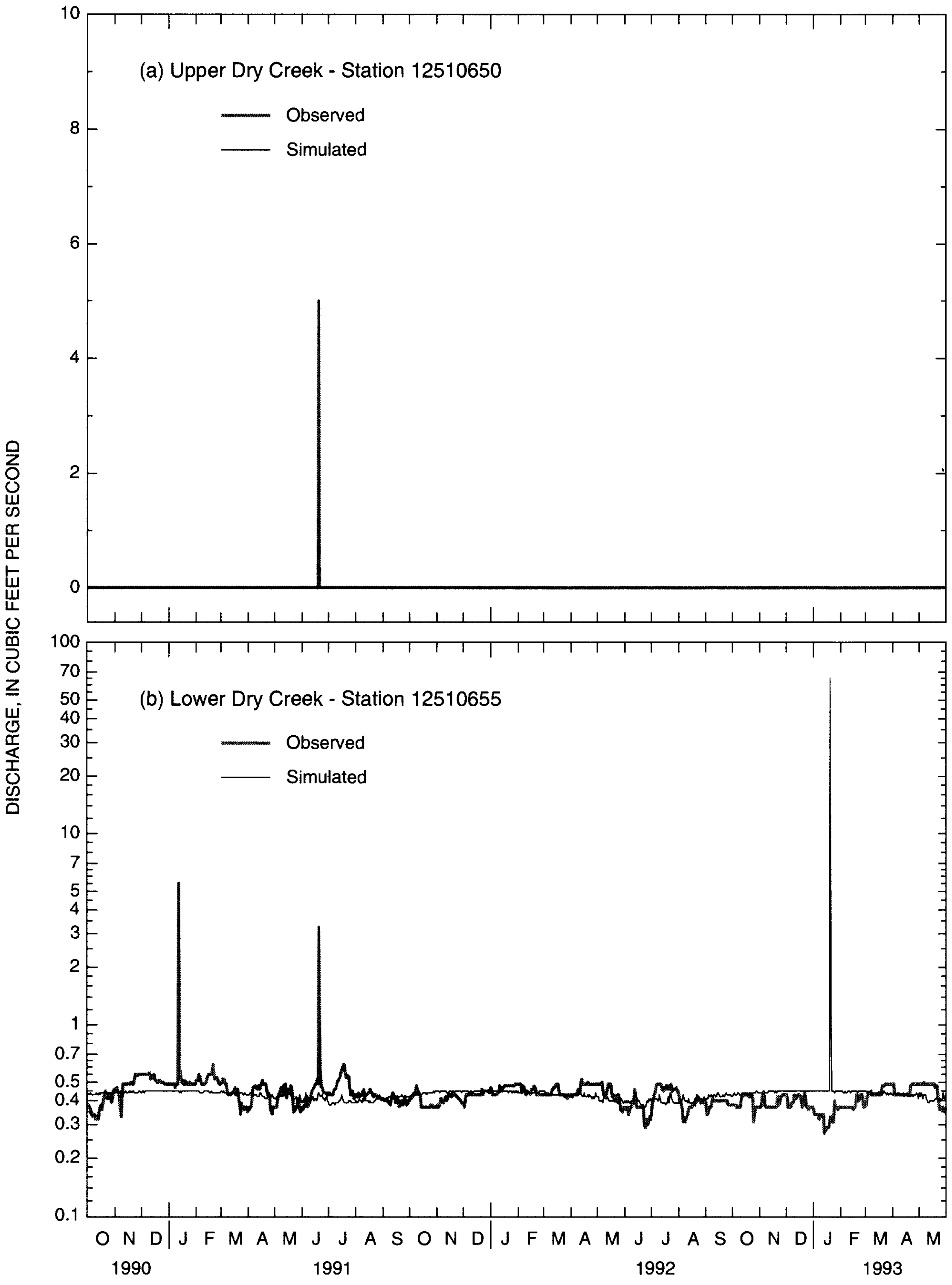

Figure 9. Observed and simulated daily mean discharge for October 1990 to May 1993, for (a) Upper Dry Creek Basin and (b) Lower Dry creek Basin.

Creek (fig. 8) for similar reasons. The observed runoff was a result of localized intense precipitation that was not represented in the precipitation data used for the simulations. The relatively large observed peak discharge of 61 ft^3/s from that runoff was also a result of rapidly released waters that were ponded behind a temporarily plugged culvert. Minor volumes of streamflow were simulated for upper Cold Creek during 1991-92, when none were recorded at the streamflow-gaging station. Minor runoff was observed in the upper basin during this period, but it was infiltrated into tributary channel bottoms before it reached the streamflow-gaging station. In the Cold Creek model, infiltration into channel deposits was not simulated in the upper basin because the alluvial channel deposits are either absent or only a few feet thick. Excess streamflow was simulated in upper Cold Creek and in lower Dry and Cold Creeks during snowmelt periods in January and March, 1993. The models correctly simulated snowmelt over frozen soils that was observed in January, but the actual snowmelt was stored in the snowpack itself, whereas the simulated snowmelt saturated the snowpack and resulted in streamflow. The models simulated snowmelt over some frozen and some thawed soils in March, as was observed, but they simulated too much melt early in the month when the ground was still frozen, so simulated streamflows were greater than observed.

Through trial and error, no combination of INFILT and INFEXP parameter values could accurately simulate all observed data--historical peak discharges were consistently underestimated, and 1990-93 streamflow was consistently overestimated. Given the likely poor correlation between the historical peak discharges and the unknown associated runoff volumes, the 1990-93 simulation results were assumed to be more indicative of overall model performance. Thus, the final parameter values were set to simulate a plausible upper limit for runoff and recharge primarily on the basis of 1990-93 simulation results. Parameter values were assigned to make infiltration capacities moderately high when soils were not frozen and very low when soils were frozen, and the models were constructed to instantaneously switch from one parameter value to the other during a freeze or thaw. In reality, infiltration capacities of frozen soils vary greatly from storm to storm, primarily as a function of the water content of the upper soil layer and of the depth, duration, and rapidity of frost formation. Also, the actual transition from thawed to frozen conditions is gradual rather than instantaneous. The assigned parameter values represent little infiltration into frozen soils for all instances, so they may oversimulate runoff from some periods, as was seen for January and March of 1993. Given that errors in almost all other components of the numerical models--including inaccuracies in the input climate data--are reflected in the calibration results, much uncertainty remains regarding how well the calibrated values represent the actual infiltration characteristics of the study area.

Reach Parameters

The important reach parameter values are in FTABLES, which define the discharge from the downstream end of a reach or a channel bottom as a function of the volume in the reach. The FTABLES for all reaches are listed in the HSPF input files in Appendixes 1 through 7. Values in all standard FTABLES were not calibrated; they were estimated directly from field and map measurements. The volumes of water in a reach for selected flow depths were determined from field measurements of representative channel cross sections and map measurements of channel length; the corresponding downstream discharges were estimated using Manning's equation. An estimate of total wetted-channel area was also made for each flow depth. Storage and discharge values for the FTABLE used to represent the ground-water reach in upper Cold Creek Basin were calibrated to match the observed 1990-93 baseflow discharge in upper Cold Creek.

The discharges representing channel infiltration were estimated for a reach by multiplying the corresponding wetted-channel area by an average infiltration rate of 4 inches per hour. That average infiltration capacity was estimated using the few observed runoff data from the basins. Soil-moisture measurements were made in access tube C2 immediately before and 17 hours after runoff flowed over the site (fig. 3). Water was still ponded around the tube when the second measurement was made, and the wetting front had moved downward at a rate of about 4 inches per hour. Also, the downstream extent of surface flow was noted for the few flood waves that passed the streamflow-gaging stations. From those data, the average unit-area infiltration rate was estimated by dividing the peak discharge by the total downstream wetted-channel area. The resulting estimates are likely larger than the actual infiltration rates because the calculation assumes that attenuation of the runoff peak was from channel infiltration only. The estimated loss rates were 2 and 5 inches per hour for events observed in Cold Creek Basin, and were 5 and 8 inches per hour for events observed in Dry Creek Basin.

SYNTHESIS OF LONG-TERM CLIMATE DATA

Synthesized long-term (October 1957 through May 1993) data sets of hourly precipitation, air temperature, dew point, solar radiation, and potential evapotranspiration--in addition to observed windspeed and solar radiation data--were used to estimate long-term average values for runoff and recharge. The climate data were synthesized by adjusting long-term data observed at nearby weather stations to account for location and altitude variability across the study area.

Seventeen precipitation data sets were synthesized from daily data observed at the HMS, Moxee City 10 E, Priest Rapids Dam, and Sunnyside weather stations. The study basins were first divided into five precipitation regions on the basis of correlation of precipitation totals to data from the four long-term stations (table 2). The UCOLD precipitation region contained subbasin COLD4; the LCOLD region contained subbasins COLD3, COLD2, and COLD1; the UDRY region contained subbasin DRY4; the MDRY region contained subbasin DRY3; and the LDRY region contained subbasins DRY2 and DRY1. Daily precipitation data from the long-term stations located outside of the study area were then multiplied by adjustment factors to represent study-area precipitation. The adjustment factors accounted for precipitation variation due to location and altitude. Variation due to location was accounted for by using different long-term station data for different precipitation regions in the study area; Priest Rapids Dam data were used for the UCOLD region, HMS data were used for the LCOLD and LDRY regions, Moxee City 10 E data were used for the UDRY region, and Sunnyside data were used for the MDRY region. The location components of the adjustment factors were determined by comparing monthly precipitation totals from the long-term stations to data from USGS recording precipitation stations located within the study basins. Precipitation variation with altitude within a given region was calculated using data from all of the USGS precipitation stations in the study area. The resulting increases in precipitation with altitude ranged from 0.24 inches per thousand feet in Cold Creek Basin to 0.79 inches per thousand feet in Dry Creek Basin. Finally, the adjusted daily values for all regions and altitudes were disaggregated into hourly values according to the hourly distribution of precipitation recorded at the HMS, which were the only observed hourly data available.

Four air temperature and dew-point temperature datasets, one for each of the four altitude categories (table 11), were synthesized from hourly data observed at the HMS. The HMS air temperature data were adjusted for the average altitude within each zone using dry and wet lapse rates. The dry lapse rate of 5°F per 1,000 feet was used when no precipitation was recorded, and the wet lapse rate of 3.5°F per 1,000 feet was used when precipitation was recorded. The HMS dew point data were adjusted by estimating the decrease in vapor pressure with altitude (Reitan, 1963) and then calculating an adjusted dew point using the lapsed temperature and vapor pressure data.

Four solar radiation datasets, one for each of the moderate and steep slope/aspect categories (table 10), were synthesized from hourly data observed at the HMS; the HMS data were used directly for the two mild-slope categories. The HMS data--representing solar radiation on a horizontal plane--were adjusted for the different slopes and aspects using an algorithm that considers latitude, day of year, and land-surface slope and aspect (Kaufman and Weatherred, 1982).

Windspeed data from the HMS were used directly for all areas in the study basins. Windspeed does vary across the basins, but the data needed to accurately adjust for that variation were not available.

Twenty potential evapotranspiration data sets--one for each unique altitude/slope/aspect zone--were synthesized from the previously adjusted air temperature and solar radiation data using a method from Jensen (1973). Daily PET was computed as a function of daily incident solar radiation, average daily air temperature, and land-surface altitude. Hourly PET was estimated by disaggregating the daily values according to the hourly distribution of solar radiation.

ESTIMATES OF RUNOFF AND RECHARGE FROM RUNOFF

The synthesized long-term climate data were input to the calibrated numerical models to simulate runoff and recharge from runoff for the 1958-93 water years (tables 14 and 15). The runoff estimates in table 14 represent simulated surface-water flows in the study area and include storm-generated runoff, discharge from Rattlesnake Springs, and discharge from the unnamed ephemeral springs along upper Cold Creek. The recharge estimates in table 15 represent the amount of simulated runoff that was infiltrated and percolated below the zone of active evapotranspiration; the recharge from runoff estimates do not include recharge from direct infiltration and

Table 14.--*Simulated annual runoff for delineated subbasins in the study area for water years 1958-93*

[Avg., average annual runoff for water years 1958-93]

Water year	Runoff, in acre-feet per year									
	COLD4	COLD3	COLD2	COLD1	COLD TOTAL	DRY4	DRY3	DRY2	DRY1	DRY TOTAL
1958	686	240	58	20	1,000	188	112	426	464	1,190
1959	892	484	208	154	1,740	152	343	729	623	1,850
1960	32	11	5	5	53	25	90	7	312	435
1961	191	110	23	9	334	214	34	355	440	1,040
1962	45	13	5	8	71	50	25	44	330	449
1963	178	178	90	95	541	330	15	500	544	1,390
1964	83	6	3	6	98	9	127	32	327	496
1965	2,140	109	23	21	2,290	787	1,530	137	380	2,840
1966	41	4	3	6	53	31	46	15	317	410
1967	363	17	7	8	394	26	121	19	317	482
1968	97	2	1	3	103	7	4	6	311	328
1969	219	100	31	20	371	62	112	92	344	611
1970	1,530	242	102	86	1,960	218	638	373	489	1,720
1971	237	30	9	7	283	156	19	88	348	611
1972	5	2	2	6	16	25	10	10	314	359
1973	3	152	27	14	197	186	158	483	475	1,300
1974	977	294	95	52	1,420	320	596	368	442	1,730
1975	109	155	47	11	322	37	141	31	319	527
1976	13	7	4	7	32	8	7	13	315	343
1977	2	2	2	4	10	7	3	5	311	326
1978	107	188	87	66	447	1,150	372	334	455	2,310
1979	8	6	3	4	22	31	80	6	311	427
1980	243	151	82	321	798	801	1,060	399	631	2,880
1981	945	52	16	10	1,020	164	288	55	328	836
1982	71	84	12	7	175	125	290	224	373	1,010
1983	967	485	208	162	1,820	862	517	197	381	1,960
1984	249	313	206	201	969	27	15	913	686	1,640
1985	35	42	17	8	103	11	13	18	315	357
1986	165	489	166	134	954	57	71	1,060	664	1,850
1987	41	25	10	7	82	35	6	9	314	364
1988	320	28	10	9	368	52	30	88	352	522
1989	46	52	18	20	137	138	51	37	323	548
1990	4	3	2	6	14	11	4	7	313	335
1991	11	3	3	7	23	22	5	10	314	352
1992	8	6	3	9	26	15	123	32	321	492
1993[1]	66	110	59	148	382	17	117	234	463	830
Avg.	308	117	46	46	517	177	199	204	396	976

[1] Values for June-September 1993 were estimated, not modeled.

Table 15.--*Simulated annual recharge from runoff for delineated subbasins the study area for water years 1958-93*

[Avg., average annual recharge from runoff for the 1958-93 water years]

Water year	Recharge from runoff, in acre-feet per year							
	COLD2	COLD1	COLD TOTAL	DRY4	DRY3	DRY2	DRY1	DRY TOTAL
1958	427	424	851	106	114	184	574	978
1959	649	940	1,589	116	255	320	870	1,560
1960	37	2	39	20	76	7	277	381
1961	161	117	278	161	62	172	480	876
1962	44	4	48	40	18	34	292	384
1963	163	294	457	204	105	167	674	1,149
1964	40	27	67	5	79	47	300	431
1965	252	1,381	1,633	169	270	177	1,826	2,443
1966	27	5	32	24	37	9	282	352
1967	130	190	320	19	110	13	282	424
1968	41	31	71	2	0	2	276	280
1969	225	97	322	55	101	82	310	548
1970	523	1,154	1,677	190	424	275	637	1,526
1971	114	113	228	90	60	52	313	515
1972	4	1	5	19	3	5	278	304
1973	49	99	147	91	148	130	641	1,011
1974	532	722	1,254	191	433	161	661	1,447
1975	215	60	275	26	117	35	286	464
1976	20	1	21	4	2	7	285	299
1977	0	0	1	1	0	0	277	278
1978	230	156	385	514	542	211	764	2,030
1979	14	0	15	24	68	3	276	372
1980	272	375	647	140	468	202	1,733	2,543
1981	249	557	806	142	159	71	363	735
1982	82	50	132	88	176	73	473	811
1983	548	1,022	1,570	354	522	161	663	1,700
1984	399	439	838	20	8	143	1,140	1,312
1985	82	5	86	4	7	13	284	309
1986	330	512	842	49	58	218	1,148	1,474
1987	65	1	66	29	3	5	280	317
1988	115	188	302	43	24	37	322	426
1989	55	41	96	71	89	35	290	486
1990	3	0	3	5	0	2	278	285
1991	9	0	9	14	0	4	281	299
1992	10	1	11	8	100	36	287	431
1993[1]	169	164	333	12	103	99	455	669
Avg.	175	255	430	85	132	89	524	830

[1] Values for June-September 1993 were estimated, not modeled.

percolation of precipitation. Simulated annual peak discharges and total streamflows are presented in table 16; those estimates represent streamflow at the four recording stream-gaging stations in the study area.

The average annual runoff simulated for Cold Creek Basin (517 acre-ft) was about half as much as that simulated for Dry Creek Basin (976 acre-ft), but the average annual runoff per square mile of drainage area was similar for the two basins (6.94 and 6.60 acre-ft/mi^2 for Cold Creek and Dry Creek, respectively). Simulated average annual ground-water discharges into Cold Creek and Dry Creek were 68 acre-ft and 310 acre-ft, respectively, so storm-generated runoff per square mile was actually greater in Cold Creek Basin (6.03 acre-ft/mi^2) than in Dry Creek Basin (4.50 acre-ft/mi^2). Those results are consistent with the conceptual model, wherein storm-generated runoff from in Cold Creek Basin with its steep slopes and thin, stony soils was expected to be greater than storm-generated runoff in Dry Creek Basin.

The average annual recharge from runoff simulated for Cold Creek Basin (430 acre-ft) was also about half as much as that simulated for Dry Creek Basin (830 acre-ft). The greatest amount of recharge from runoff was simulated for the most downstream subbasin in the Dry Creek Basin (524 acre-ft for DRY1), and about 276 acre-ft of that amount was due to recharge of spring-water from Rattlesnake Springs. No recharge from runoff was simulated for the two upper Cold Creek subbasins (COLD4 and COLD3) because, as was described in the conceptual model, there is essentially no alluvial fill in those areas. Given that there were no surface-water outflows from the study area, the difference between average annual runoff for the entire study area (1,493 acre-ft) and recharge from runoff for the study area (1,260 acre-ft) reflects that 16 percent of the runoff (237 acre-ft) was infiltrated but subsequently lost to evapotranspiration from channel sediments and from runout-zone soils.

Simulated average annual recharge from runoff for subbasins located primarily within the boundaries of the Hanford Site (subbasins DRY2, DRY1, and COLD1) was 868 acre-ft, and simulated recharge from runoff for all areas that likely contribute water directly to the uppermost unconfined aquifer beneath the Hanford Site (subbasins COLD2, COLD1, DRY3, DRY2, and DRY1) was 1,175 acre-ft/yr. The latter estimate probably best represents recharge from runoff in areas where the underlying water table is in unconsolidated sediments. Recharge from runoff in the DRY4 subbasin most likely percolates directly into basalt, and it is unknown how much of that recharge flows to the uppermost unconfined aquifer.

The uncertainty in the long-term runoff and recharge from runoff estimates could not be quantified with available data. There were few data to compare with simulated long-term runoff, and there were no data to compare with simulated recharge from runoff. As described previously, the numerical models were calibrated to simulate a plausible upper limit for runoff and recharge, and as was shown in table 13, the models simulated too much streamflow for the 1991-93 water years.

However, in a qualitative assessment of the 1958-93 runoff estimates, the runoff estimates appear to be quite reasonable; when considered with the previously presented calibration results, the estimates are certainly of the correct order of magnitude. A comparison was made between simulated streamflow at the four stream-gaging stations in the study area (table 16) and historic streamflow data from nearby Esquatzel Coulee Basin (table 6). Esquatzel Coulee is not similar enough to the study area to validly compare observed and simulated runoff for individual storms, but it is similar enough to compare observed and simulated long-term average runoff. The average annual runoff observed for water years 1958-93 at station 12513000 (Esquatzel Coulee at Connell, a 234-mi^2 drainage basin located about 40 miles east of the study area) was 4.20 acre-ft/mi^2. Comparable values simulated for the study-area stations ranged from 1.50 to 14.9 acre-ft/mi^2. Likewise, the maximum recorded annual-runoff volume at station 12513000 was 32.7 acre-ft/mi^2; comparable values simulated for the study-area stations ranged from 11.4 to 78.6 acre-ft/mi^2. Thus, the observed average annual runoff data from Esquatzel Coulee is bracketed by the simulated runoff for the study area. Dry Creek Basin, which receives relatively little precipitation, had less simulated runoff than Esquatzel Coulee, and Cold Creek Basin, which receives relatively more precipitation, had more simulated runoff than Esquatzel Coulee.

Comparison to Other Recharge Estimates

From this investigation, estimated recharge from runoff for areas within the Hanford Site boundaries is 868 acre-ft/yr, and estimated recharge from runoff for all areas that likely contribute water directly to the uppermost unconfined aquifer beneath the Hanford Site is 1,175 acre-ft/yr. These estimates are approximately 90 and 160 percent greater, respectively, than the only other known published estimate of annual recharge from runoff (450 acre-ft/yr; Newcomb and others, 1972).

Table 16.--*Simulated annual peak discharge and total streamflow for the study area for water years 1958-93*

[Max.Q, maximum hourly discharge for the year; ft^3/s, cubic feet per second; acre-ft, acre feet; Average, average annual total streamflow for 1958-93 water years; Average per mi^2, average annual total streamflow per square mile of drainage area upstream of stream-gaging station for water years 1958-93; <, less than]

	Simulated discharge							
	Upper Cold Creek Station 12510618		Lower Cold Creek Station 12510625		Upper Dry Creek Station 12510650		Lower Dry Creek Station 12510655	
Water year	Max.Q (ft^3/s)	Total (acre-ft)	Max.Q (ft^3/s)	Total (acre-ft)	Max.Q (ft^3/s)	Total (acre-ft)	Max.Q (ft^3/s)	Total (acre-ft)
1958	986	929	756	535	243	71	544	593
1959	517	1,380	428	917	69	25	362	805
1960	42	43	21	7	<1	<1	<1	309
1961	141	302	98	148	118	42	332	483
1962	47	58	25	12	2	<1	7	310
1963	248	357	225	268	233	115	332	646
1964	109	89	72	46	0	0	60	325
1965	3,750	2,250	3,380	2,010	1,600	609	3,130	2,120
1966	39	45	21	14	0	0	<1	309
1967	601	380	293	244	0	0	<1	308
1968	74	98	51	52	0	0	<1	309
1969	110	320	75	110	0	0	2	308
1970	1,640	1,780	1,410	1,340	69	19	347	618
1971	261	267	184	151	156	56	116	338
1972	1	7	0	0	0	0	<1	308
1973	193	155	155	126	290	86	532	736
1974	883	1,270	736	814	265	118	676	767
1975	130	266	121	83	6	1	2	309
1976	5	21	0	0	0	0	<1	311
1977	1	4	0	0	0	0	<1	308
1978	117	297	158	136	727	622	423	863
1979	<1	15	0	0	0	0	<1	308
1980	325	395	246	187	1,320	651	1,990	1,720
1981	1,500	999	1,260	755	29	12	225	416
1982	158	155	119	75	97	29	467	584
1983	1,220	1,460	1,020	1,090	600	497	613	810
1984	291	565	379	355	0	0	1,060	1,070
1985	24	78	20	8	0	0	<1	309
1986	541	655	393	473	1	<1	1,030	1,140
1987	16	66	<1	<1	<1	<1	<1	309
1988	442	348	268	235	6	1	137	352
1989	123	99	103	52	208	58	17	312
1990	1	7	0	0	0	0	<1	308
1991	8	14	0	0	<1	<1	<1	309
1992	3	14	0	0	0	0	<1	309
1993	41	176	52	55	0	0	205	440
Average	na	427	na	286	na	84	na	558
Average per mi^2	na	14.9	na	7.3	na	1.5	na	3.8

The recharge from runoff estimates indicate that such recharge is a significant source of water to the uppermost unconfined aquifer beneath the Hanford Site. The estimate of recharge from runoff to the aquifer (1,175 acre-ft/yr) is equal to 41 percent of Bauer and Vaccaro's (1990) estimate of direct recharge from precipitation over the same portion of the study area, and is equal to 13 percent of their estimate of direct recharge from precipitation to the aquifer. The estimate of recharge from runoff for the Hanford Site (868 acre-ft/yr) is equal to 16 percent, 13 percent, and 6 percent of Bauer and Vaccaro's (1990), Fayer and Walters' (1995), and Jacobsen and Freshley's (1990) estimates of direct recharge from precipitation over the Hanford Site, respectively. The estimated recharge from runoff to the aquifer is also equal to about 40 percent of Jacobsen and Freshley's (1990) estimate of ground-water input to the aquifer at the western boundary. Their estimate is for "water contributed...from Cold Creek valley...from Dry Creek valley and Rattlesnake Mountain Springs," so it presumably includes at least some of the recharge from runoff in those areas.

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APPENDIXES

Appendix 1.--*Final HSPF input file for Upper Cold Creek model. For brevity, the "SPECIAL ACTIONS" portion of the model input, where the dates of soil freezing and thawing are represented by changes in the INFILT parameter values, is not included. Complete input files may be obtained by contacting the District Chief at the address shown on page ii of this report*

```
RUN
GLOBAL
  Cold4 final model - hms.wdm data
  START       1957/10/01 00:00  END    1993/05/31 24:00
  RUN INTERP OUTPUT LEVEL    0
  RESUME     0 RUN     1 TSSFL    15 WDMSFL   16
END GLOBAL
OPN SEQUENCE
    INGRP              INDELT 01:00
      PERLND     207
      PERLND     227
      PERLND     247
      PERLND     287
      PERLND     301
      PERLND     307
      PERLND     309
      PERLND     321
      PERLND     323
      PERLND     327
      PERLND     341
      PERLND     343
      PERLND     347
      PERLND     348
      PERLND     349
      PERLND     361
      PERLND     367
      PERLND     368
      PERLND     381
      PERLND     387
      PERLND     389
      PERLND     401
      PERLND     407
      PERLND     421
      PERLND     422
      PERLND     427
      PERLND     461
      PERLND     467
      COPY         1
      DISPLY       1
    END INGRP
END OPN SEQUENCE

PERLND
  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC
***
  207  467    0    1    1    0    0    0    0    0    0    0    0    0
```

```
  END ACTIVITY
  PRINT-INFO
    <PLS > ******************** Print-flags ************************ PIVL
PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC
*********
  207            6
6                                                          9
  227  301       6
6                                                          9
  307            6
6                                                          9
  309  401       6
6                                                          9
  407            6
6                                                          9
  421  467       6
6                                                          9
  END PRINT-INFO
  GEN-INFO
    <PLS ><-----Name--------->NBLKS  Unit-systems  Printer
***
    # -  #                          User  t-series Engl Metr
***
                                          in  out
***
*** Grouped by elevation zone ***
  207      gras,soil1,flat        1    1    1    1    6    0
  227      gras,soil1,mod.N       1    1    1    1    6    0
  247      gras,soil1,mod.S       1    1    1    1    6    0
  287      gras,soil1,stp.S       1    1    1    1    6    0
  301      sage,soil1,flat        1    1    1    1    6    0
  307      gras,soil1,flat        1    1    1    1    6    0
  309      gras,soil3,flat        1    1    1    1    6    0
  321      sage,soil1,mod.N       1    1    1    1    6    0
  323      sage,soil3,mod.N       1    1    1    1    6    0
  327      gras,soil1,mod.N       1    1    1    1    6    0
  341      sage,soil1,mod.S       1    1    1    1    6    0
  343      sage,soil3,mod.S       1    1    1    1    6    0
  347      gras,soil1,mod.S       1    1    1    1    6    0
  348      gras,soil2,mod.S       1    1    1    1    6    0
  349      gras,soil3,mod.S       1    1    1    1    6    0
  361      sage,soil1,stp.N       1    1    1    1    6    0
  367      gras,soil1,stp.N       1    1    1    1    6    0
  368      gras,soil2,stp.N       1    1    1    1    6    0
  381      sage,soil1,stp.S       1    1    1    1    6    0
  387      gras,soil1,stp.S       1    1    1    1    6    0
  389      gras,soil3,stp.S       1    1    1    1    6    0
  401      sage,soil1,flat        1    1    1    1    6    0
  407      gras,soil1,flat        1    1    1    1    6    0
  421      sage,soil1,mod.N       1    1    1    1    6    0
  422      sage,soil2,mod.N       1    1    1    1    6    0
  427      gras,soil1,mod.N       1    1    1    1    6    0
  461      sage,soil1,stp.N       1    1    1    1    6    0
```

```
  467      gras,soil1,stp.N       1    1    1    1    6    0
  END GEN-INFO
  ICE-FLAG
    <PLS > Value of 1 means ice will be simulated, 0 means not simulated
***
    # -  #ICEFG
***
  207  467    1
  END ICE-FLAG
  SNOW-PARM1
               perlnd   perlnd    shaded  gage-catch  snow w.eq. needed for
***
    <PLS >    latitude  altitude fraction adjustment  complete snowcover
***
    # -  #       LAT     MELEV     SHADE    SNOWCF    COVIND
***
  207  287      46.6     1805.       0.0      1.25       0.5
  301  389      46.6     2789.       0.0      1.25       0.5
  401  467      46.6     3609.       0.0      1.25       0.5
  END SNOW-PARM1
  SNOW-PARM2
             new snow   rain vs  sublim.  latent ht.  max AWC   ground
***
    <PLS >    density  snow tmp   adjust    adjust    of pack   melt
***
    # -  #     RDCSN     TSNOW    SNOEVP    CCFACT    MWATER    MGMELT
***
  207  467      0.05       32.      0.85       1.5      0.08      0.02
  END SNOW-PARM2
  SNOW-INIT1
    <PLS >  SNOW initial conditions
***
    # -  #  PACKSNOW   PACKICE PACKWATER    RDENPF      DULL    PAKTMP
***
  207  467       0.0       0.0       0.0       0.2      400.      32.0
  END SNOW-INIT1
  SNOW-INIT2
    <PLS >  SNOW initial conditions
***
    # -  #    COVINX   XLNMELT    SKYCLR
***
  207  467      0.50       0.0       1.0
  END SNOW-INIT2
  PWAT-PARM1
    <PLS > PWATER variable monthly parameter value flags
***
           Snow           cepsc uzns nsur intfw irc lzetp
***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE
***
  207  467    1    0    0    1    0    0    0    0    1
  END PWAT-PARM1
  PWAT-PARM2
    <PLS > ***
```

```
   # -  # ***FOREST      LZSN     INFILT       LSUR      SLSUR      KVARY
AGWRC
*** sagebrush ***
  301           0.       2.3000     0.2000     4000.0     0.0350     0.0000
0.9900
  321           0.       2.3000     0.2000     4000.0     0.1100     0.0000
0.9900
  341           0.       2.3000     0.2000     4000.0     0.1100     0.0000
0.9900
  361           0.       2.3000     0.2000     4000.0     0.2300     0.0000
0.9900
  381           0.       2.3000     0.2000     4000.0     0.2300     0.0000
0.9900
  401           0.       2.3000     0.2000     8000.0     0.0350     0.0000
0.9900
  421           0.       2.3000     0.2000     8000.0     0.1100     0.0000
0.9900
  461           0.       2.3000     0.2000     8000.0     0.2300     0.0000
0.9900
  422           0.       4.1000     0.2000     8000.0     0.1100     0.0000
0.9900
  323           0.       6.2000     0.2000     4000.0     0.1100     0.0000
0.9900
  343           0.       6.2000     0.2000     4000.0     0.1100     0.0000
0.9900
*** grassland ***
  207           0.       2.3000     0.2000     1000.0     0.0350     0.0000
0.9900
  227           0.       2.3000     0.2000     1000.0     0.1100     0.0000
0.9900
  247           0.       2.3000     0.2000     1000.0     0.1100     0.0000
0.9900
  287           0.       2.3000     0.2000     1000.0     0.2300     0.0000
0.9900
  307           0.       2.3000     0.2000     4000.0     0.0350     0.0000
0.9900
  327           0.       2.3000     0.2000     4000.0     0.1100     0.0000
0.9900
  347           0.       2.3000     0.2000     4000.0     0.1100     0.0000
0.9900
  367           0.       2.3000     0.2000     4000.0     0.2300     0.0000
0.9900
  387           0.       2.3000     0.2000     4000.0     0.2300     0.0000
0.9900
  407           0.       2.3000     0.2000     8000.0     0.0350     0.0000
0.9900
  427           0.       2.3000     0.2000     8000.0     0.1100     0.0000
0.9900
  467           0.       2.3000     0.2000     8000.0     0.2300     0.0000
0.9900
  348           0.       4.1000     0.2000     4000.0     0.1100     0.0000
0.9900
  368           0.       4.1000     0.2000     4000.0     0.2300     0.0000
0.9900
```

```
  309           0.      2.9000     0.2000     4000.0     0.0350     0.0000
0.9900
  349           0.      2.9000     0.2000     4000.0     0.1100     0.0000
0.9900
  389           0.      2.9000     0.2000     4000.0     0.2300     0.0000
0.9900
  END PWAT-PARM2
  PWAT-PARM3
    <PLS >***
    # -  #*** PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP
AGWETP
  207  467       40.       35.    0.2500    2.0000       .00
0.        0.
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >                                                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP***
*** sagebrush ***
  301                   0.5000    0.3000     0.000    0.7000
  401                   0.5000    0.3000     0.000    0.7000
  361                   0.3000    0.3000     0.000    0.3000
  381                   0.2000    0.3000     0.000    0.3000
  461                   0.2000    0.3000     0.000    0.3000
  421                   0.3000    0.3000     0.000    0.5000
  321                   0.3000    0.3000     0.000    0.5000
  341                   0.3000    0.3000     0.000    0.5000
  422                   0.3000    0.3000     0.000    0.5000
  323                   0.3000    0.3000     0.000    0.5000
  343                   0.3000    0.3000     0.000    0.5000
*** grassland ***
  207                   0.5000    0.3500     0.000    0.7000
  307                   0.5000    0.3500     0.000    0.7000
  407                   0.5000    0.3500     0.000    0.7000
  309                   0.5000    0.3500     0.000    0.7000
  227                   0.3000    0.3500     0.000    0.5000
  247                   0.3000    0.3500     0.000    0.5000
  327                   0.3000    0.3500     0.000    0.5000
  347                   0.3000    0.3500     0.000    0.5000
  427                   0.3000    0.3500     0.000    0.5000
  348                   0.3000    0.3500     0.000    0.5000
  349                   0.3000    0.3500     0.000    0.5000
  287                   0.2000    0.3500     0.000    0.3000
  367                   0.2000    0.3500     0.000    0.3000
  387                   0.2000    0.3500     0.000    0.3000
  467                   0.2000    0.3500     0.000    0.3000
  368                   0.2000    0.3500     0.000    0.3000
  389                   0.2000    0.3500     0.000    0.3000
  END PWAT-PARM4
  PWAT-STATE1
    <PLS >  PWATER state variables***
    # -  #***   CEPS      SURS       UZS      IFWS       LZS      AGWS
GWVS
*** sagebrush ***
  301             0.        0.    0.0010        0.     0.020     0.010
```

```
.010
  321        0.      0.    0.0010     0.    0.020    0.010
.010
  323        0.      0.    0.0010     0.    0.239    0.010
.010
  341        0.      0.    0.0010     0.    0.020    0.010
.010
  343        0.      0.    0.0010     0.    0.227    0.010
.010
  361        0.      0.    0.0010     0.    0.020    0.010
.010
  381        0.      0.    0.0010     0.    0.020    0.010
.010
  401        0.      0.    0.0010     0.    0.020    0.010
.010
  421        0.      0.    0.0010     0.    0.020    0.010
.010
  422        0.      0.    0.0010     0.    0.060    0.010
.010
  461        0.      0.    0.0010     0.    0.020    0.010
.010
*** grassland ***
  207        0.      0.    0.0010     0.    0.020    0.010
.010
  227        0.      0.    0.0010     0.    0.020    0.010
.010
  247        0.      0.    0.0010     0.    0.020    0.010
.010
  287        0.      0.    0.0010     0.    0.020    0.010
.010
  307        0.      0.    0.0010     0.    0.020    0.010
.010
  309        0.      0.    0.0010     0.    0.020    0.010
.010
  327        0.      0.    0.0010     0.    0.020    0.010
.010
  347        0.      0.    0.0010     0.    0.020    0.010
.010
  348        0.      0.    0.0010     0.    0.020    0.010
.010
  349        0.      0.    0.0010     0.    0.020    0.010
.010
  367        0.      0.    0.0010     0.    0.020    0.010
.010
  368        0.      0.    0.0010     0.    0.020    0.010
.010
  387        0.      0.    0.0010     0.    0.020    0.010
.010
  389        0.      0.    0.0010     0.    0.020    0.010
.010
  407        0.      0.    0.0010     0.    0.020    0.010
.010
  427        0.      0.    0.0010     0.    0.020    0.010
.010
```

```
  467            0.         0.    0.0010         0.      0.020     0.010
.010
  END PWAT-STATE1
  MON-INTERCEP
    <PLS>   Only required if VCSFG=1 in PWAT-PARM1                        ***
    # -  #  Interception storage capacity at start of each month          ***
            JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC ***
*** sagebrush ***
  301       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  321       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  341       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  361       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  381       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  401       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  421       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  461       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  422       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  323       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  343       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
*** grassland ***
  207       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  227       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  247       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  287       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  307       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  327       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  347       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  367       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  387       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  407       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  427       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  467       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  348       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  368       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  309       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  349       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  389       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  END MON-INTERCEP
                                                                           ***
  MON-LZETPARM
    <PLS >  Only required if VLEFG=1 in PWAT-PARM1                        ***
    # -  #  Lower zone ET parameter at start of each month                ***
            JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC ***
*** sagebrush ***
  301       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  321       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  341       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  361       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  381       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  401       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  421       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  461       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  422       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  323       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
```

```
  343       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
*** grassland ***
  207       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  227       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  247       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  287       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  307       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  327       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  347       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  367       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  387       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  407       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  427       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  467       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  348       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  368       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  309       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  349       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  389       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  END MON-LZETPARM
END PERLND

EXT SOURCES

***
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->
***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #
***
WDM      3 PREC     ENGL      1.29         PERLND 207 287 EXTNL  PREC
WDM      3 PREC     ENGL      1.45         PERLND 301 389 EXTNL  PREC
WDM      3 PREC     ENGL      1.61         PERLND 401 467 EXTNL  PREC
WDM      5 WIND     ENGL                   PERLND 207 467 EXTNL  WINMOV
WDM      6 SOLR     ENGL                   PERLND 207     EXTNL  SOLRAD
WDM      7 SOLR     ENGL                   PERLND 227     EXTNL  SOLRAD
WDM      8 SOLR     ENGL                   PERLND 247     EXTNL  SOLRAD
WDM     10 SOLR     ENGL                   PERLND 287     EXTNL  SOLRAD
WDM      6 SOLR     ENGL                   PERLND 301 309 EXTNL  SOLRAD
WDM      7 SOLR     ENGL                   PERLND 321 327 EXTNL  SOLRAD
WDM      8 SOLR     ENGL                   PERLND 341 349 EXTNL  SOLRAD
WDM      9 SOLR     ENGL                   PERLND 361 368 EXTNL  SOLRAD
WDM     10 SOLR     ENGL                   PERLND 381 389 EXTNL  SOLRAD
WDM      6 SOLR     ENGL                   PERLND 401 407 EXTNL  SOLRAD
WDM      7 SOLR     ENGL                   PERLND 421 427 EXTNL  SOLRAD
WDM      9 SOLR     ENGL                   PERLND 461 467 EXTNL  SOLRAD
WDM     15 TEMP     ENGL                   PERLND 207 287 ATEMP  AIRTMP
WDM     25 DEWP     ENGL                   PERLND 207 287 EXTNL  DTMPG
WDM     18 TEMP     ENGL                   PERLND 301 389 ATEMP  AIRTMP
WDM     28 DEWP     ENGL                   PERLND 301 389 EXTNL  DTMPG
WDM     20 TEMP     ENGL                   PERLND 401 467 ATEMP  AIRTMP
WDM     30 DEWP     ENGL                   PERLND 401 467 EXTNL  DTMPG
WDM     35 PET      ENGL                   PERLND 207     EXTNL  PETINP
WDM     45 PET      ENGL                   PERLND 227     EXTNL  PETINP
WDM     55 PET      ENGL                   PERLND 247     EXTNL  PETINP
```

```
WDM      75 PET       ENGL                        PERLND 287      EXTNL  PETINP
WDM      38 PET       ENGL                        PERLND 301 309 EXTNL  PETINP
WDM      48 PET       ENGL                        PERLND 321 327 EXTNL  PETINP
WDM      58 PET       ENGL                        PERLND 341 349 EXTNL  PETINP
WDM      68 PET       ENGL                        PERLND 361 368 EXTNL  PETINP
WDM      78 PET       ENGL                        PERLND 381 389 EXTNL  PETINP
WDM      40 PET       ENGL                        PERLND 401 407 EXTNL  PETINP
WDM      50 PET       ENGL                        PERLND 421 427 EXTNL  PETINP
WDM      70 PET       ENGL                        PERLND 461 467 EXTNL  PETINP
END EXT SOURCES

***
NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->
***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #
***
***Basin geometry
     *** SURO+IFWO (runoff) summed for cold4.
     *** AGWI (direct recharge) summed for cold4.
     *** TAET+SNOWE (actual et) summed for cold4.
     *** Mfact is perlnd area (acres)/12 (coversion from inches to acre-feet)
   *** COLD4 (only subbasin)
PERLND 207 PWATER SURO       12.60000      COPY     1      INPUT  MEAN   1
PERLND 207 PWATER IFWO       12.60000      COPY     1      INPUT  MEAN   1
PERLND 207 PWATER AGWI       12.60000      COPY     1      INPUT  MEAN   3
PERLND 207 PWATER TAET       12.60000      COPY     1      INPUT  MEAN   2
PERLND 207 SNOW   SNOWE      12.60000      COPY     1      INPUT  MEAN   2
PERLND 227 PWATER SURO       23.51667      COPY     1      INPUT  MEAN   1
PERLND 227 PWATER IFWO       23.51667      COPY     1      INPUT  MEAN   1
PERLND 227 PWATER AGWI       23.51667      COPY     1      INPUT  MEAN   3
PERLND 227 PWATER TAET       23.51667      COPY     1      INPUT  MEAN   2
PERLND 227 SNOW   SNOWE      23.51667      COPY     1      INPUT  MEAN   2
PERLND 247 PWATER SURO       22.18333      COPY     1      INPUT  MEAN   1
PERLND 247 PWATER IFWO       22.18333      COPY     1      INPUT  MEAN   1
PERLND 247 PWATER AGWI       22.18333      COPY     1      INPUT  MEAN   3
PERLND 247 PWATER TAET       22.18333      COPY     1      INPUT  MEAN   2
PERLND 247 SNOW   SNOWE      22.18333      COPY     1      INPUT  MEAN   2
PERLND 287 PWATER SURO        8.42500      COPY     1      INPUT  MEAN   1
PERLND 287 PWATER IFWO        8.42500      COPY     1      INPUT  MEAN   1
PERLND 287 PWATER AGWI        8.42500      COPY     1      INPUT  MEAN   3
PERLND 287 PWATER TAET        8.42500      COPY     1      INPUT  MEAN   2
PERLND 287 SNOW   SNOWE       8.42500      COPY     1      INPUT  MEAN   2
PERLND 301 PWATER SURO       19.90000      COPY     1      INPUT  MEAN   1
PERLND 301 PWATER IFWO       19.90000      COPY     1      INPUT  MEAN   1
PERLND 301 PWATER AGWI       19.90000      COPY     1      INPUT  MEAN   3
PERLND 301 PWATER TAET       19.90000      COPY     1      INPUT  MEAN   2
PERLND 301 SNOW   SNOWE      19.90000      COPY     1      INPUT  MEAN   2
PERLND 307 PWATER SURO       41.65833      COPY     1      INPUT  MEAN   1
PERLND 307 PWATER IFWO       41.65833      COPY     1      INPUT  MEAN   1
PERLND 307 PWATER AGWI       41.65833      COPY     1      INPUT  MEAN   3
PERLND 307 PWATER TAET       41.65833      COPY     1      INPUT  MEAN   2
PERLND 307 SNOW   SNOWE      41.65833      COPY     1      INPUT  MEAN   2
PERLND 309 PWATER SURO       24.95833      COPY     1      INPUT  MEAN   1
```

PERLND	309	PWATER	IFWO	24.95833	COPY	1	INPUT	MEAN	1
PERLND	309	PWATER	AGWI	24.95833	COPY	1	INPUT	MEAN	3
PERLND	309	PWATER	TAET	24.95833	COPY	1	INPUT	MEAN	2
PERLND	309	SNOW	SNOWE	24.95833	COPY	1	INPUT	MEAN	2
PERLND	321	PWATER	SURO	29.57500	COPY	1	INPUT	MEAN	1
PERLND	321	PWATER	IFWO	29.57500	COPY	1	INPUT	MEAN	1
PERLND	321	PWATER	AGWI	29.57500	COPY	1	INPUT	MEAN	3
PERLND	321	PWATER	TAET	29.57500	COPY	1	INPUT	MEAN	2
PERLND	321	SNOW	SNOWE	29.57500	COPY	1	INPUT	MEAN	2
PERLND	323	PWATER	SURO	7.75000	COPY	1	INPUT	MEAN	1
PERLND	323	PWATER	IFWO	7.75000	COPY	1	INPUT	MEAN	1
PERLND	323	PWATER	AGWI	7.75000	COPY	1	INPUT	MEAN	3
PERLND	323	PWATER	TAET	7.75000	COPY	1	INPUT	MEAN	2
PERLND	323	SNOW	SNOWE	7.75000	COPY	1	INPUT	MEAN	2
PERLND	327	PWATER	SURO	92.76666	COPY	1	INPUT	MEAN	1
PERLND	327	PWATER	IFWO	92.76666	COPY	1	INPUT	MEAN	1
PERLND	327	PWATER	AGWI	92.76666	COPY	1	INPUT	MEAN	3
PERLND	327	PWATER	TAET	92.76666	COPY	1	INPUT	MEAN	2
PERLND	327	SNOW	SNOWE	92.76666	COPY	1	INPUT	MEAN	2
PERLND	341	PWATER	SURO	56.95833	COPY	1	INPUT	MEAN	1
PERLND	341	PWATER	IFWO	56.95833	COPY	1	INPUT	MEAN	1
PERLND	341	PWATER	AGWI	56.95833	COPY	1	INPUT	MEAN	3
PERLND	341	PWATER	TAET	56.95833	COPY	1	INPUT	MEAN	2
PERLND	341	SNOW	SNOWE	56.95833	COPY	1	INPUT	MEAN	2
PERLND	343	PWATER	SURO	29.20833	COPY	1	INPUT	MEAN	1
PERLND	343	PWATER	IFWO	29.20833	COPY	1	INPUT	MEAN	1
PERLND	343	PWATER	AGWI	29.20833	COPY	1	INPUT	MEAN	3
PERLND	343	PWATER	TAET	29.20833	COPY	1	INPUT	MEAN	2
PERLND	343	SNOW	SNOWE	29.20833	COPY	1	INPUT	MEAN	2
PERLND	347	PWATER	SURO	156.45833	COPY	1	INPUT	MEAN	1
PERLND	347	PWATER	IFWO	156.45833	COPY	1	INPUT	MEAN	1
PERLND	347	PWATER	AGWI	156.45833	COPY	1	INPUT	MEAN	3
PERLND	347	PWATER	TAET	156.45833	COPY	1	INPUT	MEAN	2
PERLND	347	SNOW	SNOWE	156.45833	COPY	1	INPUT	MEAN	2
PERLND	348	PWATER	SURO	7.40833	COPY	1	INPUT	MEAN	1
PERLND	348	PWATER	IFWO	7.40833	COPY	1	INPUT	MEAN	1
PERLND	348	PWATER	AGWI	7.40833	COPY	1	INPUT	MEAN	3
PERLND	348	PWATER	TAET	7.40833	COPY	1	INPUT	MEAN	2
PERLND	348	SNOW	SNOWE	7.40833	COPY	1	INPUT	MEAN	2
PERLND	349	PWATER	SURO	70.55000	COPY	1	INPUT	MEAN	1
PERLND	349	PWATER	IFWO	70.55000	COPY	1	INPUT	MEAN	1
PERLND	349	PWATER	AGWI	70.55000	COPY	1	INPUT	MEAN	3
PERLND	349	PWATER	TAET	70.55000	COPY	1	INPUT	MEAN	2
PERLND	349	SNOW	SNOWE	70.55000	COPY	1	INPUT	MEAN	2
PERLND	361	PWATER	SURO	46.83333	COPY	1	INPUT	MEAN	1
PERLND	361	PWATER	IFWO	46.83333	COPY	1	INPUT	MEAN	1
PERLND	361	PWATER	AGWI	46.83333	COPY	1	INPUT	MEAN	3
PERLND	361	PWATER	TAET	46.83333	COPY	1	INPUT	MEAN	2
PERLND	361	SNOW	SNOWE	46.83333	COPY	1	INPUT	MEAN	2
PERLND	367	PWATER	SURO	82.54166	COPY	1	INPUT	MEAN	1
PERLND	367	PWATER	IFWO	82.54166	COPY	1	INPUT	MEAN	1
PERLND	367	PWATER	AGWI	82.54166	COPY	1	INPUT	MEAN	3
PERLND	367	PWATER	TAET	82.54166	COPY	1	INPUT	MEAN	2
PERLND	367	SNOW	SNOWE	82.54166	COPY	1	INPUT	MEAN	2

PERLND	368	PWATER	SURO	7.17500	COPY	1	INPUT	MEAN	1
PERLND	368	PWATER	IFWO	7.17500	COPY	1	INPUT	MEAN	1
PERLND	368	PWATER	AGWI	7.17500	COPY	1	INPUT	MEAN	3
PERLND	368	PWATER	TAET	7.17500	COPY	1	INPUT	MEAN	2
PERLND	368	SNOW	SNOWE	7.17500	COPY	1	INPUT	MEAN	2
PERLND	381	PWATER	SURO	11.02500	COPY	1	INPUT	MEAN	1
PERLND	381	PWATER	IFWO	11.02500	COPY	1	INPUT	MEAN	1
PERLND	381	PWATER	AGWI	11.02500	COPY	1	INPUT	MEAN	3
PERLND	381	PWATER	TAET	11.02500	COPY	1	INPUT	MEAN	2
PERLND	381	SNOW	SNOWE	11.02500	COPY	1	INPUT	MEAN	2
PERLND	387	PWATER	SURO	35.67500	COPY	1	INPUT	MEAN	1
PERLND	387	PWATER	IFWO	35.67500	COPY	1	INPUT	MEAN	1
PERLND	387	PWATER	AGWI	35.67500	COPY	1	INPUT	MEAN	3
PERLND	387	PWATER	TAET	35.67500	COPY	1	INPUT	MEAN	2
PERLND	387	SNOW	SNOWE	35.67500	COPY	1	INPUT	MEAN	2
PERLND	389	PWATER	SURO	13.42500	COPY	1	INPUT	MEAN	1
PERLND	389	PWATER	IFWO	13.42500	COPY	1	INPUT	MEAN	1
PERLND	389	PWATER	AGWI	13.42500	COPY	1	INPUT	MEAN	3
PERLND	389	PWATER	TAET	13.42500	COPY	1	INPUT	MEAN	2
PERLND	389	SNOW	SNOWE	13.42500	COPY	1	INPUT	MEAN	2
PERLND	401	PWATER	SURO	5.55833	COPY	1	INPUT	MEAN	1
PERLND	401	PWATER	IFWO	5.55833	COPY	1	INPUT	MEAN	1
PERLND	401	PWATER	AGWI	5.55833	COPY	1	INPUT	MEAN	3
PERLND	401	PWATER	TAET	5.55833	COPY	1	INPUT	MEAN	2
PERLND	401	SNOW	SNOWE	5.55833	COPY	1	INPUT	MEAN	2
PERLND	407	PWATER	SURO	4.99167	COPY	1	INPUT	MEAN	1
PERLND	407	PWATER	IFWO	4.99167	COPY	1	INPUT	MEAN	1
PERLND	407	PWATER	AGWI	4.99167	COPY	1	INPUT	MEAN	3
PERLND	407	PWATER	TAET	4.99167	COPY	1	INPUT	MEAN	2
PERLND	407	SNOW	SNOWE	4.99167	COPY	1	INPUT	MEAN	2
PERLND	421	PWATER	SURO	15.30000	COPY	1	INPUT	MEAN	1
PERLND	421	PWATER	IFWO	15.30000	COPY	1	INPUT	MEAN	1
PERLND	421	PWATER	AGWI	15.30000	COPY	1	INPUT	MEAN	3
PERLND	421	PWATER	TAET	15.30000	COPY	1	INPUT	MEAN	2
PERLND	421	SNOW	SNOWE	15.30000	COPY	1	INPUT	MEAN	2
PERLND	422	PWATER	SURO	1.81667	COPY	1	INPUT	MEAN	1
PERLND	422	PWATER	IFWO	1.81667	COPY	1	INPUT	MEAN	1
PERLND	422	PWATER	AGWI	1.81667	COPY	1	INPUT	MEAN	3
PERLND	422	PWATER	TAET	1.81667	COPY	1	INPUT	MEAN	2
PERLND	422	SNOW	SNOWE	1.81667	COPY	1	INPUT	MEAN	2
PERLND	427	PWATER	SURO	17.42500	COPY	1	INPUT	MEAN	1
PERLND	427	PWATER	IFWO	17.42500	COPY	1	INPUT	MEAN	1
PERLND	427	PWATER	AGWI	17.42500	COPY	1	INPUT	MEAN	3
PERLND	427	PWATER	TAET	17.42500	COPY	1	INPUT	MEAN	2
PERLND	427	SNOW	SNOWE	17.42500	COPY	1	INPUT	MEAN	2
PERLND	461	PWATER	SURO	31.05833	COPY	1	INPUT	MEAN	1
PERLND	461	PWATER	IFWO	31.05833	COPY	1	INPUT	MEAN	1
PERLND	461	PWATER	AGWI	31.05833	COPY	1	INPUT	MEAN	3
PERLND	461	PWATER	TAET	31.05833	COPY	1	INPUT	MEAN	2
PERLND	461	SNOW	SNOWE	31.05833	COPY	1	INPUT	MEAN	2
PERLND	467	PWATER	SURO	31.00833	COPY	1	INPUT	MEAN	1
PERLND	467	PWATER	IFWO	31.00833	COPY	1	INPUT	MEAN	1
PERLND	467	PWATER	AGWI	31.00833	COPY	1	INPUT	MEAN	3
PERLND	467	PWATER	TAET	31.00833	COPY	1	INPUT	MEAN	2

```
PERLND 467 SNOW   SNOWE      31.00833      COPY      1      INPUT  MEAN   2
*** Water balance data for cold4
    *** Total ppt. Mfact is fraction of basin area for each elevation zone.
PERLND 207 SNOW   RAINF          .073      COPY      1      INPUT  MEAN   4
PERLND 207 SNOW   SNOWF          .073      COPY      1      INPUT  MEAN   4
PERLND 301 SNOW   RAINF          .809      COPY      1      INPUT  MEAN   4
PERLND 301 SNOW   SNOWF          .809      COPY      1      INPUT  MEAN   4
PERLND 401 SNOW   RAINF          .118      COPY      1      INPUT  MEAN   4
PERLND 401 SNOW   SNOWF          .118      COPY      1      INPUT  MEAN   4
    *** Basin water-balance displays.
COPY      1 OUTPUT MEAN   1                DISPLY    1      INPUT  TIMSER 1
END NETWORK

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd
***
<Name>    #        <Name> # #<-factor->strg <Name>    # <Name>    tem strg
strg***
COPY      1 OUTPUT MEAN   1             SAME WDM    381 RO4       ENGL      REPL
COPY      1 OUTPUT MEAN   2             SAME WDM    382 ET4       ENGL      REPL
COPY      1 OUTPUT MEAN   3             SAME WDM    383 DP4       ENGL      REPL
COPY      1 OUTPUT MEAN   4             SAME WDM    384 PT4       ENGL      REPL
END EXT TARGETS

DISPLY
  DISPLY-INFO1
*** # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2
YRND
    1     cold4 runoff (ac-ft)          SUM                   1    3
50    9
  END DISPLY-INFO1
END DISPLY

COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1            4
  END TIMESERIES
END COPY
SPEC-ACTIONS (Not shown)
  END SPEC-ACTIONS

END RUN
```

Appendix 2.--*Final HSPF input file for Lower Cold Creek model. For brevity, the "SPECIAL ACTIONS" portion of the model input, where the dates of soil freezing and thawing are represented by changes in the INFILT parameter values, is not included. Complete input files may be obtained by contacting the District Chief at the address shown on page ii of this report*

```
RUN
GLOBAL
  cold3,cold2,cold1 final model -- hms.wdm data
  START       1957/10/01 00:00  END    1993/05/31 24:00
  RUN INTERP OUTPUT LEVEL    0
  RESUME     0 RUN     1 TSSFL    15 WDMSFL   16
END GLOBAL
OPN SEQUENCE
    INGRP              INDELT 01:00
      PERLND     101
      PERLND     103
      PERLND     104
      PERLND     105
      COPY         1
      PERLND     106
      PERLND     107
      PERLND     110
      PERLND     121
      PERLND     124
      PERLND     127
      PERLND     130
      PERLND     141
      PERLND     144
      PERLND     147
      PERLND     150
      PERLND     164
      PERLND     204
      PERLND     207
      PERLND     208
      PERLND     209
      PERLND     210
      PERLND     211
      PERLND     212
      PERLND     214
      PERLND     221
      PERLND     222
      PERLND     223
      PERLND     224
      PERLND     227
      PERLND     228
      PERLND     229
      PERLND     230
      PERLND     231
      PERLND     232
      PERLND     234
      PERLND     241
      PERLND     243
      PERLND     244
```

```
      PERLND     247
      PERLND     248
      PERLND     249
      PERLND     250
      PERLND     252
      PERLND     253
      PERLND     254
      PERLND     261
      PERLND     264
      PERLND     267
      PERLND     268
      PERLND     269
      PERLND     281
      PERLND     287
      PERLND     289
      PERLND     308
      PERLND     321
      PERLND     341
      PERLND     347
      PERLND     361
      PERLND     367
      PERLND     381
      PERLND     387
      COPY         2
      COPY         3
      DISPLY       1
      DISPLY       2
      DISPLY       3
    END INGRP
END OPN SEQUENCE

PERLND
  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC
***
  101  387    0    1    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
  PRINT-INFO
    <PLS > ********************* Print-flags ************************ PIVL
PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC
*********
  101              6
6                                                           9
  103  164         6
6                                                           9
  204              6
6                                                           9
  207  289         6
6                                                           9
  308              6
6                                                           9
  321  387         6
```

```
6                                                        9
  END PRINT-INFO
  GEN-INFO
    <PLS ><-----Name--------->NBLKS   Unit-systems   Printer
***
    # -  #                          User  t-series Engl Metr
***
                                           in   out
***
*** Grouped by elevation zone ***
  101      sage,soil1,flat        1    1    1    1    6    0
  103      sage,soil3,flat        1    1    1    1    6    0
  104      sage,soil4,flat        1    1    1    1    6    0
  105      bare,soil1,flat        1    1    1    1    6    0
  106      irri,soil4,flat        1    1    1    1    6    0
  107      gras,soil1,flat        1    1    1    1    6    0
  110      gras,soil4,flat        1    1    1    1    6    0
  121      sage,soil1,mod.N       1    1    1    1    6    0
  124      sage,soil4,mod.N       1    1    1    1    6    0
  127      gras,soil1,mod.N       1    1    1    1    6    0
  130      gras,soil4,mod.N       1    1    1    1    6    0
  141      sage,soil1,mod.S       1    1    1    1    6    0
  144      sage,soil4,mod.S       1    1    1    1    6    0
  147      gras,soil1,mod.S       1    1    1    1    6    0
  150      gras,soil4,mod.S       1    1    1    1    6    0
  164      sage,soil4,stp.N       1    1    1    1    6    0
  204      sage,soil4,flat        1    1    1    1    6    0
  207      gras,soil1,flat        1    1    1    1    6    0
  208      gras,soil2,flat        1    1    1    1    6    0
  209      gras,soil3,flat        1    1    1    1    6    0
  210      gras,soil4,flat        1    1    1    1    6    0
  211      dwht,soil1,flat        1    1    1    1    6    0
  212      dwht,soil2,flat        1    1    1    1    6    0
  214      dwht,soil4,flat        1    1    1    1    6    0
  221      sage,soil1,mod.N       1    1    1    1    6    0
  222      sage,soil2,mod.N       1    1    1    1    6    0
  223      sage,soil3,mod.N       1    1    1    1    6    0
  224      sage,soil4,mod.N       1    1    1    1    6    0
  227      gras,soil1,mod.N       1    1    1    1    6    0
  228      gras,soil2,mod.N       1    1    1    1    6    0
  229      gras,soil3,mod.N       1    1    1    1    6    0
  230      gras,soil4,mod.N       1    1    1    1    6    0
  231      dwht,soil1,mod.N       1    1    1    1    6    0
  232      dwht,soil2,mod.N       1    1    1    1    6    0
  234      dwht,soil4,mod.N       1    1    1    1    6    0
  241      sage,soil1,mod.S       1    1    1    1    6    0
  243      sage,soil3,mod.S       1    1    1    1    6    0
  244      sage,soil4,mod.S       1    1    1    1    6    0
  247      gras,soil1,mod.S       1    1    1    1    6    0
  248      gras,soil2,mod.S       1    1    1    1    6    0
  249      gras,soil3,mod.S       1    1    1    1    6    0
  250      gras,soil4,mod.S       1    1    1    1    6    0
  252      dwht,soil2,mod.S       1    1    1    1    6    0
  253      dwht,soil3,mod.S       1    1    1    1    6    0
```

```
  254      dwht,soil4,mod.S      1    1    1    1    6    0
  261      sage,soil1,stp.N      1    1    1    1    6    0
  264      sage,soil4,stp.N      1    1    1    1    6    0
  267      gras,soil1,stp.N      1    1    1    1    6    0
  268      gras,soil2,stp.N      1    1    1    1    6    0
  269      gras,soil3,stp.N      1    1    1    1    6    0
  281      sage,soil1,stp.S      1    1    1    1    6    0
  287      gras,soil1,stp.S      1    1    1    1    6    0
  289      gras,soil3,stp.S      1    1    1    1    6    0
  308      gras,soil2,flat       1    1    1    1    6    0
  321      sage,soil1,mod.N      1    1    1    1    6    0
  341      sage,soil1,mod.S      1    1    1    1    6    0
  347      gras,soil1,mod.S      1    1    1    1    6    0
  361      sage,soil1,stp.N      1    1    1    1    6    0
  367      gras,soil1,stp.N      1    1    1    1    6    0
  381      sage,soil1,stp.S      1    1    1    1    6    0
  387      gras,soil1,stp.S      1    1    1    1    6    0
  END GEN-INFO
  ICE-FLAG
    <PLS > Value of 1 means ice will be simulated, 0 means not simulated
***
    # -  #ICEFG
***
  101  387    1
  END ICE-FLAG
  SNOW-PARM1
             perlnd   perlnd    shaded  gage-catch  snow w.eq. needed for
***
    <PLS >    latitude  altitude fraction adjustment  complete snowcover
***
    # -  #       LAT     MELEV     SHADE    SNOWCF    COVIND
***
  101  164      46.6      820.       0.0      1.25       0.5
  204  289      46.6     1805.       0.0      1.25       0.5
  308  387      46.6     2789.       0.0      1.25       0.5
  END SNOW-PARM1
  SNOW-PARM2
           new snow   rain vs  sublim.  latent ht.  max AWC   ground
***
    <PLS >    density  snow tmp   adjust    adjust    of pack   melt
***
    # -  #     RDCSN     TSNOW    SNOEVP    CCFACT    MWATER    MGMELT
***
  101  387      0.05       32.      0.85       1.5      0.08      0.02
  END SNOW-PARM2
  SNOW-INIT1
    <PLS >  SNOW initial conditions
***
    # -  #  PACKSNOW   PACKICE PACKWATER    RDENPF      DULL    PAKTMP
***
  101  387       0.0       0.0       0.0       0.2      400.      32.0
  END SNOW-INIT1
  SNOW-INIT2
    <PLS >  SNOW initial conditions
```

```
***
    # -  #    COVINX   XLNMELT    SKYCLR
***
  101  387      0.50       0.0       1.0
  END SNOW-INIT2
  PWAT-PARM1
    <PLS > PWATER variable monthly parameter value flags
***
         Snow          cepsc uzns nsur intfw irc lzetp
***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE
***
  101  387    1    0    0    1    0    0    0    0    1
  END PWAT-PARM1
  PWAT-PARM2
    <PLS > ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY
AGWRC
*** sagebrush ***
  101           0.      2.3000    0.2000    2000.0    0.0350    0.0000
0.9900
  121           0.      2.3000    0.2000    2000.0    0.1100    0.0000
0.9900
  221           0.      2.3000    0.2000    4000.0    0.1100    0.0000
0.9900
  321           0.      2.3000    0.2000    2000.0    0.1100    0.0000
0.9900
  141           0.      2.3000    0.2000    2000.0    0.1100    0.0000
0.9900
  241           0.      2.3000    0.2000    4000.0    0.1100    0.0000
0.9900
  341           0.      2.3000    0.2000    8000.0    0.1100    0.0000
0.9900
  261           0.      2.3000    0.2000    4000.0    0.2300    0.0000
0.9900
  361           0.      2.3000    0.2000    8000.0    0.2300    0.0000
0.9900
  281           0.      2.3000    0.2000    4000.0    0.2300    0.0000
0.9900
  381           0.      2.3000    0.2000    4000.0    0.2300    0.0000
0.9900
  222           0.      4.1000    0.2000    4000.0    0.1100    0.0000
0.9900
  103           0.      6.2000    0.2000    2000.0    0.0350    0.0000
0.9900
  223           0.      6.2000    0.2000    4000.0    0.1100    0.0000
0.9900
  243           0.      6.2000    0.2000    4000.0    0.1100    0.0000
0.9900
  104           0.      9.2000    0.2000    2000.0    0.0350    0.0000
0.9900
  204           0.      9.2000    0.2000    4000.0    0.0350    0.0000
0.9900
  124           0.      9.2000    0.2000    2000.0    0.1100    0.0000
```

```
0.9900
  224          0.      9.2000     0.2000     4000.0     0.1100     0.0000
0.9900
  144          0.      9.2000     0.2000     2000.0     0.1100     0.0000
0.9900
  244          0.      9.2000     0.2000     4000.0     0.1100     0.0000
0.9900
  164          0.      9.2000     0.2000     2000.0     0.2300     0.0000
0.9900
  264          0.      9.2000     0.2000     4000.0     0.2300     0.0000
0.9900
*** grassland ***
  107          0.      2.3000     0.2000     2000.0     0.0350     0.0000
0.9900
  207          0.      2.3000     0.2000     4000.0     0.0350     0.0000
0.9900
  127          0.      2.3000     0.2000     2000.0     0.1100     0.0000
0.9900
  227          0.      2.3000     0.2000     4000.0     0.1100     0.0000
0.9900
  147          0.      2.3000     0.2000     2000.0     0.1100     0.0000
0.9900
  247          0.      2.3000     0.2000     4000.0     0.1100     0.0000
0.9900
  347          0.      2.3000     0.2000     8000.0     0.1100     0.0000
0.9900
  267          0.      2.3000     0.2000     4000.0     0.2300     0.0000
0.9900
  367          0.      2.3000     0.2000     8000.0     0.2300     0.0000
0.9900
  287          0.      2.3000     0.2000     4000.0     0.2300     0.0000
0.9900
  387          0.      2.3000     0.2000     8000.0     0.2300     0.0000
0.9900
  208          0.      4.1000     0.2000     4000.0     0.0350     0.0000
0.9900
  308          0.      4.1000     0.2000     8000.0     0.0350     0.0000
0.9900
  228          0.      4.1000     0.2000     4000.0     0.1100     0.0000
0.9900
  248          0.      4.1000     0.2000     4000.0     0.1100     0.0000
0.9900
  268          0.      4.1000     0.2000     4000.0     0.2300     0.0000
0.9900
  209          0.      2.9000     0.2000     4000.0     0.0350     0.0000
0.9900
  229          0.      2.9000     0.2000     4000.0     0.1100     0.0000
0.9900
  249          0.      2.9000     0.2000     4000.0     0.1100     0.0000
0.9900
  269          0.      2.9000     0.2000     4000.0     0.2300     0.0000
0.9900
  289          0.      2.9000     0.2000     4000.0     0.2300     0.0000
0.9900
```

```
  110          0.       4.6000    0.2000    2000.0    0.0350    0.0000
0.9900
  210          0.       4.6000    0.2000    4000.0    0.0350    0.0000
0.9900
  130          0.       4.6000    0.2000    2000.0    0.1100    0.0000
0.9900
  230          0.       4.6000    0.2000    4000.0    0.1100    0.0000
0.9900
  150          0.       4.6000    0.2000    2000.0    0.1100    0.0000
0.9900
  250          0.       4.6000    0.2000    4000.0    0.1100    0.0000
0.9900
*** dryland wheat ***
  211          0.       2.3000    0.2000    4000.0    0.0350    0.0000
0.9900
  231          0.       2.3000    0.2000    4000.0    0.1100    0.0000
0.9900
  212          0.       4.1000    0.2000    4000.0    0.0350    0.0000
0.9900
  232          0.       4.1000    0.2000    4000.0    0.1100    0.0000
0.9900
  252          0.       4.1000    0.2000    4000.0    0.1100    0.0000
0.9900
  253          0.       5.8000    0.2000    4000.0    0.1100    0.0000
0.9900
  214          0.       9.2000    0.2000    4000.0    0.0350    0.0000
0.9900
  234          0.       9.2000    0.2000    4000.0    0.1100    0.0000
0.9900
  254          0.       9.2000    0.2000    4000.0    0.1100    0.0000
0.9900
*** irrigated ***
  106          0.       9.2000    0.2000    2000.0    0.0350    0.0000
0.9900
*** bare ***
  105          0.       0.0100    0.2000    2000.0    0.0350    0.0000
0.9900
  END PWAT-PARM2
  PWAT-PARM3
    <PLS >***
    # -  #*** PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP
AGWETP
  101  387       40.       35.    0.2500    2.0000       .00
0.       0.
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >                                                          ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC    LZETP***
*** sagebrush ***
  101                   0.5000    0.3000     0.000    0.7000
  121                   0.5000    0.3000     0.000    0.7000
  103                   0.5000    0.3000     0.000    0.7000
  104                   0.5000    0.3000     0.000    0.7000
  204                   0.5000    0.3000     0.000    0.7000
```

221	0.3000	0.3000	0.000	0.5000
321	0.3000	0.3000	0.000	0.5000
141	0.3000	0.3000	0.000	0.5000
241	0.3000	0.3000	0.000	0.5000
341	0.3000	0.3000	0.000	0.5000
222	0.3000	0.3000	0.000	0.5000
223	0.3000	0.3000	0.000	0.5000
243	0.3000	0.3000	0.000	0.5000
124	0.3000	0.3000	0.000	0.5000
224	0.3000	0.3000	0.000	0.5000
144	0.3000	0.3000	0.000	0.5000
244	0.3000	0.3000	0.000	0.5000
261	0.2000	0.3000	0.000	0.3000
361	0.2000	0.3000	0.000	0.3000
281	0.2000	0.3000	0.000	0.3000
381	0.2000	0.3000	0.000	0.3000
164	0.2000	0.3000	0.000	0.3000
264	0.2000	0.3000	0.000	0.3000
*** grassland ***				
107	0.5000	0.3000	0.000	0.7000
207	0.5000	0.3000	0.000	0.7000
208	0.5000	0.3000	0.000	0.7000
308	0.5000	0.3000	0.000	0.7000
209	0.5000	0.3000	0.000	0.7000
110	0.5000	0.3000	0.000	0.7000
210	0.5000	0.3000	0.000	0.7000
127	0.3000	0.3000	0.000	0.5000
227	0.3000	0.3000	0.000	0.5000
147	0.3000	0.3000	0.000	0.5000
247	0.3000	0.3000	0.000	0.5000
347	0.3000	0.3000	0.000	0.5000
228	0.3000	0.3000	0.000	0.5000
248	0.3000	0.3000	0.000	0.5000
229	0.3000	0.3000	0.000	0.5000
249	0.3000	0.3000	0.000	0.5000
130	0.3000	0.3000	0.000	0.5000
230	0.3000	0.3000	0.000	0.5000
150	0.3000	0.3000	0.000	0.5000
250	0.3000	0.3000	0.000	0.5000
267	0.2000	0.3000	0.000	0.3000
367	0.2000	0.3000	0.000	0.3000
287	0.2000	0.3000	0.000	0.3000
387	0.2000	0.3000	0.000	0.3000
268	0.2000	0.3000	0.000	0.3000
269	0.2000	0.3000	0.000	0.3000
289	0.2000	0.3000	0.000	0.3000
*** dryland wheat ***				
211	0.5000	0.3000	0.000	0.7000
212	0.5000	0.3000	0.000	0.7000
214	0.5000	0.3000	0.000	0.7000
231	0.3000	0.3000	0.000	0.5000
232	0.3000	0.3000	0.000	0.5000
252	0.3000	0.3000	0.000	0.5000
253	0.3000	0.3000	0.000	0.5000

```
  234                     0.3000    0.3000     0.000    0.7000
  254                     0.3000    0.3000     0.000    0.7000
*** irrigated ***
  106                     0.5000    0.3000     0.000    0.7000
*** bare ***
  105               0.    0.5000    0.3000     0.000    0.0350    0.0000
  END PWAT-PARM4
  PWAT-STATE1
    <PLS >  PWATER state variables***
    # -  #***   CEPS      SURS       UZS      IFWS       LZS      AGWS
GWVS
*** sagebrush ***
  101               0.        0.    0.0010        0.     0.020     0.010
.010
  121               0.        0.    0.0010        0.     0.020     0.010
.010
  221               0.        0.    0.0010        0.     0.020     0.010
.010
  321               0.        0.    0.0010        0.     0.020     0.010
.010
  141               0.        0.    0.0010        0.     0.020     0.010
.010
  241               0.        0.    0.0010        0.     0.020     0.010
.010
  341               0.        0.    0.0010        0.     0.020     0.010
.010
  261               0.        0.    0.0010        0.     0.020     0.010
.010
  361               0.        0.    0.0010        0.     0.020     0.010
.010
  281               0.        0.    0.0010        0.     0.020     0.010
.010
  381               0.        0.    0.0010        0.     0.020     0.010
.010
  222               0.        0.    0.0010        0.     0.020     0.010
.010
  103               0.        0.    0.0010        0.     0.020     0.010
.010
  223               0.        0.    0.0010        0.     0.020     0.010
.010
  243               0.        0.    0.0010        0.     0.020     0.010
.010
  104               0.        0.    0.0010        0.     0.020     0.010
.010
  204               0.        0.    0.0010        0.     0.020     0.010
.010
  124               0.        0.    0.0010        0.     0.020     0.010
.010
  224               0.        0.    0.0010        0.     0.020     0.010
.010
  144               0.        0.    0.0010        0.     0.020     0.010
.010
  244               0.        0.    0.0010        0.     0.020     0.010
.010
```

```
 164       0.      0.     0.0010      0.     0.020     0.010
.010
 264       0.      0.     0.0010      0.     0.020     0.010
.010
*** grassland ***
 107       0.      0.     0.0010      0.     0.020     0.010
.010
 207       0.      0.     0.0010      0.     0.020     0.010
.010
 127       0.      0.     0.0010      0.     0.020     0.010
.010
 227       0.      0.     0.0010      0.     0.020     0.010
.010
 147       0.      0.     0.0010      0.     0.020     0.010
.010
 247       0.      0.     0.0010      0.     0.020     0.010
.010
 347       0.      0.     0.0010      0.     0.020     0.010
.010
 267       0.      0.     0.0010      0.     0.020     0.010
.010
 367       0.      0.     0.0010      0.     0.020     0.010
.010
 287       0.      0.     0.0010      0.     0.020     0.010
.010
 387       0.      0.     0.0010      0.     0.020     0.010
.010
 208       0.      0.     0.0010      0.     0.020     0.010
.010
 308       0.      0.     0.0010      0.     0.020     0.010
.010
 228       0.      0.     0.0010      0.     0.020     0.010
.010
 248       0.      0.     0.0010      0.     0.020     0.010
.010
 268       0.      0.     0.0010      0.     0.020     0.010
.010
 209       0.      0.     0.0010      0.     0.020     0.010
.010
 229       0.      0.     0.0010      0.     0.020     0.010
.010
 249       0.      0.     0.0010      0.     0.020     0.010
.010
 269       0.      0.     0.0010      0.     0.020     0.010
.010
 289       0.      0.     0.0010      0.     0.020     0.010
.010
 110       0.      0.     0.0010      0.     0.020     0.010
.010
 210       0.      0.     0.0010      0.     0.020     0.010
.010
 130       0.      0.     0.0010      0.     0.020     0.010
.010
 230       0.      0.     0.0010      0.     0.020     0.010
```

```
.010
  150             0.         0.     0.0010        0.     0.020     0.010
.010
  250             0.         0.     0.0010        0.     0.020     0.010
.010
*** dryland wheat ***
  211             0.         0.     0.0010        0.     0.020     0.010
.010
  231             0.         0.     0.0010        0.     0.020     0.010
.010
  212             0.         0.     0.0010        0.     0.020     0.010
.010
  232             0.         0.     0.0010        0.     0.020     0.010
.010
  252             0.         0.     0.0010        0.     0.020     0.010
.010
  253             0.         0.     0.0010        0.     0.020     0.010
.010
  214             0.         0.     0.0010        0.     0.020     0.010
.010
  234             0.         0.     0.0010        0.     0.020     0.010
.010
  254             0.         0.     0.0010        0.     0.020     0.010
.010
*** irrigated ***
  106             0.         0.     0.0010        0.     0.020     0.010
.010
*** bare ***
  105             0.         0.     0.0010        0.     0.020     0.010
.010
  END PWAT-STATE1
  MON-INTERCEP
    <PLS>   Only required if VCSFG=1 in PWAT-PARM1                    ***
    # -  #  Interception storage capacity at start of each month      ***
            JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC ***
*** sagebrush ***
  101      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  121      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  221      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  321      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  141      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  241      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  341      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  261      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  361      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  281      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  381      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  222      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  103      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  223      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  243      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  104      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  204      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  124      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
```

```
  224      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  144      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  244      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  164      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  264      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
*** grassland ***
  107      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  207      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  127      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  227      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  147      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  247      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  347      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  267      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  367      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  287      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  387      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  208      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  308      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  228      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  248      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  268      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  209      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  229      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  249      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  269      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  289      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  110      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  210      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  130      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  230      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  150      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  250      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
*** dryland wheat ***
  211      0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  231      0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  212      0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  232      0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  252      0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  253      0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  214      0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  234      0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  254      0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
*** irrigated vineyards and orchards ***
  106      0.02 0.02 0.03 0.05 0.06 0.07 0.07 0.08 0.08 0.03 0.02 0.02
  END MON-INTERCEP
                                                                       ***
  MON-LZETPARM
    <PLS >  Only required if VLEFG=1 in PWAT-PARM1                     ***
    # -  #  Lower zone ET parameter at start of each month             ***
            JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC ***
*** sagebrush ***
  101      0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  121      0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
```

221	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
321	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
141	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
241	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
341	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
261	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
361	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
281	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
381	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
222	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
103	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
223	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
243	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
104	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
204	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
124	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
224	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
144	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
244	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
164	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
264	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
*** grassland ***												
107	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
207	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
127	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
227	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
147	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
247	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
347	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
267	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
367	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
287	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
387	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
208	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
308	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
228	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
248	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
268	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
209	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
229	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
249	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
269	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
289	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
110	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
210	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
130	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
230	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
150	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
250	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
*** dryland wheat ***												
211	0.99	0.99	0.99	0.99	0.99	0.50	0.00	0.00	0.37	0.99	0.99	0.99
231	0.99	0.99	0.99	0.99	0.99	0.50	0.00	0.00	0.37	0.99	0.99	0.99
212	0.99	0.99	0.99	0.99	0.99	0.50	0.00	0.00	0.37	0.99	0.99	0.99
232	0.99	0.99	0.99	0.99	0.99	0.50	0.00	0.00	0.37	0.99	0.99	0.99

```
  252       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  253       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  214       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  234       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  254       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
*** irrigated vineyards and orchards ***
  106       0.57 0.65 0.76 0.87 0.96 0.99 0.98 0.93 0.87 0.78 0.66 0.57
  END MON-LZETPARM
END PERLND
EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->
***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #
***
*** Irrigation water supply + precip is for perlnd 106 only ***
WDM      1 PREC     ENGL       1.045       COPY     1      INPUT  MEAN   1
WDM    100 IRRI     ENGL                   COPY     1      INPUT  MEAN   1
***
WDM      1 PREC     ENGL       0.95        PERLND 101 105 EXTNL  PREC
WDM      1 PREC     ENGL       0.95        PERLND 107 164 EXTNL  PREC
WDM      1 PREC     ENGL       1.25        PERLND 204 289 EXTNL  PREC
WDM      1 PREC     ENGL       1.49        PERLND 308 387 EXTNL  PREC
WDM      5 WIND     ENGL                   PERLND 101 387 EXTNL  WINMOV
WDM      6 SOLR     ENGL                   PERLND 101 110 EXTNL  SOLRAD
WDM      7 SOLR     ENGL                   PERLND 121 130 EXTNL  SOLRAD
WDM      8 SOLR     ENGL                   PERLND 141 150 EXTNL  SOLRAD
WDM      9 SOLR     ENGL                   PERLND 164     EXTNL  SOLRAD
WDM      6 SOLR     ENGL                   PERLND 204 214 EXTNL  SOLRAD
WDM      7 SOLR     ENGL                   PERLND 221 234 EXTNL  SOLRAD
WDM      8 SOLR     ENGL                   PERLND 241 254 EXTNL  SOLRAD
WDM      9 SOLR     ENGL                   PERLND 261 269 EXTNL  SOLRAD
WDM     10 SOLR     ENGL                   PERLND 281 289 EXTNL  SOLRAD
WDM      6 SOLR     ENGL                   PERLND 308     EXTNL  SOLRAD
WDM      7 SOLR     ENGL                   PERLND 321     EXTNL  SOLRAD
WDM      8 SOLR     ENGL                   PERLND 341 347 EXTNL  SOLRAD
WDM      9 SOLR     ENGL                   PERLND 361 367 EXTNL  SOLRAD
WDM     10 SOLR     ENGL                   PERLND 381 387 EXTNL  SOLRAD
WDM     12 TEMP     ENGL                   PERLND 101 164 ATEMP  AIRTMP
WDM     22 DEWP     ENGL                   PERLND 101 164 EXTNL  DTMPG
WDM     15 TEMP     ENGL                   PERLND 204 289 ATEMP  AIRTMP
WDM     25 DEWP     ENGL                   PERLND 204 289 EXTNL  DTMPG
WDM     18 TEMP     ENGL                   PERLND 308 387 ATEMP  AIRTMP
WDM     28 DEWP     ENGL                   PERLND 308 387 EXTNL  DTMPG
WDM     32 PET      ENGL                   PERLND 101 110 EXTNL  PETINP
WDM     42 PET      ENGL                   PERLND 121 130 EXTNL  PETINP
WDM     52 PET      ENGL                   PERLND 141 150 EXTNL  PETINP
WDM     62 PET      ENGL                   PERLND 164     EXTNL  PETINP
WDM     35 PET      ENGL                   PERLND 204 214 EXTNL  PETINP
WDM     45 PET      ENGL                   PERLND 221 234 EXTNL  PETINP
WDM     55 PET      ENGL                   PERLND 241 254 EXTNL  PETINP
WDM     65 PET      ENGL                   PERLND 261 269 EXTNL  PETINP
WDM     75 PET      ENGL                   PERLND 281 289 EXTNL  PETINP
WDM     38 PET      ENGL                   PERLND 308     EXTNL  PETINP
WDM     48 PET      ENGL                   PERLND 321     EXTNL  PETINP
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WDM      58 PET      ENGL                        PERLND 341 347 EXTNL  PETINP
WDM      68 PET      ENGL                        PERLND 361 367 EXTNL  PETINP
WDM      78 PET      ENGL                        PERLND 381 387 EXTNL  PETINP
END EXT SOURCES

***
NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->
***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #
***
*** Irrigation water and ppt to perlnd 106, vineyards and orchrds***
COPY     1 OUTPUT MEAN   1                       PERLND 106     EXTNL  PREC
***Basin geometry
     *** SURO+IFWO (runoff) summed for each subbasin (cold3, cold2, cold1).
     *** AGWI (direct recharge) summed for cold1.
     *** TAET and SNOWE (actual et) summed for cold1
     *** Mfact is perlnd area (acres)/12 (coversion from inches to acre-feet)
   *** COLD3 (upstream subbasin)
PERLND 204 PWATER SURO        0.72500      COPY     2      INPUT  MEAN   1
PERLND 204 PWATER IFWO        0.72500      COPY     2      INPUT  MEAN   1
PERLND 207 PWATER SURO       11.74167      COPY     2      INPUT  MEAN   1
PERLND 207 PWATER IFWO       11.74167      COPY     2      INPUT  MEAN   1
PERLND 208 PWATER SURO        5.95000      COPY     2      INPUT  MEAN   1
PERLND 208 PWATER IFWO        5.95000      COPY     2      INPUT  MEAN   1
PERLND 209 PWATER SURO        4.70833      COPY     2      INPUT  MEAN   1
PERLND 209 PWATER IFWO        4.70833      COPY     2      INPUT  MEAN   1
PERLND 210 PWATER SURO        6.51667      COPY     2      INPUT  MEAN   1
PERLND 210 PWATER IFWO        6.51667      COPY     2      INPUT  MEAN   1
PERLND 211 PWATER SURO        1.28333      COPY     2      INPUT  MEAN   1
PERLND 211 PWATER IFWO        1.28333      COPY     2      INPUT  MEAN   1
PERLND 212 PWATER SURO        0.35000      COPY     2      INPUT  MEAN   1
PERLND 212 PWATER IFWO        0.35000      COPY     2      INPUT  MEAN   1
PERLND 214 PWATER SURO        0.05833      COPY     2      INPUT  MEAN   1
PERLND 214 PWATER IFWO        0.05833      COPY     2      INPUT  MEAN   1
PERLND 221 PWATER SURO       19.46667      COPY     2      INPUT  MEAN   1
PERLND 221 PWATER IFWO       19.46667      COPY     2      INPUT  MEAN   1
PERLND 222 PWATER SURO        3.41667      COPY     2      INPUT  MEAN   1
PERLND 222 PWATER IFWO        3.41667      COPY     2      INPUT  MEAN   1
PERLND 223 PWATER SURO        4.70000      COPY     2      INPUT  MEAN   1
PERLND 223 PWATER IFWO        4.70000      COPY     2      INPUT  MEAN   1
PERLND 224 PWATER SURO        2.61667      COPY     2      INPUT  MEAN   1
PERLND 224 PWATER IFWO        2.61667      COPY     2      INPUT  MEAN   1
PERLND 227 PWATER SURO       35.59167      COPY     2      INPUT  MEAN   1
PERLND 227 PWATER IFWO       35.59167      COPY     2      INPUT  MEAN   1
PERLND 228 PWATER SURO        7.06667      COPY     2      INPUT  MEAN   1
PERLND 228 PWATER IFWO        7.06667      COPY     2      INPUT  MEAN   1
PERLND 229 PWATER SURO       23.55000      COPY     2      INPUT  MEAN   1
PERLND 229 PWATER IFWO       23.55000      COPY     2      INPUT  MEAN   1
PERLND 230 PWATER SURO       13.95000      COPY     2      INPUT  MEAN   1
PERLND 230 PWATER IFWO       13.95000      COPY     2      INPUT  MEAN   1
PERLND 231 PWATER SURO        0.22500      COPY     2      INPUT  MEAN   1
PERLND 231 PWATER IFWO        0.22500      COPY     2      INPUT  MEAN   1
PERLND 232 PWATER SURO        0.02500      COPY     2      INPUT  MEAN   1
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PERLND 232 PWATER IFWO         0.02500       COPY      2       INPUT   MEAN    1
PERLND 241 PWATER SURO        20.35000       COPY      2       INPUT   MEAN    1
PERLND 241 PWATER IFWO        20.35000       COPY      2       INPUT   MEAN    1
PERLND 243 PWATER SURO         2.93333       COPY      2       INPUT   MEAN    1
PERLND 243 PWATER IFWO         2.93333       COPY      2       INPUT   MEAN    1
PERLND 244 PWATER SURO         6.59167       COPY      2       INPUT   MEAN    1
PERLND 244 PWATER IFWO         6.59167       COPY      2       INPUT   MEAN    1
PERLND 247 PWATER SURO        68.49167       COPY      2       INPUT   MEAN    1
PERLND 247 PWATER IFWO        68.49167       COPY      2       INPUT   MEAN    1
PERLND 248 PWATER SURO         6.85833       COPY      2       INPUT   MEAN    1
PERLND 248 PWATER IFWO         6.85833       COPY      2       INPUT   MEAN    1
PERLND 249 PWATER SURO        10.23333       COPY      2       INPUT   MEAN    1
PERLND 249 PWATER IFWO        10.23333       COPY      2       INPUT   MEAN    1
PERLND 250 PWATER SURO        28.48333       COPY      2       INPUT   MEAN    1
PERLND 250 PWATER IFWO        28.48333       COPY      2       INPUT   MEAN    1
PERLND 253 PWATER SURO         0.60833       COPY      2       INPUT   MEAN    1
PERLND 253 PWATER IFWO         0.60833       COPY      2       INPUT   MEAN    1
PERLND 254 PWATER SURO         0.84167       COPY      2       INPUT   MEAN    1
PERLND 254 PWATER IFWO         0.84167       COPY      2       INPUT   MEAN    1
PERLND 261 PWATER SURO        18.20833       COPY      2       INPUT   MEAN    1
PERLND 261 PWATER IFWO        18.20833       COPY      2       INPUT   MEAN    1
PERLND 264 PWATER SURO         7.21667       COPY      2       INPUT   MEAN    1
PERLND 264 PWATER IFWO         7.21667       COPY      2       INPUT   MEAN    1
PERLND 267 PWATER SURO        29.65000       COPY      2       INPUT   MEAN    1
PERLND 267 PWATER IFWO        29.65000       COPY      2       INPUT   MEAN    1
PERLND 268 PWATER SURO         0.88333       COPY      2       INPUT   MEAN    1
PERLND 268 PWATER IFWO         0.88333       COPY      2       INPUT   MEAN    1
PERLND 269 PWATER SURO         6.71667       COPY      2       INPUT   MEAN    1
PERLND 269 PWATER IFWO         6.71667       COPY      2       INPUT   MEAN    1
PERLND 281 PWATER SURO        18.05000       COPY      2       INPUT   MEAN    1
PERLND 281 PWATER IFWO        18.05000       COPY      2       INPUT   MEAN    1
PERLND 287 PWATER SURO        38.87500       COPY      2       INPUT   MEAN    1
PERLND 287 PWATER IFWO        38.87500       COPY      2       INPUT   MEAN    1
PERLND 289 PWATER SURO         6.34167       COPY      2       INPUT   MEAN    1
PERLND 289 PWATER IFWO         6.34167       COPY      2       INPUT   MEAN    1
PERLND 308 PWATER SURO        10.65000       COPY      2       INPUT   MEAN    1
PERLND 308 PWATER IFWO        10.65000       COPY      2       INPUT   MEAN    1
PERLND 321 PWATER SURO        28.70000       COPY      2       INPUT   MEAN    1
PERLND 321 PWATER IFWO        28.70000       COPY      2       INPUT   MEAN    1
PERLND 341 PWATER SURO        21.43333       COPY      2       INPUT   MEAN    1
PERLND 341 PWATER IFWO        21.43333       COPY      2       INPUT   MEAN    1
PERLND 347 PWATER SURO        23.31667       COPY      2       INPUT   MEAN    1
PERLND 347 PWATER IFWO        23.31667       COPY      2       INPUT   MEAN    1
PERLND 361 PWATER SURO        37.83333       COPY      2       INPUT   MEAN    1
PERLND 361 PWATER IFWO        37.83333       COPY      2       INPUT   MEAN    1
PERLND 367 PWATER SURO        29.24167       COPY      2       INPUT   MEAN    1
PERLND 367 PWATER IFWO        29.24167       COPY      2       INPUT   MEAN    1
PERLND 381 PWATER SURO        25.04167       COPY      2       INPUT   MEAN    1
PERLND 381 PWATER IFWO        25.04167       COPY      2       INPUT   MEAN    1
PERLND 387 PWATER SURO        28.76667       COPY      2       INPUT   MEAN    1
PERLND 387 PWATER IFWO        28.76667       COPY      2       INPUT   MEAN    1
   *** COLD2 (Middle subbasin)
PERLND 103 PWATER SURO        12.13333       COPY      2       INPUT   MEAN    2
PERLND 103 PWATER IFWO        12.13333       COPY      2       INPUT   MEAN    2
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PERLND	104	PWATER	SURO	2.55000	COPY	2	INPUT	MEAN	2
PERLND	104	PWATER	IFWO	2.55000	COPY	2	INPUT	MEAN	2
PERLND	106	PWATER	SURO	28.96667	COPY	2	INPUT	MEAN	2
PERLND	106	PWATER	IFWO	28.96667	COPY	2	INPUT	MEAN	2
PERLND	110	PWATER	SURO	19.95000	COPY	2	INPUT	MEAN	2
PERLND	110	PWATER	IFWO	19.95000	COPY	2	INPUT	MEAN	2
PERLND	124	PWATER	SURO	2.50000	COPY	2	INPUT	MEAN	2
PERLND	124	PWATER	IFWO	2.50000	COPY	2	INPUT	MEAN	2
PERLND	130	PWATER	SURO	10.54167	COPY	2	INPUT	MEAN	2
PERLND	130	PWATER	IFWO	10.54167	COPY	2	INPUT	MEAN	2
PERLND	144	PWATER	SURO	0.03333	COPY	2	INPUT	MEAN	2
PERLND	144	PWATER	IFWO	0.03333	COPY	2	INPUT	MEAN	2
PERLND	150	PWATER	SURO	9.93333	COPY	2	INPUT	MEAN	2
PERLND	150	PWATER	IFWO	9.93333	COPY	2	INPUT	MEAN	2
PERLND	164	PWATER	SURO	0.06667	COPY	2	INPUT	MEAN	2
PERLND	164	PWATER	IFWO	0.06667	COPY	2	INPUT	MEAN	2
PERLND	204	PWATER	SURO	4.11667	COPY	2	INPUT	MEAN	2
PERLND	204	PWATER	IFWO	4.11667	COPY	2	INPUT	MEAN	2
PERLND	207	PWATER	SURO	1.31667	COPY	2	INPUT	MEAN	2
PERLND	207	PWATER	IFWO	1.31667	COPY	2	INPUT	MEAN	2
PERLND	208	PWATER	SURO	10.30833	COPY	2	INPUT	MEAN	2
PERLND	208	PWATER	IFWO	10.30833	COPY	2	INPUT	MEAN	2
PERLND	209	PWATER	SURO	10.88333	COPY	2	INPUT	MEAN	2
PERLND	209	PWATER	IFWO	10.88333	COPY	2	INPUT	MEAN	2
PERLND	210	PWATER	SURO	12.41667	COPY	2	INPUT	MEAN	2
PERLND	210	PWATER	IFWO	12.41667	COPY	2	INPUT	MEAN	2
PERLND	212	PWATER	SURO	8.42500	COPY	2	INPUT	MEAN	2
PERLND	212	PWATER	IFWO	8.42500	COPY	2	INPUT	MEAN	2
PERLND	214	PWATER	SURO	4.95000	COPY	2	INPUT	MEAN	2
PERLND	214	PWATER	IFWO	4.95000	COPY	2	INPUT	MEAN	2
PERLND	221	PWATER	SURO	3.70000	COPY	2	INPUT	MEAN	2
PERLND	221	PWATER	IFWO	3.70000	COPY	2	INPUT	MEAN	2
PERLND	222	PWATER	SURO	12.97500	COPY	2	INPUT	MEAN	2
PERLND	222	PWATER	IFWO	12.97500	COPY	2	INPUT	MEAN	2
PERLND	223	PWATER	SURO	9.75000	COPY	2	INPUT	MEAN	2
PERLND	223	PWATER	IFWO	9.75000	COPY	2	INPUT	MEAN	2
PERLND	224	PWATER	SURO	11.85833	COPY	2	INPUT	MEAN	2
PERLND	224	PWATER	IFWO	11.85833	COPY	2	INPUT	MEAN	2
PERLND	227	PWATER	SURO	9.69167	COPY	2	INPUT	MEAN	2
PERLND	227	PWATER	IFWO	9.69167	COPY	2	INPUT	MEAN	2
PERLND	228	PWATER	SURO	18.46667	COPY	2	INPUT	MEAN	2
PERLND	228	PWATER	IFWO	18.46667	COPY	2	INPUT	MEAN	2
PERLND	229	PWATER	SURO	7.94167	COPY	2	INPUT	MEAN	2
PERLND	229	PWATER	IFWO	7.94167	COPY	2	INPUT	MEAN	2
PERLND	230	PWATER	SURO	28.90833	COPY	2	INPUT	MEAN	2
PERLND	230	PWATER	IFWO	28.90833	COPY	2	INPUT	MEAN	2
PERLND	232	PWATER	SURO	2.09167	COPY	2	INPUT	MEAN	2
PERLND	232	PWATER	IFWO	2.09167	COPY	2	INPUT	MEAN	2
PERLND	234	PWATER	SURO	7.02500	COPY	2	INPUT	MEAN	2
PERLND	234	PWATER	IFWO	7.02500	COPY	2	INPUT	MEAN	2
PERLND	241	PWATER	SURO	2.67500	COPY	2	INPUT	MEAN	2
PERLND	241	PWATER	IFWO	2.67500	COPY	2	INPUT	MEAN	2
PERLND	243	PWATER	SURO	22.58333	COPY	2	INPUT	MEAN	2
PERLND	243	PWATER	IFWO	22.58333	COPY	2	INPUT	MEAN	2

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PERLND 244 PWATER SURO       12.77500      COPY      2      INPUT  MEAN    2
PERLND 244 PWATER IFWO       12.77500      COPY      2      INPUT  MEAN    2
PERLND 247 PWATER SURO        4.66667      COPY      2      INPUT  MEAN    2
PERLND 247 PWATER IFWO        4.66667      COPY      2      INPUT  MEAN    2
PERLND 248 PWATER SURO        9.95833      COPY      2      INPUT  MEAN    2
PERLND 248 PWATER IFWO        9.95833      COPY      2      INPUT  MEAN    2
PERLND 249 PWATER SURO       35.18333      COPY      2      INPUT  MEAN    2
PERLND 249 PWATER IFWO       35.18333      COPY      2      INPUT  MEAN    2
PERLND 250 PWATER SURO       56.16667      COPY      2      INPUT  MEAN    2
PERLND 250 PWATER IFWO       56.16667      COPY      2      INPUT  MEAN    2
PERLND 252 PWATER SURO       13.75000      COPY      2      INPUT  MEAN    2
PERLND 252 PWATER IFWO       13.75000      COPY      2      INPUT  MEAN    2
PERLND 253 PWATER SURO       15.94167      COPY      2      INPUT  MEAN    2
PERLND 253 PWATER IFWO       15.94167      COPY      2      INPUT  MEAN    2
PERLND 254 PWATER SURO       35.32500      COPY      2      INPUT  MEAN    2
PERLND 254 PWATER IFWO       35.32500      COPY      2      INPUT  MEAN    2
PERLND 261 PWATER SURO        1.10000      COPY      2      INPUT  MEAN    2
PERLND 261 PWATER IFWO        1.10000      COPY      2      INPUT  MEAN    2
PERLND 264 PWATER SURO       14.12500      COPY      2      INPUT  MEAN    2
PERLND 264 PWATER IFWO       14.12500      COPY      2      INPUT  MEAN    2
PERLND 267 PWATER SURO        1.82500      COPY      2      INPUT  MEAN    2
PERLND 267 PWATER IFWO        1.82500      COPY      2      INPUT  MEAN    2
PERLND 268 PWATER SURO       20.68333      COPY      2      INPUT  MEAN    2
PERLND 268 PWATER IFWO       20.68333      COPY      2      INPUT  MEAN    2
PERLND 269 PWATER SURO        4.57500      COPY      2      INPUT  MEAN    2
PERLND 269 PWATER IFWO        4.57500      COPY      2      INPUT  MEAN    2
PERLND 281 PWATER SURO        2.70833      COPY      2      INPUT  MEAN    2
PERLND 281 PWATER IFWO        2.70833      COPY      2      INPUT  MEAN    2
PERLND 287 PWATER SURO        1.10000      COPY      2      INPUT  MEAN    2
PERLND 287 PWATER IFWO        1.10000      COPY      2      INPUT  MEAN    2
PERLND 289 PWATER SURO       29.10833      COPY      2      INPUT  MEAN    2
PERLND 289 PWATER IFWO       29.10833      COPY      2      INPUT  MEAN    2
PERLND 308 PWATER SURO        8.91667      COPY      2      INPUT  MEAN    2
PERLND 308 PWATER IFWO        8.91667      COPY      2      INPUT  MEAN    2
PERLND 321 PWATER SURO        5.99167      COPY      2      INPUT  MEAN    2
PERLND 321 PWATER IFWO        5.99167      COPY      2      INPUT  MEAN    2
PERLND 341 PWATER SURO        4.63333      COPY      2      INPUT  MEAN    2
PERLND 341 PWATER IFWO        4.63333      COPY      2      INPUT  MEAN    2
PERLND 347 PWATER SURO        7.76667      COPY      2      INPUT  MEAN    2
PERLND 347 PWATER IFWO        7.76667      COPY      2      INPUT  MEAN    2
PERLND 361 PWATER SURO        0.24167      COPY      2      INPUT  MEAN    2
PERLND 361 PWATER IFWO        0.24167      COPY      2      INPUT  MEAN    2
PERLND 367 PWATER SURO        0.47500      COPY      2      INPUT  MEAN    2
PERLND 367 PWATER IFWO        0.47500      COPY      2      INPUT  MEAN    2
PERLND 381 PWATER SURO        3.87500      COPY      2      INPUT  MEAN    2
PERLND 381 PWATER IFWO        3.87500      COPY      2      INPUT  MEAN    2
PERLND 387 PWATER SURO        1.70000      COPY      2      INPUT  MEAN    2
PERLND 387 PWATER IFWO        1.70000      COPY      2      INPUT  MEAN    2
   *** COLD1 subbasin (downstream subbasin)
PERLND 101 PWATER SURO       98.92500      COPY      2      INPUT  MEAN    3
PERLND 101 PWATER IFWO       98.92500      COPY      2      INPUT  MEAN    3
PERLND 101 PWATER AGWI       98.92500      COPY      2      INPUT  MEAN    7
PERLND 101 PWATER TAET       98.92500      COPY      2      INPUT  MEAN    5
PERLND 101 SNOW   SNOWE      98.92500      COPY      2      INPUT  MEAN    5
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PERLND	103	PWATER	SURO	13.51667	COPY	2	INPUT	MEAN	3
PERLND	103	PWATER	IFWO	13.51667	COPY	2	INPUT	MEAN	3
PERLND	103	PWATER	AGWI	13.51667	COPY	2	INPUT	MEAN	7
PERLND	103	PWATER	TAET	13.51667	COPY	2	INPUT	MEAN	5
PERLND	103	SNOW	SNOWE	13.51667	COPY	2	INPUT	MEAN	5
PERLND	104	PWATER	SURO	270.27499	COPY	2	INPUT	MEAN	3
PERLND	104	PWATER	IFWO	270.27499	COPY	2	INPUT	MEAN	3
PERLND	104	PWATER	AGWI	270.27499	COPY	2	INPUT	MEAN	7
PERLND	104	PWATER	TAET	270.27499	COPY	2	INPUT	MEAN	5
PERLND	104	SNOW	SNOWE	270.27499	COPY	2	INPUT	MEAN	5
PERLND	105	PWATER	SURO	31.89167	COPY	2	INPUT	MEAN	3
PERLND	105	PWATER	IFWO	31.89167	COPY	2	INPUT	MEAN	3
PERLND	105	PWATER	AGWI	31.89167	COPY	2	INPUT	MEAN	7
PERLND	105	PWATER	TAET	31.89167	COPY	2	INPUT	MEAN	5
PERLND	105	SNOW	SNOWE	31.89167	COPY	2	INPUT	MEAN	5
PERLND	106	PWATER	SURO	72.98333	COPY	2	INPUT	MEAN	3
PERLND	106	PWATER	IFWO	72.98333	COPY	2	INPUT	MEAN	3
PERLND	106	PWATER	AGWI	72.98333	COPY	2	INPUT	MEAN	7
PERLND	106	PWATER	TAET	72.98333	COPY	2	INPUT	MEAN	5
PERLND	106	SNOW	SNOWE	72.98333	COPY	2	INPUT	MEAN	5
PERLND	107	PWATER	SURO	35.50834	COPY	2	INPUT	MEAN	3
PERLND	107	PWATER	IFWO	35.50834	COPY	2	INPUT	MEAN	3
PERLND	107	PWATER	AGWI	35.50834	COPY	2	INPUT	MEAN	7
PERLND	107	PWATER	TAET	35.50834	COPY	2	INPUT	MEAN	5
PERLND	107	SNOW	SNOWE	35.50834	COPY	2	INPUT	MEAN	5
PERLND	110	PWATER	SURO	511.64999	COPY	2	INPUT	MEAN	3
PERLND	110	PWATER	IFWO	511.64999	COPY	2	INPUT	MEAN	3
PERLND	110	PWATER	AGWI	511.64999	COPY	2	INPUT	MEAN	7
PERLND	110	PWATER	TAET	511.64999	COPY	2	INPUT	MEAN	5
PERLND	110	SNOW	SNOWE	511.64999	COPY	2	INPUT	MEAN	5
PERLND	121	PWATER	SURO	86.91666	COPY	2	INPUT	MEAN	3
PERLND	121	PWATER	IFWO	86.91666	COPY	2	INPUT	MEAN	3
PERLND	121	PWATER	AGWI	86.91666	COPY	2	INPUT	MEAN	7
PERLND	121	PWATER	TAET	86.91666	COPY	2	INPUT	MEAN	5
PERLND	121	SNOW	SNOWE	86.91666	COPY	2	INPUT	MEAN	5
PERLND	124	PWATER	SURO	53.05000	COPY	2	INPUT	MEAN	3
PERLND	124	PWATER	IFWO	53.05000	COPY	2	INPUT	MEAN	3
PERLND	124	PWATER	AGWI	53.05000	COPY	2	INPUT	MEAN	7
PERLND	124	PWATER	TAET	53.05000	COPY	2	INPUT	MEAN	5
PERLND	124	SNOW	SNOWE	53.05000	COPY	2	INPUT	MEAN	5
PERLND	127	PWATER	SURO	34.75834	COPY	2	INPUT	MEAN	3
PERLND	127	PWATER	IFWO	34.75834	COPY	2	INPUT	MEAN	3
PERLND	127	PWATER	AGWI	34.75834	COPY	2	INPUT	MEAN	7
PERLND	127	PWATER	TAET	34.75834	COPY	2	INPUT	MEAN	5
PERLND	127	SNOW	SNOWE	34.75834	COPY	2	INPUT	MEAN	5
PERLND	130	PWATER	SURO	20.59167	COPY	2	INPUT	MEAN	3
PERLND	130	PWATER	IFWO	20.59167	COPY	2	INPUT	MEAN	3
PERLND	130	PWATER	AGWI	20.59167	COPY	2	INPUT	MEAN	7
PERLND	130	PWATER	TAET	20.59167	COPY	2	INPUT	MEAN	5
PERLND	130	SNOW	SNOWE	20.59167	COPY	2	INPUT	MEAN	5
PERLND	141	PWATER	SURO	14.00000	COPY	2	INPUT	MEAN	3
PERLND	141	PWATER	IFWO	14.00000	COPY	2	INPUT	MEAN	3
PERLND	141	PWATER	AGWI	14.00000	COPY	2	INPUT	MEAN	7
PERLND	141	PWATER	TAET	14.00000	COPY	2	INPUT	MEAN	5

PERLND	141	SNOW	SNOWE	14.00000	COPY	2	INPUT	MEAN	5
PERLND	144	PWATER	SURO	13.35833	COPY	2	INPUT	MEAN	3
PERLND	144	PWATER	IFWO	13.35833	COPY	2	INPUT	MEAN	3
PERLND	144	PWATER	AGWI	13.35833	COPY	2	INPUT	MEAN	7
PERLND	144	PWATER	TAET	13.35833	COPY	2	INPUT	MEAN	5
PERLND	144	SNOW	SNOWE	13.35833	COPY	2	INPUT	MEAN	5
PERLND	147	PWATER	SURO	19.33333	COPY	2	INPUT	MEAN	3
PERLND	147	PWATER	IFWO	19.33333	COPY	2	INPUT	MEAN	3
PERLND	147	PWATER	AGWI	19.33333	COPY	2	INPUT	MEAN	7
PERLND	147	PWATER	TAET	19.33333	COPY	2	INPUT	MEAN	5
PERLND	147	SNOW	SNOWE	19.33333	COPY	2	INPUT	MEAN	5
PERLND	150	PWATER	SURO	62.13333	COPY	2	INPUT	MEAN	3
PERLND	150	PWATER	IFWO	62.13333	COPY	2	INPUT	MEAN	3
PERLND	150	PWATER	AGWI	62.13333	COPY	2	INPUT	MEAN	7
PERLND	150	PWATER	TAET	62.13333	COPY	2	INPUT	MEAN	5
PERLND	150	SNOW	SNOWE	62.13333	COPY	2	INPUT	MEAN	5
PERLND	164	PWATER	SURO	14.21667	COPY	2	INPUT	MEAN	3
PERLND	164	PWATER	IFWO	14.21667	COPY	2	INPUT	MEAN	3
PERLND	164	PWATER	AGWI	14.21667	COPY	2	INPUT	MEAN	7
PERLND	164	PWATER	TAET	14.21667	COPY	2	INPUT	MEAN	5
PERLND	164	SNOW	SNOWE	14.21667	COPY	2	INPUT	MEAN	5
PERLND	204	PWATER	SURO	15.19167	COPY	2	INPUT	MEAN	3
PERLND	204	PWATER	IFWO	15.19167	COPY	2	INPUT	MEAN	3
PERLND	204	PWATER	AGWI	15.19167	COPY	2	INPUT	MEAN	7
PERLND	204	PWATER	TAET	15.19167	COPY	2	INPUT	MEAN	5
PERLND	204	SNOW	SNOWE	15.19167	COPY	2	INPUT	MEAN	5
PERLND	207	PWATER	SURO	7.03333	COPY	2	INPUT	MEAN	3
PERLND	207	PWATER	IFWO	7.03333	COPY	2	INPUT	MEAN	3
PERLND	207	PWATER	AGWI	7.03333	COPY	2	INPUT	MEAN	7
PERLND	207	PWATER	TAET	7.03333	COPY	2	INPUT	MEAN	5
PERLND	207	SNOW	SNOWE	7.03333	COPY	2	INPUT	MEAN	5
PERLND	208	PWATER	SURO	20.30000	COPY	2	INPUT	MEAN	3
PERLND	208	PWATER	IFWO	20.30000	COPY	2	INPUT	MEAN	3
PERLND	208	PWATER	AGWI	20.30000	COPY	2	INPUT	MEAN	7
PERLND	208	PWATER	TAET	20.30000	COPY	2	INPUT	MEAN	5
PERLND	208	SNOW	SNOWE	20.30000	COPY	2	INPUT	MEAN	5
PERLND	209	PWATER	SURO	1.63333	COPY	2	INPUT	MEAN	3
PERLND	209	PWATER	IFWO	1.63333	COPY	2	INPUT	MEAN	3
PERLND	209	PWATER	AGWI	1.63333	COPY	2	INPUT	MEAN	7
PERLND	209	PWATER	TAET	1.63333	COPY	2	INPUT	MEAN	5
PERLND	209	SNOW	SNOWE	1.63333	COPY	2	INPUT	MEAN	5
PERLND	210	PWATER	SURO	24.47500	COPY	2	INPUT	MEAN	3
PERLND	210	PWATER	IFWO	24.47500	COPY	2	INPUT	MEAN	3
PERLND	210	PWATER	AGWI	24.47500	COPY	2	INPUT	MEAN	7
PERLND	210	PWATER	TAET	24.47500	COPY	2	INPUT	MEAN	5
PERLND	210	SNOW	SNOWE	24.47500	COPY	2	INPUT	MEAN	5
PERLND	211	PWATER	SURO	11.83333	COPY	2	INPUT	MEAN	3
PERLND	211	PWATER	IFWO	11.83333	COPY	2	INPUT	MEAN	3
PERLND	211	PWATER	AGWI	11.83333	COPY	2	INPUT	MEAN	7
PERLND	211	PWATER	TAET	11.83333	COPY	2	INPUT	MEAN	5
PERLND	211	SNOW	SNOWE	11.83333	COPY	2	INPUT	MEAN	5
PERLND	212	PWATER	SURO	12.65000	COPY	2	INPUT	MEAN	3
PERLND	212	PWATER	IFWO	12.65000	COPY	2	INPUT	MEAN	3
PERLND	212	PWATER	AGWI	12.65000	COPY	2	INPUT	MEAN	7

PERLND	212	PWATER	TAET	12.65000	COPY	2	INPUT	MEAN	5
PERLND	212	SNOW	SNOWE	12.65000	COPY	2	INPUT	MEAN	5
PERLND	214	PWATER	SURO	37.60833	COPY	2	INPUT	MEAN	3
PERLND	214	PWATER	IFWO	37.60833	COPY	2	INPUT	MEAN	3
PERLND	214	PWATER	AGWI	37.60833	COPY	2	INPUT	MEAN	7
PERLND	214	PWATER	TAET	37.60833	COPY	2	INPUT	MEAN	5
PERLND	214	SNOW	SNOWE	37.60833	COPY	2	INPUT	MEAN	5
PERLND	221	PWATER	SURO	2.21667	COPY	2	INPUT	MEAN	3
PERLND	221	PWATER	IFWO	2.21667	COPY	2	INPUT	MEAN	3
PERLND	221	PWATER	AGWI	2.21667	COPY	2	INPUT	MEAN	7
PERLND	221	PWATER	TAET	2.21667	COPY	2	INPUT	MEAN	5
PERLND	221	SNOW	SNOWE	2.21667	COPY	2	INPUT	MEAN	5
PERLND	222	PWATER	SURO	8.16667	COPY	2	INPUT	MEAN	3
PERLND	222	PWATER	IFWO	8.16667	COPY	2	INPUT	MEAN	3
PERLND	222	PWATER	AGWI	8.16667	COPY	2	INPUT	MEAN	7
PERLND	222	PWATER	TAET	8.16667	COPY	2	INPUT	MEAN	5
PERLND	222	SNOW	SNOWE	8.16667	COPY	2	INPUT	MEAN	5
PERLND	223	PWATER	SURO	0.15000	COPY	2	INPUT	MEAN	3
PERLND	223	PWATER	IFWO	0.15000	COPY	2	INPUT	MEAN	3
PERLND	223	PWATER	AGWI	0.15000	COPY	2	INPUT	MEAN	7
PERLND	223	PWATER	TAET	0.15000	COPY	2	INPUT	MEAN	5
PERLND	223	SNOW	SNOWE	0.15000	COPY	2	INPUT	MEAN	5
PERLND	224	PWATER	SURO	16.99167	COPY	2	INPUT	MEAN	3
PERLND	224	PWATER	IFWO	16.99167	COPY	2	INPUT	MEAN	3
PERLND	224	PWATER	AGWI	16.99167	COPY	2	INPUT	MEAN	7
PERLND	224	PWATER	TAET	16.99167	COPY	2	INPUT	MEAN	5
PERLND	224	SNOW	SNOWE	16.99167	COPY	2	INPUT	MEAN	5
PERLND	227	PWATER	SURO	15.14167	COPY	2	INPUT	MEAN	3
PERLND	227	PWATER	IFWO	15.14167	COPY	2	INPUT	MEAN	3
PERLND	227	PWATER	AGWI	15.14167	COPY	2	INPUT	MEAN	7
PERLND	227	PWATER	TAET	15.14167	COPY	2	INPUT	MEAN	5
PERLND	227	SNOW	SNOWE	15.14167	COPY	2	INPUT	MEAN	5
PERLND	228	PWATER	SURO	42.04167	COPY	2	INPUT	MEAN	3
PERLND	228	PWATER	IFWO	42.04167	COPY	2	INPUT	MEAN	3
PERLND	228	PWATER	AGWI	42.04167	COPY	2	INPUT	MEAN	7
PERLND	228	PWATER	TAET	42.04167	COPY	2	INPUT	MEAN	5
PERLND	228	SNOW	SNOWE	42.04167	COPY	2	INPUT	MEAN	5
PERLND	229	PWATER	SURO	4.98333	COPY	2	INPUT	MEAN	3
PERLND	229	PWATER	IFWO	4.98333	COPY	2	INPUT	MEAN	3
PERLND	229	PWATER	AGWI	4.98333	COPY	2	INPUT	MEAN	7
PERLND	229	PWATER	TAET	4.98333	COPY	2	INPUT	MEAN	5
PERLND	229	SNOW	SNOWE	4.98333	COPY	2	INPUT	MEAN	5
PERLND	230	PWATER	SURO	34.27500	COPY	2	INPUT	MEAN	3
PERLND	230	PWATER	IFWO	34.27500	COPY	2	INPUT	MEAN	3
PERLND	230	PWATER	AGWI	34.27500	COPY	2	INPUT	MEAN	7
PERLND	230	PWATER	TAET	34.27500	COPY	2	INPUT	MEAN	5
PERLND	230	SNOW	SNOWE	34.27500	COPY	2	INPUT	MEAN	5
PERLND	231	PWATER	SURO	14.95833	COPY	2	INPUT	MEAN	3
PERLND	231	PWATER	IFWO	14.95833	COPY	2	INPUT	MEAN	3
PERLND	231	PWATER	AGWI	14.95833	COPY	2	INPUT	MEAN	7
PERLND	231	PWATER	TAET	14.95833	COPY	2	INPUT	MEAN	5
PERLND	231	SNOW	SNOWE	14.95833	COPY	2	INPUT	MEAN	5
PERLND	232	PWATER	SURO	14.49167	COPY	2	INPUT	MEAN	3
PERLND	232	PWATER	IFWO	14.49167	COPY	2	INPUT	MEAN	3

PERLND	232	PWATER	AGWI	14.49167	COPY	2	INPUT	MEAN	7
PERLND	232	PWATER	TAET	14.49167	COPY	2	INPUT	MEAN	5
PERLND	232	SNOW	SNOWE	14.49167	COPY	2	INPUT	MEAN	5
PERLND	234	PWATER	SURO	17.07500	COPY	2	INPUT	MEAN	3
PERLND	234	PWATER	IFWO	17.07500	COPY	2	INPUT	MEAN	3
PERLND	234	PWATER	AGWI	17.07500	COPY	2	INPUT	MEAN	7
PERLND	234	PWATER	TAET	17.07500	COPY	2	INPUT	MEAN	5
PERLND	234	SNOW	SNOWE	17.07500	COPY	2	INPUT	MEAN	5
PERLND	241	PWATER	SURO	0.82500	COPY	2	INPUT	MEAN	3
PERLND	241	PWATER	IFWO	0.82500	COPY	2	INPUT	MEAN	3
PERLND	241	PWATER	AGWI	0.82500	COPY	2	INPUT	MEAN	7
PERLND	241	PWATER	TAET	0.82500	COPY	2	INPUT	MEAN	5
PERLND	241	SNOW	SNOWE	0.82500	COPY	2	INPUT	MEAN	5
PERLND	243	PWATER	SURO	1.87500	COPY	2	INPUT	MEAN	3
PERLND	243	PWATER	IFWO	1.87500	COPY	2	INPUT	MEAN	3
PERLND	243	PWATER	AGWI	1.87500	COPY	2	INPUT	MEAN	7
PERLND	243	PWATER	TAET	1.87500	COPY	2	INPUT	MEAN	5
PERLND	243	SNOW	SNOWE	1.87500	COPY	2	INPUT	MEAN	5
PERLND	244	PWATER	SURO	20.73333	COPY	2	INPUT	MEAN	3
PERLND	244	PWATER	IFWO	20.73333	COPY	2	INPUT	MEAN	3
PERLND	244	PWATER	AGWI	20.73333	COPY	2	INPUT	MEAN	7
PERLND	244	PWATER	TAET	20.73333	COPY	2	INPUT	MEAN	5
PERLND	244	SNOW	SNOWE	20.73333	COPY	2	INPUT	MEAN	5
PERLND	247	PWATER	SURO	18.77500	COPY	2	INPUT	MEAN	3
PERLND	247	PWATER	IFWO	18.77500	COPY	2	INPUT	MEAN	3
PERLND	247	PWATER	AGWI	18.77500	COPY	2	INPUT	MEAN	7
PERLND	247	PWATER	TAET	18.77500	COPY	2	INPUT	MEAN	5
PERLND	247	SNOW	SNOWE	18.77500	COPY	2	INPUT	MEAN	5
PERLND	248	PWATER	SURO	43.18333	COPY	2	INPUT	MEAN	3
PERLND	248	PWATER	IFWO	43.18333	COPY	2	INPUT	MEAN	3
PERLND	248	PWATER	AGWI	43.18333	COPY	2	INPUT	MEAN	7
PERLND	248	PWATER	TAET	43.18333	COPY	2	INPUT	MEAN	5
PERLND	248	SNOW	SNOWE	43.18333	COPY	2	INPUT	MEAN	5
PERLND	249	PWATER	SURO	8.29167	COPY	2	INPUT	MEAN	3
PERLND	249	PWATER	IFWO	8.29167	COPY	2	INPUT	MEAN	3
PERLND	249	PWATER	AGWI	8.29167	COPY	2	INPUT	MEAN	7
PERLND	249	PWATER	TAET	8.29167	COPY	2	INPUT	MEAN	5
PERLND	249	SNOW	SNOWE	8.29167	COPY	2	INPUT	MEAN	5
PERLND	250	PWATER	SURO	58.85833	COPY	2	INPUT	MEAN	3
PERLND	250	PWATER	IFWO	58.85833	COPY	2	INPUT	MEAN	3
PERLND	250	PWATER	AGWI	58.85833	COPY	2	INPUT	MEAN	7
PERLND	250	PWATER	TAET	58.85833	COPY	2	INPUT	MEAN	5
PERLND	250	SNOW	SNOWE	58.85833	COPY	2	INPUT	MEAN	5
PERLND	252	PWATER	SURO	4.37500	COPY	2	INPUT	MEAN	3
PERLND	252	PWATER	IFWO	4.37500	COPY	2	INPUT	MEAN	3
PERLND	252	PWATER	AGWI	4.37500	COPY	2	INPUT	MEAN	7
PERLND	252	PWATER	TAET	4.37500	COPY	2	INPUT	MEAN	5
PERLND	252	SNOW	SNOWE	4.37500	COPY	2	INPUT	MEAN	5
PERLND	253	PWATER	SURO	0.74167	COPY	2	INPUT	MEAN	3
PERLND	253	PWATER	IFWO	0.74167	COPY	2	INPUT	MEAN	3
PERLND	253	PWATER	AGWI	0.74167	COPY	2	INPUT	MEAN	7
PERLND	253	PWATER	TAET	0.74167	COPY	2	INPUT	MEAN	5
PERLND	253	SNOW	SNOWE	0.74167	COPY	2	INPUT	MEAN	5
PERLND	254	PWATER	SURO	7.38333	COPY	2	INPUT	MEAN	3

```
PERLND 254 PWATER IFWO        7.38333      COPY     2      INPUT  MEAN   3
PERLND 254 PWATER AGWI        7.38333      COPY     2      INPUT  MEAN   7
PERLND 254 PWATER TAET        7.38333      COPY     2      INPUT  MEAN   5
PERLND 254 SNOW   SNOWE       7.38333      COPY     2      INPUT  MEAN   5
PERLND 261 PWATER SURO        1.84167      COPY     2      INPUT  MEAN   3
PERLND 261 PWATER IFWO        1.84167      COPY     2      INPUT  MEAN   3
PERLND 261 PWATER AGWI        1.84167      COPY     2      INPUT  MEAN   7
PERLND 261 PWATER TAET        1.84167      COPY     2      INPUT  MEAN   5
PERLND 261 SNOW   SNOWE       1.84167      COPY     2      INPUT  MEAN   5
PERLND 264 PWATER SURO       14.29167      COPY     2      INPUT  MEAN   3
PERLND 264 PWATER IFWO       14.29167      COPY     2      INPUT  MEAN   3
PERLND 264 PWATER AGWI       14.29167      COPY     2      INPUT  MEAN   7
PERLND 264 PWATER TAET       14.29167      COPY     2      INPUT  MEAN   5
PERLND 264 SNOW   SNOWE      14.29167      COPY     2      INPUT  MEAN   5
PERLND 267 PWATER SURO        4.63333      COPY     2      INPUT  MEAN   3
PERLND 267 PWATER IFWO        4.63333      COPY     2      INPUT  MEAN   3
PERLND 267 PWATER AGWI        4.63333      COPY     2      INPUT  MEAN   7
PERLND 267 PWATER TAET        4.63333      COPY     2      INPUT  MEAN   5
PERLND 267 SNOW   SNOWE       4.63333      COPY     2      INPUT  MEAN   5
PERLND 268 PWATER SURO        2.45000      COPY     2      INPUT  MEAN   3
PERLND 268 PWATER IFWO        2.45000      COPY     2      INPUT  MEAN   3
PERLND 268 PWATER AGWI        2.45000      COPY     2      INPUT  MEAN   7
PERLND 268 PWATER TAET        2.45000      COPY     2      INPUT  MEAN   5
PERLND 268 SNOW   SNOWE       2.45000      COPY     2      INPUT  MEAN   5
PERLND 281 PWATER SURO        0.10000      COPY     2      INPUT  MEAN   3
PERLND 281 PWATER IFWO        0.10000      COPY     2      INPUT  MEAN   3
PERLND 281 PWATER AGWI        0.10000      COPY     2      INPUT  MEAN   7
PERLND 281 PWATER TAET        0.10000      COPY     2      INPUT  MEAN   5
PERLND 281 SNOW   SNOWE       0.10000      COPY     2      INPUT  MEAN   5
PERLND 287 PWATER SURO        6.42500      COPY     2      INPUT  MEAN   3
PERLND 287 PWATER IFWO        6.42500      COPY     2      INPUT  MEAN   3
PERLND 287 PWATER AGWI        6.42500      COPY     2      INPUT  MEAN   7
PERLND 287 PWATER TAET        6.42500      COPY     2      INPUT  MEAN   5
PERLND 287 SNOW   SNOWE       6.42500      COPY     2      INPUT  MEAN   5
PERLND 289 PWATER SURO        4.06667      COPY     2      INPUT  MEAN   3
PERLND 289 PWATER IFWO        4.06667      COPY     2      INPUT  MEAN   3
PERLND 289 PWATER AGWI        4.06667      COPY     2      INPUT  MEAN   7
PERLND 289 PWATER TAET        4.06667      COPY     2      INPUT  MEAN   5
PERLND 289 SNOW   SNOWE       4.06667      COPY     2      INPUT  MEAN   5
PERLND 308 PWATER SURO        0.16667      COPY     2      INPUT  MEAN   3
PERLND 308 PWATER IFWO        0.16667      COPY     2      INPUT  MEAN   3
PERLND 308 PWATER AGWI        0.16667      COPY     2      INPUT  MEAN   7
PERLND 308 PWATER TAET        0.16667      COPY     2      INPUT  MEAN   5
PERLND 308 SNOW   SNOWE       0.16667      COPY     2      INPUT  MEAN   5
PERLND 347 PWATER SURO        0.03333      COPY     2      INPUT  MEAN   3
PERLND 347 PWATER IFWO        0.03333      COPY     2      INPUT  MEAN   3
PERLND 347 PWATER AGWI        0.03333      COPY     2      INPUT  MEAN   7
PERLND 347 PWATER TAET        0.03333      COPY     2      INPUT  MEAN   5
PERLND 347 SNOW   SNOWE       0.03333      COPY     2      INPUT  MEAN   5
   *** AGWI from cold3+cold2 summed for routing to gw reservoir
   *** TAET and from cold3+cold2 summed for output
   *** Mfact is cold3 acres + cold2 acres / 12
PERLND 103 PWATER AGWI       12.13333      COPY     2      INPUT  MEAN   6
PERLND 103 PWATER TAET       12.13333      COPY     2      INPUT  MEAN   4
```

PERLND	104	PWATER	AGWI	2.55000	COPY	2	INPUT	MEAN	6
PERLND	104	PWATER	TAET	2.55000	COPY	2	INPUT	MEAN	4
PERLND	106	PWATER	AGWI	28.96667	COPY	2	INPUT	MEAN	6
PERLND	106	PWATER	TAET	28.96667	COPY	2	INPUT	MEAN	4
PERLND	110	PWATER	AGWI	19.95000	COPY	2	INPUT	MEAN	6
PERLND	110	PWATER	TAET	19.95000	COPY	2	INPUT	MEAN	4
PERLND	124	PWATER	AGWI	2.50000	COPY	2	INPUT	MEAN	6
PERLND	124	PWATER	TAET	2.50000	COPY	2	INPUT	MEAN	4
PERLND	130	PWATER	AGWI	10.54167	COPY	2	INPUT	MEAN	6
PERLND	130	PWATER	TAET	10.54167	COPY	2	INPUT	MEAN	4
PERLND	144	PWATER	AGWI	0.03333	COPY	2	INPUT	MEAN	6
PERLND	144	PWATER	TAET	0.03333	COPY	2	INPUT	MEAN	4
PERLND	150	PWATER	AGWI	9.93333	COPY	2	INPUT	MEAN	6
PERLND	150	PWATER	TAET	9.93333	COPY	2	INPUT	MEAN	4
PERLND	164	PWATER	AGWI	0.06667	COPY	2	INPUT	MEAN	6
PERLND	164	PWATER	TAET	0.06667	COPY	2	INPUT	MEAN	4
PERLND	204	PWATER	AGWI	4.84167	COPY	2	INPUT	MEAN	6
PERLND	204	PWATER	TAET	4.84167	COPY	2	INPUT	MEAN	4
PERLND	207	PWATER	AGWI	13.05827	COPY	2	INPUT	MEAN	6
PERLND	207	PWATER	TAET	13.05827	COPY	2	INPUT	MEAN	4
PERLND	208	PWATER	AGWI	16.25833	COPY	2	INPUT	MEAN	6
PERLND	208	PWATER	TAET	16.25833	COPY	2	INPUT	MEAN	4
PERLND	209	PWATER	AGWI	15.59166	COPY	2	INPUT	MEAN	6
PERLND	209	PWATER	TAET	15.59166	COPY	2	INPUT	MEAN	4
PERLND	210	PWATER	AGWI	18.93334	COPY	2	INPUT	MEAN	6
PERLND	210	PWATER	TAET	18.93334	COPY	2	INPUT	MEAN	4
PERLND	211	PWATER	AGWI	1.28333	COPY	2	INPUT	MEAN	6
PERLND	211	PWATER	TAET	1.28333	COPY	2	INPUT	MEAN	4
PERLND	212	PWATER	AGWI	8.77500	COPY	2	INPUT	MEAN	6
PERLND	212	PWATER	TAET	8.77500	COPY	2	INPUT	MEAN	4
PERLND	214	PWATER	AGWI	5.00833	COPY	2	INPUT	MEAN	6
PERLND	214	PWATER	TAET	5.00833	COPY	2	INPUT	MEAN	4
PERLND	221	PWATER	AGWI	23.16667	COPY	2	INPUT	MEAN	6
PERLND	221	PWATER	TAET	23.16667	COPY	2	INPUT	MEAN	4
PERLND	222	PWATER	AGWI	16.39167	COPY	2	INPUT	MEAN	6
PERLND	222	PWATER	TAET	16.39167	COPY	2	INPUT	MEAN	4
PERLND	223	PWATER	AGWI	14.45000	COPY	2	INPUT	MEAN	6
PERLND	223	PWATER	TAET	14.45000	COPY	2	INPUT	MEAN	4
PERLND	224	PWATER	AGWI	14.47500	COPY	2	INPUT	MEAN	6
PERLND	224	PWATER	TAET	14.47500	COPY	2	INPUT	MEAN	4
PERLND	227	PWATER	AGWI	45.28334	COPY	2	INPUT	MEAN	6
PERLND	227	PWATER	TAET	45.28334	COPY	2	INPUT	MEAN	4
PERLND	228	PWATER	AGWI	25.53334	COPY	2	INPUT	MEAN	6
PERLND	228	PWATER	TAET	25.53334	COPY	2	INPUT	MEAN	4
PERLND	229	PWATER	AGWI	31.49167	COPY	2	INPUT	MEAN	6
PERLND	229	PWATER	TAET	31.49167	COPY	2	INPUT	MEAN	4
PERLND	230	PWATER	AGWI	42.85833	COPY	2	INPUT	MEAN	6
PERLND	230	PWATER	TAET	42.85833	COPY	2	INPUT	MEAN	4
PERLND	231	PWATER	AGWI	0.22500	COPY	2	INPUT	MEAN	6
PERLND	231	PWATER	TAET	0.22500	COPY	2	INPUT	MEAN	4
PERLND	232	PWATER	AGWI	2.11667	COPY	2	INPUT	MEAN	6
PERLND	232	PWATER	TAET	2.11667	COPY	2	INPUT	MEAN	4
PERLND	234	PWATER	AGWI	7.02500	COPY	2	INPUT	MEAN	6
PERLND	234	PWATER	TAET	7.02500	COPY	2	INPUT	MEAN	4

PERLND	241	PWATER	AGWI	23.02500	COPY	2	INPUT	MEAN	6
PERLND	241	PWATER	TAET	23.02500	COPY	2	INPUT	MEAN	4
PERLND	243	PWATER	AGWI	25.51663	COPY	2	INPUT	MEAN	6
PERLND	243	PWATER	TAET	25.51663	COPY	2	INPUT	MEAN	4
PERLND	244	PWATER	AGWI	19.36667	COPY	2	INPUT	MEAN	6
PERLND	244	PWATER	TAET	19.36667	COPY	2	INPUT	MEAN	4
PERLND	247	PWATER	AGWI	73.15834	COPY	2	INPUT	MEAN	6
PERLND	247	PWATER	TAET	73.15834	COPY	2	INPUT	MEAN	4
PERLND	248	PWATER	AGWI	16.81666	COPY	2	INPUT	MEAN	6
PERLND	248	PWATER	TAET	16.81666	COPY	2	INPUT	MEAN	4
PERLND	249	PWATER	AGWI	45.41666	COPY	2	INPUT	MEAN	6
PERLND	249	PWATER	TAET	45.41666	COPY	2	INPUT	MEAN	4
PERLND	250	PWATER	AGWI	84.65000	COPY	2	INPUT	MEAN	6
PERLND	250	PWATER	TAET	84.65000	COPY	2	INPUT	MEAN	4
PERLND	252	PWATER	AGWI	13.75000	COPY	2	INPUT	MEAN	6
PERLND	252	PWATER	TAET	13.75000	COPY	2	INPUT	MEAN	4
PERLND	253	PWATER	AGWI	16.55000	COPY	2	INPUT	MEAN	6
PERLND	253	PWATER	TAET	16.55000	COPY	2	INPUT	MEAN	4
PERLND	254	PWATER	AGWI	36.16667	COPY	2	INPUT	MEAN	6
PERLND	254	PWATER	TAET	36.16667	COPY	2	INPUT	MEAN	4
PERLND	261	PWATER	AGWI	19.30833	COPY	2	INPUT	MEAN	6
PERLND	261	PWATER	TAET	19.30833	COPY	2	INPUT	MEAN	4
PERLND	264	PWATER	AGWI	21.34167	COPY	2	INPUT	MEAN	6
PERLND	264	PWATER	TAET	21.24167	COPY	2	INPUT	MEAN	4
PERLND	267	PWATER	AGWI	31.47500	COPY	2	INPUT	MEAN	6
PERLND	267	PWATER	TAET	31.47500	COPY	2	INPUT	MEAN	4
PERLND	268	PWATER	AGWI	21.56666	COPY	2	INPUT	MEAN	6
PERLND	268	PWATER	TAET	21.56666	COPY	2	INPUT	MEAN	4
PERLND	269	PWATER	AGWI	11.29167	COPY	2	INPUT	MEAN	6
PERLND	269	PWATER	TAET	11.29167	COPY	2	INPUT	MEAN	4
PERLND	281	PWATER	AGWI	20.75833	COPY	2	INPUT	MEAN	6
PERLND	281	PWATER	TAET	20.75833	COPY	2	INPUT	MEAN	4
PERLND	287	PWATER	AGWI	39.97500	COPY	2	INPUT	MEAN	6
PERLND	287	PWATER	TAET	39.97500	COPY	2	INPUT	MEAN	4
PERLND	289	PWATER	AGWI	35.45000	COPY	2	INPUT	MEAN	6
PERLND	289	PWATER	TAET	35.45000	COPY	2	INPUT	MEAN	4
PERLND	308	PWATER	AGWI	19.56667	COPY	2	INPUT	MEAN	6
PERLND	308	PWATER	TAET	19.56667	COPY	2	INPUT	MEAN	4
PERLND	321	PWATER	AGWI	34.69167	COPY	2	INPUT	MEAN	6
PERLND	321	PWATER	TAET	34.69167	COPY	2	INPUT	MEAN	4
PERLND	341	PWATER	AGWI	26.06666	COPY	2	INPUT	MEAN	6
PERLND	341	PWATER	TAET	26.06666	COPY	2	INPUT	MEAN	4
PERLND	347	PWATER	AGWI	31.08334	COPY	2	INPUT	MEAN	6
PERLND	347	PWATER	TAET	31.08334	COPY	2	INPUT	MEAN	4
PERLND	361	PWATER	AGWI	38.07500	COPY	2	INPUT	MEAN	6
PERLND	361	PWATER	TAET	38.07500	COPY	2	INPUT	MEAN	4
PERLND	367	PWATER	AGWI	29.71667	COPY	2	INPUT	MEAN	6
PERLND	367	PWATER	TAET	29.71667	COPY	2	INPUT	MEAN	4
PERLND	381	PWATER	AGWI	28.91667	COPY	2	INPUT	MEAN	6
PERLND	381	PWATER	TAET	28.91667	COPY	2	INPUT	MEAN	4
PERLND	387	PWATER	AGWI	30.46667	COPY	2	INPUT	MEAN	6
PERLND	387	PWATER	TAET	30.46667	COPY	2	INPUT	MEAN	4

*** SNOWE from cold3+cold2 elevation/slope/aspect zones added to TAET

*** mfact is total acres in elev/slope/aspect zone / 12.

```
   *** perlnd # is one that represents a given zone.
PERLND 103 SNOW   SNOWE      63.60000     COPY     2     INPUT  MEAN   4
PERLND 124 SNOW   SNOWE      13.04167     COPY     2     INPUT  MEAN   4
PERLND 144 SNOW   SNOWE       9.96667     COPY     2     INPUT  MEAN   4
PERLND 164 SNOW   SNOWE       0.06667     COPY     2     INPUT  MEAN   4
PERLND 204 SNOW   SNOWE      83.74993     COPY     2     INPUT  MEAN   4
PERLND 221 SNOW   SNOWE     223.01669     COPY     2     INPUT  MEAN   4
PERLND 241 SNOW   SNOWE     356.41633     COPY     2     INPUT  MEAN   4
PERLND 261 SNOW   SNOWE     104.98333     COPY     2     INPUT  MEAN   4
PERLND 281 SNOW   SNOWE     100.18333     COPY     2     INPUT  MEAN   4
PERLND 308 SNOW   SNOWE      19.56667     COPY     2     INPUT  MEAN   4
PERLND 321 SNOW   SNOWE      34.69167     COPY     2     INPUT  MEAN   4
PERLND 341 SNOW   SNOWE      57.15000     COPY     2     INPUT  MEAN   4
PERLND 361 SNOW   SNOWE      67.79167     COPY     2     INPUT  MEAN   4
PERLND 381 SNOW   SNOWE      59.38334     COPY     2     INPUT  MEAN   4
 *** Water balance data for cold3+cold2 and cold1
 *** Total ppt. Mfact is fraction of basin area for each elevation zone.
PERLND 101 SNOW   RAINF        .049       COPY     2     INPUT  MEAN   8
PERLND 101 SNOW   SNOWF        .049       COPY     2     INPUT  MEAN   8
PERLND 106 SNOW   RAINF        .024       COPY     2     INPUT  MEAN   8
PERLND 106 SNOW   SNOWF        .024       COPY     2     INPUT  MEAN   8
PERLND 204 SNOW   RAINF        .726       COPY     2     INPUT  MEAN   8
PERLND 204 SNOW   SNOWF        .726       COPY     2     INPUT  MEAN   8
PERLND 308 SNOW   RAINF        .201       COPY     2     INPUT  MEAN   8
PERLND 308 SNOW   SNOWF        .201       COPY     2     INPUT  MEAN   8
PERLND 101 SNOW   RAINF        .694       COPY     3     INPUT  MEAN   1
PERLND 101 SNOW   SNOWF        .694       COPY     3     INPUT  MEAN   1
PERLND 106 SNOW   RAINF        .039       COPY     3     INPUT  MEAN   1
PERLND 106 SNOW   SNOWF        .039       COPY     3     INPUT  MEAN   1
PERLND 204 SNOW   RAINF        .267       COPY     3     INPUT  MEAN   1
PERLND 204 SNOW   SNOWF        .267       COPY     3     INPUT  MEAN   1
    *** Basin water-balance displays.
COPY     2 OUTPUT MEAN   1                DISPLY   1     INPUT  TIMSER 1
COPY     2 OUTPUT MEAN   2                DISPLY   2     INPUT  TIMSER 1
COPY     2 OUTPUT MEAN   3                DISPLY   3     INPUT  TIMSER 1
END NETWORK

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd
***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg
strg***
COPY     2 OUTPUT MEAN   1            SAME WDM    391 RO3       ENGL      REPL
COPY     2 OUTPUT MEAN   2            SAME WDM    385 RO2       ENGL      REPL
COPY     2 OUTPUT MEAN   3            SAME WDM    393 RO1       ENGL      REPL
COPY     2 OUTPUT MEAN   4            SAME WDM    394 ET32      ENGL      REPL
COPY     2 OUTPUT MEAN   5            SAME WDM    395 ET1       ENGL      REPL
COPY     2 OUTPUT MEAN   6            SAME WDM    396 DP32      ENGL      REPL
COPY     2 OUTPUT MEAN   7            SAME WDM    387 DP1       ENGL      REPL
COPY     2 OUTPUT MEAN   8            SAME WDM    388 PT32      ENGL      REPL
COPY     3 OUTPUT MEAN   1            SAME WDM    386 PT1       ENGL      REPL
END EXT TARGETS

DISPLY
```

```
  DISPLY-INFO1
*** # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2
YRND
    1     cold3 runoff (ac-ft)          SUM                      1    3
50    9
    2     cold2 runoff (ac-ft)          SUM                      1    3
50    9
    3     cold1 runoff (ac-ft)          SUM                      1    3
50    9
  END DISPLY-INFO1
END DISPLY

COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1             1
    2             8
    3             1
  END TIMESERIES
END COPY
SPEC-ACTIONS (Not shown)
END SPEC-ACTIONS

END RUN
```

Appendix 3.--*Final HSPF input file for combined Cold Creek model*

```
RUN
GLOBAL
  Cold Creek basin final model - hms.wdm data
  START       1957/10/01 00:00  END    1993/05/31 24:00
  RUN INTERP OUTPUT LEVEL    0
  RESUME     0 RUN     1 TSSFL    15 WDMSFL   16
END GLOBAL
OPN SEQUENCE
    INGRP              INDELT 01:00
      COPY         1
      RCHRES      99
      RCHRES       1
      RCHRES       2
      RCHRES       3
      RCHRES       4
      RCHRES       5
      COPY         2
      PERLND       1
      COPY         3
      PERLND       2
      COPY         4
      PERLND       3
      PERLND       4
      PERLND       5
      COPY         5
      COPY         6
      COPY         7
      COPY         8
      DISPLY      32
      DISPLY      33
      DISPLY      34
      DISPLY      35
    END INGRP
END OPN SEQUENCE

PERLND
  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC
***
    1    3    0    1    1    0    0    0    0    0    0    0    0    0
    4    5    0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
  PRINT-INFO
    <PLS > ********************* Print-flags ************************* PIVL
PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC
*********
    1    3         5
5                                                        9
    4    5
5                                                        9
```

```
  END PRINT-INFO
  GEN-INFO
    <PLS ><-----Name--------->NBLKS   Unit-systems   Printer
***
    # -  #                        User  t-series Engl Metr
***
                                         in   out
***
    1      recharge zone 1        1    1    1    1    6    0
    2      recharge zone 2        1    1    1    1    6    0
    3      recharge zone 3        1    1    1    1    6    0
    4      channel 4 et           1    1    1    1    6    0
    5      channel 5 et           1    1    1    1    6    0
  END GEN-INFO
  ICE-FLAG
    <PLS > Value of 1 means ice will be simulated, 0 means not simulated
***
    # -  #ICEFG
***
    1    3    0
  END ICE-FLAG
  SNOW-PARM1
               perlnd   perlnd    shaded  gage-catch  snow w.eq. needed for
***
    <PLS >    latitude  altitude fraction adjustment  complete snowcover
***
    # -  #        LAT      MELEV     SHADE    SNOWCF    COVIND
***
    1    3       46.6      820.        0.0      1.25       0.5
  END SNOW-PARM1
  SNOW-PARM2
             new snow   rain vs   sublim.  latent ht.  max AWC   ground
***
    <PLS >    density  snow tmp    adjust    adjust    of pack    melt
***
    # -  #      RDCSN      TSNOW    SNOEVP    CCFACT    MWATER    MGMELT
***
    1    3       0.05        32.      0.85       1.5      0.08      0.02
  END SNOW-PARM2
  SNOW-INIT1
    <PLS >  SNOW initial conditions
***
    # -  #  PACKSNOW   PACKICE PACKWATER    RDENPF      DULL    PAKTMP
***
    1    3        0.0       0.0       0.0       0.2      400.      32.0
  END SNOW-INIT1
  SNOW-INIT2
    <PLS >  SNOW initial conditions
***
    # -  #    COVINX   XLNMELT    SKYCLR
***
    1    3       0.50       0.0       1.0
  END SNOW-INIT2
  PWAT-PARM1
```

```
    <PLS > PWATER variable monthly parameter value flags
***
           Snow         cepsc uzns nsur intfw irc lzetp
***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE
***
    1    3    1    0    0    1    0    0    0    0    1
    4    5    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1
  PWAT-PARM2
    <PLS > ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY
AGWRC
    1    3        0.    9.2000    6.2500     600.0    0.0010    0.0000
0.9900
    4    5        0.    1.0000   25.0000     600.0    0.0010    0.0000
0.9900
  END PWAT-PARM2
  PWAT-PARM3
    <PLS >***
    # -  #*** PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP
AGWETP
    1    3       40.       35.    2.0000    2.0000       .00
0.        0.
    4    5       40.       35.    2.0000    2.0000       .00
0.        0.
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >                                                            ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP***
    1    3              8.0000    0.3000     0.000    0.9900
    4    5     0.000    0.2500    0.3000     0.000    0.9900     0.100
  END PWAT-PARM4
  PWAT-STATE1
    <PLS >  PWATER state variables***
    # -  #***    CEPS      SURS       UZS      IFWS       LZS      AGWS
GWVS
    1    3        0.        0.    0.0010        0.     0.020     0.010
.010
    4    5        0.        0.    0.0010        0.     0.010     0.010
.010
  END PWAT-STATE1
  MON-INTERCEP
    <PLS>   Only required if VCSFG=1 in PWAT-PARM1                      ***
    # -  #  Interception storage capacity at start of each month        ***
            JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC ***
    1    3 0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  END MON-INTERCEP
                                                                       ***
  MON-LZETPARM
    <PLS >  Only required if VLEFG=1 in PWAT-PARM1                      ***
    # -  #  Lower zone ET parameter at start of each month              ***
            JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC ***
    1    3 0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
```

```
  END MON-LZETPARM
END PERLND

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->
***
<Name>    # <Name> # tem strg<-factor->strg <Name>    #    #        <Name> # #
***
*** Climate data to recharge perlnds (Elev.zone 1, HMS gage)
WDM       1 PREC     ENGL      0.950        COPY      2      INPUT  MEAN   1
WDM       1 PREC     ENGL      0.950        COPY      3      INPUT  MEAN   1
WDM       1 PREC     ENGL      0.950        COPY      4      INPUT  MEAN   1
WDM       5 WIND     ENGL                   PERLND    1    3 EXTNL  WINMOV
WDM       6 SOLR     ENGL                   PERLND    1    3 EXTNL  SOLRAD
WDM      12 TEMP     ENGL                   PERLND    1    3 ATEMP  AIRTMP
WDM      22 DEWP     ENGL                   PERLND    1    3 EXTNL  DTMPG
WDM      32 PET      ENGL                   PERLND    1    5 EXTNL  PETINP
*** Ppt and pet to area of gw reservoir (Elev.zone 3, HMS gage)
WDM       1 PREC     ENGL      1.250        RCHRES   99      EXTNL  PREC
WDM      35 PET      ENGL                   RCHRES   99      EXTNL  POTEV
*** Upland runoff data for routing to channels
WDM     381 RO4      ENGL                   COPY      1      INPUT  MEAN   1
WDM     391 RO3      ENGL                   COPY      1      INPUT  MEAN   2
WDM     385 RO2      ENGL                   COPY      1      INPUT  MEAN   3
WDM     393 RO1      ENGL                   COPY      1      INPUT  MEAN   4
*** Upland deep percolation data for routing to gw reservoir
WDM     383 DP4      ENGL                   COPY      1      INPUT  MEAN   5
WDM     396 DP32     ENGL                   COPY      1      INPUT  MEAN   6
*** aet data from subbasin runs
WDM     382 ET4      ENGL                   COPY      5      INPUT  MEAN   1
WDM     394 ET32     ENGL                   COPY      5      INPUT  MEAN   2
WDM     395 ET1      ENGL                   COPY      5      INPUT  MEAN   3
*** Cold1 deep percolation data from subbasin runs
WDM     387 DP1      ENGL                   COPY      5      INPUT  MEAN   4
*** Area weighted ppt data from subbasin runs
WDM     384 PT4      ENGL                   COPY      5      INPUT  MEAN   5
WDM     388 PT32     ENGL                   COPY      5      INPUT  MEAN   6
WDM     386 PT1      ENGL                   COPY      5      INPUT  MEAN   7
END EXT SOURCES
NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->
***
<Name>    #        <Name> # #<-factor->strg <Name>    #    #        <Name> # #
***

***Basin geometry (all units are ac-ft)
  *** Channel inflows from direct runoff in cold4,cold3,cold2,cold1
COPY      1 OUTPUT MEAN   1                 RCHRES    1      INFLOW IVOL   1
COPY      1 OUTPUT MEAN   2                 RCHRES    2      INFLOW IVOL   1
COPY      1 OUTPUT MEAN   3                 RCHRES    3      INFLOW IVOL   1
COPY      1 OUTPUT MEAN   4                 RCHRES    5      INFLOW IVOL   1
  *** Recharge to GW reservoir from upland recharge in cold4,cold3,cold2
COPY      1 OUTPUT MEAN   5                 RCHRES   99      INFLOW IVOL   1
COPY      1 OUTPUT MEAN   6                 RCHRES   99      INFLOW IVOL   1
```

```
  *** Discharge from GW reservoir to channels in cold4,cold3,cold2
RCHRES  99 HYDR   OVOL   2                    RCHRES   1     INFLOW IVOL   1
RCHRES  99 HYDR   OVOL   3                    RCHRES   2     INFLOW IVOL   1
RCHRES  99 HYDR   OVOL   4                    RCHRES   3     INFLOW IVOL   1
  *** Channel connections-cold4 to cold3 to cold2up to cold2low to cold1
RCHRES   1 HYDR   ROVOL                       RCHRES   2     INFLOW IVOL   1
RCHRES   2 HYDR   ROVOL                       RCHRES   3     INFLOW IVOL   1
RCHRES   3 HYDR   ROVOL                       RCHRES   4     INFLOW IVOL   1
RCHRES   4 HYDR   OVOL   2                    RCHRES   5     INFLOW IVOL   1
    *** Channel discharge+ppt to recharge zone perlnds
    *** mfact for ovol to copy converts acft to inches
    *** mfact for suro to copy is the ratio of source area to target area
    *** recharge zone perlnd areas are 19.4, 147, 104 acres
    *** Channel discharge to subsurface perlnd for channel et losses (applied
    ***   over 'average' channel area for rchres 4+5 of 33 and 129 acres)
RCHRES   5 HYDR   OVOL   2   0.61856          COPY     2     INPUT  MEAN   1
COPY     2 OUTPUT MEAN   1                    PERLND   1     EXTNL  PREC
PERLND   1 PWATER SURO       0.13197          COPY     3     INPUT  MEAN   1
COPY     3 OUTPUT MEAN   1                    PERLND   2     EXTNL  PREC
PERLND   2 PWATER SURO       1.41346          COPY     4     INPUT  MEAN   1
COPY     4 OUTPUT MEAN   1                    PERLND   3     EXTNL  PREC
RCHRES   4 HYDR   OVOL   1   0.36364          PERLND   4     EXTNL  PREC
RCHRES   5 HYDR   OVOL   1   0.09302          PERLND   5     EXTNL  PREC
*** End Basin Geometry

***Ground-water reservoir water balance (ac-ft and inches). Area=25182 acres
   *** Inflow - (ac-ft to inches conversion is 12 / 25182 acres)
COPY     1 OUTPUT MEAN   5                    COPY     6     INPUT  MEAN   1
COPY     1 OUTPUT MEAN   6                    COPY     6     INPUT  MEAN   1
RCHRES  99 HYDR   PRSUPY                      COPY     6     INPUT  MEAN   1
COPY**   6 OUTPUT MEAN   1                    DISPLY   1     INPUT  TIMSER 1
   *** Outflows
     *** Deep recharge
RCHRES  99 HYDR   OVOL   1                    COPY     6     INPUT  MEAN   2
COPY**   6 OUTPUT MEAN   2                    DISPLY   2     INPUT  TIMSER 1
     *** ET losses
RCHRES  99 HYDR   VOLEV                       COPY     6     INPUT  MEAN   3
COPY**   6 OUTPUT MEAN   3                    DISPLY   3     INPUT  TIMSER 1
     *** Discharge to Cold Creek
RCHRES  99 HYDR   OVOL   2                    COPY     6     INPUT  MEAN   4
RCHRES  99 HYDR   OVOL   3                    COPY     6     INPUT  MEAN   4
RCHRES  99 HYDR   OVOL   4                    COPY     6     INPUT  MEAN   4
COPY**   6 OUTPUT MEAN   4                    DISPLY   4     INPUT  TIMSER 1
   *** Storage
RCHRES  99 HYDR   VOL                         COPY     6     INPUT  MEAN   5
COPY**   6 OUTPUT MEAN   5                    DISPLY   5     INPUT  TIMSER 1

***Upper basin (cold4-cold2) water balance (ac-ft and inches).
Areas=10908,14274
     *** The short losing reach above the flume is NOT included here.
   *** Precip - areally weighted because it was stored as inches
COPY     5 OUTPUT MEAN   5  .4332             COPY     7     INPUT  MEAN   1
COPY     5 OUTPUT MEAN   6  .5668             COPY     7     INPUT  MEAN   1
COPY**   7 OUTPUT MEAN   1  2098.5            DISPLY  11     INPUT  TIMSER 1
```

```
   *** ET losses from regular land area and riparian zone (eg gw res).
COPY      5 OUTPUT MEAN   1                     COPY      7      INPUT  MEAN   2
COPY      5 OUTPUT MEAN   2                     COPY      7      INPUT  MEAN   2
COPY      6 OUTPUT MEAN   3                     COPY      7      INPUT  MEAN   2
COPY**    7 OUTPUT MEAN   2                     DISPLY   12      INPUT  TIMSER 1
   *** Deep Recharge (already in copy6mean2)
COPY**    6 OUTPUT MEAN   2                     DISPLY   13      INPUT  TIMSER 1
   *** Streamflow at beginning of alluvial fill
RCHRES** 3 HYDR   ROVOL                         DISPLY   14      INPUT  TIMSER 1

***Lower basin (cold1) water balance (ac-ft and inches). Area=22510 ac.
   *** Inflows = ppt(stored as inches) + streamflow from reach 3.
COPY      5 OUTPUT MEAN   7  1875.833           COPY      7      INPUT  MEAN   3
RCHRES    3 HYDR   ROVOL                        COPY      7      INPUT  MEAN   3
COPY**    7 OUTPUT MEAN   3                     DISPLY   19      INPUT  TIMSER 1
   *** ET losses from regular land area, channel, and recharge zone perlnds.
      ***(first mfacts are perlnd area/12 - inches to ac-ft)
COPY      5 OUTPUT MEAN   3                     COPY      7      INPUT  MEAN   4
PERLND    1 PWATER TAET      1.616667           COPY      7      INPUT  MEAN   4
PERLND    2 PWATER TAET      12.25000           COPY      7      INPUT  MEAN   4
PERLND    3 PWATER TAET      8.666667           COPY      7      INPUT  MEAN   4
PERLND    4 PWATER TAET      2.750000           COPY      7      INPUT  MEAN   4
PERLND    5 PWATER TAET      10.75000           COPY      7      INPUT  MEAN   4
PERLND    1 SNOW   SNOWE     1.616667           COPY      7      INPUT  MEAN   4
PERLND    2 SNOW   SNOWE     12.25000           COPY      7      INPUT  MEAN   4
PERLND    3 SNOW   SNOWE     8.666667           COPY      7      INPUT  MEAN   4
COPY**    7 OUTPUT MEAN   4                     DISPLY   20      INPUT  TIMSER 1
   *** Recharge from land area, channel losses, and recharge zone.
COPY      5 OUTPUT MEAN   4                     COPY      7      INPUT  MEAN   5
PERLND    4 PWATER SURO      2.750000           COPY      7      INPUT  MEAN   5
PERLND    4 PWATER IFWO      2.750000           COPY      7      INPUT  MEAN   5
PERLND    4 PWATER AGWI      2.750000           COPY      7      INPUT  MEAN   5
PERLND    5 PWATER SURO      10.75000           COPY      7      INPUT  MEAN   5
PERLND    5 PWATER IFWO      10.75000           COPY      7      INPUT  MEAN   5
PERLND    5 PWATER AGWI      10.75000           COPY      7      INPUT  MEAN   5
PERLND    1 PWATER AGWI      1.616667           COPY      7      INPUT  MEAN   5
PERLND    2 PWATER AGWI      12.25000           COPY      7      INPUT  MEAN   5
PERLND    3 PWATER AGWI      8.666667           COPY      7      INPUT  MEAN   5
PERLND    3 PWATER SURO      8.666667           COPY      7      INPUT  MEAN   5
PERLND    3 PWATER IFWO      8.666667           COPY      7      INPUT  MEAN   5
COPY**    7 OUTPUT MEAN   5                     DISPLY   21      INPUT  TIMSER 1

***Whole basin (cold4-cold1 and recharge zone) water balance (ac-ft and
inches)
   *** Precip - areally weighted for upper and lower basins
COPY      7 OUTPUT MEAN   1   .5280             COPY      8      INPUT  MEAN   1
COPY      5 OUTPUT MEAN   7   .4720             COPY      8      INPUT  MEAN   1
COPY**    8 OUTPUT MEAN   1   3974.333          DISPLY   26      INPUT  TIMSER 1
   *** ET losses from upper and lower basins
COPY      7 OUTPUT MEAN   2                     COPY      8      INPUT  MEAN   2
COPY      7 OUTPUT MEAN   4                     COPY      8      INPUT  MEAN   2
COPY**    8 OUTPUT MEAN   2                     DISPLY   27      INPUT  TIMSER 1
   *** Recharge - deep recharge from upper basin (eg gw res) and all from
      ***lower basin
```

```
COPY      6 OUTPUT MEAN   2                   COPY      8      INPUT  MEAN   3
COPY      7 OUTPUT MEAN   5                   COPY      8      INPUT  MEAN   3
COPY**    8 OUTPUT MEAN   3                   DISPLY   28      INPUT  TIMSER 1
   *** Streamflow - none

***Simulated flow at gages (cfs and ac-ft)
RCHRES    2 HYDR   ROVOL       12.1           COPY      8      INPUT  MEAN   4
RCHRES    2 HYDR   ROVOL                      COPY      8      INPUT  MEAN   5
RCHRES    4 HYDR   OVOL   2    12.1           COPY      8      INPUT  MEAN   6
RCHRES    4 HYDR   OVOL   2                   COPY      8      INPUT  MEAN   7
COPY      8 OUTPUT MEAN   4                   DISPLY   32      INPUT  TIMSER 1
COPY      8 OUTPUT MEAN   5                   DISPLY   34      INPUT  TIMSER 1
COPY      8 OUTPUT MEAN   6                   DISPLY   33      INPUT  TIMSER 1
COPY      8 OUTPUT MEAN   7                   DISPLY   35      INPUT  TIMSER 1

*** Recharge from runoff
  *** reach 4 (acft)
PERLND** 4 PWATER SURO       2.750000         DISPLY   36      INPUT  TIMSER 1
PERLND** 4 PWATER IFWO       2.750000         DISPLY   36      INPUT  TIMSER 1
PERLND** 4 PWATER AGWI       2.750000         DISPLY   36      INPUT  TIMSER 1
PERLND   4 PWATER SURO       2.750000         COPY      7      INPUT  MEAN   8
PERLND   4 PWATER IFWO       2.750000         COPY      7      INPUT  MEAN   8
PERLND   4 PWATER AGWI       2.750000         COPY      7      INPUT  MEAN   8
  *** reach 5 and recharge zone (acft)
PERLND   5 PWATER SURO       10.75000         COPY      7      INPUT  MEAN   6
PERLND   5 PWATER IFWO       10.75000         COPY      7      INPUT  MEAN   6
PERLND   5 PWATER AGWI       10.75000         COPY      7      INPUT  MEAN   6
PERLND   1 PWATER AGWI       1.616667         COPY      7      INPUT  MEAN   6
PERLND   2 PWATER AGWI       12.25000         COPY      7      INPUT  MEAN   6
PERLND   3 PWATER AGWI       8.666667         COPY      7      INPUT  MEAN   6
PERLND   3 PWATER SURO       8.666667         COPY      7      INPUT  MEAN   6
PERLND   3 PWATER IFWO       8.666667         COPY      7      INPUT  MEAN   6
COPY**   7 OUTPUT MEAN   6                    DISPLY   37      INPUT  TIMSER 1
  *** all recharge from runoff (acft)
PERLND   4 PWATER SURO       2.750000         COPY      8      INPUT  MEAN   8
PERLND   4 PWATER IFWO       2.750000         COPY      8      INPUT  MEAN   8
PERLND   4 PWATER AGWI       2.750000         COPY      8      INPUT  MEAN   8
COPY     7 OUTPUT MEAN   6                    COPY      8      INPUT  MEAN   8
COPY**   8 OUTPUT MEAN   8                    DISPLY   38      INPUT  TIMSER 1

END NETWORK

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd
***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg
strg***
***Ground-water reservoir water balance (ac-ft and inches).
   *** Inflow
COPY     6 OUTPUT MEAN   1               SAME WDM    401 GWIA     ENGL      REPL
   *** Outflows   .
     *** Deep recharge
COPY     6 OUTPUT MEAN   2               SAME WDM    402 GWDA     ENGL      REPL
     *** ET losses
```

```
COPY      6 OUTPUT MEAN   3             SAME WDM    403 GWEA     ENGL      REPL
     *** Discharge to Cold Creek
COPY      6 OUTPUT MEAN   4             SAME WDM    404 GWQA     ENGL      REPL
   *** Storage
COPY      6 OUTPUT MEAN   5             SAME WDM    405 GWSA     ENGL      REPL

***Upper basin (cold4-cold2) water balance (ac-ft and inches).
   *** Precip
COPY      7 OUTPUT MEAN   1  2098.5     SAME WDM    411 UPPA     ENGL      REPL
   *** ET losses
COPY      7 OUTPUT MEAN   2             SAME WDM    412 UPEA     ENGL      REPL
   *** Recharge
COPY      6 OUTPUT MEAN   2             SAME WDM    413 UPDA     ENGL      REPL
   *** Streamflow
RCHRES    3 HYDR   ROVOL                SAME WDM    414 UPQA     ENGL      REPL

***Lower basin (cold1) water balance (ac-ft and inches).
   *** Inflows (ppt+streamflow)
COPY      7 OUTPUT MEAN   3             SAME WDM    419 LPA      ENGL      REPL
   *** ET losses
COPY      7 OUTPUT MEAN   4             SAME WDM    420 LEA      ENGL      REPL
   *** Recharge
COPY      7 OUTPUT MEAN   5             SAME WDM    421 LDA      ENGL      REPL

***Whole basin (cold4-cold1 and recharge zone) water balance (ac-ft and
inches)
   *** Precip
COPY      8 OUTPUT MEAN   1  3974.6     SAME WDM    426 PPTA     ENGL      REPL
   *** ET losses
COPY      8 OUTPUT MEAN   2             SAME WDM    427 AETA     ENGL      REPL
   *** Recharge
COPY      8 OUTPUT MEAN   3             SAME WDM    428 DPA      ENGL      REPL

***Simulated flow at gages (cfs and ac-ft)
COPY      8 OUTPUT MEAN   4             SAME WDM    432 QWA      ENGL      REPL
COPY      8 OUTPUT MEAN   5             SAME WDM    434 QWI      ENGL      REPL
COPY      8 OUTPUT MEAN   6             SAME WDM    433 QFA      ENGL      REPL
COPY      8 OUTPUT MEAN   7             SAME WDM    435 QFI      ENGL      REPL

***Recharge from runoff (ac-ft)
COPY      7 OUTPUT MEAN   8             SAME WDM    610 TL2      ENGL      REPL
COPY      7 OUTPUT MEAN   6             SAME WDM    611 TL1      ENGL      REPL
COPY      8 OUTPUT MEAN   8             SAME WDM    612 TL21     ENGL      REPL
END EXT TARGETS

RCHRES
  GEN-INFO
    RCHRES      Name        Nexits   Unit Systems   Printer
***
    # -  #<------------------><---> User T-series  Engl Metr LKFG
***
                                              in  out
***
    1     Channel - cold4        1    1    1    1    6    0    0
```

```
    2     Channel - cold3          1    1    1    1    6    0    0
    3     Channel - cold2up        1    1    1    1    6    0    0
    4     Channel - cold2low       2    1    1    1    6    0    0
    5     Channel - cold1          2    1    1    1    6    0    0
   99     Ground-water Reser.      4    1    1    1    6    0    0
  END GEN-INFO
  ACTIVITY
    RCHRES *************** Active Sections *****************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG
***
    1   99    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
  PRINT-INFO
    RCHRES *************** Printout Flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB *********
    1   99    5    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
  HYDR-PARM1
    RCHRES  Flags for each HYDR Section
***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for
each
            FG FG FG FG  possible  exit  *** possible  exit      possible
exit
             *  *  *  *    *  *  *  *  *        *  *  *  *  *          ***
    1    3   0  0  0  0    4  0  0  0  0        0  0  0  0  0       2  2  2
2  2
    4    5   0  0  0  0    4  5  0  0  0        0  0  0  0  0       2  2  2
2  2
   99        0  1  0  0    4  5  6  7  0        0  0  0  0  0       2  2  2
2  2
  END HYDR-PARM1
  HYDR-PARM2
    RCHRES
***
    # -  #    FTABNO       LEN     DELTH     STCOR        KS       DB50
***
  <------><--------><--------><--------><--------><--------><-------->
***
    1             1   4.072                              0.0
    2             2   4.072                              0.0
    3             3   1.837                              0.0
    4             4   2.405                              0.0
    5             5   3.789                              0.0
   99             6   5.909                              0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section
***
    # -  # ***    VOL     Initial  value  of COLIND    Initial  value  of
OUTDGT
          *** ac-ft     for each possible exit       for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--
->
```

```
    1     0.0              4.0
    2     0.0              4.0
    3     0.0              4.0
    4     0.0              4.0  5.0
    5     0.0              4.0  5.0
   99     47400.           4.0  5.0  6.0  7.0
  END HYDR-INIT
END RCHRES

***
FTABLES
  FTABLE      1
 Rows Cols    (Cold4 reach - headwaters to cold3 boundary)
***
    4    4
     Depth       Area    Volume  Outflow1
***
      (ft)    (acres) (acre-ft)   (cfs)
***
     0.0       0.0       0.0       0.0
     0.4       14.8      0.69      4.8
     1.0       14.8      3.70      47.6
     2.0       14.8      14.8      302.
  END FTABLE  1
  FTABLE      2
 Rows Cols    (Cold3 reach - cold4 outflow to weir at 12510618)
***
   10    4
     Depth       Area    Volume  Outflow1
***
      (ft)    (acres) (acre-ft)   (cfs)
***
     0.0       0.0       0.0       0.0
     0.38      14.8      0.36      0.97
     0.50      14.8      1.23      2.40
     0.75      14.8      1.39      6.80
     1.00      14.8      2.47      13.9
     1.50      14.8      5.55      38.5
     2.00      14.8      9.87      78.7
     2.90      14.8      20.8      191.
     4.00      14.8      37.6      381.
     5.00      14.8      60.0      700.
  END FTABLE  2
  FTABLE      3
 Rows Cols    (Cold2a reach - weir to end of bedrock channel)
***
    5    4
     Depth       Area    Volume  Outflow1
***
      (ft)    (acres) (acre-ft)   (cfs)
***
     0.0       0.0       0.0       0.0
     1.00      8.9       0.77      9.7
     3.00      8.9       5.76      153.
```

```
     5.00     8.9      15.8      527.
     8.00     8.9      40.1      1669.
  END FTABLE  3
  FTABLE      4
 Rows Cols    (Cold2b reach - alluvial reach above flume @ 12510625)
***
    7    5
*** Outflow 1 is channel loss (4 cfs per acre = 4 in/hr channel infilt rate)
*** Reach length = 12,700 ft
     Depth       Area     Volume  Outflow1  Outflow2
***
      (ft)    (acres) (acre-ft)    (cfs)     (cfs)
***
     0.0      0.0      0.0       0.0       0.0
     0.75     2.20     0.70      8.80      0.0
     1.00     2.33     1.17      9.32      0.3
     3.00     7.29     10.9      29.2      152.
     4.00     32.1     30.6      128.      300.
     5.00     32.7     63.0      131.      960.
     6.00     33.3     96.0      133.      2150.
  END FTABLE  4
  FTABLE      5
 Rows Cols    (Cold1 reach - alluvial reach from flume to C2 access tubes)
***
    7    5
*** Outflow 1 is channel loss (4 cfs per acre) ***
*** Reach length = 23,000 ft
     Depth       Area     Volume  Outflow1  Outflow2
***
      (ft)    (acres) (acre-ft)    (cfs)     (cfs)
***
     0.0      0.0      0.0       0.0       0.0
     0.75     4.80     1.60      19.2      0.0
     1.00     5.28     2.64      21.1      0.10
     2.00     10.6     10.6      42.4      17.2
     3.00     68.9     48.2      276.      105.
     4.00     129.     147.      516.      870.
     5.00     150.     277.      600.      2400.
  END FTABLE  5
  FTABLE      6
 Rows Cols    Ground-water reservoir. Area - 25182 acres, porosity = .5
***
    7    7
*** Outflow1 is deep percolation - 1 cfs = 724 ac-ft/yr
*** Outflow2 to rchres 1, outflow3 to rchres 2, outflow4 to rchres 3
*** Outflows to channels are proportional to riparian zone area.
*** Volumes from reservoir area of 25200 acres, storage coeff. of 0.2.
*** Volumes increase at 5040 ac-ft per ft of depth untill drainage begins.
     Depth       Area     Volume  Outflow1  Outflow2  Outflow3  Outflow4
***
      (ft)    (acres) (acre-ft)    (cfs)     (cfs)     (cfs)     (cfs)
***
     0.0      0.0      0.0       0.0       0.0       0.0       0.0
     9.00     38.5     45360.    0.584     0.0       0.0       0.0
```

```
     9.42      38.5      47480.    2.920     0.0       0.0       0.0
     9.65      38.5      48640.    5.        0.10      0.10      0.03
    10.0       38.5      50400.    10.       0.20      0.20      0.06
    11.0       38.5      55440.    40.       0.25      0.25      0.07
    12.0       38.5      60440.    70.       0.40      0.40      0.13
  END FTABLE  6
END FTABLES

DISPLY
  DISPLY-INFO1
*** # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2
YRND
   32     SimQ at wier-max cfs-final     MAX                        1    2
50    9
   33     SimQ at flume-max cfs-final    MAX                        1    2
50    9
   34     SimQ at wier-acft-final        SUM                        1    1
50    9
   35     SimQ at flume-acft-final       SUM                        1    1
50    9
  END DISPLY-INFO1
END DISPLY

COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1              6
    2    4         1
    5              7
    6              5
    7              8
    8              8
  END TIMESERIES
END COPY

END RUN
```

Appendix 4.--*Final HSPF input file for Upper Dry Creek model. For brevity, the "SPECIAL ACTIONS" portion of the model input, where the dates of soil freezing and thawing are represented by changes in the INFILT parameter values, is not included. Complete input files may be obtained by contacting the District Chief at the address shown on page ii of this report*

```
RUN
GLOBAL
  Dry4 final model - hms.wdm data
  START       1957/10/01 00:00  END    1993/05/31 24:00
  RUN INTERP OUTPUT LEVEL    0
  RESUME     0 RUN     1 TSSFL    15 WDMSFL   16
END GLOBAL
OPN SEQUENCE
    INGRP              INDELT 01:00
      PERLND     201
      PERLND     202
      PERLND     203
      PERLND     204
      PERLND     207
      PERLND     208
      PERLND     209
      PERLND     210
      PERLND     212
      PERLND     213
      PERLND     214
      PERLND     221
      PERLND     222
      PERLND     223
      PERLND     224
      PERLND     227
      PERLND     228
      PERLND     229
      PERLND     230
      PERLND     232
      PERLND     233
      PERLND     234
      PERLND     241
      PERLND     242
      PERLND     243
      PERLND     247
      PERLND     248
      PERLND     249
      PERLND     250
      PERLND     252
      PERLND     253
      PERLND     254
      PERLND     261
      PERLND     262
      PERLND     264
      PERLND     267
      PERLND     270
      PERLND     271
      PERLND     273
```

```
      PERLND     274
      PERLND     281
      PERLND     282
      PERLND     283
      PERLND     287
      PERLND     288
      PERLND     289
      PERLND     301
      PERLND     303
      PERLND     307
      PERLND     309
      PERLND     321
      PERLND     323
      PERLND     327
      PERLND     328
      PERLND     341
      PERLND     343
      PERLND     347
      PERLND     349
      PERLND     361
      PERLND     363
      PERLND     367
      PERLND     381
      PERLND     383
      PERLND     387
      PERLND     389
      PERLND     441
      PERLND     447
      PERLND     481
      PERLND     487
      COPY         1
      DISPLY       1
    END INGRP
END OPN SEQUENCE
PERLND
  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC
***
  201  487    0    1    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
  PRINT-INFO
    <PLS > ******************** Print-flags ************************ PIVL
PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC
*********
  201              5
5                                                        9
  202  289         6
6                                                        9
  301              5
5                                                        9
  303  389         6
6                                                        9
```

```
  441             5
5                                                      9
  447  487        6
6                                                      9
  END PRINT-INFO
  GEN-INFO
    <PLS ><------NAME-------->NBLKS   Unit-systems   Printer
***
    # -  #                        User  t-series Engl Metr
***
                                        in  out
***
*** Grouped by elevation zone ***
  201      sage,soil1,flat        1    1    1    1    6    0
  202      sage,soil2,flat        1    1    1    1    6    0
  203      sage,soil3,flat        1    1    1    1    6    0
  204      sage,soil4,flat        1    1    1    1    6    0
  207      gras,soil1,flat        1    1    1    1    6    0
  208      gras,soil2,flat        1    1    1    1    6    0
  209      gras,soil3,flat        1    1    1    1    6    0
  210      gras,soil4,flat        1    1    1    1    6    0
  212      dryw,soil2,mod.N       1    1    1    1    6    0
  213      dryw,soil3,mod.N       1    1    1    1    6    0
  214      dryw,soil4,mod.N       1    1    1    1    6    0
  221      sage,soil1,mod.N       1    1    1    1    6    0
  222      sage,soil2,mod.N       1    1    1    1    6    0
  223      sage,soil3,mod.N       1    1    1    1    6    0
  224      sage,soil4,mod.N       1    1    1    1    6    0
  227      gras,soil1,mod.N       1    1    1    1    6    0
  228      gras,soil2,mod.N       1    1    1    1    6    0
  229      gras,soil3,mod.N       1    1    1    1    6    0
  230      gras,soil4,mod.N       1    1    1    1    6    0
  232      dryw,soil2,mod.N       1    1    1    1    6    0
  233      dryw,soil3,mod.N       1    1    1    1    6    0
  234      dryw,soil4,mod.N       1    1    1    1    6    0
  241      sage,soil1,mod.S       1    1    1    1    6    0
  242      sage,soil2,mod.S       1    1    1    1    6    0
  243      sage,soil3,mod.S       1    1    1    1    6    0
  247      gras,soil1,mod.S       1    1    1    1    6    0
  248      gras,soil1,mod.S       1    1    1    1    6    0
  249      gras,soil3,mod.S       1    1    1    1    6    0
  250      gras,soil4,mod.S       1    1    1    1    6    0
  252      dryw,soil2,mod.S       1    1    1    1    6    0
  253      dryw,soil3,mod.S       1    1    1    1    6    0
  254      dryw,soil4,mod.S       1    1    1    1    6    0
  261      sage,soil1,stp.N       1    1    1    1    6    0
  262      sage,soil2,stp.N       1    1    1    1    6    0
  264      sage,soil4,stp.N       1    1    1    1    6    0
  267      gras,soil1,stp.N       1    1    1    1    6    0
  270      gras,soil4,stp.N       1    1    1    1    6    0
  271      dryw,soil1,stp.N       1    1    1    1    6    0
  273      dryw,soil3,stp.N       1    1    1    1    6    0
  274      dryw,soil4,stp.N       1    1    1    1    6    0
  281      sage,soil1,stp.N       1    1    1    1    6    0
```

```
  282      sage,soil2,stp.S       1    1    1    1    6    0
  283      sage,soil3,stp.S       1    1    1    1    6    0
  287      gras,soil1,stp.S       1    1    1    1    6    0
  288      gras,soil1,stp.S       1    1    1    1    6    0
  289      gras,soil3,stp.S       1    1    1    1    6    0
  301      sage,soil1,flat        1    1    1    1    6    0
  303      sage,soil3,flat        1    1    1    1    6    0
  307      gras,soil1,flat        1    1    1    1    6    0
  309      gras,soil3,flat        1    1    1    1    6    0
  321      sage,soil1,mod.N       1    1    1    1    6    0
  323      sage,soil3,mod.N       1    1    1    1    6    0
  327      gras,soil1,mod.N       1    1    1    1    6    0
  328      gras,soil1,mod.N       1    1    1    1    6    0
  341      sage,soil1,mod.S       1    1    1    1    6    0
  343      sage,soil3,mod.S       1    1    1    1    6    0
  347      gras,soil1,mod.S       1    1    1    1    6    0
  349      gras,soil3,mod.S       1    1    1    1    6    0
  361      sage,soil1,stp.N       1    1    1    1    6    0
  363      sage,soil3,stp.N       1    1    1    1    6    0
  367      gras,soil1,stp.N       1    1    1    1    6    0
  381      sage,soil1,stp.S       1    1    1    1    6    0
  383      sage,soil3,stp.S       1    1    1    1    6    0
  387      gras,soil1,stp.S       1    1    1    1    6    0
  389      gras,soil3,stp.S       1    1    1    1    6    0
  441      sage,soil1,mod.S       1    1    1    1    6    0
  447      gras,soil1,mod.S       1    1    1    1    6    0
  481      sage,soil1,stp.S       1    1    1    1    6    0
  487      gras,soil1,stp.S       1    1    1    1    6    0
  END GEN-INFO
  ICE-FLAG
    <PLS > Value of 1 means ice will be simulated, 0 means not simulated
***
    # -  #ICEFG
***
  201  487    1
  END ICE-FLAG
  SNOW-PARM1
              perlnd   perlnd    shaded  gage-catch  snow w.eq. needed for
***
    <PLS >   latitude  altitude fraction adjustment  complete snowcover
***
    # -  #       LAT     MELEV     SHADE     SNOWCF    COVIND
***
  201  289      46.6     1805.       0.0       1.25       0.5
  301  389      46.6     2789.       0.0       1.25       0.5
  441  487      46.6     3609        0.0       1.25       0.5
  END SNOW-PARM1
  SNOW-PARM2
             new snow   rain vs  sublim.  latent ht.  max AWC   ground
***
    <PLS >   density  snow tmp   adjust    adjust    of pack   melt
***
    # -  #     RDCSN     TSNOW    SNOEVP    CCFACT    MWATER    MGMELT
***
```

```
  201  487      0.05       32.       0.85       1.5      0.08      0.02
  END SNOW-PARM2
  SNOW-INIT1
    <PLS >  SNOW initial conditions
***
    # -  #  PACKSNOW   PACKICE PACKWATER    RDENPF      DULL    PAKTMP
***
  201  487       0.0       0.0       0.0       0.2      400.      32.0
  END SNOW-INIT1
  SNOW-INIT2
    <PLS >  SNOW initial conditions
***
    # -  #    COVINX   XLNMELT    SKYCLR
***
  201  487      0.50       0.0       1.0
  END SNOW-INIT2
  PWAT-PARM1
    <PLS > PWATER variable monthly parameter value flags
***
           Snow          cepsc uzns nsur intfw irc lzetp
***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE
***
  201  487    1    0    0    1    0    0    0    0    1
  END PWAT-PARM1
  PWAT-PARM2
    <PLS > ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY
AGWRC
*** sagebrush ***
  201             0.    2.3000    0.2000    1000.0    0.0350    0.0000
0.9900
  221             0.    2.3000    0.2000    2000.0    0.1100    0.0000
0.9900
  241             0.    2.3000    0.2000   10000.0    0.1100    0.0000
0.9900
  261             0.    2.3000    0.2000    2000.0    0.2300    0.0000
0.9900
  281             0.    2.3000    0.2000   10000.0    0.2300    0.0000
0.9900
  301             0.    2.3000    0.2000    1000.0    0.0350    0.0000
0.9900
  321             0.    2.3000    0.2000    2000.0    0.1100    0.0000
0.9900
  341             0.    2.3000    0.2000   10000.0    0.1100    0.0000
0.9900
  361             0.    2.3000    0.2000    2000.0    0.2300    0.0000
0.9900
  381             0.    2.3000    0.2000   10000.0    0.2300    0.0000
0.9900
  441             0.    2.3000    0.2000   25000.0    0.1100    0.0000
0.9900
  481             0.    2.3000    0.2000   25000.0    0.2300    0.0000
0.9900
```

```
  202          0.      4.1000    0.2000    1000.0    0.0350    0.0000
0.9900
  222          0.      4.1000    0.2000    2000.0    0.1100    0.0000
0.9900
  242          0.      4.1000    0.2000   10000.0    0.1100    0.0000
0.9900
  262          0.      4.1000    0.2000    2000.0    0.2300    0.0000
0.9900
  282          0.      4.1000    0.2000   10000.0    0.2300    0.0000
0.9900
  203          0.      6.2000    0.2000    1000.0    0.0350    0.0000
0.9900
  223          0.      6.2000    0.2000    2000.0    0.1100    0.0000
0.9900
  243          0.      6.2000    0.2000   10000.0    0.1100    0.0000
0.9900
  283          0.      6.2000    0.2000   10000.0    0.2300    0.0000
0.9900
  303          0.      6.2000    0.2000    1000.0    0.0350    0.0000
0.9900
  323          0.      6.2000    0.2000    2000.0    0.1100    0.0000
0.9900
  343          0.      6.2000    0.2000   10000.0    0.1100    0.0000
0.9900
  363          0.      6.2000    0.2000    2000.0    0.2300    0.0000
0.9900
  383          0.      6.2000    0.2000   10000.0    0.2300    0.0000
0.9900
  204          0.      9.2000    0.2000    1000.0    0.0350    0.0000
0.9900
  224          0.      9.2000    0.2000    2000.0    0.1100    0.0000
0.9900
  264          0.      9.2000    0.2000    2000.0    0.2300    0.0000
0.9900
*** grassland ***
  207          0.      2.3000    0.2000    1000.0    0.0350    0.0000
0.9900
  227          0.      2.3000    0.2000    2000.0    0.1100    0.0000
0.9900
  247          0.      2.3000    0.2000   10000.0    0.1100    0.0000
0.9900
  267          0.      2.3000    0.2000    2000.0    0.2300    0.0000
0.9900
  287          0.      2.3000    0.2000   10000.0    0.2300    0.0000
0.9900
  307          0.      2.3000    0.2000    1000.0    0.0350    0.0000
0.9900
  327          0.      2.3000    0.2000    2000.0    0.1100    0.0000
0.9900
  347          0.      2.3000    0.2000   10000.0    0.1100    0.0000
0.9900
  367          0.      2.3000    0.2000    2000.0    0.2300    0.0000
0.9900
  387          0.      2.3000    0.2000    2000.0    0.2300    0.0000
```

```
0.9900
  447          0.       2.3000    0.2000   25000.0    0.1100    0.0000
0.9900
  487          0.       2.3000    0.2000   25000.0    0.2300    0.0000
0.9900
  208          0.       4.1000    0.2000    1000.0    0.0350    0.0000
0.9900
  228          0.       4.1000    0.2000    2000.0    0.1100    0.0000
0.9900
  248          0.       4.1000    0.2000   10000.0    0.1100    0.0000
0.9900
  288          0.       4.1000    0.2000   10000.0    0.2300    0.0000
0.9900
  328          0.       4.1000    0.2000    2000.0    0.1100    0.0000
0.9900
  209          0.       2.9000    0.2000    1000.0    0.0350    0.0000
0.9900
  229          0.       2.9000    0.2000    2000.0    0.1100    0.0000
0.9900
  249          0.       2.9000    0.2000   10000.0    0.1100    0.0000
0.9900
  289          0.       2.9000    0.2000   10000.0    0.2300    0.0000
0.9900
  309          0.       2.9000    0.2000    1000.0    0.0350    0.0000
0.9900
  349          0.       2.9000    0.2000   10000.0    0.1100    0.0000
0.9900
  389          0.       2.9000    0.2000   10000.0    0.2300    0.0000
0.9900
  210          0.       4.6000    0.2000    1000.0    0.0350    0.0000
0.9900
  230          0.       4.6000    0.2000    2000.0    0.1100    0.0000
0.9900
  250          0.       4.6000    0.2000   10000.0    0.1100    0.0000
0.9900
  270          0.       4.6000    0.2000    2000.0    0.2300    0.0000
0.9900
*** dry.wheat ***
  271          0.       2.3000    0.2000    2000.0    0.2300    0.0000
0.9900
  212          0.       4.1000    0.2000    1000.0    0.0350    0.0000
0.9900
  232          0.       4.1000    0.2000    2000.0    0.1100    0.0000
0.9900
  252          0.       4.1000    0.2000   10000.0    0.1100    0.0000
0.9900
  213          0.       5.8000    0.2000    1000.0    0.0350    0.0000
0.9900
  233          0.       5.8000    0.2000    2000.0    0.1100    0.0000
0.9900
  253          0.       5.8000    0.2000   10000.0    0.1100    0.0000
0.9900
  273          0.       5.8000    0.2000    2000.0    0.2300    0.0000
0.9900
```

```
  214           0.      9.2000    0.2000    1000.0    0.0350    0.0000
0.9900
  234           0.      9.2000    0.2000    2000.0    0.1100    0.0000
0.9900
  254           0.      9.2000    0.2000   10000.0    0.1100    0.0000
0.9900
  274           0.      9.2000    0.2000    2000.0    0.2300    0.0000
0.9900
  END PWAT-PARM2
  PWAT-PARM3
    <PLS >***
    # -  #*** PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP
AGWETP
  201  487       40.       35.    0.2500    2.0000       .00
0.        0.
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >                                                             ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP***
*** sagebrush ***
  201                   0.5000    0.3000     0.000    0.7000
  301                   0.5000    0.3000     0.000    0.7000
  202                   0.5000    0.3000     0.000    0.7000
  203                   0.5000    0.3000     0.000    0.7000
  303                   0.5000    0.3000     0.000    0.7000
  204                   0.5000    0.3000     0.000    0.7000
  221                   0.3000    0.3000     0.000    0.5000
  241                   0.3000    0.3000     0.000    0.5000
  321                   0.3000    0.3000     0.000    0.5000
  341                   0.3000    0.3000     0.000    0.5000
  441                   0.3000    0.3000     0.000    0.5000
  222                   0.3000    0.3000     0.000    0.5000
  242                   0.3000    0.3000     0.000    0.5000
  223                   0.3000    0.3000     0.000    0.5000
  243                   0.3000    0.3000     0.000    0.5000
  323                   0.3000    0.3000     0.000    0.5000
  343                   0.3000    0.3000     0.000    0.5000
  224                   0.3000    0.3000     0.000    0.5000
  261                   0.2000    0.3000     0.000    0.3000
  281                   0.2000    0.3000     0.000    0.3000
  361                   0.2000    0.3000     0.000    0.3000
  381                   0.2000    0.3000     0.000    0.3000
  481                   0.2000    0.3000     0.000    0.3000
  262                   0.2000    0.3000     0.000    0.3000
  282                   0.2000    0.3000     0.000    0.3000
  283                   0.2000    0.3000     0.000    0.3000
  363                   0.2000    0.3000     0.000    0.3000
  383                   0.2000    0.3000     0.000    0.3000
  264                   0.2000    0.3000     0.000    0.3000
*** grassland ***
  207                   0.5000    0.3000     0.000    0.7000
  307                   0.5000    0.3000     0.000    0.7000
  208                   0.5000    0.3000     0.000    0.7000
  209                   0.5000    0.3000     0.000    0.7000
```

```
  309                      0.5000    0.3000     0.000    0.7000
  210                      0.5000    0.3000     0.000    0.7000
  227                      0.3000    0.3000     0.000    0.5000
  247                      0.3000    0.3000     0.000    0.5000
  327                      0.3000    0.3000     0.000    0.5000
  347                      0.3000    0.3000     0.000    0.5000
  447                      0.3000    0.3000     0.000    0.5000
  228                      0.3000    0.3000     0.000    0.5000
  248                      0.3000    0.3000     0.000    0.5000
  328                      0.3000    0.3000     0.000    0.5000
  229                      0.3000    0.3000     0.000    0.5000
  249                      0.3000    0.3000     0.000    0.5000
  349                      0.3000    0.3000     0.000    0.5000
  230                      0.3000    0.3000     0.000    0.5000
  250                      0.3000    0.3000     0.000    0.5000
  267                      0.2000    0.3000     0.000    0.3000
  287                      0.2000    0.3000     0.000    0.3000
  367                      0.2000    0.3000     0.000    0.3000
  387                      0.2000    0.3000     0.000    0.3000
  487                      0.2000    0.3000     0.000    0.3000
  288                      0.2000    0.3000     0.000    0.3000
  289                      0.2000    0.3000     0.000    0.3000
  389                      0.2000    0.3000     0.000    0.3000
  270                      0.2000    0.3000     0.000    0.3000
*** dry.wheat ***
  212                      0.5000    0.3000     0.000    0.7000
  213                      0.5000    0.3000     0.000    0.7000
  214                      0.5000    0.3000     0.000    0.7000
  232                      0.3000    0.3000     0.000    0.5000
  252                      0.3000    0.3000     0.000    0.5000
  233                      0.3000    0.3000     0.000    0.5000
  253                      0.3000    0.3000     0.000    0.5000
  234                      0.3000    0.3000     0.000    0.5000
  254                      0.3000    0.3000     0.000    0.5000
  271                      0.2000    0.3000     0.000    0.3000
  273                      0.2000    0.3000     0.000    0.3000
  274                      0.2000    0.3000     0.000    0.3000
  END PWAT-PARM4
  PWAT-STATE1
    <PLS >  PWATER state variables***
    # -  #***   CEPS      SURS       UZS      IFWS       LZS      AGWS
GWVS
*** sagebrush ***
  201            0.         0.    0.0010        0.     0.020     0.010
.010
  221            0.         0.    0.0010        0.     0.020     0.010
.010
  241            0.         0.    0.0010        0.     0.020     0.010
.010
  261            0.         0.    0.0010        0.     0.020     0.010
.010
  281            0.         0.    0.0010        0.     0.020     0.010
.010
  301            0.         0.    0.0010        0.     0.020     0.010
```

```
.010
  321          0.        0.     0.0010       0.      0.020     0.010
.010
  341          0.        0.     0.0010       0.      0.020     0.010
.010
  361          0.        0.     0.0010       0.      0.020     0.010
.010
  381          0.        0.     0.0010       0.      0.020     0.010
.010
  441          0.        0.     0.0010       0.      0.020     0.010
.010
  481          0.        0.     0.0010       0.      0.020     0.010
.010
  202          0.        0.     0.0010       0.      0.020     0.010
.010
  222          0.        0.     0.0010       0.      0.020     0.010
.010
  242          0.        0.     0.0010       0.      0.020     0.010
.010
  262          0.        0.     0.0010       0.      0.020     0.010
.010
  282          0.        0.     0.0010       0.      0.020     0.010
.010
  203          0.        0.     0.0010       0.      0.020     0.010
.010
  223          0.        0.     0.0010       0.      0.020     0.010
.010
  243          0.        0.     0.0010       0.      0.020     0.010
.010
  283          0.        0.     0.0010       0.      0.020     0.010
.010
  303          0.        0.     0.0010       0.      0.020     0.010
.010
  323          0.        0.     0.0010       0.      0.020     0.010
.010
  343          0.        0.     0.0010       0.      0.020     0.010
.010
  363          0.        0.     0.0010       0.      0.020     0.010
.010
  383          0.        0.     0.0010       0.      0.020     0.010
.010
  204          0.        0.     0.0010       0.      0.020     0.010
.010
  224          0.        0.     0.0010       0.      0.020     0.010
.010
  264          0.        0.     0.0010       0.      0.020     0.010
.010
***grassland***
  207          0.        0.     0.0010       0.      0.020     0.010
.010
  227          0.        0.     0.0010       0.      0.020     0.010
.010
  247          0.        0.     0.0010       0.      0.020     0.010
.010
```

```
  267        0.     0.    0.0010     0.    0.020    0.010
.010
  287        0.     0.    0.0010     0.    0.020    0.010
.010
  307        0.     0.    0.0010     0.    0.020    0.010
.010
  327        0.     0.    0.0010     0.    0.020    0.010
.010
  347        0.     0.    0.0010     0.    0.020    0.010
.010
  367        0.     0.    0.0010     0.    0.020    0.010
.010
  387        0.     0.    0.0010     0.    0.020    0.010
.010
  447        0.     0.    0.0010     0.    0.020    0.010
.010
  487        0.     0.    0.0010     0.    0.020    0.010
.010
  208        0.     0.    0.0010     0.    0.020    0.010
.010
  228        0.     0.    0.0010     0.    0.020    0.010
.010
  248        0.     0.    0.0010     0.    0.020    0.010
.010
  288        0.     0.    0.0010     0.    0.020    0.010
.010
  328        0.     0.    0.0010     0.    0.020    0.010
.010
  209        0.     0.    0.0010     0.    0.020    0.010
.010
  229        0.     0.    0.0010     0.    0.020    0.010
.010
  249        0.     0.    0.0010     0.    0.020    0.010
.010
  289        0.     0.    0.0010     0.    0.020    0.010
.010
  309        0.     0.    0.0010     0.    0.020    0.010
.010
  349        0.     0.    0.0010     0.    0.020    0.010
.010
  389        0.     0.    0.0010     0.    0.020    0.010
.010
  210        0.     0.    0.0010     0.    0.020    0.010
.010
  230        0.     0.    0.0010     0.    0.020    0.010
.010
  250        0.     0.    0.0010     0.    0.020    0.010
.010
  270        0.     0.    0.0010     0.    0.020    0.010
.010
***dryland.wheat***
  271        0.     0.    0.0010     0.    0.020    0.010
.010
  212        0.     0.    0.0010     0.    0.020    0.010
```

```
.010
  232             0.          0.    0.0010        0.       0.020      0.010
.010
  252             0.          0.    0.0010        0.       0.020      0.010
.010
  213             0.          0.    0.0010        0.       0.020      0.010
.010
  233             0.          0.    0.0010        0.       0.020      0.010
.010
  253             0.          0.    0.0010        0.       0.020      0.010
.010
  273             0.          0.    0.0010        0.       0.020      0.010
.010
  214             0.          0.    0.0010        0.       0.020      0.010
.010
  234             0.          0.    0.0010        0.       0.020      0.010
.010
  254             0.          0.    0.0010        0.       0.020      0.010
.010
  274             0.          0.    0.0010        0.       0.020      0.010
.010
  END PWAT-STATE1
  MON-INTERCEP
    <PLS>   Only required if VCSFG=1 in PWAT-PARM1                          ***
    # -  #  Interception storage capacity at start of each month            ***
            JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC ***
*** sagebrush ***
  201       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  202       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  203       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  204       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  221       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  222       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  223       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  224       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  241       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  242       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  243       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  261       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  262       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  264       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  281       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  282       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  283       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  301       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  303       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  321       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  323       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  341       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  343       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  361       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  363       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  381       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  383       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
```

```
  441       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  481       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
*** grassland ***
  207       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  208       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  209       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  210       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  227       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  228       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  229       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  230       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  247       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  248       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  249       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  250       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  267       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  270       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  287       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  288       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  289       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  307       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  309       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  327       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  328       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  347       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  349       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  367       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  387       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  389       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  447       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  487       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
*** dry.wheat ***
  212       0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  213       0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  214       0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  232       0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  233       0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  234       0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  252       0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  253       0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  254       0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  271       0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  273       0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  274       0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  END MON-INTERCEP
  MON-LZETPARM
    <PLS >  Only required if VLEFG=1 in PWAT-PARM1                     ***
    # -  #  Lower zone ET parameter at start of each month             ***
            JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC ***
*** sagebrush ***
  201       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  202       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  203       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  204       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
```

221	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
222	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
223	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
224	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
241	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
242	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
243	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
261	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
262	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
264	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
281	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
282	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
283	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
301	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
303	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
321	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
323	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
341	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
343	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
361	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
363	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
381	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
383	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
441	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
481	0.75	0.99	0.97	0.78	0.80	0.81	0.81	0.80	0.77	0.69	0.71	0.73
*** grassland ***												
207	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
208	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
209	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
210	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
227	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
228	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
229	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
230	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
247	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
248	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
249	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
250	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
267	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
270	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
287	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
288	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
289	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
307	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
309	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
327	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
328	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
347	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
349	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
367	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
387	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
389	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
447	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48
487	0.45	0.52	0.65	0.76	0.80	0.81	0.81	0.80	0.77	0.69	0.58	0.48

```
*** dry.wheat ***
  212      0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  213      0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  214      0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  232      0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  233      0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  234      0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  252      0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  253      0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  254      0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  271      0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  273      0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  274      0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  END MON-LZETPARM
END PERLND
EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->
***
<Name>    # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #
***
WDM      2 PREC     ENGL       .890         PERLND 201 289 EXTNL  PREC
WDM      2 PREC     ENGL      1.150         PERLND 301 389 EXTNL  PREC
WDM      2 PREC     ENGL      1.320         PERLND 441 487 EXTNL  PREC
WDM      5 WIND     ENGL                    PERLND 201 487 EXTNL  WINMOV
WDM      6 SOLR     ENGL                    PERLND 201 214 EXTNL  SOLRAD
WDM      7 SOLR     ENGL                    PERLND 221 234 EXTNL  SOLRAD
WDM      8 SOLR     ENGL                    PERLND 241 254 EXTNL  SOLRAD
WDM      9 SOLR     ENGL                    PERLND 261 274 EXTNL  SOLRAD
WDM     10 SOLR     ENGL                    PERLND 281 289 EXTNL  SOLRAD
WDM      6 SOLR     ENGL                    PERLND 301 309 EXTNL  SOLRAD
WDM      7 SOLR     ENGL                    PERLND 321 328 EXTNL  SOLRAD
WDM      8 SOLR     ENGL                    PERLND 341 349 EXTNL  SOLRAD
WDM      9 SOLR     ENGL                    PERLND 361 367 EXTNL  SOLRAD
WDM     10 SOLR     ENGL                    PERLND 381 389 EXTNL  SOLRAD
WDM      8 SOLR     ENGL                    PERLND 441 447 EXTNL  SOLRAD
WDM     10 SOLR     ENGL                    PERLND 481 487 EXTNL  SOLRAD
WDM     15 TEMP     ENGL                    PERLND 201 289 ATEMP  AIRTMP
WDM     25 DEWP     ENGL                    PERLND 201 289 EXTNL  DTMPG
WDM     18 TEMP     ENGL                    PERLND 301 389 ATEMP  AIRTMP
WDM     28 DEWP     ENGL                    PERLND 301 389 EXTNL  DTMPG
WDM     20 TEMP     ENGL                    PERLND 441 487 ATEMP  AIRTMP
WDM     30 DEWP     ENGL                    PERLND 441 487 EXTNL  DTMPG
WDM     35 PET      ENGL                    PERLND 201 214 EXTNL  PETINP
WDM     45 PET      ENGL                    PERLND 221 234 EXTNL  PETINP
WDM     55 PET      ENGL                    PERLND 241 254 EXTNL  PETINP
WDM     65 PET      ENGL                    PERLND 261 274 EXTNL  PETINP
WDM     75 PET      ENGL                    PERLND 281 289 EXTNL  PETINP
WDM     38 PET      ENGL                    PERLND 301 309 EXTNL  PETINP
WDM     48 PET      ENGL                    PERLND 321 328 EXTNL  PETINP
WDM     58 PET      ENGL                    PERLND 341 349 EXTNL  PETINP
WDM     68 PET      ENGL                    PERLND 361 367 EXTNL  PETINP
WDM     78 PET      ENGL                    PERLND 381 389 EXTNL  PETINP
WDM     60 PET      ENGL                    PERLND 441 447 EXTNL  PETINP
WDM     80 PET      ENGL                    PERLND 481 487 EXTNL  PETINP
```

```
END EXT SOURCES
NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->
***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #
***
***Basin geometry
   *** SURO+IFWO summed for basin.
   *** AGWI summed for basin.
   *** Total actual ET (TAET+SNOWE) summed for basin.
   *** Mfact is perlnd area (acres)/12 (coversion from inches to acre-feet)
PERLND 201 PWATER SURO       14.71667       COPY     1      INPUT  MEAN   1
PERLND 201 PWATER IFWO       14.71667       COPY     1      INPUT  MEAN   1
PERLND 201 PWATER AGWI       14.71667       COPY     1      INPUT  MEAN   2
PERLND 201 PWATER TAET       14.71667       COPY     1      INPUT  MEAN   3
PERLND 201 SNOW   SNOWE      14.71667       COPY     1      INPUT  MEAN   3
PERLND 202 PWATER SURO        8.35833       COPY     1      INPUT  MEAN   1
PERLND 202 PWATER IFWO        8.35833       COPY     1      INPUT  MEAN   1
PERLND 202 PWATER AGWI        8.35833       COPY     1      INPUT  MEAN   2
PERLND 202 PWATER TAET        8.35833       COPY     1      INPUT  MEAN   3
PERLND 202 SNOW   SNOWE       8.35833       COPY     1      INPUT  MEAN   3
PERLND 203 PWATER SURO       18.96667       COPY     1      INPUT  MEAN   1
PERLND 203 PWATER IFWO       18.96667       COPY     1      INPUT  MEAN   1
PERLND 203 PWATER AGWI       18.96667       COPY     1      INPUT  MEAN   2
PERLND 203 PWATER TAET       18.96667       COPY     1      INPUT  MEAN   3
PERLND 203 SNOW   SNOWE      18.96667       COPY     1      INPUT  MEAN   3
PERLND 204 PWATER SURO       21.49167       COPY     1      INPUT  MEAN   1
PERLND 204 PWATER IFWO       21.49167       COPY     1      INPUT  MEAN   1
PERLND 204 PWATER AGWI       21.49167       COPY     1      INPUT  MEAN   2
PERLND 204 PWATER TAET       21.49167       COPY     1      INPUT  MEAN   3
PERLND 204 SNOW   SNOWE      21.49167       COPY     1      INPUT  MEAN   3
PERLND 207 PWATER SURO       29.86667       COPY     1      INPUT  MEAN   1
PERLND 207 PWATER IFWO       29.86667       COPY     1      INPUT  MEAN   1
PERLND 207 PWATER AGWI       29.86667       COPY     1      INPUT  MEAN   2
PERLND 207 PWATER TAET       29.86667       COPY     1      INPUT  MEAN   3
PERLND 207 SNOW   SNOWE      29.86667       COPY     1      INPUT  MEAN   3
PERLND 208 PWATER SURO       94.08334       COPY     1      INPUT  MEAN   1
PERLND 208 PWATER IFWO       94.08334       COPY     1      INPUT  MEAN   1
PERLND 208 PWATER AGWI       94.08334       COPY     1      INPUT  MEAN   2
PERLND 208 PWATER TAET       94.08334       COPY     1      INPUT  MEAN   3
PERLND 208 SNOW   SNOWE      94.08334       COPY     1      INPUT  MEAN   3
PERLND 209 PWATER SURO       85.39166       COPY     1      INPUT  MEAN   1
PERLND 209 PWATER IFWO       85.39166       COPY     1      INPUT  MEAN   1
PERLND 209 PWATER AGWI       85.39166       COPY     1      INPUT  MEAN   2
PERLND 209 PWATER TAET       85.39166       COPY     1      INPUT  MEAN   3
PERLND 209 SNOW   SNOWE      85.39166       COPY     1      INPUT  MEAN   3
PERLND 210 PWATER SURO      130.84999       COPY     1      INPUT  MEAN   1
PERLND 210 PWATER IFWO      130.84999       COPY     1      INPUT  MEAN   1
PERLND 210 PWATER AGWI      130.84999       COPY     1      INPUT  MEAN   2
PERLND 210 PWATER TAET      130.84999       COPY     1      INPUT  MEAN   3
PERLND 210 SNOW   SNOWE     130.84999       COPY     1      INPUT  MEAN   3
PERLND 212 PWATER SURO       55.04167       COPY     1      INPUT  MEAN   1
PERLND 212 PWATER IFWO       55.04167       COPY     1      INPUT  MEAN   1
PERLND 212 PWATER AGWI       55.04167       COPY     1      INPUT  MEAN   2
```

PERLND	212	PWATER	TAET	55.04167	COPY	1	INPUT	MEAN	3
PERLND	212	SNOW	SNOWE	55.04167	COPY	1	INPUT	MEAN	3
PERLND	213	PWATER	SURO	184.83333	COPY	1	INPUT	MEAN	1
PERLND	213	PWATER	IFWO	184.83333	COPY	1	INPUT	MEAN	1
PERLND	213	PWATER	AGWI	184.83333	COPY	1	INPUT	MEAN	2
PERLND	213	PWATER	TAET	184.83333	COPY	1	INPUT	MEAN	3
PERLND	213	SNOW	SNOWE	184.83333	COPY	1	INPUT	MEAN	3
PERLND	214	PWATER	SURO	241.32500	COPY	1	INPUT	MEAN	1
PERLND	214	PWATER	IFWO	241.32500	COPY	1	INPUT	MEAN	1
PERLND	214	PWATER	AGWI	241.32500	COPY	1	INPUT	MEAN	2
PERLND	214	PWATER	TAET	241.32500	COPY	1	INPUT	MEAN	3
PERLND	214	SNOW	SNOWE	241.32500	COPY	1	INPUT	MEAN	3
PERLND	221	PWATER	SURO	14.12500	COPY	1	INPUT	MEAN	1
PERLND	221	PWATER	IFWO	14.12500	COPY	1	INPUT	MEAN	1
PERLND	221	PWATER	AGWI	14.12500	COPY	1	INPUT	MEAN	2
PERLND	221	PWATER	TAET	14.12500	COPY	1	INPUT	MEAN	3
PERLND	221	SNOW	SNOWE	14.12500	COPY	1	INPUT	MEAN	3
PERLND	222	PWATER	SURO	8.70833	COPY	1	INPUT	MEAN	1
PERLND	222	PWATER	IFWO	8.70833	COPY	1	INPUT	MEAN	1
PERLND	222	PWATER	AGWI	8.70833	COPY	1	INPUT	MEAN	2
PERLND	222	PWATER	TAET	8.70833	COPY	1	INPUT	MEAN	3
PERLND	222	SNOW	SNOWE	8.70833	COPY	1	INPUT	MEAN	3
PERLND	223	PWATER	SURO	21.39167	COPY	1	INPUT	MEAN	1
PERLND	223	PWATER	IFWO	21.39167	COPY	1	INPUT	MEAN	1
PERLND	223	PWATER	AGWI	21.39167	COPY	1	INPUT	MEAN	2
PERLND	223	PWATER	TAET	21.39167	COPY	1	INPUT	MEAN	3
PERLND	223	SNOW	SNOWE	21.39167	COPY	1	INPUT	MEAN	3
PERLND	224	PWATER	SURO	18.59167	COPY	1	INPUT	MEAN	1
PERLND	224	PWATER	IFWO	18.59167	COPY	1	INPUT	MEAN	1
PERLND	224	PWATER	AGWI	18.59167	COPY	1	INPUT	MEAN	2
PERLND	224	PWATER	TAET	18.59167	COPY	1	INPUT	MEAN	3
PERLND	224	SNOW	SNOWE	18.59167	COPY	1	INPUT	MEAN	3
PERLND	227	PWATER	SURO	17.24167	COPY	1	INPUT	MEAN	1
PERLND	227	PWATER	IFWO	17.24167	COPY	1	INPUT	MEAN	1
PERLND	227	PWATER	AGWI	17.24167	COPY	1	INPUT	MEAN	2
PERLND	227	PWATER	TAET	17.24167	COPY	1	INPUT	MEAN	3
PERLND	227	SNOW	SNOWE	17.24167	COPY	1	INPUT	MEAN	3
PERLND	228	PWATER	SURO	32.16667	COPY	1	INPUT	MEAN	1
PERLND	228	PWATER	IFWO	32.16667	COPY	1	INPUT	MEAN	1
PERLND	228	PWATER	AGWI	32.16667	COPY	1	INPUT	MEAN	2
PERLND	228	PWATER	TAET	32.16667	COPY	1	INPUT	MEAN	3
PERLND	228	SNOW	SNOWE	32.16667	COPY	1	INPUT	MEAN	3
PERLND	229	PWATER	SURO	32.95000	COPY	1	INPUT	MEAN	1
PERLND	229	PWATER	IFWO	32.95000	COPY	1	INPUT	MEAN	1
PERLND	229	PWATER	AGWI	32.95000	COPY	1	INPUT	MEAN	2
PERLND	229	PWATER	TAET	32.95000	COPY	1	INPUT	MEAN	3
PERLND	229	SNOW	SNOWE	32.95000	COPY	1	INPUT	MEAN	3
PERLND	230	PWATER	SURO	46.60000	COPY	1	INPUT	MEAN	1
PERLND	230	PWATER	IFWO	46.60000	COPY	1	INPUT	MEAN	1
PERLND	230	PWATER	AGWI	46.60000	COPY	1	INPUT	MEAN	2
PERLND	230	PWATER	TAET	46.60000	COPY	1	INPUT	MEAN	3
PERLND	230	SNOW	SNOWE	46.60000	COPY	1	INPUT	MEAN	3
PERLND	232	PWATER	SURO	22.17500	COPY	1	INPUT	MEAN	1
PERLND	232	PWATER	IFWO	22.17500	COPY	1	INPUT	MEAN	1

PERLND	232	PWATER	AGWI	22.17500	COPY	1	INPUT	MEAN	2
PERLND	232	PWATER	TAET	22.17500	COPY	1	INPUT	MEAN	3
PERLND	232	SNOW	SNOWE	22.17500	COPY	1	INPUT	MEAN	3
PERLND	233	PWATER	SURO	26.00000	COPY	1	INPUT	MEAN	1
PERLND	233	PWATER	IFWO	26.00000	COPY	1	INPUT	MEAN	1
PERLND	233	PWATER	AGWI	26.00000	COPY	1	INPUT	MEAN	2
PERLND	233	PWATER	TAET	26.00000	COPY	1	INPUT	MEAN	3
PERLND	233	SNOW	SNOWE	26.00000	COPY	1	INPUT	MEAN	3
PERLND	234	PWATER	SURO	67.42500	COPY	1	INPUT	MEAN	1
PERLND	234	PWATER	IFWO	67.42500	COPY	1	INPUT	MEAN	1
PERLND	234	PWATER	AGWI	67.42500	COPY	1	INPUT	MEAN	2
PERLND	234	PWATER	TAET	67.42500	COPY	1	INPUT	MEAN	3
PERLND	234	SNOW	SNOWE	67.42500	COPY	1	INPUT	MEAN	3
PERLND	241	PWATER	SURO	49.21666	COPY	1	INPUT	MEAN	1
PERLND	241	PWATER	IFWO	49.21666	COPY	1	INPUT	MEAN	1
PERLND	241	PWATER	AGWI	49.21666	COPY	1	INPUT	MEAN	2
PERLND	241	PWATER	TAET	49.21666	COPY	1	INPUT	MEAN	3
PERLND	241	SNOW	SNOWE	49.21666	COPY	1	INPUT	MEAN	3
PERLND	242	PWATER	SURO	15.63333	COPY	1	INPUT	MEAN	1
PERLND	242	PWATER	IFWO	15.63333	COPY	1	INPUT	MEAN	1
PERLND	242	PWATER	AGWI	15.63333	COPY	1	INPUT	MEAN	2
PERLND	242	PWATER	TAET	15.63333	COPY	1	INPUT	MEAN	3
PERLND	242	SNOW	SNOWE	15.63333	COPY	1	INPUT	MEAN	3
PERLND	243	PWATER	SURO	39.30000	COPY	1	INPUT	MEAN	1
PERLND	243	PWATER	IFWO	39.30000	COPY	1	INPUT	MEAN	1
PERLND	243	PWATER	AGWI	39.30000	COPY	1	INPUT	MEAN	2
PERLND	243	PWATER	TAET	39.30000	COPY	1	INPUT	MEAN	3
PERLND	243	SNOW	SNOWE	39.30000	COPY	1	INPUT	MEAN	3
PERLND	247	PWATER	SURO	85.25833	COPY	1	INPUT	MEAN	1
PERLND	247	PWATER	IFWO	85.25833	COPY	1	INPUT	MEAN	1
PERLND	247	PWATER	AGWI	85.25833	COPY	1	INPUT	MEAN	2
PERLND	247	PWATER	TAET	85.25833	COPY	1	INPUT	MEAN	3
PERLND	247	SNOW	SNOWE	85.25833	COPY	1	INPUT	MEAN	3
PERLND	248	PWATER	SURO	130.00833	COPY	1	INPUT	MEAN	1
PERLND	248	PWATER	IFWO	130.00833	COPY	1	INPUT	MEAN	1
PERLND	248	PWATER	AGWI	130.00833	COPY	1	INPUT	MEAN	2
PERLND	248	PWATER	TAET	130.00833	COPY	1	INPUT	MEAN	3
PERLND	248	SNOW	SNOWE	130.00833	COPY	1	INPUT	MEAN	3
PERLND	249	PWATER	SURO	142.04167	COPY	1	INPUT	MEAN	1
PERLND	249	PWATER	IFWO	142.04167	COPY	1	INPUT	MEAN	1
PERLND	249	PWATER	AGWI	142.04167	COPY	1	INPUT	MEAN	2
PERLND	249	PWATER	TAET	142.04167	COPY	1	INPUT	MEAN	3
PERLND	249	SNOW	SNOWE	142.04167	COPY	1	INPUT	MEAN	3
PERLND	250	PWATER	SURO	41.96667	COPY	1	INPUT	MEAN	1
PERLND	250	PWATER	IFWO	41.96667	COPY	1	INPUT	MEAN	1
PERLND	250	PWATER	AGWI	41.96667	COPY	1	INPUT	MEAN	2
PERLND	250	PWATER	TAET	41.96667	COPY	1	INPUT	MEAN	3
PERLND	250	SNOW	SNOWE	41.96667	COPY	1	INPUT	MEAN	3
PERLND	252	PWATER	SURO	29.98333	COPY	1	INPUT	MEAN	1
PERLND	252	PWATER	IFWO	29.98333	COPY	1	INPUT	MEAN	1
PERLND	252	PWATER	AGWI	29.98333	COPY	1	INPUT	MEAN	2
PERLND	252	PWATER	TAET	29.98333	COPY	1	INPUT	MEAN	3
PERLND	252	SNOW	SNOWE	29.98333	COPY	1	INPUT	MEAN	3
PERLND	253	PWATER	SURO	69.99167	COPY	1	INPUT	MEAN	1

PERLND	253	PWATER	IFWO	69.99167	COPY	1	INPUT	MEAN	1
PERLND	253	PWATER	AGWI	69.99167	COPY	1	INPUT	MEAN	2
PERLND	253	PWATER	TAET	69.99167	COPY	1	INPUT	MEAN	3
PERLND	253	SNOW	SNOWE	69.99167	COPY	1	INPUT	MEAN	3
PERLND	254	PWATER	SURO	22.06667	COPY	1	INPUT	MEAN	1
PERLND	254	PWATER	IFWO	22.06667	COPY	1	INPUT	MEAN	1
PERLND	254	PWATER	AGWI	22.06667	COPY	1	INPUT	MEAN	2
PERLND	254	PWATER	TAET	22.06667	COPY	1	INPUT	MEAN	3
PERLND	254	SNOW	SNOWE	22.06667	COPY	1	INPUT	MEAN	3
PERLND	261	PWATER	SURO	32.05000	COPY	1	INPUT	MEAN	1
PERLND	261	PWATER	IFWO	32.05000	COPY	1	INPUT	MEAN	1
PERLND	261	PWATER	AGWI	32.05000	COPY	1	INPUT	MEAN	2
PERLND	261	PWATER	TAET	32.05000	COPY	1	INPUT	MEAN	3
PERLND	261	SNOW	SNOWE	32.05000	COPY	1	INPUT	MEAN	3
PERLND	262	PWATER	SURO	14.90000	COPY	1	INPUT	MEAN	1
PERLND	262	PWATER	IFWO	14.90000	COPY	1	INPUT	MEAN	1
PERLND	262	PWATER	AGWI	14.90000	COPY	1	INPUT	MEAN	2
PERLND	262	PWATER	TAET	14.90000	COPY	1	INPUT	MEAN	3
PERLND	262	SNOW	SNOWE	14.90000	COPY	1	INPUT	MEAN	3
PERLND	264	PWATER	SURO	39.85833	COPY	1	INPUT	MEAN	1
PERLND	264	PWATER	IFWO	39.85833	COPY	1	INPUT	MEAN	1
PERLND	264	PWATER	AGWI	39.85833	COPY	1	INPUT	MEAN	2
PERLND	264	PWATER	TAET	39.85833	COPY	1	INPUT	MEAN	3
PERLND	264	SNOW	SNOWE	39.85833	COPY	1	INPUT	MEAN	3
PERLND	267	PWATER	SURO	12.02500	COPY	1	INPUT	MEAN	1
PERLND	267	PWATER	IFWO	12.02500	COPY	1	INPUT	MEAN	1
PERLND	267	PWATER	AGWI	12.02500	COPY	1	INPUT	MEAN	2
PERLND	267	PWATER	TAET	12.02500	COPY	1	INPUT	MEAN	3
PERLND	267	SNOW	SNOWE	12.02500	COPY	1	INPUT	MEAN	3
PERLND	270	PWATER	SURO	19.80000	COPY	1	INPUT	MEAN	1
PERLND	270	PWATER	IFWO	19.80000	COPY	1	INPUT	MEAN	1
PERLND	270	PWATER	AGWI	19.80000	COPY	1	INPUT	MEAN	2
PERLND	270	PWATER	TAET	19.80000	COPY	1	INPUT	MEAN	3
PERLND	270	SNOW	SNOWE	19.80000	COPY	1	INPUT	MEAN	3
PERLND	271	PWATER	SURO	11.00000	COPY	1	INPUT	MEAN	1
PERLND	271	PWATER	IFWO	11.00000	COPY	1	INPUT	MEAN	1
PERLND	271	PWATER	AGWI	11.00000	COPY	1	INPUT	MEAN	2
PERLND	271	PWATER	TAET	11.00000	COPY	1	INPUT	MEAN	3
PERLND	271	SNOW	SNOWE	11.00000	COPY	1	INPUT	MEAN	3
PERLND	273	PWATER	SURO	8.95833	COPY	1	INPUT	MEAN	1
PERLND	273	PWATER	IFWO	8.95833	COPY	1	INPUT	MEAN	1
PERLND	273	PWATER	AGWI	8.95833	COPY	1	INPUT	MEAN	2
PERLND	273	PWATER	TAET	8.95833	COPY	1	INPUT	MEAN	3
PERLND	273	SNOW	SNOWE	8.95833	COPY	1	INPUT	MEAN	3
PERLND	274	PWATER	SURO	13.14167	COPY	1	INPUT	MEAN	1
PERLND	274	PWATER	IFWO	13.14167	COPY	1	INPUT	MEAN	1
PERLND	274	PWATER	AGWI	13.14167	COPY	1	INPUT	MEAN	2
PERLND	274	PWATER	TAET	13.14167	COPY	1	INPUT	MEAN	3
PERLND	274	SNOW	SNOWE	13.14167	COPY	1	INPUT	MEAN	3
PERLND	281	PWATER	SURO	17.67500	COPY	1	INPUT	MEAN	1
PERLND	281	PWATER	IFWO	17.67500	COPY	1	INPUT	MEAN	1
PERLND	281	PWATER	AGWI	17.67500	COPY	1	INPUT	MEAN	2
PERLND	281	PWATER	TAET	17.67500	COPY	1	INPUT	MEAN	3
PERLND	281	SNOW	SNOWE	17.67500	COPY	1	INPUT	MEAN	3

PERLND	282	PWATER	SURO	12.34167	COPY	1	INPUT	MEAN	1
PERLND	282	PWATER	IFWO	12.34167	COPY	1	INPUT	MEAN	1
PERLND	282	PWATER	AGWI	12.34167	COPY	1	INPUT	MEAN	2
PERLND	282	PWATER	TAET	12.34167	COPY	1	INPUT	MEAN	3
PERLND	282	SNOW	SNOWE	12.34167	COPY	1	INPUT	MEAN	3
PERLND	283	PWATER	SURO	17.18333	COPY	1	INPUT	MEAN	1
PERLND	283	PWATER	IFWO	17.18333	COPY	1	INPUT	MEAN	1
PERLND	283	PWATER	AGWI	17.18333	COPY	1	INPUT	MEAN	2
PERLND	283	PWATER	TAET	17.18333	COPY	1	INPUT	MEAN	3
PERLND	283	SNOW	SNOWE	17.18333	COPY	1	INPUT	MEAN	3
PERLND	287	PWATER	SURO	17.38333	COPY	1	INPUT	MEAN	1
PERLND	287	PWATER	IFWO	17.38333	COPY	1	INPUT	MEAN	1
PERLND	287	PWATER	AGWI	17.38333	COPY	1	INPUT	MEAN	2
PERLND	287	PWATER	TAET	17.38333	COPY	1	INPUT	MEAN	3
PERLND	287	SNOW	SNOWE	17.38333	COPY	1	INPUT	MEAN	3
PERLND	288	PWATER	SURO	15.50833	COPY	1	INPUT	MEAN	1
PERLND	288	PWATER	IFWO	15.50833	COPY	1	INPUT	MEAN	1
PERLND	288	PWATER	AGWI	15.50833	COPY	1	INPUT	MEAN	2
PERLND	288	PWATER	TAET	15.50833	COPY	1	INPUT	MEAN	3
PERLND	288	SNOW	SNOWE	15.50833	COPY	1	INPUT	MEAN	3
PERLND	289	PWATER	SURO	25.54167	COPY	1	INPUT	MEAN	1
PERLND	289	PWATER	IFWO	25.54167	COPY	1	INPUT	MEAN	1
PERLND	289	PWATER	AGWI	25.54167	COPY	1	INPUT	MEAN	2
PERLND	289	PWATER	TAET	25.54167	COPY	1	INPUT	MEAN	3
PERLND	289	SNOW	SNOWE	25.54167	COPY	1	INPUT	MEAN	3
PERLND	301	PWATER	SURO	29.51667	COPY	1	INPUT	MEAN	1
PERLND	301	PWATER	IFWO	29.51667	COPY	1	INPUT	MEAN	1
PERLND	301	PWATER	AGWI	29.51667	COPY	1	INPUT	MEAN	2
PERLND	301	PWATER	TAET	29.51667	COPY	1	INPUT	MEAN	3
PERLND	301	SNOW	SNOWE	29.51667	COPY	1	INPUT	MEAN	3
PERLND	303	PWATER	SURO	13.80833	COPY	1	INPUT	MEAN	1
PERLND	303	PWATER	IFWO	13.80833	COPY	1	INPUT	MEAN	1
PERLND	303	PWATER	AGWI	13.80833	COPY	1	INPUT	MEAN	2
PERLND	303	PWATER	TAET	13.80833	COPY	1	INPUT	MEAN	3
PERLND	303	SNOW	SNOWE	13.80833	COPY	1	INPUT	MEAN	3
PERLND	307	PWATER	SURO	44.43333	COPY	1	INPUT	MEAN	1
PERLND	307	PWATER	IFWO	44.43333	COPY	1	INPUT	MEAN	1
PERLND	307	PWATER	AGWI	44.43333	COPY	1	INPUT	MEAN	2
PERLND	307	PWATER	TAET	44.43333	COPY	1	INPUT	MEAN	3
PERLND	307	SNOW	SNOWE	44.43333	COPY	1	INPUT	MEAN	3
PERLND	309	PWATER	SURO	20.00000	COPY	1	INPUT	MEAN	1
PERLND	309	PWATER	IFWO	20.00000	COPY	1	INPUT	MEAN	1
PERLND	309	PWATER	AGWI	20.00000	COPY	1	INPUT	MEAN	2
PERLND	309	PWATER	TAET	20.00000	COPY	1	INPUT	MEAN	3
PERLND	309	SNOW	SNOWE	20.00000	COPY	1	INPUT	MEAN	3
PERLND	321	PWATER	SURO	18.95833	COPY	1	INPUT	MEAN	1
PERLND	321	PWATER	IFWO	18.95833	COPY	1	INPUT	MEAN	1
PERLND	321	PWATER	AGWI	18.95833	COPY	1	INPUT	MEAN	2
PERLND	321	PWATER	TAET	18.95833	COPY	1	INPUT	MEAN	3
PERLND	321	SNOW	SNOWE	18.95833	COPY	1	INPUT	MEAN	3
PERLND	323	PWATER	SURO	8.05833	COPY	1	INPUT	MEAN	1
PERLND	323	PWATER	IFWO	8.05833	COPY	1	INPUT	MEAN	1
PERLND	323	PWATER	AGWI	8.05833	COPY	1	INPUT	MEAN	2
PERLND	323	PWATER	TAET	8.05833	COPY	1	INPUT	MEAN	3

PERLND	323	SNOW	SNOWE	8.05833	COPY	1	INPUT	MEAN	3
PERLND	327	PWATER	SURO	24.15000	COPY	1	INPUT	MEAN	1
PERLND	327	PWATER	IFWO	24.15000	COPY	1	INPUT	MEAN	1
PERLND	327	PWATER	AGWI	24.15000	COPY	1	INPUT	MEAN	2
PERLND	327	PWATER	TAET	24.15000	COPY	1	INPUT	MEAN	3
PERLND	327	SNOW	SNOWE	24.15000	COPY	1	INPUT	MEAN	3
PERLND	328	PWATER	SURO	8.79167	COPY	1	INPUT	MEAN	1
PERLND	328	PWATER	IFWO	8.79167	COPY	1	INPUT	MEAN	1
PERLND	328	PWATER	AGWI	8.79167	COPY	1	INPUT	MEAN	2
PERLND	328	PWATER	TAET	8.79167	COPY	1	INPUT	MEAN	3
PERLND	328	SNOW	SNOWE	8.79167	COPY	1	INPUT	MEAN	3
PERLND	341	PWATER	SURO	96.05000	COPY	1	INPUT	MEAN	1
PERLND	341	PWATER	IFWO	96.05000	COPY	1	INPUT	MEAN	1
PERLND	341	PWATER	AGWI	96.05000	COPY	1	INPUT	MEAN	2
PERLND	341	PWATER	TAET	96.05000	COPY	1	INPUT	MEAN	3
PERLND	341	SNOW	SNOWE	96.05000	COPY	1	INPUT	MEAN	3
PERLND	343	PWATER	SURO	49.64167	COPY	1	INPUT	MEAN	1
PERLND	343	PWATER	IFWO	49.64167	COPY	1	INPUT	MEAN	1
PERLND	343	PWATER	AGWI	49.64167	COPY	1	INPUT	MEAN	2
PERLND	343	PWATER	TAET	49.64167	COPY	1	INPUT	MEAN	3
PERLND	343	SNOW	SNOWE	49.64167	COPY	1	INPUT	MEAN	3
PERLND	347	PWATER	SURO	173.32500	COPY	1	INPUT	MEAN	1
PERLND	347	PWATER	IFWO	173.32500	COPY	1	INPUT	MEAN	1
PERLND	347	PWATER	AGWI	173.32500	COPY	1	INPUT	MEAN	2
PERLND	347	PWATER	TAET	173.32500	COPY	1	INPUT	MEAN	3
PERLND	347	SNOW	SNOWE	173.32500	COPY	1	INPUT	MEAN	3
PERLND	349	PWATER	SURO	100.06667	COPY	1	INPUT	MEAN	1
PERLND	349	PWATER	IFWO	100.06667	COPY	1	INPUT	MEAN	1
PERLND	349	PWATER	AGWI	100.06667	COPY	1	INPUT	MEAN	2
PERLND	349	PWATER	TAET	100.06667	COPY	1	INPUT	MEAN	3
PERLND	349	SNOW	SNOWE	100.06667	COPY	1	INPUT	MEAN	3
PERLND	361	PWATER	SURO	77.14167	COPY	1	INPUT	MEAN	1
PERLND	361	PWATER	IFWO	77.14167	COPY	1	INPUT	MEAN	1
PERLND	361	PWATER	AGWI	77.14167	COPY	1	INPUT	MEAN	2
PERLND	361	PWATER	TAET	77.14167	COPY	1	INPUT	MEAN	3
PERLND	361	SNOW	SNOWE	77.14167	COPY	1	INPUT	MEAN	3
PERLND	363	PWATER	SURO	9.26667	COPY	1	INPUT	MEAN	1
PERLND	363	PWATER	IFWO	9.26667	COPY	1	INPUT	MEAN	1
PERLND	363	PWATER	AGWI	9.26667	COPY	1	INPUT	MEAN	2
PERLND	363	PWATER	TAET	9.26667	COPY	1	INPUT	MEAN	3
PERLND	363	SNOW	SNOWE	9.26667	COPY	1	INPUT	MEAN	3
PERLND	367	PWATER	SURO	19.40833	COPY	1	INPUT	MEAN	1
PERLND	367	PWATER	IFWO	19.40833	COPY	1	INPUT	MEAN	1
PERLND	367	PWATER	AGWI	19.40833	COPY	1	INPUT	MEAN	2
PERLND	367	PWATER	TAET	19.40833	COPY	1	INPUT	MEAN	3
PERLND	367	SNOW	SNOWE	19.40833	COPY	1	INPUT	MEAN	3
PERLND	381	PWATER	SURO	55.98333	COPY	1	INPUT	MEAN	1
PERLND	381	PWATER	IFWO	55.98333	COPY	1	INPUT	MEAN	1
PERLND	381	PWATER	AGWI	55.98333	COPY	1	INPUT	MEAN	2
PERLND	381	PWATER	TAET	55.98333	COPY	1	INPUT	MEAN	3
PERLND	381	SNOW	SNOWE	55.98333	COPY	1	INPUT	MEAN	3
PERLND	383	PWATER	SURO	16.18333	COPY	1	INPUT	MEAN	1
PERLND	383	PWATER	IFWO	16.18333	COPY	1	INPUT	MEAN	1
PERLND	383	PWATER	AGWI	16.18333	COPY	1	INPUT	MEAN	2

```
PERLND 383 PWATER TAET        16.18333       COPY     1      INPUT  MEAN   3
PERLND 383 SNOW   SNOWE       16.18333       COPY     1      INPUT  MEAN   3
PERLND 387 PWATER SURO        69.16666       COPY     1      INPUT  MEAN   1
PERLND 387 PWATER IFWO        69.16666       COPY     1      INPUT  MEAN   1
PERLND 387 PWATER AGWI        69.16666       COPY     1      INPUT  MEAN   2
PERLND 387 PWATER TAET        69.16666       COPY     1      INPUT  MEAN   3
PERLND 387 SNOW   SNOWE       69.16666       COPY     1      INPUT  MEAN   3
PERLND 389 PWATER SURO        28.42500       COPY     1      INPUT  MEAN   1
PERLND 389 PWATER IFWO        28.42500       COPY     1      INPUT  MEAN   1
PERLND 389 PWATER AGWI        28.42500       COPY     1      INPUT  MEAN   2
PERLND 389 PWATER TAET        28.42500       COPY     1      INPUT  MEAN   3
PERLND 389 SNOW   SNOWE       28.42500       COPY     1      INPUT  MEAN   3
PERLND 441 PWATER SURO        10.71667       COPY     1      INPUT  MEAN   1
PERLND 441 PWATER IFWO        10.71667       COPY     1      INPUT  MEAN   1
PERLND 441 PWATER AGWI        10.71667       COPY     1      INPUT  MEAN   2
PERLND 441 PWATER TAET        10.71667       COPY     1      INPUT  MEAN   3
PERLND 441 SNOW   SNOWE       10.71667       COPY     1      INPUT  MEAN   3
PERLND 447 PWATER SURO        16.18333       COPY     1      INPUT  MEAN   1
PERLND 447 PWATER IFWO        16.18333       COPY     1      INPUT  MEAN   1
PERLND 447 PWATER AGWI        16.18333       COPY     1      INPUT  MEAN   2
PERLND 447 PWATER TAET        16.18333       COPY     1      INPUT  MEAN   3
PERLND 447 SNOW   SNOWE       16.18333       COPY     1      INPUT  MEAN   3
PERLND 481 PWATER SURO        28.66667       COPY     1      INPUT  MEAN   1
PERLND 481 PWATER IFWO        28.66667       COPY     1      INPUT  MEAN   1
PERLND 481 PWATER AGWI        28.66667       COPY     1      INPUT  MEAN   2
PERLND 481 PWATER TAET        28.66667       COPY     1      INPUT  MEAN   3
PERLND 481 SNOW   SNOWE       28.66667       COPY     1      INPUT  MEAN   3
PERLND 487 PWATER SURO        44.05000       COPY     1      INPUT  MEAN   1
PERLND 487 PWATER IFWO        44.05000       COPY     1      INPUT  MEAN   1
PERLND 487 PWATER AGWI        44.05000       COPY     1      INPUT  MEAN   2
PERLND 487 PWATER TAET        44.05000       COPY     1      INPUT  MEAN   3
PERLND 487 SNOW   SNOWE       44.05000       COPY     1      INPUT  MEAN   3
***Basin water balance information
    *** Total ppt. Mfact is fraction of basin area for each elevation zone.
PERLND 201 SNOW   RAINF          .683        COPY     1      INPUT  MEAN   4
PERLND 201 SNOW   SNOWF          .683        COPY     1      INPUT  MEAN   4
PERLND 301 SNOW   RAINF          .284        COPY     1      INPUT  MEAN   4
PERLND 301 SNOW   SNOWF          .284        COPY     1      INPUT  MEAN   4
PERLND 441 SNOW   RAINF          .033        COPY     1      INPUT  MEAN   4
PERLND 441 SNOW   SNOWF          .033        COPY     1      INPUT  MEAN   4
    ***Basin water-balance displays (runoff)
COPY     1 OUTPUT MEAN   1                   DISPLY   1      INPUT  TIMSER 1
END NETWORK
***
EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd
***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg
strg***
COPY     1 OUTPUT MEAN   1            SAME WDM    436 RO4      ENGL       REPL
COPY     1 OUTPUT MEAN   3            SAME WDM    437 ET4      ENGL       REPL
COPY     1 OUTPUT MEAN   2            SAME WDM    438 DP4      ENGL       REPL
COPY     1 OUTPUT MEAN   4            SAME WDM    439 PT4      ENGL       REPL
END EXT TARGETS
```

```
***
DISPLY
  DISPLY-INFO1
*** # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2
YRND
    1     Dry4   -Runoff       (ac-ft )   SUM                       1    1
50    9
  END DISPLY-INFO1
END DISPLY

COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1              4
  END TIMESERIES
END COPY
**
SPEC-ACTIONS (Not shown)
END SPEC-ACTIONS
END RUN
```

Appendix 5.--*Final HSPF input file for Middle Dry Creek model. For brevity, the "SPECIAL ACTIONS" portion of the model input, where the dates of soil freezing and thawing are represented by changes in the INFILT parameter values, is not included. Complete input files may be obtained by contacting the District Chief at the address shown on page ii of this report*

```
RUN
GLOBAL
  Dry3 final model - hms.wdm data
  START       1957/10/01 00:00  END    1993/05/31 24:00
  RUN INTERP OUTPUT LEVEL    0
  RESUME     0 RUN     1 TSSFL    15 WDMSFL   16
END GLOBAL
OPN SEQUENCE
    INGRP              INDELT 01:00
      PERLND     104
      COPY         1
      PERLND     106
      PERLND     107
      PERLND     110
      PERLND     114
      PERLND     130
      PERLND     134
      PERLND     147
      PERLND     150
      PERLND     190
      PERLND     209
      PERLND     210
      PERLND     212
      PERLND     214
      PERLND     222
      PERLND     223
      PERLND     224
      PERLND     227
      PERLND     228
      PERLND     229
      PERLND     230
      PERLND     232
      PERLND     234
      PERLND     242
      PERLND     247
      PERLND     248
      PERLND     249
      PERLND     250
      PERLND     252
      PERLND     261
      PERLND     263
      PERLND     264
      PERLND     267
      PERLND     268
      PERLND     269
      PERLND     270
      PERLND     274
      PERLND     283
```

```
      PERLND     287
      PERLND     288
      PERLND     289
      PERLND     290
      PERLND     307
      PERLND     321
      PERLND     327
      PERLND     328
      PERLND     343
      PERLND     347
      PERLND     361
      PERLND     363
      PERLND     364
      PERLND     367
      PERLND     370
      PERLND     387
      PERLND     388
      PERLND     421
      PERLND     427
      COPY         2
      COPY         3
      DISPLY       2
    END INGRP
END OPN SEQUENCE
PERLND
  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC
***
  104  427    0    1    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
  PRINT-INFO
    <PLS > ********************* Print-flags ************************* PIVL
PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC
*********
  104              6
6                                                 9
  106  427         6
6                                                 9
  END PRINT-INFO
  GEN-INFO
  <PLS><-------NAME---------->NBLKS  Unit-systems   Printer
***
    # -  #                          User  t-series Engl Metr
***
                                           in   out
***
*** Grouped by elevation zone ***
  104      sage,soil1,flat        1    1    1    1    6    0
  106      irri,soil4,flat        1    1    1    1    6    0
  107      gras,soil1,flat        1    1    1    1    6    0
  110      gras,soil4,flat        1    1    1    1    6    0
  114      dryw,soil4,flat        1    1    1    1    6    0
```

130	gras,soil4,mod.N	1	1	1	1	6	0
134	dryw,soil4,mod.N	1	1	1	1	6	0
147	gras,soil1,mod.S	1	1	1	1	6	0
150	gras,soil4,mod.S	1	1	1	1	6	0
190	gras,soil4,stp.S	1	1	1	1	6	0
209	gras,soil3,flat	1	1	1	1	6	0
210	gras,soil4,flat	1	1	1	1	6	0
212	dryw,soil2,mod.N	1	1	1	1	6	0
214	dryw,soil4,mod.N	1	1	1	1	6	0
222	sage,soil2,mod.N	1	1	1	1	6	0
223	sage,soil3,mod.N	1	1	1	1	6	0
224	sage,soil4,mod.N	1	1	1	1	6	0
227	gras,soil1,mod.N	1	1	1	1	6	0
228	gras,soil2,mod.N	1	1	1	1	6	0
229	gras,soil3,mod.N	1	1	1	1	6	0
230	gras,soil4,mod.N	1	1	1	1	6	0
232	dryw,soil2,mod.N	1	1	1	1	6	0
234	dryw,soil4,mod.N	1	1	1	1	6	0
242	sage,soil2,mod.S	1	1	1	1	6	0
247	gras,soil1,mod.S	1	1	1	1	6	0
248	gras,soil1,mod.S	1	1	1	1	6	0
249	gras,soil3,mod.S	1	1	1	1	6	0
250	gras,soil4,mod.S	1	1	1	1	6	0
252	dryw,soil2,mod.S	1	1	1	1	6	0
261	sage,soil1,stp.N	1	1	1	1	6	0
263	sage,soil3,stp.N	1	1	1	1	6	0
264	sage,soil4,stp.N	1	1	1	1	6	0
267	gras,soil1,stp.N	1	1	1	1	6	0
268	gras,soil2,stp.N	1	1	1	1	6	0
269	gras,soil3,stp.N	1	1	1	1	6	0
270	gras,soil4,stp.N	1	1	1	1	6	0
274	dryw,soil4,stp.N	1	1	1	1	6	0
283	sage,soil3,stp.S	1	1	1	1	6	0
287	gras,soil1,stp.S	1	1	1	1	6	0
288	gras,soil1,stp.S	1	1	1	1	6	0
289	gras,soil3,stp.S	1	1	1	1	6	0
290	gras,soil4,stp.S	1	1	1	1	6	0
307	gras,soil1,flat	1	1	1	1	6	0
321	sage,soil1,mod.N	1	1	1	1	6	0
327	gras,soil1,mod.N	1	1	1	1	6	0
328	gras,soil1,mod.N	1	1	1	1	6	0
343	sage,soil3,mod.S	1	1	1	1	6	0
347	gras,soil1,mod.S	1	1	1	1	6	0
361	sage,soil1,stp.N	1	1	1	1	6	0
363	sage,soil3,stp.N	1	1	1	1	6	0
364	sage,soil4,stp.N	1	1	1	1	6	0
367	gras,soil1,stp.N	1	1	1	1	6	0
370	dryw,soil4,stp.N	1	1	1	1	6	0
387	gras,soil1,stp.S	1	1	1	1	6	0
388	gras,soil2,stp,S	1	1	1	1	6	0
421	sage,soil1,mod.N	1	1	1	1	6	0
427	gras,soil1,mod.N	1	1	1	1	6	0

END GEN-INFO
ICE-FLAG

```
    <PLS > Value of 1 means ice will be simulated, 0 means not simulated
***
    # -  #ICEFG
***
  104  427    1
  END ICE-FLAG
  SNOW-PARM1
               perlnd   perlnd    shaded  gage-catch  snow w.eq. needed for
***
    <PLS >    latitude  altitude fraction adjustment  complete snowcover
***
    # -  #        LAT     MELEV     SHADE    SNOWCF    COVIND
***
  104  190      46.6      820.       0.0      1.25       0.5
  209  290      46.6     1805.       0.0      1.25       0.5
  307  388      46.6     2789.       0.0      1.25       0.5
  421  427      46.6     3609        0.0      1.25       0.5
  END SNOW-PARM1
  SNOW-PARM2
             new snow   rain vs  sublim.  latent ht.  max AWC   ground
***
    <PLS >    density  snow tmp   adjust    adjust    of pack   melt
***
    # -  #      RDCSN     TSNOW    SNOEVP    CCFACT    MWATER    MGMELT
***
  104  427      0.05       32.      0.85       1.5      0.08      0.02
  END SNOW-PARM2
  SNOW-INIT1
    <PLS >  SNOW initial conditions
***
    # -  #  PACKSNOW   PACKICE PACKWATER    RDENPF      DULL    PAKTMP
***
  104  427       0.0       0.0       0.0       0.2      400.      32.0
  END SNOW-INIT1
  SNOW-INIT2
    <PLS >  SNOW initial conditions
***
    # -  #    COVINX   XLNMELT    SKYCLR
***
  104  427      0.50       0.0       1.0
  END SNOW-INIT2
  PWAT-PARM1
    <PLS > PWATER variable monthly parameter value flags
***
           Snow           cepsc uzns nsur intfw irc lzetp
***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE
***
  104  427    1    0    0    1    0    0    0    0    1
  END PWAT-PARM1
  PWAT-PARM2
    <PLS > ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY
AGWRC
```

```
*** LSUR by elevation zone: 4000,10000,12000,14000 ft
*** sagebrush ***
  261          0.       2.3000     0.2000    10000.0     0.2300     0.0000
0.9900
  321          0.       2.3000     0.2000    10000.0     0.1100     0.0000
0.9900
  361          0.       2.3000     0.2000    12000.0     0.2300     0.0000
0.9900
  421          0.       2.3000     0.2000    14000.0     0.1100     0.0000
0.9900
  222          0.       4.1000     0.2000    10000.0     0.1100     0.0000
0.9900
  242          0.       4.1000     0.2000    10000.0     0.1100     0.0000
0.9900
  223          0.       6.2000     0.2000    10000.0     0.1100     0.0000
0.9900
  263          0.       6.2000     0.2000    10000.0     0.2300     0.0000
0.9900
  283          0.       6.2000     0.2000    10000.0     0.2300     0.0000
0.9900
  343          0.       6.2000     0.2000    12000.0     0.1100     0.0000
0.9900
  363          0.       6.2000     0.2000    12000.0     0.2300     0.0000
0.9900
  104          0.       9.2000     0.2000     4000.0     0.0350     0.0000
0.9900
  224          0.       9.2000     0.2000    10000.0     0.1100     0.0000
0.9900
  264          0.       9.2000     0.2000    10000.0     0.2300     0.0000
0.9900
  364          0.       9.2000     0.2000    12000.0     0.2300     0.0000
0.9900
*** grassland **
  107          0.       2.3000     0.2000     4000.0     0.0350     0.0000
0.9900
  147          0.       2.3000     0.2000     4000.0     0.1100     0.0000
0.9900
  227          0.       2.3000     0.2000    10000.0     0.1100     0.0000
0.9900
  247          0.       2.3000     0.2000    10000.0     0.1100     0.0000
0.9900
  267          0.       2.3000     0.2000    10000.0     0.2300     0.0000
0.9900
  287          0.       2.3000     0.2000    10000.0     0.2300     0.0000
0.9900
  307          0.       2.3000     0.2000    12000.0     0.0350     0.0000
0.9900
  327          0.       2.3000     0.2000    12000.0     0.1100     0.0000
0.9900
  347          0.       2.3000     0.2000    12000.0     0.1100     0.0000
0.9900
  367          0.       2.3000     0.2000    12000.0     0.2300     0.0000
0.9900
  387          0.       2.3000     0.2000    12000.0     0.2300     0.0000
```

```
0.9900
  427          0.       2.3000    0.2000   14000.0     0.1100     0.0000
0.9900
  228          0.       4.1000    0.2000   10000.0     0.1100     0.0000
0.9900
  248          0.       4.1000    0.2000   10000.0     0.1100     0.0000
0.9900
  268          0.       4.1000    0.2000   10000.0     0.2300     0.0000
0.9900
  288          0.       4.1000    0.2000   10000.0     0.2300     0.0000
0.9900
  328          0.       4.1000    0.2000   12000.0     0.1100     0.0000
0.9900
  388          0.       4.1000    0.2000   12000.0     0.2300     0.0000
0.9900
  209          0.       2.9000    0.2000   10000.0     0.0350     0.0000
0.9900
  229          0.       2.9000    0.2000   10000.0     0.1100     0.0000
0.9900
  249          0.       2.9000    0.2000   10000.0     0.1100     0.0000
0.9900
  269          0.       2.9000    0.2000   10000.0     0.2300     0.0000
0.9900
  289          0.       2.9000    0.2000   10000.0     0.2300     0.0000
0.9900
  110          0.       4.6000    0.2000    4000.0     0.0350     0.0000
0.9900
  130          0.       4.6000    0.2000    4000.0     0.1100     0.0000
0.9900
  150          0.       4.6000    0.2000    4000.0     0.1100     0.0000
0.9900
  190          0.       4.6000    0.2000    4000.0     0.2300     0.0000
0.9900
  210          0.       4.6000    0.2000   10000.0     0.1100     0.0000
0.9900
  230          0.       4.6000    0.2000   10000.0     0.1100     0.0000
0.9900
  250          0.       4.6000    0.2000   10000.0     0.1100     0.0000
0.9900
  270          0.       4.6000    0.2000   10000.0     0.2300     0.0000
0.9900
  290          0.       4.6000    0.2000   10000.0     0.2300     0.0000
0.9900
  370          0.       4.6000    0.2000   12000.0     0.2300     0.0000
0.9900
*** dry.wheat ***
  212          0.       4.1000    0.2000   10000.0     0.0350     0.0000
0.9900
  232          0.       4.1000    0.2000   10000.0     0.0350     0.0000
0.9900
  252          0.       4.1000    0.2000   10000.0     0.1100     0.0000
0.9900
  114          0.       9.2000    0.2000    4000.0     0.0350     0.0000
0.9900
```

```
  134           0.       9.2000     0.2000     4000.0     0.1100     0.0000
0.9900
  214           0.       9.2000     0.2000    10000.0     0.0350     0.0000
0.9900
  234           0.       9.2000     0.2000    10000.0     0.1100     0.0000
0.9900
  274           0.       9.2000     0.2000    10000.0     0.2300     0.0000
0.9900
***irr***
  106           0.       9.2000     0.2000     4000.0     0.0350     0.0000
0.9900
  END PWAT-PARM2
  PWAT-PARM3
    <PLS >***
    # -  #*** PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP
AGWETP
  104  427       40.       35.    0.2500    2.0000       .00
0.        0.
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >                                                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP***
*** sagebrush ***
  104                   0.5000    0.3000     0.000    0.7000
  321                   0.3000    0.3000     0.000    0.5000
  421                   0.3000    0.3000     0.000    0.5000
  222                   0.3000    0.3000     0.000    0.5000
  242                   0.3000    0.3000     0.000    0.5000
  223                   0.3000    0.3000     0.000    0.5000
  343                   0.3000    0.3000     0.000    0.5000
  224                   0.3000    0.3000     0.000    0.5000
  261                   0.2000    0.3000     0.000    0.3000
  361                   0.2000    0.3000     0.000    0.3000
  263                   0.2000    0.3000     0.000    0.3000
  283                   0.2000    0.3000     0.000    0.3000
  363                   0.2000    0.3000     0.000    0.3000
  264                   0.2000    0.3000     0.000    0.3000
  364                   0.2000    0.3000     0.000    0.3000
*** grassland ***
  107                   0.5000    0.3000     0.000    0.7000
  307                   0.5000    0.3000     0.000    0.7000
  209                   0.5000    0.3000     0.000    0.7000
  110                   0.5000    0.3000     0.000    0.7000
  210                   0.5000    0.3000     0.000    0.7000
  147                   0.3000    0.3000     0.000    0.5000
  227                   0.3000    0.3000     0.000    0.5000
  247                   0.3000    0.3000     0.000    0.5000
  327                   0.3000    0.3000     0.000    0.5000
  347                   0.3000    0.3000     0.000    0.5000
  427                   0.3000    0.3000     0.000    0.5000
  228                   0.3000    0.3000     0.000    0.5000
  248                   0.3000    0.3000     0.000    0.5000
  328                   0.3000    0.3000     0.000    0.5000
  229                   0.3000    0.3000     0.000    0.5000
```

```
  249                     0.3000    0.3000     0.000    0.5000
  130                     0.3000    0.3000     0.000    0.5000
  150                     0.3000    0.3000     0.000    0.5000
  230                     0.3000    0.3000     0.000    0.5000
  250                     0.3000    0.3000     0.000    0.5000
  267                     0.2000    0.3000     0.000    0.3000
  287                     0.2000    0.3000     0.000    0.3000
  367                     0.2000    0.3000     0.000    0.3000
  387                     0.2000    0.3000     0.000    0.3000
  268                     0.2000    0.3000     0.000    0.3000
  288                     0.2000    0.3000     0.000    0.3000
  388                     0.2000    0.3000     0.000    0.3000
  269                     0.2000    0.3000     0.000    0.3000
  289                     0.2000    0.3000     0.000    0.3000
  190                     0.2000    0.3000     0.000    0.3000
  270                     0.2000    0.3000     0.000    0.3000
  290                     0.2000    0.3000     0.000    0.3000
  370                     0.2000    0.3000     0.000    0.3000
*** dry.wheat ***
  212                     0.5000    0.3000     0.000    0.7000
  114                     0.5000    0.3000     0.000    0.7000
  214                     0.5000    0.3000     0.000    0.7000
  232                     0.3000    0.3000     0.000    0.5000
  252                     0.3000    0.3000     0.000    0.5000
  134                     0.3000    0.3000     0.000    0.5000
  234                     0.3000    0.3000     0.000    0.5000
  274                     0.2000    0.3000     0.000    0.3000
***irr***
  106                     0.5000    0.3000     0.000    0.5000
  END PWAT-PARM4
  PWAT-STATE1
    <PLS >  PWATER state variables***
    # -  #***    CEPS       SURS         UZS       IFWS         LZS        AGWS
GWVS
*** sagebrush ***
  261              0.         0.     0.0010         0.     0.0200       0.010
0.010
  321              0.         0.     0.0010         0.     0.0200       0.010
0.010
  361              0.         0.     0.0010         0.     0.0200       0.010
0.010
  421              0.         0.     0.0010         0.     0.0200       0.010
0.010
  222              0.         0.     0.0010         0.     0.0200       0.010
0.010
  242              0.         0.     0.0010         0.     0.0200       0.010
0.010
  223              0.         0.     0.0010         0.     0.0200       0.010
0.010
  263              0.         0.     0.0010         0.     0.0200       0.010
0.010
  283              0.         0.     0.0010         0.     0.0200       0.010
0.010
  343              0.         0.     0.0010         0.     0.0200       0.010
```

```
0.010
  363           0.        0.     0.0010        0.     0.0200      0.010
0.010
  104           0.        0.     0.0010        0.     0.0200      0.010
0.010
  224           0.        0.     0.0010        0.     0.0200      0.010
0.010
  264           0.        0.     0.0010        0.     0.0200      0.010
0.010
  364           0.        0.     0.0010        0.     0.0200      0.010
0.010
*** grassland ***
  107           0.        0.     0.0010        0.     0.0200      0.010
0.010
  147           0.        0.     0.0010        0.     0.0200      0.010
0.010
  227           0.        0.     0.0010        0.     0.0200      0.010
0.010
  247           0.        0.     0.0010        0.     0.0200      0.010
0.010
  267           0.        0.     0.0010        0.     0.0200      0.010
0.010
  287           0.        0.     0.0010        0.     0.0200      0.010
0.010
  307           0.        0.     0.0010        0.     0.0200      0.010
0.010
  327           0.        0.     0.0010        0.     0.0200      0.010
0.010
  347           0.        0.     0.0010        0.     0.0200      0.010
0.010
  367           0.        0.     0.0010        0.     0.0200      0.010
0.010
  387           0.        0.     0.0010        0.     0.0200      0.010
0.010
  427           0.        0.     0.0010        0.     0.0200      0.010
0.010
  228           0.        0.     0.0010        0.     0.0200      0.010
0.010
  248           0.        0.     0.0010        0.     0.0200      0.010
0.010
  268           0.        0.     0.0010        0.     0.0200      0.010
0.010
  288           0.        0.     0.0010        0.     0.0200      0.010
0.010
  328           0.        0.     0.0010        0.     0.0200      0.010
0.010
  388           0.        0.     0.0010        0.     0.0200      0.010
0.010
  209           0.        0.     0.0010        0.     0.0200      0.010
0.010
  229           0.        0.     0.0010        0.     0.0200      0.010
0.010
  249           0.        0.     0.0010        0.     0.0200      0.010
0.010
```

```
  269            0.        0.     0.0010        0.     0.0200     0.010
0.010
  289            0.        0.     0.0010        0.     0.0200     0.010
0.010
  110            0.        0.     0.0010        0.     0.0200     0.010
0.010
  130            0.        0.     0.0010        0.     0.0200     0.010
0.010
  150            0.        0.     0.0010        0.     0.0200     0.010
0.010
  190            0.        0.     0.0010        0.     0.0200     0.010
0.010
  210            0.        0.     0.0010        0.     0.0200     0.010
0.010
  230            0.        0.     0.0010        0.     0.0200     0.010
0.010
  250            0.        0.     0.0010        0.     0.0200     0.010
0.010
  270            0.        0.     0.0010        0.     0.0200     0.010
0.010
  290            0.        0.     0.0010        0.     0.0200     0.010
0.010
  370            0.        0.     0.0010        0.     0.0200     0.010
0.010
*** dry.wheat ***
  212            0.        0.     0.0010        0.     0.0200     0.010
0.010
  232            0.        0.     0.0010        0.     0.0200     0.010
0.010
  252            0.        0.     0.0010        0.     0.0200     0.010
0.010
  114            0.        0.     0.0010        0.     0.0200     0.010
0.010
  134            0.        0.     0.0010        0.     0.0200     0.010
0.010
  214            0.        0.     0.0010        0.     0.0200     0.010
0.010
  234            0.        0.     0.0010        0.     0.0200     0.010
0.010
  274            0.        0.     0.0010        0.     0.0200     0.010
0.010
***irr***
  106            0.        0.     0.0010        0.     0.0200     0.010
0.010
  END PWAT-STATE1
  MON-INTERCEP
    <PLS>   Only required if VCSFG=1 in PWAT-PARM1                    ***
    # -  #  Interception storage capacity at start of each month      ***
            JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC ***
*** sagebrush ***
  261       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  321       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  361       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  421       0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
```

222	0.04	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.05	0.04	0.04
242	0.04	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.05	0.04	0.04
223	0.04	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.05	0.04	0.04
263	0.04	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.05	0.04	0.04
283	0.04	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.05	0.04	0.04
343	0.04	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.05	0.04	0.04
363	0.04	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.05	0.04	0.04
104	0.04	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.05	0.04	0.04
224	0.04	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.05	0.04	0.04
264	0.04	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.05	0.04	0.04
364	0.04	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.05	0.04	0.04
*** grass ***												
107	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
147	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
227	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
247	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
267	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
287	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
307	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
327	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
347	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
367	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
387	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
427	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
228	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
248	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
268	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
288	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
328	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
388	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
209	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
229	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
249	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
269	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
289	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
110	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
130	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
150	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
190	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
210	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
230	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
250	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
270	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
290	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
370	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04
*** dry.wheat ***												
212	0.16	0.16	0.16	0.16	0.16	0.08	0.00	0.00	0.06	0.16	0.16	0.16
232	0.16	0.16	0.16	0.16	0.16	0.08	0.00	0.00	0.06	0.16	0.16	0.16
252	0.16	0.16	0.16	0.16	0.16	0.08	0.00	0.00	0.06	0.16	0.16	0.16
114	0.16	0.16	0.16	0.16	0.16	0.08	0.00	0.00	0.06	0.16	0.16	0.16
134	0.16	0.16	0.16	0.16	0.16	0.08	0.00	0.00	0.06	0.16	0.16	0.16
214	0.16	0.16	0.16	0.16	0.16	0.08	0.00	0.00	0.06	0.16	0.16	0.16
234	0.16	0.16	0.16	0.16	0.16	0.08	0.00	0.00	0.06	0.16	0.16	0.16
274	0.16	0.16	0.16	0.16	0.16	0.08	0.00	0.00	0.06	0.16	0.16	0.16

```
***irr***
  106       0.07 0.07 0.08 0.11 0.11 0.11 0.11 0.11 0.11 0.10 0.04 0.07
  END MON-INTERCEP
  MON-LZETPARM
    <PLS >  Only required if VLEFG=1 in PWAT-PARM1                       ***
    # -  #  Lower zone ET parameter at start of each month               ***
            JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC ***
*** sagebrush ***
  261       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  321       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  361       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  421       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  222       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  242       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  223       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  263       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  283       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  343       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  363       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  104       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  224       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  264       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  364       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
*** grassland ***
  107       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  147       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  227       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  247       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  267       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  287       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  307       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  327       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  347       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  367       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  387       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  427       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  228       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  248       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  268       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  288       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  328       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  388       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  209       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  229       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  249       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  269       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  289       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  110       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  130       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  150       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  190       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  210       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  230       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  250       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
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  270       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  290       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  370       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
*** dry.wheat ***
  212       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  232       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  252       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  114       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  134       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  214       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  234       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  274       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
***irr***
  106       0.63 0.70 0.99 0.99 0.99 0.99 0.99 0.99 0.90 0.77 0.67 0.62
  END MON-LZETPARM
END PERLND
EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->
***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #
***
WDM      4 PREC     ENGL      0.920         COPY     1      INPUT  MEAN   1
WDM    100 IRRI     ENGL                    COPY     1      INPUT  MEAN   1
WDM      4 PREC     ENGL      0.920         PERLND 104      EXTNL  PREC
WDM      4 PREC     ENGL      0.920         PERLND 107 190  EXTNL  PREC
WDM      4 PREC     ENGL      1.270         PERLND 209 290  EXTNL  PREC
WDM      4 PREC     ENGL      1.540         PERLND 307 388  EXTNL  PREC
WDM      4 PREC     ENGL      1.770         PERLND 421 427  EXTNL  PREC
WDM      5 WIND     ENGL                    PERLND 104 427  EXTNL  WINMOV
WDM      6 SOLR     ENGL                    PERLND 104 114  EXTNL  SOLRAD
WDM      7 SOLR     ENGL                    PERLND 130 134  EXTNL  SOLRAD
WDM      8 SOLR     ENGL                    PERLND 147 150  EXTNL  SOLRAD
WDM     10 SOLR     ENGL                    PERLND 190      EXTNL  SOLRAD
WDM      6 SOLR     ENGL                    PERLND 209 214  EXTNL  SOLRAD
WDM      7 SOLR     ENGL                    PERLND 222 234  EXTNL  SOLRAD
WDM      8 SOLR     ENGL                    PERLND 242 252  EXTNL  SOLRAD
WDM      9 SOLR     ENGL                    PERLND 261 274  EXTNL  SOLRAD
WDM     10 SOLR     ENGL                    PERLND 283 290  EXTNL  SOLRAD
WDM      6 SOLR     ENGL                    PERLND 307      EXTNL  SOLRAD
WDM      7 SOLR     ENGL                    PERLND 321 328  EXTNL  SOLRAD
WDM      8 SOLR     ENGL                    PERLND 343 347  EXTNL  SOLRAD
WDM      9 SOLR     ENGL                    PERLND 361 370  EXTNL  SOLRAD
WDM     10 SOLR     ENGL                    PERLND 387 388  EXTNL  SOLRAD
WDM      7 SOLR     ENGL                    PERLND 421 427  EXTNL  SOLRAD
WDM     12 TEMP     ENGL                    PERLND 104 190  ATEMP  AIRTMP
WDM     22 DEWP     ENGL                    PERLND 104 190  EXTNL  DTMPG
WDM     15 TEMP     ENGL                    PERLND 209 290  ATEMP  AIRTMP
WDM     25 DEWP     ENGL                    PERLND 209 290  EXTNL  DTMPG
WDM     18 TEMP     ENGL                    PERLND 307 388  ATEMP  AIRTMP
WDM     28 DEWP     ENGL                    PERLND 307 388  EXTNL  DTMPG
WDM     20 TEMP     ENGL                    PERLND 421 427  ATEMP  AIRTMP
WDM     30 DEWP     ENGL                    PERLND 421 427  EXTNL  DTMPG
WDM     32 PET      ENGL                    PERLND 104 114  EXTNL  PETINP
WDM     42 PET      ENGL                    PERLND 130 134  EXTNL  PETINP
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WDM      52 PET      ENGL                      PERLND 147 150 EXTNL  PETINP
WDM      72 PET      ENGL                      PERLND 190     EXTNL  PETINP
WDM      35 PET      ENGL                      PERLND 209 214 EXTNL  PETINP
WDM      45 PET      ENGL                      PERLND 222 234 EXTNL  PETINP
WDM      55 PET      ENGL                      PERLND 242 252 EXTNL  PETINP
WDM      65 PET      ENGL                      PERLND 261 274 EXTNL  PETINP
WDM      75 PET      ENGL                      PERLND 283 290 EXTNL  PETINP
WDM      38 PET      ENGL                      PERLND 307     EXTNL  PETINP
WDM      48 PET      ENGL                      PERLND 321 328 EXTNL  PETINP
WDM      58 PET      ENGL                      PERLND 343 347 EXTNL  PETINP
WDM      68 PET      ENGL                      PERLND 361 370 EXTNL  PETINP
WDM      78 PET      ENGL                      PERLND 387 388 EXTNL  PETINP
WDM      50 PET      ENGL                      PERLND 421 427 EXTNL  PETINP
END EXT SOURCES

***
NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->
***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #
***
*** Irrigation water and ppt to perlnd 106, alfalfa
COPY     1 OUTPUT MEAN   1                     PERLND 106     EXTNL  PREC
***Basin geometry
   *** SURO+IFWO summed for basin.
   *** AGWI summed for basin.
   *** Total actual ET (TAET+SNOWE) summed for basin.
   *** Mfact is perlnd area (acres)/12 (coversion from inches to acre-feet)
PERLND 104 PWATER SURO       17.16667      COPY     2      INPUT  MEAN   1
PERLND 104 PWATER IFWO       17.16667      COPY     2      INPUT  MEAN   1
PERLND 104 PWATER AGWI       17.16667      COPY     2      INPUT  MEAN   2
PERLND 104 PWATER TAET       17.16667      COPY     2      INPUT  MEAN   3
PERLND 104 SNOW   SNOWE      17.16667      COPY     2      INPUT  MEAN   3
PERLND 106 PWATER SURO        2.71667      COPY     2      INPUT  MEAN   1
PERLND 106 PWATER IFWO        2.71667      COPY     2      INPUT  MEAN   1
PERLND 106 PWATER AGWI        2.71667      COPY     2      INPUT  MEAN   2
PERLND 106 PWATER TAET        2.71667      COPY     2      INPUT  MEAN   3
PERLND 106 SNOW   SNOWE       2.71667      COPY     2      INPUT  MEAN   3
PERLND 107 PWATER SURO       40.51667      COPY     2      INPUT  MEAN   1
PERLND 107 PWATER IFWO       40.51667      COPY     2      INPUT  MEAN   1
PERLND 107 PWATER AGWI       40.51667      COPY     2      INPUT  MEAN   2
PERLND 107 PWATER TAET       40.51667      COPY     2      INPUT  MEAN   3
PERLND 107 SNOW   SNOWE      40.51667      COPY     2      INPUT  MEAN   3
PERLND 110 PWATER SURO      117.28333      COPY     2      INPUT  MEAN   1
PERLND 110 PWATER IFWO      117.28333      COPY     2      INPUT  MEAN   1
PERLND 110 PWATER AGWI      117.28333      COPY     2      INPUT  MEAN   2
PERLND 110 PWATER TAET      117.28333      COPY     2      INPUT  MEAN   3
PERLND 110 SNOW   SNOWE     117.28333      COPY     2      INPUT  MEAN   3
PERLND 114 PWATER SURO      203.42500      COPY     2      INPUT  MEAN   1
PERLND 114 PWATER IFWO      203.42500      COPY     2      INPUT  MEAN   1
PERLND 114 PWATER AGWI      203.42500      COPY     2      INPUT  MEAN   2
PERLND 114 PWATER TAET      203.42500      COPY     2      INPUT  MEAN   3
PERLND 114 SNOW   SNOWE     203.42500      COPY     2      INPUT  MEAN   3
PERLND 130 PWATER SURO       21.02500      COPY     2      INPUT  MEAN   1
```

PERLND	130	PWATER	IFWO	21.02500	COPY	2	INPUT	MEAN	1
PERLND	130	PWATER	AGWI	21.02500	COPY	2	INPUT	MEAN	2
PERLND	130	PWATER	TAET	21.02500	COPY	2	INPUT	MEAN	3
PERLND	130	SNOW	SNOWE	21.02500	COPY	2	INPUT	MEAN	3
PERLND	134	PWATER	SURO	19.16667	COPY	2	INPUT	MEAN	1
PERLND	134	PWATER	IFWO	19.16667	COPY	2	INPUT	MEAN	1
PERLND	134	PWATER	AGWI	19.16667	COPY	2	INPUT	MEAN	2
PERLND	134	PWATER	TAET	19.16667	COPY	2	INPUT	MEAN	3
PERLND	134	SNOW	SNOWE	19.16667	COPY	2	INPUT	MEAN	3
PERLND	147	PWATER	SURO	22.65000	COPY	2	INPUT	MEAN	1
PERLND	147	PWATER	IFWO	22.65000	COPY	2	INPUT	MEAN	1
PERLND	147	PWATER	AGWI	22.65000	COPY	2	INPUT	MEAN	2
PERLND	147	PWATER	TAET	22.65000	COPY	2	INPUT	MEAN	3
PERLND	147	SNOW	SNOWE	22.65000	COPY	2	INPUT	MEAN	3
PERLND	150	PWATER	SURO	40.04167	COPY	2	INPUT	MEAN	1
PERLND	150	PWATER	IFWO	40.04167	COPY	2	INPUT	MEAN	1
PERLND	150	PWATER	AGWI	40.04167	COPY	2	INPUT	MEAN	2
PERLND	150	PWATER	TAET	40.04167	COPY	2	INPUT	MEAN	3
PERLND	150	SNOW	SNOWE	40.04167	COPY	2	INPUT	MEAN	3
PERLND	190	PWATER	SURO	18.76667	COPY	2	INPUT	MEAN	1
PERLND	190	PWATER	IFWO	18.76667	COPY	2	INPUT	MEAN	1
PERLND	190	PWATER	AGWI	18.76667	COPY	2	INPUT	MEAN	2
PERLND	190	PWATER	TAET	18.76667	COPY	2	INPUT	MEAN	3
PERLND	190	SNOW	SNOWE	18.76667	COPY	2	INPUT	MEAN	3
PERLND	209	PWATER	SURO	13.15000	COPY	2	INPUT	MEAN	1
PERLND	209	PWATER	IFWO	13.15000	COPY	2	INPUT	MEAN	1
PERLND	209	PWATER	AGWI	13.15000	COPY	2	INPUT	MEAN	2
PERLND	209	PWATER	TAET	13.15000	COPY	2	INPUT	MEAN	3
PERLND	209	SNOW	SNOWE	13.15000	COPY	2	INPUT	MEAN	3
PERLND	210	PWATER	SURO	32.63334	COPY	2	INPUT	MEAN	1
PERLND	210	PWATER	IFWO	32.63334	COPY	2	INPUT	MEAN	1
PERLND	210	PWATER	AGWI	32.63334	COPY	2	INPUT	MEAN	2
PERLND	210	PWATER	TAET	32.63334	COPY	2	INPUT	MEAN	3
PERLND	210	SNOW	SNOWE	32.63334	COPY	2	INPUT	MEAN	3
PERLND	212	PWATER	SURO	11.24167	COPY	2	INPUT	MEAN	1
PERLND	212	PWATER	IFWO	11.24167	COPY	2	INPUT	MEAN	1
PERLND	212	PWATER	AGWI	11.24167	COPY	2	INPUT	MEAN	2
PERLND	212	PWATER	TAET	11.24167	COPY	2	INPUT	MEAN	3
PERLND	212	SNOW	SNOWE	11.24167	COPY	2	INPUT	MEAN	3
PERLND	214	PWATER	SURO	14.65000	COPY	2	INPUT	MEAN	1
PERLND	214	PWATER	IFWO	14.65000	COPY	2	INPUT	MEAN	1
PERLND	214	PWATER	AGWI	14.65000	COPY	2	INPUT	MEAN	2
PERLND	214	PWATER	TAET	14.65000	COPY	2	INPUT	MEAN	3
PERLND	214	SNOW	SNOWE	14.65000	COPY	2	INPUT	MEAN	3
PERLND	222	PWATER	SURO	12.83333	COPY	2	INPUT	MEAN	1
PERLND	222	PWATER	IFWO	12.83333	COPY	2	INPUT	MEAN	1
PERLND	222	PWATER	AGWI	12.83333	COPY	2	INPUT	MEAN	2
PERLND	222	PWATER	TAET	12.83333	COPY	2	INPUT	MEAN	3
PERLND	222	SNOW	SNOWE	12.83333	COPY	2	INPUT	MEAN	3
PERLND	223	PWATER	SURO	9.29167	COPY	2	INPUT	MEAN	1
PERLND	223	PWATER	IFWO	9.29167	COPY	2	INPUT	MEAN	1
PERLND	223	PWATER	AGWI	9.29167	COPY	2	INPUT	MEAN	2
PERLND	223	PWATER	TAET	9.29167	COPY	2	INPUT	MEAN	3
PERLND	223	SNOW	SNOWE	9.29167	COPY	2	INPUT	MEAN	3

PERLND	224	PWATER	SURO	15.58333	COPY	2	INPUT	MEAN	1
PERLND	224	PWATER	IFWO	15.58333	COPY	2	INPUT	MEAN	1
PERLND	224	PWATER	AGWI	15.58333	COPY	2	INPUT	MEAN	2
PERLND	224	PWATER	TAET	15.58333	COPY	2	INPUT	MEAN	3
PERLND	224	SNOW	SNOWE	15.58333	COPY	2	INPUT	MEAN	3
PERLND	227	PWATER	SURO	19.42500	COPY	2	INPUT	MEAN	1
PERLND	227	PWATER	IFWO	19.42500	COPY	2	INPUT	MEAN	1
PERLND	227	PWATER	AGWI	19.42500	COPY	2	INPUT	MEAN	2
PERLND	227	PWATER	TAET	19.42500	COPY	2	INPUT	MEAN	3
PERLND	227	SNOW	SNOWE	19.42500	COPY	2	INPUT	MEAN	3
PERLND	228	PWATER	SURO	15.92500	COPY	2	INPUT	MEAN	1
PERLND	228	PWATER	IFWO	15.92500	COPY	2	INPUT	MEAN	1
PERLND	228	PWATER	AGWI	15.92500	COPY	2	INPUT	MEAN	2
PERLND	228	PWATER	TAET	15.92500	COPY	2	INPUT	MEAN	3
PERLND	228	SNOW	SNOWE	15.92500	COPY	2	INPUT	MEAN	3
PERLND	229	PWATER	SURO	27.78333	COPY	2	INPUT	MEAN	1
PERLND	229	PWATER	IFWO	27.78333	COPY	2	INPUT	MEAN	1
PERLND	229	PWATER	AGWI	27.78333	COPY	2	INPUT	MEAN	2
PERLND	229	PWATER	TAET	27.78333	COPY	2	INPUT	MEAN	3
PERLND	229	SNOW	SNOWE	27.78333	COPY	2	INPUT	MEAN	3
PERLND	230	PWATER	SURO	78.85833	COPY	2	INPUT	MEAN	1
PERLND	230	PWATER	IFWO	78.85833	COPY	2	INPUT	MEAN	1
PERLND	230	PWATER	AGWI	78.85833	COPY	2	INPUT	MEAN	2
PERLND	230	PWATER	TAET	78.85833	COPY	2	INPUT	MEAN	3
PERLND	230	SNOW	SNOWE	78.85833	COPY	2	INPUT	MEAN	3
PERLND	232	PWATER	SURO	10.56667	COPY	2	INPUT	MEAN	1
PERLND	232	PWATER	IFWO	10.56667	COPY	2	INPUT	MEAN	1
PERLND	232	PWATER	AGWI	10.56667	COPY	2	INPUT	MEAN	2
PERLND	232	PWATER	TAET	10.56667	COPY	2	INPUT	MEAN	3
PERLND	232	SNOW	SNOWE	10.56667	COPY	2	INPUT	MEAN	3
PERLND	234	PWATER	SURO	25.77500	COPY	2	INPUT	MEAN	1
PERLND	234	PWATER	IFWO	25.77500	COPY	2	INPUT	MEAN	1
PERLND	234	PWATER	AGWI	25.77500	COPY	2	INPUT	MEAN	2
PERLND	234	PWATER	TAET	25.77500	COPY	2	INPUT	MEAN	3
PERLND	234	SNOW	SNOWE	25.77500	COPY	2	INPUT	MEAN	3
PERLND	242	PWATER	SURO	17.78333	COPY	2	INPUT	MEAN	1
PERLND	242	PWATER	IFWO	17.78333	COPY	2	INPUT	MEAN	1
PERLND	242	PWATER	AGWI	17.78333	COPY	2	INPUT	MEAN	2
PERLND	242	PWATER	TAET	17.78333	COPY	2	INPUT	MEAN	3
PERLND	242	SNOW	SNOWE	17.78333	COPY	2	INPUT	MEAN	3
PERLND	247	PWATER	SURO	21.55833	COPY	2	INPUT	MEAN	1
PERLND	247	PWATER	IFWO	21.55833	COPY	2	INPUT	MEAN	1
PERLND	247	PWATER	AGWI	21.55833	COPY	2	INPUT	MEAN	2
PERLND	247	PWATER	TAET	21.55833	COPY	2	INPUT	MEAN	3
PERLND	247	SNOW	SNOWE	21.55833	COPY	2	INPUT	MEAN	3
PERLND	248	PWATER	SURO	44.92500	COPY	2	INPUT	MEAN	1
PERLND	248	PWATER	IFWO	44.92500	COPY	2	INPUT	MEAN	1
PERLND	248	PWATER	AGWI	44.92500	COPY	2	INPUT	MEAN	2
PERLND	248	PWATER	TAET	44.92500	COPY	2	INPUT	MEAN	3
PERLND	248	SNOW	SNOWE	44.92500	COPY	2	INPUT	MEAN	3
PERLND	249	PWATER	SURO	9.66667	COPY	2	INPUT	MEAN	1
PERLND	249	PWATER	IFWO	9.66667	COPY	2	INPUT	MEAN	1
PERLND	249	PWATER	AGWI	9.66667	COPY	2	INPUT	MEAN	2
PERLND	249	PWATER	TAET	9.66667	COPY	2	INPUT	MEAN	3

PERLND	249	SNOW	SNOWE	9.66667	COPY	2	INPUT	MEAN	3
PERLND	250	PWATER	SURO	24.07500	COPY	2	INPUT	MEAN	1
PERLND	250	PWATER	IFWO	24.07500	COPY	2	INPUT	MEAN	1
PERLND	250	PWATER	AGWI	24.07500	COPY	2	INPUT	MEAN	2
PERLND	250	PWATER	TAET	24.07500	COPY	2	INPUT	MEAN	3
PERLND	250	SNOW	SNOWE	24.07500	COPY	2	INPUT	MEAN	3
PERLND	252	PWATER	SURO	17.55000	COPY	2	INPUT	MEAN	1
PERLND	252	PWATER	IFWO	17.55000	COPY	2	INPUT	MEAN	1
PERLND	252	PWATER	AGWI	17.55000	COPY	2	INPUT	MEAN	2
PERLND	252	PWATER	TAET	17.55000	COPY	2	INPUT	MEAN	3
PERLND	252	SNOW	SNOWE	17.55000	COPY	2	INPUT	MEAN	3
PERLND	261	PWATER	SURO	24.33333	COPY	2	INPUT	MEAN	1
PERLND	261	PWATER	IFWO	24.33333	COPY	2	INPUT	MEAN	1
PERLND	261	PWATER	AGWI	24.33333	COPY	2	INPUT	MEAN	2
PERLND	261	PWATER	TAET	24.33333	COPY	2	INPUT	MEAN	3
PERLND	261	SNOW	SNOWE	24.33333	COPY	2	INPUT	MEAN	3
PERLND	263	PWATER	SURO	13.00833	COPY	2	INPUT	MEAN	1
PERLND	263	PWATER	IFWO	13.00833	COPY	2	INPUT	MEAN	1
PERLND	263	PWATER	AGWI	13.00833	COPY	2	INPUT	MEAN	2
PERLND	263	PWATER	TAET	13.00833	COPY	2	INPUT	MEAN	3
PERLND	263	SNOW	SNOWE	13.00833	COPY	2	INPUT	MEAN	3
PERLND	264	PWATER	SURO	23.95833	COPY	2	INPUT	MEAN	1
PERLND	264	PWATER	IFWO	23.95833	COPY	2	INPUT	MEAN	1
PERLND	264	PWATER	AGWI	23.95833	COPY	2	INPUT	MEAN	2
PERLND	264	PWATER	TAET	23.95833	COPY	2	INPUT	MEAN	3
PERLND	264	SNOW	SNOWE	23.95833	COPY	2	INPUT	MEAN	3
PERLND	267	PWATER	SURO	31.50833	COPY	2	INPUT	MEAN	1
PERLND	267	PWATER	IFWO	31.50833	COPY	2	INPUT	MEAN	1
PERLND	267	PWATER	AGWI	31.50833	COPY	2	INPUT	MEAN	2
PERLND	267	PWATER	TAET	31.50833	COPY	2	INPUT	MEAN	3
PERLND	267	SNOW	SNOWE	31.50833	COPY	2	INPUT	MEAN	3
PERLND	268	PWATER	SURO	10.54167	COPY	2	INPUT	MEAN	1
PERLND	268	PWATER	IFWO	10.54167	COPY	2	INPUT	MEAN	1
PERLND	268	PWATER	AGWI	10.54167	COPY	2	INPUT	MEAN	2
PERLND	268	PWATER	TAET	10.54167	COPY	2	INPUT	MEAN	3
PERLND	268	SNOW	SNOWE	10.54167	COPY	2	INPUT	MEAN	3
PERLND	269	PWATER	SURO	22.73333	COPY	2	INPUT	MEAN	1
PERLND	269	PWATER	IFWO	22.73333	COPY	2	INPUT	MEAN	1
PERLND	269	PWATER	AGWI	22.73333	COPY	2	INPUT	MEAN	2
PERLND	269	PWATER	TAET	22.73333	COPY	2	INPUT	MEAN	3
PERLND	269	SNOW	SNOWE	22.73333	COPY	2	INPUT	MEAN	3
PERLND	270	PWATER	SURO	45.75000	COPY	2	INPUT	MEAN	1
PERLND	270	PWATER	IFWO	45.75000	COPY	2	INPUT	MEAN	1
PERLND	270	PWATER	AGWI	45.75000	COPY	2	INPUT	MEAN	2
PERLND	270	PWATER	TAET	45.75000	COPY	2	INPUT	MEAN	3
PERLND	270	SNOW	SNOWE	45.75000	COPY	2	INPUT	MEAN	3
PERLND	274	PWATER	SURO	8.35000	COPY	2	INPUT	MEAN	1
PERLND	274	PWATER	IFWO	8.35000	COPY	2	INPUT	MEAN	1
PERLND	274	PWATER	AGWI	8.35000	COPY	2	INPUT	MEAN	2
PERLND	274	PWATER	TAET	8.35000	COPY	2	INPUT	MEAN	3
PERLND	274	SNOW	SNOWE	8.35000	COPY	2	INPUT	MEAN	3
PERLND	283	PWATER	SURO	19.75833	COPY	2	INPUT	MEAN	1
PERLND	283	PWATER	IFWO	19.75833	COPY	2	INPUT	MEAN	1
PERLND	283	PWATER	AGWI	19.75833	COPY	2	INPUT	MEAN	2

PERLND	283	PWATER	TAET	19.75833	COPY	2	INPUT	MEAN	3
PERLND	283	SNOW	SNOWE	19.75833	COPY	2	INPUT	MEAN	3
PERLND	287	PWATER	SURO	22.84167	COPY	2	INPUT	MEAN	1
PERLND	287	PWATER	IFWO	22.84167	COPY	2	INPUT	MEAN	1
PERLND	287	PWATER	AGWI	22.84167	COPY	2	INPUT	MEAN	2
PERLND	287	PWATER	TAET	22.84167	COPY	2	INPUT	MEAN	3
PERLND	287	SNOW	SNOWE	22.84167	COPY	2	INPUT	MEAN	3
PERLND	288	PWATER	SURO	21.02500	COPY	2	INPUT	MEAN	1
PERLND	288	PWATER	IFWO	21.02500	COPY	2	INPUT	MEAN	1
PERLND	288	PWATER	AGWI	21.02500	COPY	2	INPUT	MEAN	2
PERLND	288	PWATER	TAET	21.02500	COPY	2	INPUT	MEAN	3
PERLND	288	SNOW	SNOWE	21.02500	COPY	2	INPUT	MEAN	3
PERLND	289	PWATER	SURO	13.18333	COPY	2	INPUT	MEAN	1
PERLND	289	PWATER	IFWO	13.18333	COPY	2	INPUT	MEAN	1
PERLND	289	PWATER	AGWI	13.18333	COPY	2	INPUT	MEAN	2
PERLND	289	PWATER	TAET	13.18333	COPY	2	INPUT	MEAN	3
PERLND	289	SNOW	SNOWE	13.18333	COPY	2	INPUT	MEAN	3
PERLND	290	PWATER	SURO	14.81667	COPY	2	INPUT	MEAN	1
PERLND	290	PWATER	IFWO	14.81667	COPY	2	INPUT	MEAN	1
PERLND	290	PWATER	AGWI	14.81667	COPY	2	INPUT	MEAN	2
PERLND	290	PWATER	TAET	14.81667	COPY	2	INPUT	MEAN	3
PERLND	290	SNOW	SNOWE	14.81667	COPY	2	INPUT	MEAN	3
PERLND	307	PWATER	SURO	13.79167	COPY	2	INPUT	MEAN	1
PERLND	307	PWATER	IFWO	13.79167	COPY	2	INPUT	MEAN	1
PERLND	307	PWATER	AGWI	13.79167	COPY	2	INPUT	MEAN	2
PERLND	307	PWATER	TAET	13.79167	COPY	2	INPUT	MEAN	3
PERLND	307	SNOW	SNOWE	13.79167	COPY	2	INPUT	MEAN	3
PERLND	321	PWATER	SURO	24.76667	COPY	2	INPUT	MEAN	1
PERLND	321	PWATER	IFWO	24.76667	COPY	2	INPUT	MEAN	1
PERLND	321	PWATER	AGWI	24.76667	COPY	2	INPUT	MEAN	2
PERLND	321	PWATER	TAET	24.76667	COPY	2	INPUT	MEAN	3
PERLND	321	SNOW	SNOWE	24.76667	COPY	2	INPUT	MEAN	3
PERLND	327	PWATER	SURO	28.80833	COPY	2	INPUT	MEAN	1
PERLND	327	PWATER	IFWO	28.80833	COPY	2	INPUT	MEAN	1
PERLND	327	PWATER	AGWI	28.80833	COPY	2	INPUT	MEAN	2
PERLND	327	PWATER	TAET	28.80833	COPY	2	INPUT	MEAN	3
PERLND	327	SNOW	SNOWE	28.80833	COPY	2	INPUT	MEAN	3
PERLND	328	PWATER	SURO	9.10833	COPY	2	INPUT	MEAN	1
PERLND	328	PWATER	IFWO	9.10833	COPY	2	INPUT	MEAN	1
PERLND	328	PWATER	AGWI	9.10833	COPY	2	INPUT	MEAN	2
PERLND	328	PWATER	TAET	9.10833	COPY	2	INPUT	MEAN	3
PERLND	328	SNOW	SNOWE	9.10833	COPY	2	INPUT	MEAN	3
PERLND	347	PWATER	SURO	12.91667	COPY	2	INPUT	MEAN	1
PERLND	347	PWATER	IFWO	12.91667	COPY	2	INPUT	MEAN	1
PERLND	347	PWATER	AGWI	12.91667	COPY	2	INPUT	MEAN	2
PERLND	347	PWATER	TAET	12.91667	COPY	2	INPUT	MEAN	3
PERLND	347	SNOW	SNOWE	12.91667	COPY	2	INPUT	MEAN	3
PERLND	343	PWATER	SURO	7.06667	COPY	2	INPUT	MEAN	1
PERLND	343	PWATER	IFWO	7.06667	COPY	2	INPUT	MEAN	1
PERLND	343	PWATER	AGWI	7.06667	COPY	2	INPUT	MEAN	2
PERLND	343	PWATER	TAET	7.06667	COPY	2	INPUT	MEAN	3
PERLND	343	SNOW	SNOWE	7.06667	COPY	2	INPUT	MEAN	3
PERLND	361	PWATER	SURO	97.37500	COPY	2	INPUT	MEAN	1
PERLND	361	PWATER	IFWO	97.37500	COPY	2	INPUT	MEAN	1

```
PERLND 361 PWATER AGWI       97.37500       COPY      2      INPUT  MEAN   2
PERLND 361 PWATER TAET       97.37500       COPY      2      INPUT  MEAN   3
PERLND 361 SNOW   SNOWE      97.37500       COPY      2      INPUT  MEAN   3
PERLND 363 PWATER SURO       10.65000       COPY      2      INPUT  MEAN   1
PERLND 363 PWATER IFWO       10.65000       COPY      2      INPUT  MEAN   1
PERLND 363 PWATER AGWI       10.65000       COPY      2      INPUT  MEAN   2
PERLND 363 PWATER TAET       10.65000       COPY      2      INPUT  MEAN   3
PERLND 363 SNOW   SNOWE      10.65000       COPY      2      INPUT  MEAN   3
PERLND 364 PWATER SURO       14.95833       COPY      2      INPUT  MEAN   1
PERLND 364 PWATER IFWO       14.95833       COPY      2      INPUT  MEAN   1
PERLND 364 PWATER AGWI       14.95833       COPY      2      INPUT  MEAN   2
PERLND 364 PWATER TAET       14.95833       COPY      2      INPUT  MEAN   3
PERLND 364 SNOW   SNOWE      14.95833       COPY      2      INPUT  MEAN   3
PERLND 367 PWATER SURO       62.94167       COPY      2      INPUT  MEAN   1
PERLND 367 PWATER IFWO       62.94167       COPY      2      INPUT  MEAN   1
PERLND 367 PWATER AGWI       62.94167       COPY      2      INPUT  MEAN   2
PERLND 367 PWATER TAET       62.94167       COPY      2      INPUT  MEAN   3
PERLND 367 SNOW   SNOWE      62.94167       COPY      2      INPUT  MEAN   3
PERLND 370 PWATER SURO       26.40000       COPY      2      INPUT  MEAN   1
PERLND 370 PWATER IFWO       26.40000       COPY      2      INPUT  MEAN   1
PERLND 370 PWATER AGWI       26.40000       COPY      2      INPUT  MEAN   2
PERLND 370 PWATER TAET       26.40000       COPY      2      INPUT  MEAN   3
PERLND 370 SNOW   SNOWE      26.40000       COPY      2      INPUT  MEAN   3
PERLND 387 PWATER SURO       17.28333       COPY      2      INPUT  MEAN   1
PERLND 387 PWATER IFWO       17.28333       COPY      2      INPUT  MEAN   1
PERLND 387 PWATER AGWI       17.28333       COPY      2      INPUT  MEAN   2
PERLND 387 PWATER TAET       17.28333       COPY      2      INPUT  MEAN   3
PERLND 387 SNOW   SNOWE      17.28333       COPY      2      INPUT  MEAN   3
PERLND 388 PWATER SURO        8.99167       COPY      2      INPUT  MEAN   1
PERLND 388 PWATER IFWO        8.99167       COPY      2      INPUT  MEAN   1
PERLND 388 PWATER AGWI        8.99167       COPY      2      INPUT  MEAN   2
PERLND 388 PWATER TAET        8.99167       COPY      2      INPUT  MEAN   3
PERLND 388 SNOW   SNOWE       8.99167       COPY      2      INPUT  MEAN   3
PERLND 421 PWATER SURO       26.37500       COPY      2      INPUT  MEAN   1
PERLND 421 PWATER IFWO       26.37500       COPY      2      INPUT  MEAN   1
PERLND 421 PWATER AGWI       26.37500       COPY      2      INPUT  MEAN   2
PERLND 421 PWATER TAET       26.37500       COPY      2      INPUT  MEAN   3
PERLND 421 SNOW   SNOWE      26.37500       COPY      2      INPUT  MEAN   3
PERLND 427 PWATER SURO       18.35833       COPY      2      INPUT  MEAN   1
PERLND 427 PWATER IFWO       18.35833       COPY      2      INPUT  MEAN   1
PERLND 427 PWATER AGWI       18.35833       COPY      2      INPUT  MEAN   2
PERLND 427 PWATER TAET       18.35833       COPY      2      INPUT  MEAN   3
PERLND 427 SNOW   SNOWE      18.35833       COPY      2      INPUT  MEAN   3
***Basin water balance information
    *** Total ppt. Mfact is fraction of basin area for each elevation zone.
PERLND 106 SNOW   RAINF       .0017         COPY      3      INPUT  MEAN   1
PERLND 106 SNOW   SNOWF       .0017         COPY      3      INPUT  MEAN   1
PERLND 104 SNOW   RAINF       .3170         COPY      3      INPUT  MEAN   1
PERLND 104 SNOW   SNOWF       .3170         COPY      3      INPUT  MEAN   1
PERLND 209 SNOW   RAINF       .4406         COPY      3      INPUT  MEAN   1
PERLND 209 SNOW   SNOWF       .4406         COPY      3      INPUT  MEAN   1
PERLND 307 SNOW   RAINF       .2124         COPY      3      INPUT  MEAN   1
PERLND 307 SNOW   SNOWF       .2124         COPY      3      INPUT  MEAN   1
PERLND 421 SNOW   RAINF       .0284         COPY      3      INPUT  MEAN   1
```

```
PERLND 421 SNOW   SNOWF       .0284        COPY     3     INPUT  MEAN   1
    ***Convert ac-ft to inches (12/18932 acres) for runoff, recharge, & ET.
COPY      2 OUTPUT MEAN   1   .000634      COPY     3     INPUT  MEAN   2
COPY      2 OUTPUT MEAN   2   .000634      COPY     3     INPUT  MEAN   3
COPY      2 OUTPUT MEAN   3   .000634      COPY     3     INPUT  MEAN   4
    ***Basin water-balance displays.
COPY      2 OUTPUT MEAN   1                DISPLY   2     INPUT  TIMSER 1
END NETWORK

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd
***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg
strg***
COPY      2 OUTPUT MEAN   1              SAME WDM    440 RO3       ENGL       REPL
COPY      2 OUTPUT MEAN   3              SAME WDM    441 ET3       ENGL       REPL
COPY      2 OUTPUT MEAN   2              SAME WDM    442 DP3       ENGL       REPL
COPY      3 OUTPUT MEAN   1              SAME WDM    443 PT3       ENGL       REPL
END EXT TARGETS

DISPLY
  DISPLY-INFO1
*** # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2
YRND
    2     Dry3 - runoff(ac-ft)          SUM                     1    3
50    9
  END DISPLY-INFO1
END DISPLY

COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1             1
    2             3
    3             4
  END TIMESERIES
END COPY
SPEC-ACTIONS (Not shown)
END SPEC-ACTIONS

END RUN
```

Appendix 6.--*Final HSPF input file for Lower Dry Creek model. For brevity, the "SPECIAL ACTIONS" portion of the model input, where the dates of soil freezing and thawing are represented by changes in the INFILT parameter values, is not included. Complete input files may be obtained by contacting the District Chief at the address shown on page ii of this report*

```
RUN
GLOBAL
  Dry2 and Dry1 final model - hms.wdm data
  START       1957/10/01 00:00  END    1993/05/31 24:00
  RUN INTERP OUTPUT LEVEL    0
  RESUME     0 RUN     1 TSSFL    15 WDMSFL   16
END GLOBAL
OPN SEQUENCE
    INGRP                INDELT 01:00
      PERLND     101
      PERLND     103
      PERLND     104
      PERLND     107
      PERLND     109
      PERLND     110
      PERLND     111
      PERLND     114
      PERLND     121
      PERLND     124
      PERLND     127
      PERLND     130
      PERLND     131
      PERLND     134
      PERLND     141
      PERLND     144
      PERLND     147
      PERLND     150
      PERLND     151
      PERLND     161
      PERLND     164
      PERLND     167
      PERLND     184
      PERLND     190
      PERLND     201
      PERLND     204
      PERLND     207
      PERLND     210
      PERLND     221
      PERLND     224
      PERLND     227
      PERLND     229
      PERLND     230
      PERLND     241
      PERLND     244
      PERLND     247
      PERLND     250
      PERLND     261
      PERLND     264
```

```
      PERLND     267
      PERLND     269
      PERLND     270
      PERLND     281
      PERLND     284
      PERLND     287
      PERLND     290
      PERLND     304
      PERLND     314
      PERLND     321
      PERLND     324
      PERLND     327
      PERLND     330
      PERLND     334
      PERLND     344
      PERLND     361
      PERLND     364
      PERLND     367
      PERLND     370
      PERLND     390
      COPY         1
      COPY         2
      DISPLY       2
      DISPLY       6
    END INGRP
END OPN SEQUENCE

PERLND
  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC
***
  101  390    0    1    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
  PRINT-INFO
    <PLS > ********************* Print-flags ************************* PIVL
PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS
TRAC*********
  101            6
6                                                    9
  103  390       6
6                                                    9
  END PRINT-INFO
  GEN-INFO
  <PLS> ------NAME------->NBLKS   Unit-systems   Printer
***
    # -  #                         User  t-series Engl Metr
***
                                          in   out
***
*** Grouped by elevation zone ***
  101      sage,soil1,flat        1    1    1    1    6    0
  103      sage,soil3,flat        1    1    1    1    6    0
```

104	sage,soil4,flat	1	1	1	1	6	0
107	gras,soil1,flat	1	1	1	1	6	0
109	gras,soil3,flat	1	1	1	1	6	0
110	gras,soil4,flat	1	1	1	1	6	0
111	dryw,soil1,flat	1	1	1	1	6	0
114	dryw,soil4,flat	1	1	1	1	6	0
121	sage,soil1,mod.N	1	1	1	1	6	0
124	sage,soil4,mod.N	1	1	1	1	6	0
127	gras,soil1,mod.N	1	1	1	1	6	0
130	gras,soil4,mod.N	1	1	1	1	6	0
131	dryw,soil4,mod.N	1	1	1	1	6	0
134	dryw,soil4,mod.N	1	1	1	1	6	0
141	sage,soil1,mod.S	1	1	1	1	6	0
144	sage,soil4,mod.S	1	1	1	1	6	0
147	gras,soil1,mod.S	1	1	1	1	6	0
150	gras,soil4,mod.S	1	1	1	1	6	0
151	dryw,soil1,mod.S	1	1	1	1	6	0
161	sage,soil1,stp.N	1	1	1	1	6	0
164	sage,soil1,stp.N	1	1	1	1	6	0
167	gras,soil1,stp.N	1	1	1	1	6	0
184	sage,soil4,stp.S	1	1	1	1	6	0
190	gras,soil4,stp.S	1	1	1	1	6	0
201	sage,soil1,flat	1	1	1	1	6	0
204	sage,soil4,flat	1	1	1	1	6	0
207	gras,soil1,flat	1	1	1	1	6	0
210	gras,soil4,flat	1	1	1	1	6	0
221	sage,soil1,mod.N	1	1	1	1	6	0
224	sage,soil4,mod.N	1	1	1	1	6	0
227	gras,soil1,mod.N	1	1	1	1	6	0
229	gras,soil3,mod.N	1	1	1	1	6	0
230	gras,soil4,mod.N	1	1	1	1	6	0
241	sage,soil1,mod.S	1	1	1	1	6	0
244	sage,soil4,mod.S	1	1	1	1	6	0
247	gras,soil1,mod.S	1	1	1	1	6	0
250	gras,soil4,mod.S	1	1	1	1	6	0
261	sage,soil1,stp.N	1	1	1	1	6	0
264	sage,soil4,stp.N	1	1	1	1	6	0
267	gras,soil1,stp.N	1	1	1	1	6	0
269	gras,soil3,stp.N	1	1	1	1	6	0
270	gras,soil4,stp.N	1	1	1	1	6	0
281	sage,soil1,stp.N	1	1	1	1	6	0
284	sage,soil4,stp.S	1	1	1	1	6	0
287	gras,soil1,stp.S	1	1	1	1	6	0
290	gras,soil4,stp.S	1	1	1	1	6	0
304	sage,soil4,flat	1	1	1	1	6	0
314	dryw,soil4,flat	1	1	1	1	6	0
321	sage,soil1,mod.N	1	1	1	1	6	0
324	sage,soil4,mod.N	1	1	1	1	6	0
327	gras,soil1,mod.N	1	1	1	1	6	0
330	gras,soil4,mod.N	1	1	1	1	6	0
334	dryw,soil4,mod.N	1	1	1	1	6	0
344	sage,soil4,mod.S	1	1	1	1	6	0
361	sage,soil1,stp.N	1	1	1	1	6	0
364	sage,soil4,stp.N	1	1	1	1	6	0

```
  367      gras,soil1,stp.N       1    1    1    1    6    0
  370      gras,soil4,stp.N       1    1    1    1    6    0
  390      gras,soil4,stp.S       1    1    1    1    6    0
  END GEN-INFO
  ICE-FLAG
    <PLS > Value of 1 means ice will be simulated, 0 means not simulated
***
    # -  #ICEFG
***
  101  390    1
  END ICE-FLAG
  SNOW-PARM1
                 perlnd   perlnd    shaded  gage-catch  snow w.eq. needed for
***
    <PLS >     latitude  altitude fraction adjustment  complete snowcover
***
    # -  #         LAT     MELEV     SHADE    SNOWCF    COVIND
***
  101  190       46.6      820.       0.0      1.25       0.5
  201  290       46.6     1805.       0.0      1.25       0.5
  304  390       46.6     2789.       0.0      1.25       0.5
  END SNOW-PARM1
  SNOW-PARM2
               new snow   rain vs  sublim.  latent ht.  max AWC   ground
***
    <PLS >     density  snow tmp   adjust    adjust    of pack   melt
***
    # -  #      RDCSN     TSNOW    SNOEVP    CCFACT    MWATER    MGMELT
***
  101  390       0.05       32.      0.85       1.5      0.08      0.02
  END SNOW-PARM2
  SNOW-INIT1
    <PLS >  SNOW initial conditions
***
    # -  #  PACKSNOW   PACKICE PACKWATER    RDENPF      DULL    PAKTMP
***
  101  390        0.0       0.0       0.0       0.2      400.      32.0
  END SNOW-INIT1
  SNOW-INIT2
    <PLS >  SNOW initial conditions
***
    # -  #     COVINX   XLNMELT    SKYCLR
***
  101  390       0.50       0.0       1.0
  END SNOW-INIT2
  PWAT-PARM1
    <PLS > PWATER variable monthly parameter value flags
***
           Snow           cepsc uzns nsur intfw irc lzetp
***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE
***
  101  390    1    0    0    1    0    0    0    0    1
  END PWAT-PARM1
```

```
  PWAT-PARM2
    <PLS > ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY
AGWRC
*** sagebrush ***
  101         0.      2.3000    0.2000    4000.0    0.0350    0.0000
0.9900
  121         0.      2.3000    0.2000    4000.0    0.1100    0.0000
0.9900
  141         0.      2.3000    0.2000    4000.0    0.1100    0.0000
0.9900
  161         0.      2.3000    0.2000    4000.0    0.2300    0.0000
0.9900
  201         0.      2.3000    0.2000   10000.0    0.0350    0.0000
0.9900
  221         0.      2.3000    0.2000   10000.0    0.1100    0.0000
0.9900
  241         0.      2.3000    0.2000   10000.0    0.1100    0.0000
0.9900
  261         0.      2.3000    0.2000   10000.0    0.2300    0.0000
0.9900
  281         0.      2.3000    0.2000   10000.0    0.2300    0.0000
0.9900
  321         0.      2.3000    0.2000   12000.0    0.1100    0.0000
0.9900
  361         0.      2.3000    0.2000   12000.0    0.2300    0.0000
0.9900
  103         0.      6.2000    0.2000    4000.0    0.0350    0.0000
0.9900
  104         0.      9.2000    0.2000    4000.0    0.0350    0.0000
0.9900
  124         0.      9.2000    0.2000    4000.0    0.1100    0.0000
0.9900
  144         0.      9.2000    0.2000    4000.0    0.1100    0.0000
0.9900
  164         0.      9.2000    0.2000    4000.0    0.2300    0.0000
0.9900
  184         0.      9.2000    0.2000    4000.0    0.2300    0.0000
0.9900
  204         0.      9.2000    0.2000   10000.0    0.0350    0.0000
0.9900
  224         0.      9.2000    0.2000   10000.0    0.1100    0.0000
0.9900
  244         0.      9.2000    0.2000   10000.0    0.1100    0.0000
0.9900
  264         0.      9.2000    0.2000   10000.0    0.2300    0.0000
0.9900
  284         0.      9.2000    0.2000   10000.0    0.2300    0.0000
0.9900
  304         0.      9.2000    0.2000   12000.0    0.0350    0.0000
0.9900
  324         0.      9.2000    0.2000   12000.0    0.1100    0.0000
0.9900
  344         0.      9.2000    0.2000   12000.0    0.1100    0.0000
```

```
0.9900
  364          0.      9.2000    0.2000   12000.0    0.2300    0.0000
0.9900
*** grassland ***
  107          0.      2.3000    0.2000    4000.0    0.0350    0.0000
0.9900
  127          0.      2.3000    0.2000    4000.0    0.1100    0.0000
0.9900
  147          0.      2.3000    0.2000    4000.0    0.1100    0.0000
0.9900
  167          0.      2.3000    0.2000    4000.0    0.2300    0.0000
0.9900
  207          0.      2.3000    0.2000   10000.0    0.0350    0.0000
0.9900
  227          0.      2.3000    0.2000   10000.0    0.1100    0.0000
0.9900
  247          0.      2.3000    0.2000   10000.0    0.1100    0.0000
0.9900
  267          0.      2.3000    0.2000   10000.0    0.2300    0.0000
0.9900
  287          0.      2.3000    0.2000   10000.0    0.2300    0.0000
0.9900
  327          0.      2.3000    0.2000   12000.0    0.1100    0.0000
0.9900
  367          0.      2.3000    0.2000   12000.0    0.2300    0.0000
0.9900
  109          0.      2.9000    0.2000    4000.0    0.0350    0.0000
0.9900
  229          0.      2.9000    0.2000   10000.0    0.1100    0.0000
0.9900
  269          0.      2.9000    0.2000   10000.0    0.2300    0.0000
0.9900
  110          0.      4.6000    0.2000    4000.0    0.0350    0.0000
0.9900
  130          0.      4.6000    0.2000    4000.0    0.1100    0.0000
0.9900
  150          0.      4.6000    0.2000    4000.0    0.1100    0.0000
0.9900
  190          0.      4.6000    0.2000    4000.0    0.2300    0.0000
0.9900
  210          0.      4.6000    0.2000   10000.0    0.0350    0.0000
0.9900
  230          0.      4.6000    0.2000   10000.0    0.1100    0.0000
0.9900
  250          0.      4.6000    0.2000   10000.0    0.1100    0.0000
0.9900
  270          0.      4.6000    0.2000   10000.0    0.2300    0.0000
0.9900
  290          0.      4.6000    0.2000   10000.0    0.2300    0.0000
0.9900
  330          0.      4.6000    0.2000   12000.0    0.1100    0.0000
0.9900
  370          0.      4.6000    0.2000   12000.0    0.2300    0.0000
0.9900
```

```
  390            0.      4.6000    0.2000   12000.0    0.2300    0.0000
0.9900
*** dry.wheat ***
  111            0.      2.3000    0.2000    4000.0    0.0350    0.0000
0.9900
  131            0.      2.3000    0.2000    4000.0    0.1100    0.0000
0.9900
  151            0.      2.3000    0.2000    4000.0    0.1100    0.0000
0.9900
  114            0.      9.2000    0.2000    4000.0    0.0350    0.0000
0.9900
  134            0.      9.2000    0.2000    4000.0    0.1100    0.0000
0.9900
  314            0.      9.2000    0.2000   12000.0    0.0350    0.0000
0.9900
  334            0.      9.2000    0.2000   12000.0    0.1100    0.0000
0.9900
  END PWAT-PARM2
  PWAT-PARM3
    <PLS >***
    # -  #*** PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP
AGWETP
  101  390      40.       35.    0.2500    2.0000       .00
0.        0.
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >                                                            ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP***
*** sagebrush ***
  101                 0.5000    0.3000     0.000    0.7000
  201                 0.5000    0.3000     0.000    0.7000
  103                 0.5000    0.3000     0.000    0.7000
  104                 0.5000    0.3000     0.000    0.7000
  204                 0.5000    0.3000     0.000    0.7000
  304                 0.5000    0.3000     0.000    0.7000
  121                 0.3000    0.3000     0.000    0.5000
  141                 0.3000    0.3000     0.000    0.5000
  221                 0.3000    0.3000     0.000    0.7000
  241                 0.3000    0.3000     0.000    0.5000
  321                 0.3000    0.3000     0.000    0.5000
  124                 0.3000    0.3000     0.000    0.5000
  144                 0.3000    0.3000     0.000    0.5000
  224                 0.3000    0.3000     0.000    0.5000
  244                 0.3000    0.3000     0.000    0.5000
  324                 0.3000    0.3000     0.000    0.5000
  344                 0.3000    0.3000     0.000    0.5000
  161                 0.2000    0.3000     0.000    0.3000
  261                 0.2000    0.3000     0.000    0.3000
  281                 0.2000    0.3000     0.000    0.3000
  361                 0.2000    0.3000     0.000    0.3000
  164                 0.2000    0.3000     0.000    0.3000
  184                 0.2000    0.3000     0.000    0.3000
  264                 0.2000    0.3000     0.000    0.3000
  284                 0.2000    0.3000     0.000    0.3000
```

```
  364                   0.2000    0.3000     0.000    0.3000
*** grassland ***
  107                   0.5000    0.3000     0.000    0.7000
  207                   0.5000    0.3000     0.000    0.7000
  109                   0.5000    0.3000     0.000    0.7000
  110                   0.5000    0.3000     0.000    0.7000
  210                   0.5000    0.3000     0.000    0.7000
  127                   0.3000    0.3000     0.000    0.5000
  147                   0.3000    0.3000     0.000    0.5000
  227                   0.3000    0.3000     0.000    0.5000
  247                   0.3000    0.3000     0.000    0.5000
  327                   0.3000    0.3000     0.000    0.5000
  229                   0.3000    0.3000     0.000    0.5000
  130                   0.3000    0.3000     0.000    0.5000
  150                   0.3000    0.3000     0.000    0.5000
  230                   0.3000    0.3000     0.000    0.5000
  250                   0.3000    0.3000     0.000    0.5000
  330                   0.3000    0.3000     0.000    0.5000
  167                   0.2000    0.3000     0.000    0.3000
  267                   0.2000    0.3000     0.000    0.3000
  287                   0.2000    0.3000     0.000    0.3000
  367                   0.2000    0.3000     0.000    0.3000
  269                   0.2000    0.3000     0.000    0.3000
  190                   0.2000    0.3000     0.000    0.3000
  270                   0.2000    0.3000     0.000    0.3000
  290                   0.2000    0.3000     0.000    0.3000
  370                   0.2000    0.3000     0.000    0.3000
  390                   0.2000    0.3000     0.000    0.3000
*** dry.wheat ***
  111                   0.5000    0.3000     0.000    0.7000
  114                   0.5000    0.3000     0.000    0.7000
  314                   0.5000    0.3000     0.000    0.7000
  131                   0.3000    0.3000     0.000    0.5000
  151                   0.3000    0.3000     0.000    0.5000
  134                   0.3000    0.3000     0.000    0.5000
  334                   0.3000    0.3000     0.000    0.5000
  END PWAT-PARM4
  PWAT-STATE1
    <PLS >  PWATER state variables***
    # -  #***    CEPS      SURS       UZS      IFWS       LZS      AGWS
GWVS
*** sagebrush ***
  101             0.        0.    0.0010        0.     0.020     0.010
0.010
  121             0.        0.    0.0010        0.     0.020     0.010
0.010
  141             0.        0.    0.0010        0.     0.020     0.010
0.010
  161             0.        0.    0.0010        0.     0.020     0.010
0.010
  201             0.        0.    0.0010        0.     0.020     0.010
0.010
  221             0.        0.    0.0010        0.     0.020     0.010
0.010
```

241	0.	0.	0.0010	0.	0.020	0.010	0.010
261	0.	0.	0.0010	0.	0.020	0.010	0.010
281	0.	0.	0.0010	0.	0.020	0.010	0.010
321	0.	0.	0.0010	0.	0.020	0.010	0.010
361	0.	0.	0.0010	0.	0.020	0.010	0.010
103	0.	0.	0.0010	0.	0.020	0.010	0.010
104	0.	0.	0.0010	0.	0.020	0.010	0.010
124	0.	0.	0.0010	0.	0.020	0.010	0.010
144	0.	0.	0.0010	0.	0.020	0.010	0.010
164	0.	0.	0.0010	0.	0.020	0.010	0.010
184	0.	0.	0.0010	0.	0.020	0.010	0.010
204	0.	0.	0.0010	0.	0.020	0.010	0.010
224	0.	0.	0.0010	0.	0.020	0.010	0.010
244	0.	0.	0.0010	0.	0.020	0.010	0.010
264	0.	0.	0.0010	0.	0.020	0.010	0.010
284	0.	0.	0.0010	0.	0.020	0.010	0.010
304	0.	0.	0.0010	0.	0.020	0.010	0.010
324	0.	0.	0.0010	0.	0.020	0.010	0.010
344	0.	0.	0.0010	0.	0.020	0.010	0.010
364	0.	0.	0.0010	0.	0.020	0.010	0.010
*** grassland ***							
107	0.	0.	0.0010	0.	0.020	0.010	0.010
127	0.	0.	0.0010	0.	0.020	0.010	0.010
147	0.	0.	0.0010	0.	0.020	0.010	0.010
167	0.	0.	0.0010	0.	0.020	0.010	0.010
207	0.	0.	0.0010	0.	0.020	0.010	0.010
227	0.	0.	0.0010	0.	0.020	0.010	0.010
247	0.	0.	0.0010	0.	0.020	0.010	

```
0.010
  267          0.       0.     0.0010       0.      0.020      0.010
0.010
  287          0.       0.     0.0010       0.      0.020      0.010
0.010
  327          0.       0.     0.0010       0.      0.020      0.010
0.010
  367          0.       0.     0.0010       0.      0.020      0.010
0.010
  109          0.       0.     0.0010       0.      0.020      0.010
0.010
  229          0.       0.     0.0010       0.      0.020      0.010
0.010
  269          0.       0.     0.0010       0.      0.020      0.010
0.010
  110          0.       0.     0.0010       0.      0.020      0.010
0.010
  130          0.       0.     0.0010       0.      0.020      0.010
0.010
  150          0.       0.     0.0010       0.      0.020      0.010
0.010
  190          0.       0.     0.0010       0.      0.020      0.010
0.010
  210          0.       0.     0.0010       0.      0.020      0.010
0.010
  230          0.       0.     0.0010       0.      0.020      0.010
0.010
  250          0.       0.     0.0010       0.      0.020      0.010
0.010
  270          0.       0.     0.0010       0.      0.020      0.010
0.010
  290          0.       0.     0.0010       0.      0.020      0.010
0.010
  330          0.       0.     0.0010       0.      0.020      0.010
0.010
  370          0.       0.     0.0010       0.      0.020      0.010
0.010
  390          0.       0.     0.0010       0.      0.020      0.010
0.010
*** dry.wheat ***
  111          0.       0.     0.0010       0.      0.020      0.010
0.010
  131          0.       0.     0.0010       0.      0.020      0.010
0.010
  151          0.       0.     0.0010       0.      0.020      0.010
0.010
  114          0.       0.     0.0010       0.      0.020      0.010
0.010
  134          0.       0.     0.0010       0.      0.020      0.010
0.010
  314          0.       0.     0.0010       0.      0.020      0.010
0.010
  334          0.       0.     0.0010       0.      0.020      0.010
0.010
```

```
  END PWAT-STATE1
  MON-INTERCEP
    <PLS>   Only required if VCSFG=1 in PWAT-PARM1                       ***
    # -  #  Interception storage capacity at start of each month         ***
            JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC ***
*** sagebrush ***
  101      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  121      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  141      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  161      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  201      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  221      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  241      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  261      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  281      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  321      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  361      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  103      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  104      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  124      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  144      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  164      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  184      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  204      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  224      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  244      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  264      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  284      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  304      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  324      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  344      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
  364      0.04 0.06 0.06 0.06 0.05 0.05 0.04 0.04 0.04 0.05 0.04 0.04
*** grassland ***
  107      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  127      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  147      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  167      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  207      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  227      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  247      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  267      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  287      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  327      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  367      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  109      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  229      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  269      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  110      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  130      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  150      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  190      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  210      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  230      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  250      0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
```

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  270       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  290       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  330       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  370       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  390       0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
*** dry.wheat ***
  111       0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  131       0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  151       0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  114       0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  134       0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  314       0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  334       0.16 0.16 0.16 0.16 0.16 0.08 0.00 0.00 0.06 0.16 0.16 0.16
  END MON-INTERCEP
  MON-LZETPARM
    <PLS >  Only required if VLEFG=1 in PWAT-PARM1                      ***
    # -  #  Lower zone ET parameter at start of each month              ***
            JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC ***
*** sagebrush ***
  101       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  103       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  104       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  121       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  124       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  141       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  144       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  161       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  164       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  184       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  201       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  204       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  221       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  224       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  241       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  244       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  261       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  264       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  281       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  284       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  304       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  321       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  324       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  344       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  361       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
  364       0.75 0.99 0.97 0.78 0.80 0.81 0.81 0.80 0.77 0.69 0.71 0.73
*** grassland ***
  107       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  109       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  110       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  127       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  130       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  147       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  150       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  167       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
```

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  190       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  207       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  210       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  227       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  229       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  230       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  247       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  250       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  267       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  269       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  270       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  287       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  290       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  327       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  330       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  367       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  370       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  390       0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
*** dry.wheat ***
  111       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  114       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  131       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  134       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  151       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  314       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  334       0.99 0.99 0.99 0.99 0.99 0.50 0.00 0.00 0.37 0.99 0.99 0.99
  END MON-LZETPARM
END PERLND
EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->
***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #
***
WDM     1 PREC     ENGL      1.12          PERLND 101 190 EXTNL  PREC
WDM     1 PREC     ENGL      1.56          PERLND 201 290 EXTNL  PREC
WDM     1 PREC     ENGL      1.83          PERLND 304 390 EXTNL  PREC
WDM     5 WIND     ENGL                    PERLND 101 390 EXTNL  WINMOV
WDM     6 SOLR     ENGL                    PERLND 101 114 EXTNL  SOLRAD
WDM     7 SOLR     ENGL                    PERLND 121 134 EXTNL  SOLRAD
WDM     8 SOLR     ENGL                    PERLND 141 151 EXTNL  SOLRAD
WDM     9 SOLR     ENGL                    PERLND 161 167 EXTNL  SOLRAD
WDM    10 SOLR     ENGL                    PERLND 184 190 EXTNL  SOLRAD
WDM     6 SOLR     ENGL                    PERLND 201 210 EXTNL  SOLRAD
WDM     7 SOLR     ENGL                    PERLND 221 230 EXTNL  SOLRAD
WDM     8 SOLR     ENGL                    PERLND 241 250 EXTNL  SOLRAD
WDM     9 SOLR     ENGL                    PERLND 261 270 EXTNL  SOLRAD
WDM    10 SOLR     ENGL                    PERLND 281 290 EXTNL  SOLRAD
WDM     6 SOLR     ENGL                    PERLND 304 314 EXTNL  SOLRAD
WDM     7 SOLR     ENGL                    PERLND 321 334 EXTNL  SOLRAD
WDM     8 SOLR     ENGL                    PERLND 344     EXTNL  SOLRAD
WDM     9 SOLR     ENGL                    PERLND 361 370 EXTNL  SOLRAD
WDM    10 SOLR     ENGL                    PERLND 390     EXTNL  SOLRAD
WDM    12 TEMP     ENGL                    PERLND 101 190 ATEMP  AIRTMP
WDM    22 DEWP     ENGL                    PERLND 101 190 EXTNL  DTMPG
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WDM      15 TEMP     ENGL                       PERLND 201 290 ATEMP   AIRTMP
WDM      25 DEWP     ENGL                       PERLND 201 290 EXTNL   DTMPG
WDM      18 TEMP     ENGL                       PERLND 304 390 ATEMP   AIRTMP
WDM      28 DEWP     ENGL                       PERLND 304 390 EXTNL   DTMPG
WDM      32 PET      ENGL                       PERLND 101 114 EXTNL   PETINP
WDM      42 PET      ENGL                       PERLND 121 134 EXTNL   PETINP
WDM      52 PET      ENGL                       PERLND 141 151 EXTNL   PETINP
WDM      62 PET      ENGL                       PERLND 161 167 EXTNL   PETINP
WDM      72 PET      ENGL                       PERLND 184 190 EXTNL   PETINP
WDM      35 PET      ENGL                       PERLND 201 210 EXTNL   PETINP
WDM      45 PET      ENGL                       PERLND 221 230 EXTNL   PETINP
WDM      55 PET      ENGL                       PERLND 241 250 EXTNL   PETINP
WDM      65 PET      ENGL                       PERLND 261 270 EXTNL   PETINP
WDM      75 PET      ENGL                       PERLND 281 290 EXTNL   PETINP
WDM      38 PET      ENGL                       PERLND 304 314 EXTNL   PETINP
WDM      48 PET      ENGL                       PERLND 321 334 EXTNL   PETINP
WDM      58 PET      ENGL                       PERLND 344     EXTNL   PETINP
WDM      68 PET      ENGL                       PERLND 361 370 EXTNL   PETINP
WDM      78 PET      ENGL                       PERLND 390     EXTNL   PETINP
END EXT SOURCES

***
NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->
***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #
***
***Basin geometry
   *** SURO+IFWO summed for dry2 and dry1 subbasins.
   *** AGWI summed for dry2 and dry1 subbasins.
   *** Total actual ET (TAET+SNOWE) summed for dry1 and dry2 subbasins.
   *** Mfact is perlnd area (acres)/12 (coversion from inches to acre-feet)
  **dry2 subbasin***
PERLND 101 PWATER SURO       66.06667       COPY     1      INPUT  MEAN   1
PERLND 101 PWATER IFWO       66.06667       COPY     1      INPUT  MEAN   1
PERLND 101 PWATER AGWI       66.06667       COPY     1      INPUT  MEAN   2
PERLND 101 PWATER TAET       66.06667       COPY     1      INPUT  MEAN   3
PERLND 101 SNOW   SNOWE      66.06667       COPY     1      INPUT  MEAN   3
PERLND 104 PWATER SURO      228.53333       COPY     1      INPUT  MEAN   1
PERLND 104 PWATER IFWO      228.53333       COPY     1      INPUT  MEAN   1
PERLND 104 PWATER AGWI      228.53333       COPY     1      INPUT  MEAN   2
PERLND 104 PWATER TAET      228.53333       COPY     1      INPUT  MEAN   3
PERLND 104 SNOW   SNOWE     228.53333       COPY     1      INPUT  MEAN   3
PERLND 107 PWATER SURO       18.29167       COPY     1      INPUT  MEAN   1
PERLND 107 PWATER IFWO       18.29167       COPY     1      INPUT  MEAN   1
PERLND 107 PWATER AGWI       18.29167       COPY     1      INPUT  MEAN   2
PERLND 107 PWATER TAET       18.29167       COPY     1      INPUT  MEAN   3
PERLND 107 SNOW   SNOWE      18.29167       COPY     1      INPUT  MEAN   3
PERLND 110 PWATER SURO       67.55833       COPY     1      INPUT  MEAN   1
PERLND 110 PWATER IFWO       67.55833       COPY     1      INPUT  MEAN   1
PERLND 110 PWATER AGWI       67.55833       COPY     1      INPUT  MEAN   2
PERLND 110 PWATER TAET       67.55833       COPY     1      INPUT  MEAN   3
PERLND 110 SNOW   SNOWE      67.55833       COPY     1      INPUT  MEAN   3
PERLND 111 PWATER SURO       12.36667       COPY     1      INPUT  MEAN   1
```

PERLND	111	PWATER	IFWO	12.36667	COPY	1	INPUT	MEAN	1
PERLND	111	PWATER	AGWI	12.36667	COPY	1	INPUT	MEAN	2
PERLND	111	PWATER	TAET	12.36667	COPY	1	INPUT	MEAN	3
PERLND	111	SNOW	SNOWE	12.36667	COPY	1	INPUT	MEAN	3
PERLND	114	PWATER	SURO	52.62500	COPY	1	INPUT	MEAN	1
PERLND	114	PWATER	IFWO	52.62500	COPY	1	INPUT	MEAN	1
PERLND	114	PWATER	AGWI	52.62500	COPY	1	INPUT	MEAN	2
PERLND	114	PWATER	TAET	52.62500	COPY	1	INPUT	MEAN	3
PERLND	114	SNOW	SNOWE	52.62500	COPY	1	INPUT	MEAN	3
PERLND	121	PWATER	SURO	35.76667	COPY	1	INPUT	MEAN	1
PERLND	121	PWATER	IFWO	35.76667	COPY	1	INPUT	MEAN	1
PERLND	121	PWATER	AGWI	35.76667	COPY	1	INPUT	MEAN	2
PERLND	121	PWATER	TAET	35.76667	COPY	1	INPUT	MEAN	3
PERLND	121	SNOW	SNOWE	35.76667	COPY	1	INPUT	MEAN	3
PERLND	124	PWATER	SURO	106.93333	COPY	1	INPUT	MEAN	1
PERLND	124	PWATER	IFWO	106.93333	COPY	1	INPUT	MEAN	1
PERLND	124	PWATER	AGWI	106.93333	COPY	1	INPUT	MEAN	2
PERLND	124	PWATER	TAET	106.93333	COPY	1	INPUT	MEAN	3
PERLND	124	SNOW	SNOWE	106.93333	COPY	1	INPUT	MEAN	3
PERLND	127	PWATER	SURO	21.61667	COPY	1	INPUT	MEAN	1
PERLND	127	PWATER	IFWO	21.61667	COPY	1	INPUT	MEAN	1
PERLND	127	PWATER	AGWI	21.61667	COPY	1	INPUT	MEAN	2
PERLND	127	PWATER	TAET	21.61667	COPY	1	INPUT	MEAN	3
PERLND	127	SNOW	SNOWE	21.61667	COPY	1	INPUT	MEAN	3
PERLND	130	PWATER	SURO	23.42500	COPY	1	INPUT	MEAN	1
PERLND	130	PWATER	IFWO	23.42500	COPY	1	INPUT	MEAN	1
PERLND	130	PWATER	AGWI	23.42500	COPY	1	INPUT	MEAN	2
PERLND	130	PWATER	TAET	23.42500	COPY	1	INPUT	MEAN	3
PERLND	130	SNOW	SNOWE	23.42500	COPY	1	INPUT	MEAN	3
PERLND	131	PWATER	SURO	16.65000	COPY	1	INPUT	MEAN	1
PERLND	131	PWATER	IFWO	16.65000	COPY	1	INPUT	MEAN	1
PERLND	131	PWATER	AGWI	16.65000	COPY	1	INPUT	MEAN	2
PERLND	131	PWATER	TAET	16.65000	COPY	1	INPUT	MEAN	3
PERLND	131	SNOW	SNOWE	16.65000	COPY	1	INPUT	MEAN	3
PERLND	134	PWATER	SURO	17.13333	COPY	1	INPUT	MEAN	1
PERLND	134	PWATER	IFWO	17.13333	COPY	1	INPUT	MEAN	1
PERLND	134	PWATER	AGWI	17.13333	COPY	1	INPUT	MEAN	2
PERLND	134	PWATER	TAET	17.13333	COPY	1	INPUT	MEAN	3
PERLND	134	SNOW	SNOWE	17.13333	COPY	1	INPUT	MEAN	3
PERLND	141	PWATER	SURO	33.12500	COPY	1	INPUT	MEAN	1
PERLND	141	PWATER	IFWO	33.12500	COPY	1	INPUT	MEAN	1
PERLND	141	PWATER	AGWI	33.12500	COPY	1	INPUT	MEAN	2
PERLND	141	PWATER	TAET	33.12500	COPY	1	INPUT	MEAN	3
PERLND	141	SNOW	SNOWE	33.12500	COPY	1	INPUT	MEAN	3
PERLND	144	PWATER	SURO	49.20833	COPY	1	INPUT	MEAN	1
PERLND	144	PWATER	IFWO	49.20833	COPY	1	INPUT	MEAN	1
PERLND	144	PWATER	AGWI	49.20833	COPY	1	INPUT	MEAN	2
PERLND	144	PWATER	TAET	49.20833	COPY	1	INPUT	MEAN	3
PERLND	144	SNOW	SNOWE	49.20833	COPY	1	INPUT	MEAN	3
PERLND	147	PWATER	SURO	15.33333	COPY	1	INPUT	MEAN	1
PERLND	147	PWATER	IFWO	15.33333	COPY	1	INPUT	MEAN	1
PERLND	147	PWATER	AGWI	15.33333	COPY	1	INPUT	MEAN	2
PERLND	147	PWATER	TAET	15.33333	COPY	1	INPUT	MEAN	3
PERLND	147	SNOW	SNOWE	15.33333	COPY	1	INPUT	MEAN	3

```
PERLND 150 PWATER SURO       27.42500      COPY     1      INPUT  MEAN   1
PERLND 150 PWATER IFWO       27.42500      COPY     1      INPUT  MEAN   1
PERLND 150 PWATER AGWI       27.42500      COPY     1      INPUT  MEAN   2
PERLND 150 PWATER TAET       27.42500      COPY     1      INPUT  MEAN   3
PERLND 150 SNOW   SNOWE      27.42500      COPY     1      INPUT  MEAN   3
PERLND 151 PWATER SURO        8.60000      COPY     1      INPUT  MEAN   1
PERLND 151 PWATER IFWO        8.60000      COPY     1      INPUT  MEAN   1
PERLND 151 PWATER AGWI        8.60000      COPY     1      INPUT  MEAN   2
PERLND 151 PWATER TAET        8.60000      COPY     1      INPUT  MEAN   3
PERLND 151 SNOW   SNOWE       8.60000      COPY     1      INPUT  MEAN   3
PERLND 161 PWATER SURO        3.02500      COPY     1      INPUT  MEAN   1
PERLND 161 PWATER IFWO        3.02500      COPY     1      INPUT  MEAN   1
PERLND 161 PWATER AGWI        3.02500      COPY     1      INPUT  MEAN   2
PERLND 161 PWATER TAET        3.02500      COPY     1      INPUT  MEAN   3
PERLND 161 SNOW   SNOWE       3.02500      COPY     1      INPUT  MEAN   3
PERLND 164 PWATER SURO       16.56667      COPY     1      INPUT  MEAN   1
PERLND 164 PWATER IFWO       16.56667      COPY     1      INPUT  MEAN   1
PERLND 164 PWATER AGWI       16.56667      COPY     1      INPUT  MEAN   2
PERLND 164 PWATER TAET       16.56667      COPY     1      INPUT  MEAN   3
PERLND 164 SNOW   SNOWE      16.56667      COPY     1      INPUT  MEAN   3
PERLND 167 PWATER SURO        6.99167      COPY     1      INPUT  MEAN   1
PERLND 167 PWATER IFWO        6.99167      COPY     1      INPUT  MEAN   1
PERLND 167 PWATER AGWI        6.99167      COPY     1      INPUT  MEAN   2
PERLND 167 PWATER TAET        6.99167      COPY     1      INPUT  MEAN   3
PERLND 167 SNOW   SNOWE       6.99167      COPY     1      INPUT  MEAN   3
PERLND 184 PWATER SURO       18.45833      COPY     1      INPUT  MEAN   1
PERLND 184 PWATER IFWO       18.45833      COPY     1      INPUT  MEAN   1
PERLND 184 PWATER AGWI       18.45833      COPY     1      INPUT  MEAN   2
PERLND 184 PWATER TAET       18.45833      COPY     1      INPUT  MEAN   3
PERLND 184 SNOW   SNOWE      18.45833      COPY     1      INPUT  MEAN   3
PERLND 190 PWATER SURO       24.14167      COPY     1      INPUT  MEAN   1
PERLND 190 PWATER IFWO       24.14167      COPY     1      INPUT  MEAN   1
PERLND 190 PWATER AGWI       24.14167      COPY     1      INPUT  MEAN   2
PERLND 190 PWATER TAET       24.14167      COPY     1      INPUT  MEAN   3
PERLND 190 SNOW   SNOWE      24.14167      COPY     1      INPUT  MEAN   3
PERLND 201 PWATER SURO       13.99167      COPY     1      INPUT  MEAN   1
PERLND 201 PWATER IFWO       13.99167      COPY     1      INPUT  MEAN   1
PERLND 201 PWATER AGWI       13.99167      COPY     1      INPUT  MEAN   2
PERLND 201 PWATER TAET       13.99167      COPY     1      INPUT  MEAN   3
PERLND 201 SNOW   SNOWE      13.99167      COPY     1      INPUT  MEAN   3
PERLND 204 PWATER SURO       11.75833      COPY     1      INPUT  MEAN   1
PERLND 204 PWATER IFWO       11.75833      COPY     1      INPUT  MEAN   1
PERLND 204 PWATER AGWI       11.75833      COPY     1      INPUT  MEAN   2
PERLND 204 PWATER TAET       11.75833      COPY     1      INPUT  MEAN   3
PERLND 204 SNOW   SNOWE      11.75833      COPY     1      INPUT  MEAN   3
PERLND 207 PWATER SURO       35.94167      COPY     1      INPUT  MEAN   1
PERLND 207 PWATER IFWO       35.94167      COPY     1      INPUT  MEAN   1
PERLND 207 PWATER AGWI       35.94167      COPY     1      INPUT  MEAN   2
PERLND 207 PWATER TAET       35.94167      COPY     1      INPUT  MEAN   3
PERLND 207 SNOW   SNOWE      35.94167      COPY     1      INPUT  MEAN   3
PERLND 210 PWATER SURO       15.40833      COPY     1      INPUT  MEAN   1
PERLND 210 PWATER IFWO       15.40833      COPY     1      INPUT  MEAN   1
PERLND 210 PWATER AGWI       15.40833      COPY     1      INPUT  MEAN   2
PERLND 210 PWATER TAET       15.40833      COPY     1      INPUT  MEAN   3
```

PERLND	210	SNOW	SNOWE	15.40833	COPY	1	INPUT	MEAN	3
PERLND	221	PWATER	SURO	44.55000	COPY	1	INPUT	MEAN	1
PERLND	221	PWATER	IFWO	44.55000	COPY	1	INPUT	MEAN	1
PERLND	221	PWATER	AGWI	44.55000	COPY	1	INPUT	MEAN	2
PERLND	221	PWATER	TAET	44.55000	COPY	1	INPUT	MEAN	3
PERLND	221	SNOW	SNOWE	44.55000	COPY	1	INPUT	MEAN	3
PERLND	224	PWATER	SURO	24.31667	COPY	1	INPUT	MEAN	1
PERLND	224	PWATER	IFWO	24.31667	COPY	1	INPUT	MEAN	1
PERLND	224	PWATER	AGWI	24.31667	COPY	1	INPUT	MEAN	2
PERLND	224	PWATER	TAET	24.31667	COPY	1	INPUT	MEAN	3
PERLND	224	SNOW	SNOWE	24.31667	COPY	1	INPUT	MEAN	3
PERLND	227	PWATER	SURO	110.52500	COPY	1	INPUT	MEAN	1
PERLND	227	PWATER	IFWO	110.52500	COPY	1	INPUT	MEAN	1
PERLND	227	PWATER	AGWI	110.52500	COPY	1	INPUT	MEAN	2
PERLND	227	PWATER	TAET	110.52500	COPY	1	INPUT	MEAN	3
PERLND	227	SNOW	SNOWE	110.52500	COPY	1	INPUT	MEAN	3
PERLND	229	PWATER	SURO	8.70000	COPY	1	INPUT	MEAN	1
PERLND	229	PWATER	IFWO	8.70000	COPY	1	INPUT	MEAN	1
PERLND	229	PWATER	AGWI	8.70000	COPY	1	INPUT	MEAN	2
PERLND	229	PWATER	TAET	8.70000	COPY	1	INPUT	MEAN	3
PERLND	229	SNOW	SNOWE	8.70000	COPY	1	INPUT	MEAN	3
PERLND	230	PWATER	SURO	51.82500	COPY	1	INPUT	MEAN	1
PERLND	230	PWATER	IFWO	51.82500	COPY	1	INPUT	MEAN	1
PERLND	230	PWATER	AGWI	51.82500	COPY	1	INPUT	MEAN	2
PERLND	230	PWATER	TAET	51.82500	COPY	1	INPUT	MEAN	3
PERLND	230	SNOW	SNOWE	51.82500	COPY	1	INPUT	MEAN	3
PERLND	241	PWATER	SURO	14.90000	COPY	1	INPUT	MEAN	1
PERLND	241	PWATER	IFWO	14.90000	COPY	1	INPUT	MEAN	1
PERLND	241	PWATER	AGWI	14.90000	COPY	1	INPUT	MEAN	2
PERLND	241	PWATER	TAET	14.90000	COPY	1	INPUT	MEAN	3
PERLND	241	SNOW	SNOWE	14.90000	COPY	1	INPUT	MEAN	3
PERLND	244	PWATER	SURO	10.23333	COPY	1	INPUT	MEAN	1
PERLND	244	PWATER	IFWO	10.23333	COPY	1	INPUT	MEAN	1
PERLND	244	PWATER	AGWI	10.23333	COPY	1	INPUT	MEAN	2
PERLND	244	PWATER	TAET	10.23333	COPY	1	INPUT	MEAN	3
PERLND	244	SNOW	SNOWE	10.23333	COPY	1	INPUT	MEAN	3
PERLND	247	PWATER	SURO	35.37500	COPY	1	INPUT	MEAN	1
PERLND	247	PWATER	IFWO	35.37500	COPY	1	INPUT	MEAN	1
PERLND	247	PWATER	AGWI	35.37500	COPY	1	INPUT	MEAN	2
PERLND	247	PWATER	TAET	35.37500	COPY	1	INPUT	MEAN	3
PERLND	247	SNOW	SNOWE	35.37500	COPY	1	INPUT	MEAN	3
PERLND	250	PWATER	SURO	14.44167	COPY	1	INPUT	MEAN	1
PERLND	250	PWATER	IFWO	14.44167	COPY	1	INPUT	MEAN	1
PERLND	250	PWATER	AGWI	14.44167	COPY	1	INPUT	MEAN	2
PERLND	250	PWATER	TAET	14.44167	COPY	1	INPUT	MEAN	3
PERLND	250	SNOW	SNOWE	14.44167	COPY	1	INPUT	MEAN	3
PERLND	261	PWATER	SURO	51.40000	COPY	1	INPUT	MEAN	1
PERLND	261	PWATER	IFWO	51.40000	COPY	1	INPUT	MEAN	1
PERLND	261	PWATER	AGWI	51.40000	COPY	1	INPUT	MEAN	2
PERLND	261	PWATER	TAET	51.40000	COPY	1	INPUT	MEAN	3
PERLND	261	SNOW	SNOWE	51.40000	COPY	1	INPUT	MEAN	3
PERLND	264	PWATER	SURO	35.40833	COPY	1	INPUT	MEAN	1
PERLND	264	PWATER	IFWO	35.40833	COPY	1	INPUT	MEAN	1
PERLND	264	PWATER	AGWI	35.40833	COPY	1	INPUT	MEAN	2

PERLND	264	PWATER	TAET	35.40833	COPY	1	INPUT	MEAN	3
PERLND	264	SNOW	SNOWE	35.40833	COPY	1	INPUT	MEAN	3
PERLND	267	PWATER	SURO	69.73333	COPY	1	INPUT	MEAN	1
PERLND	267	PWATER	IFWO	69.73333	COPY	1	INPUT	MEAN	1
PERLND	267	PWATER	AGWI	69.73333	COPY	1	INPUT	MEAN	2
PERLND	267	PWATER	TAET	69.73333	COPY	1	INPUT	MEAN	3
PERLND	267	SNOW	SNOWE	69.73333	COPY	1	INPUT	MEAN	3
PERLND	269	PWATER	SURO	16.10833	COPY	1	INPUT	MEAN	1
PERLND	269	PWATER	IFWO	16.10833	COPY	1	INPUT	MEAN	1
PERLND	269	PWATER	AGWI	16.10833	COPY	1	INPUT	MEAN	2
PERLND	269	PWATER	TAET	16.10833	COPY	1	INPUT	MEAN	3
PERLND	269	SNOW	SNOWE	16.10833	COPY	1	INPUT	MEAN	3
PERLND	270	PWATER	SURO	42.90834	COPY	1	INPUT	MEAN	1
PERLND	270	PWATER	IFWO	42.90834	COPY	1	INPUT	MEAN	1
PERLND	270	PWATER	AGWI	42.90834	COPY	1	INPUT	MEAN	2
PERLND	270	PWATER	TAET	42.90834	COPY	1	INPUT	MEAN	3
PERLND	270	SNOW	SNOWE	42.90834	COPY	1	INPUT	MEAN	3
PERLND	281	PWATER	SURO	11.66667	COPY	1	INPUT	MEAN	1
PERLND	281	PWATER	IFWO	11.66667	COPY	1	INPUT	MEAN	1
PERLND	281	PWATER	AGWI	11.66667	COPY	1	INPUT	MEAN	2
PERLND	281	PWATER	TAET	11.66667	COPY	1	INPUT	MEAN	3
PERLND	281	SNOW	SNOWE	11.66667	COPY	1	INPUT	MEAN	3
PERLND	284	PWATER	SURO	10.60000	COPY	1	INPUT	MEAN	1
PERLND	284	PWATER	IFWO	10.60000	COPY	1	INPUT	MEAN	1
PERLND	284	PWATER	AGWI	10.60000	COPY	1	INPUT	MEAN	2
PERLND	284	PWATER	TAET	10.60000	COPY	1	INPUT	MEAN	3
PERLND	284	SNOW	SNOWE	10.60000	COPY	1	INPUT	MEAN	3
PERLND	287	PWATER	SURO	14.55000	COPY	1	INPUT	MEAN	1
PERLND	287	PWATER	IFWO	14.55000	COPY	1	INPUT	MEAN	1
PERLND	287	PWATER	AGWI	14.55000	COPY	1	INPUT	MEAN	2
PERLND	287	PWATER	TAET	14.55000	COPY	1	INPUT	MEAN	3
PERLND	287	SNOW	SNOWE	14.55000	COPY	1	INPUT	MEAN	3
PERLND	290	PWATER	SURO	9.94167	COPY	1	INPUT	MEAN	1
PERLND	290	PWATER	IFWO	9.94167	COPY	1	INPUT	MEAN	1
PERLND	290	PWATER	AGWI	9.94167	COPY	1	INPUT	MEAN	2
PERLND	290	PWATER	TAET	9.94167	COPY	1	INPUT	MEAN	3
PERLND	290	SNOW	SNOWE	9.94167	COPY	1	INPUT	MEAN	3
PERLND	304	PWATER	SURO	9.02500	COPY	1	INPUT	MEAN	1
PERLND	304	PWATER	IFWO	9.02500	COPY	1	INPUT	MEAN	1
PERLND	304	PWATER	AGWI	9.02500	COPY	1	INPUT	MEAN	2
PERLND	304	PWATER	TAET	9.02500	COPY	1	INPUT	MEAN	3
PERLND	304	SNOW	SNOWE	9.02500	COPY	1	INPUT	MEAN	3
PERLND	314	PWATER	SURO	20.72500	COPY	1	INPUT	MEAN	1
PERLND	314	PWATER	IFWO	20.72500	COPY	1	INPUT	MEAN	1
PERLND	314	PWATER	AGWI	20.72500	COPY	1	INPUT	MEAN	2
PERLND	314	PWATER	TAET	20.72500	COPY	1	INPUT	MEAN	3
PERLND	314	SNOW	SNOWE	20.72500	COPY	1	INPUT	MEAN	3
PERLND	321	PWATER	SURO	11.70833	COPY	1	INPUT	MEAN	1
PERLND	321	PWATER	IFWO	11.70833	COPY	1	INPUT	MEAN	1
PERLND	321	PWATER	AGWI	11.70833	COPY	1	INPUT	MEAN	2
PERLND	321	PWATER	TAET	11.70833	COPY	1	INPUT	MEAN	3
PERLND	321	SNOW	SNOWE	11.70833	COPY	1	INPUT	MEAN	3
PERLND	324	PWATER	SURO	28.75000	COPY	1	INPUT	MEAN	1
PERLND	324	PWATER	IFWO	28.75000	COPY	1	INPUT	MEAN	1

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PERLND 324 PWATER AGWI       28.75000       COPY      1       INPUT  MEAN   2
PERLND 324 PWATER TAET       28.75000       COPY      1       INPUT  MEAN   3
PERLND 324 SNOW   SNOWE      28.75000       COPY      1       INPUT  MEAN   3
PERLND 327 PWATER SURO        6.55833       COPY      1       INPUT  MEAN   1
PERLND 327 PWATER IFWO        6.55833       COPY      1       INPUT  MEAN   1
PERLND 327 PWATER AGWI        6.55833       COPY      1       INPUT  MEAN   2
PERLND 327 PWATER TAET        6.55833       COPY      1       INPUT  MEAN   3
PERLND 327 SNOW   SNOWE       6.55833       COPY      1       INPUT  MEAN   3
PERLND 330 PWATER SURO       17.99167       COPY      1       INPUT  MEAN   1
PERLND 330 PWATER IFWO       17.99167       COPY      1       INPUT  MEAN   1
PERLND 330 PWATER AGWI       17.99167       COPY      1       INPUT  MEAN   2
PERLND 330 PWATER TAET       17.99167       COPY      1       INPUT  MEAN   3
PERLND 330 SNOW   SNOWE      17.99167       COPY      1       INPUT  MEAN   3
PERLND 334 PWATER SURO       12.10000       COPY      1       INPUT  MEAN   1
PERLND 334 PWATER IFWO       12.10000       COPY      1       INPUT  MEAN   1
PERLND 334 PWATER AGWI       12.10000       COPY      1       INPUT  MEAN   2
PERLND 334 PWATER TAET       12.10000       COPY      1       INPUT  MEAN   3
PERLND 334 SNOW   SNOWE      12.10000       COPY      1       INPUT  MEAN   3
PERLND 344 PWATER SURO        8.12500       COPY      1       INPUT  MEAN   1
PERLND 344 PWATER IFWO        8.12500       COPY      1       INPUT  MEAN   1
PERLND 344 PWATER AGWI        8.12500       COPY      1       INPUT  MEAN   2
PERLND 344 PWATER TAET        8.12500       COPY      1       INPUT  MEAN   3
PERLND 344 SNOW   SNOWE       8.12500       COPY      1       INPUT  MEAN   3
PERLND 361 PWATER SURO       43.27500       COPY      1       INPUT  MEAN   1
PERLND 361 PWATER IFWO       43.27500       COPY      1       INPUT  MEAN   1
PERLND 361 PWATER AGWI       43.27500       COPY      1       INPUT  MEAN   2
PERLND 361 PWATER TAET       43.27500       COPY      1       INPUT  MEAN   3
PERLND 361 SNOW   SNOWE      43.27500       COPY      1       INPUT  MEAN   3
PERLND 364 PWATER SURO       78.15000       COPY      1       INPUT  MEAN   1
PERLND 364 PWATER IFWO       78.15000       COPY      1       INPUT  MEAN   1
PERLND 364 PWATER AGWI       78.15000       COPY      1       INPUT  MEAN   2
PERLND 364 PWATER TAET       78.15000       COPY      1       INPUT  MEAN   3
PERLND 364 SNOW   SNOWE      78.15000       COPY      1       INPUT  MEAN   3
PERLND 367 PWATER SURO       37.23333       COPY      1       INPUT  MEAN   1
PERLND 367 PWATER IFWO       37.23333       COPY      1       INPUT  MEAN   1
PERLND 367 PWATER AGWI       37.23333       COPY      1       INPUT  MEAN   2
PERLND 367 PWATER TAET       37.23333       COPY      1       INPUT  MEAN   3
PERLND 367 SNOW   SNOWE      37.23333       COPY      1       INPUT  MEAN   3
PERLND 370 PWATER SURO       41.80000       COPY      1       INPUT  MEAN   1
PERLND 370 PWATER IFWO       41.80000       COPY      1       INPUT  MEAN   1
PERLND 370 PWATER AGWI       41.80000       COPY      1       INPUT  MEAN   2
PERLND 370 PWATER TAET       41.80000       COPY      1       INPUT  MEAN   3
PERLND 370 SNOW   SNOWE      41.80000       COPY      1       INPUT  MEAN   3
PERLND 390 PWATER SURO       13.55000       COPY      1       INPUT  MEAN   1
PERLND 390 PWATER IFWO       13.55000       COPY      1       INPUT  MEAN   1
PERLND 390 PWATER AGWI       13.55000       COPY      1       INPUT  MEAN   2
PERLND 390 PWATER TAET       13.55000       COPY      1       INPUT  MEAN   3
PERLND 390 SNOW   SNOWE      13.55000       COPY      1       INPUT  MEAN   3
  **dry1 subbasin***
PERLND 101 PWATER SURO       61.03334       COPY      1       INPUT  MEAN   4
PERLND 101 PWATER IFWO       61.03334       COPY      1       INPUT  MEAN   4
PERLND 101 PWATER AGWI       61.03334       COPY      1       INPUT  MEAN   5
PERLND 101 PWATER TAET       61.03334       COPY      1       INPUT  MEAN   6
PERLND 101 SNOW   SNOWE      61.03334       COPY      1       INPUT  MEAN   6
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PERLND	103	PWATER	SURO	86.65000	COPY	1	INPUT	MEAN	4
PERLND	103	PWATER	IFWO	86.65000	COPY	1	INPUT	MEAN	4
PERLND	103	PWATER	AGWI	86.65000	COPY	1	INPUT	MEAN	5
PERLND	103	PWATER	TAET	86.65000	COPY	1	INPUT	MEAN	6
PERLND	103	SNOW	SNOWE	86.65000	COPY	1	INPUT	MEAN	6
PERLND	104	PWATER	SURO	431.17500	COPY	1	INPUT	MEAN	4
PERLND	104	PWATER	IFWO	431.17500	COPY	1	INPUT	MEAN	4
PERLND	104	PWATER	AGWI	431.17500	COPY	1	INPUT	MEAN	5
PERLND	104	PWATER	TAET	431.17500	COPY	1	INPUT	MEAN	6
PERLND	104	SNOW	SNOWE	431.17500	COPY	1	INPUT	MEAN	6
PERLND	107	PWATER	SURO	35.00834	COPY	1	INPUT	MEAN	4
PERLND	107	PWATER	IFWO	35.00834	COPY	1	INPUT	MEAN	4
PERLND	107	PWATER	AGWI	35.00834	COPY	1	INPUT	MEAN	5
PERLND	107	PWATER	TAET	35.00834	COPY	1	INPUT	MEAN	6
PERLND	107	SNOW	SNOWE	35.00834	COPY	1	INPUT	MEAN	6
PERLND	109	PWATER	SURO	44.71666	COPY	1	INPUT	MEAN	4
PERLND	109	PWATER	IFWO	44.71666	COPY	1	INPUT	MEAN	4
PERLND	109	PWATER	AGWI	44.71666	COPY	1	INPUT	MEAN	5
PERLND	109	PWATER	TAET	44.71666	COPY	1	INPUT	MEAN	6
PERLND	109	SNOW	SNOWE	44.71666	COPY	1	INPUT	MEAN	6
PERLND	110	PWATER	SURO	220.95833	COPY	1	INPUT	MEAN	4
PERLND	110	PWATER	IFWO	220.95833	COPY	1	INPUT	MEAN	4
PERLND	110	PWATER	AGWI	220.95833	COPY	1	INPUT	MEAN	5
PERLND	110	PWATER	TAET	220.95833	COPY	1	INPUT	MEAN	6
PERLND	110	SNOW	SNOWE	220.95833	COPY	1	INPUT	MEAN	6
PERLND	114	PWATER	SURO	2.58830	COPY	1	INPUT	MEAN	4
PERLND	114	PWATER	IFWO	2.58830	COPY	1	INPUT	MEAN	4
PERLND	114	PWATER	AGWI	2.58830	COPY	1	INPUT	MEAN	5
PERLND	114	PWATER	TAET	2.58830	COPY	1	INPUT	MEAN	6
PERLND	114	SNOW	SNOWE	2.58830	COPY	1	INPUT	MEAN	6
PERLND	121	PWATER	SURO	40.64167	COPY	1	INPUT	MEAN	4
PERLND	121	PWATER	IFWO	40.64167	COPY	1	INPUT	MEAN	4
PERLND	121	PWATER	AGWI	40.64167	COPY	1	INPUT	MEAN	5
PERLND	121	PWATER	TAET	40.64167	COPY	1	INPUT	MEAN	6
PERLND	121	SNOW	SNOWE	40.64167	COPY	1	INPUT	MEAN	6
PERLND	124	PWATER	SURO	57.95833	COPY	1	INPUT	MEAN	4
PERLND	124	PWATER	IFWO	57.95833	COPY	1	INPUT	MEAN	4
PERLND	124	PWATER	AGWI	57.95833	COPY	1	INPUT	MEAN	5
PERLND	124	PWATER	TAET	57.95833	COPY	1	INPUT	MEAN	6
PERLND	124	SNOW	SNOWE	57.95833	COPY	1	INPUT	MEAN	6
PERLND	127	PWATER	SURO	35.30833	COPY	1	INPUT	MEAN	4
PERLND	127	PWATER	IFWO	35.30833	COPY	1	INPUT	MEAN	4
PERLND	127	PWATER	AGWI	35.30833	COPY	1	INPUT	MEAN	5
PERLND	127	PWATER	TAET	35.30833	COPY	1	INPUT	MEAN	6
PERLND	127	SNOW	SNOWE	35.30833	COPY	1	INPUT	MEAN	6
PERLND	130	PWATER	SURO	18.61667	COPY	1	INPUT	MEAN	4
PERLND	130	PWATER	IFWO	18.61667	COPY	1	INPUT	MEAN	4
PERLND	130	PWATER	AGWI	18.61667	COPY	1	INPUT	MEAN	5
PERLND	130	PWATER	TAET	18.61667	COPY	1	INPUT	MEAN	6
PERLND	130	SNOW	SNOWE	18.61667	COPY	1	INPUT	MEAN	6
PERLND	144	PWATER	SURO	7.00000	COPY	1	INPUT	MEAN	4
PERLND	144	PWATER	IFWO	7.00000	COPY	1	INPUT	MEAN	4
PERLND	144	PWATER	AGWI	7.00000	COPY	1	INPUT	MEAN	5
PERLND	144	PWATER	TAET	7.00000	COPY	1	INPUT	MEAN	6

PERLND	144	SNOW	SNOWE	7.00000	COPY	1	INPUT	MEAN	6
PERLND	150	PWATER	SURO	2.01667	COPY	1	INPUT	MEAN	4
PERLND	150	PWATER	IFWO	2.01667	COPY	1	INPUT	MEAN	4
PERLND	150	PWATER	AGWI	2.01667	COPY	1	INPUT	MEAN	5
PERLND	150	PWATER	TAET	2.01667	COPY	1	INPUT	MEAN	6
PERLND	150	SNOW	SNOWE	2.01667	COPY	1	INPUT	MEAN	6
PERLND	161	PWATER	SURO	8.57500	COPY	1	INPUT	MEAN	4
PERLND	161	PWATER	IFWO	8.57500	COPY	1	INPUT	MEAN	4
PERLND	161	PWATER	AGWI	8.57500	COPY	1	INPUT	MEAN	5
PERLND	161	PWATER	TAET	8.57500	COPY	1	INPUT	MEAN	6
PERLND	161	SNOW	SNOWE	8.57500	COPY	1	INPUT	MEAN	6
PERLND	164	PWATER	SURO	2.51667	COPY	1	INPUT	MEAN	4
PERLND	164	PWATER	IFWO	2.51667	COPY	1	INPUT	MEAN	4
PERLND	164	PWATER	AGWI	2.51667	COPY	1	INPUT	MEAN	5
PERLND	164	PWATER	TAET	2.51667	COPY	1	INPUT	MEAN	6
PERLND	164	SNOW	SNOWE	2.51667	COPY	1	INPUT	MEAN	6
PERLND	167	PWATER	SURO	27.10000	COPY	1	INPUT	MEAN	4
PERLND	167	PWATER	IFWO	27.10000	COPY	1	INPUT	MEAN	4
PERLND	167	PWATER	AGWI	27.10000	COPY	1	INPUT	MEAN	5
PERLND	167	PWATER	TAET	27.10000	COPY	1	INPUT	MEAN	6
PERLND	167	SNOW	SNOWE	27.10000	COPY	1	INPUT	MEAN	6
PERLND	201	PWATER	SURO	3.84167	COPY	1	INPUT	MEAN	4
PERLND	201	PWATER	IFWO	3.84167	COPY	1	INPUT	MEAN	4
PERLND	201	PWATER	AGWI	3.84167	COPY	1	INPUT	MEAN	5
PERLND	201	PWATER	TAET	3.84167	COPY	1	INPUT	MEAN	6
PERLND	201	SNOW	SNOWE	3.84167	COPY	1	INPUT	MEAN	6
PERLND	207	PWATER	SURO	12.93333	COPY	1	INPUT	MEAN	4
PERLND	207	PWATER	IFWO	12.93333	COPY	1	INPUT	MEAN	4
PERLND	207	PWATER	AGWI	12.93333	COPY	1	INPUT	MEAN	5
PERLND	207	PWATER	TAET	12.93333	COPY	1	INPUT	MEAN	6
PERLND	207	SNOW	SNOWE	12.93333	COPY	1	INPUT	MEAN	6
PERLND	221	PWATER	SURO	19.90000	COPY	1	INPUT	MEAN	4
PERLND	221	PWATER	IFWO	19.90000	COPY	1	INPUT	MEAN	4
PERLND	221	PWATER	AGWI	19.90000	COPY	1	INPUT	MEAN	5
PERLND	221	PWATER	TAET	19.90000	COPY	1	INPUT	MEAN	6
PERLND	221	SNOW	SNOWE	19.90000	COPY	1	INPUT	MEAN	6
PERLND	224	PWATER	SURO	3.40833	COPY	1	INPUT	MEAN	4
PERLND	224	PWATER	IFWO	3.40833	COPY	1	INPUT	MEAN	4
PERLND	224	PWATER	AGWI	3.40833	COPY	1	INPUT	MEAN	5
PERLND	224	PWATER	TAET	3.40833	COPY	1	INPUT	MEAN	6
PERLND	224	SNOW	SNOWE	3.40833	COPY	1	INPUT	MEAN	6
PERLND	227	PWATER	SURO	51.65000	COPY	1	INPUT	MEAN	4
PERLND	227	PWATER	IFWO	51.65000	COPY	1	INPUT	MEAN	4
PERLND	227	PWATER	AGWI	51.65000	COPY	1	INPUT	MEAN	5
PERLND	227	PWATER	TAET	51.65000	COPY	1	INPUT	MEAN	6
PERLND	227	SNOW	SNOWE	51.65000	COPY	1	INPUT	MEAN	6
PERLND	230	PWATER	SURO	3.10000	COPY	1	INPUT	MEAN	4
PERLND	230	PWATER	IFWO	3.10000	COPY	1	INPUT	MEAN	4
PERLND	230	PWATER	AGWI	3.10000	COPY	1	INPUT	MEAN	5
PERLND	230	PWATER	TAET	3.10000	COPY	1	INPUT	MEAN	6
PERLND	230	SNOW	SNOWE	3.10000	COPY	1	INPUT	MEAN	6
PERLND	241	PWATER	SURO	3.12500	COPY	1	INPUT	MEAN	4
PERLND	241	PWATER	IFWO	3.12500	COPY	1	INPUT	MEAN	4
PERLND	241	PWATER	AGWI	3.12500	COPY	1	INPUT	MEAN	5

PERLND	241	PWATER	TAET	3.12500	COPY	1	INPUT	MEAN	6
PERLND	241	SNOW	SNOWE	3.12500	COPY	1	INPUT	MEAN	6
PERLND	247	PWATER	SURO	16.55000	COPY	1	INPUT	MEAN	4
PERLND	247	PWATER	IFWO	16.55000	COPY	1	INPUT	MEAN	4
PERLND	247	PWATER	AGWI	16.55000	COPY	1	INPUT	MEAN	5
PERLND	247	PWATER	TAET	16.55000	COPY	1	INPUT	MEAN	6
PERLND	247	SNOW	SNOWE	16.55000	COPY	1	INPUT	MEAN	6
PERLND	261	PWATER	SURO	39.96667	COPY	1	INPUT	MEAN	4
PERLND	261	PWATER	IFWO	39.96667	COPY	1	INPUT	MEAN	4
PERLND	261	PWATER	AGWI	39.96667	COPY	1	INPUT	MEAN	5
PERLND	261	PWATER	TAET	39.96667	COPY	1	INPUT	MEAN	6
PERLND	261	SNOW	SNOWE	39.96667	COPY	1	INPUT	MEAN	6
PERLND	264	PWATER	SURO	9.14167	COPY	1	INPUT	MEAN	4
PERLND	264	PWATER	IFWO	9.14167	COPY	1	INPUT	MEAN	4
PERLND	264	PWATER	AGWI	9.14167	COPY	1	INPUT	MEAN	5
PERLND	264	PWATER	TAET	9.14167	COPY	1	INPUT	MEAN	6
PERLND	264	SNOW	SNOWE	9.14167	COPY	1	INPUT	MEAN	6
PERLND	267	PWATER	SURO	55.40833	COPY	1	INPUT	MEAN	4
PERLND	267	PWATER	IFWO	55.40833	COPY	1	INPUT	MEAN	4
PERLND	267	PWATER	AGWI	55.40833	COPY	1	INPUT	MEAN	5
PERLND	267	PWATER	TAET	55.40833	COPY	1	INPUT	MEAN	6
PERLND	267	SNOW	SNOWE	55.40833	COPY	1	INPUT	MEAN	6
PERLND	270	PWATER	SURO	11.50000	COPY	1	INPUT	MEAN	4
PERLND	270	PWATER	IFWO	11.50000	COPY	1	INPUT	MEAN	4
PERLND	270	PWATER	AGWI	11.50000	COPY	1	INPUT	MEAN	5
PERLND	270	PWATER	TAET	11.50000	COPY	1	INPUT	MEAN	6
PERLND	270	SNOW	SNOWE	11.50000	COPY	1	INPUT	MEAN	6
PERLND	281	PWATER	SURO	3.19167	COPY	1	INPUT	MEAN	4
PERLND	281	PWATER	IFWO	3.19167	COPY	1	INPUT	MEAN	4
PERLND	281	PWATER	AGWI	3.19167	COPY	1	INPUT	MEAN	5
PERLND	281	PWATER	TAET	3.19167	COPY	1	INPUT	MEAN	6
PERLND	281	SNOW	SNOWE	3.19167	COPY	1	INPUT	MEAN	6
PERLND	287	PWATER	SURO	8.71667	COPY	1	INPUT	MEAN	4
PERLND	287	PWATER	IFWO	8.71667	COPY	1	INPUT	MEAN	4
PERLND	287	PWATER	AGWI	8.71667	COPY	1	INPUT	MEAN	5
PERLND	287	PWATER	TAET	8.71667	COPY	1	INPUT	MEAN	6
PERLND	287	SNOW	SNOWE	8.71667	COPY	1	INPUT	MEAN	6
PERLND	304	PWATER	SURO	1.10833	COPY	1	INPUT	MEAN	4
PERLND	304	PWATER	IFWO	1.10833	COPY	1	INPUT	MEAN	4
PERLND	304	PWATER	AGWI	1.10833	COPY	1	INPUT	MEAN	5
PERLND	304	PWATER	TAET	1.10833	COPY	1	INPUT	MEAN	6
PERLND	304	SNOW	SNOWE	1.10833	COPY	1	INPUT	MEAN	6
PERLND	314	PWATER	SURO	1.81667	COPY	1	INPUT	MEAN	4
PERLND	314	PWATER	IFWO	1.81667	COPY	1	INPUT	MEAN	4
PERLND	314	PWATER	AGWI	1.81667	COPY	1	INPUT	MEAN	5
PERLND	314	PWATER	TAET	1.81667	COPY	1	INPUT	MEAN	6
PERLND	314	SNOW	SNOWE	1.81667	COPY	1	INPUT	MEAN	6
PERLND	321	PWATER	SURO	8.47500	COPY	1	INPUT	MEAN	4
PERLND	321	PWATER	IFWO	8.47500	COPY	1	INPUT	MEAN	4
PERLND	321	PWATER	AGWI	8.47500	COPY	1	INPUT	MEAN	5
PERLND	321	PWATER	TAET	8.47500	COPY	1	INPUT	MEAN	6
PERLND	321	SNOW	SNOWE	8.47500	COPY	1	INPUT	MEAN	6
PERLND	324	PWATER	SURO	14.19167	COPY	1	INPUT	MEAN	4
PERLND	324	PWATER	IFWO	14.19167	COPY	1	INPUT	MEAN	4

```
PERLND 324 PWATER AGWI       14.19167       COPY     1     INPUT  MEAN   5
PERLND 324 PWATER TAET       14.19167       COPY     1     INPUT  MEAN   6
PERLND 324 SNOW   SNOWE      14.19167       COPY     1     INPUT  MEAN   6
PERLND 327 PWATER SURO        2.85833       COPY     1     INPUT  MEAN   4
PERLND 327 PWATER IFWO        2.85833       COPY     1     INPUT  MEAN   4
PERLND 327 PWATER AGWI        2.85833       COPY     1     INPUT  MEAN   5
PERLND 327 PWATER TAET        2.85833       COPY     1     INPUT  MEAN   6
PERLND 327 SNOW   SNOWE       2.85833       COPY     1     INPUT  MEAN   6
PERLND 330 PWATER SURO        9.45833       COPY     1     INPUT  MEAN   4
PERLND 330 PWATER IFWO        9.45833       COPY     1     INPUT  MEAN   4
PERLND 330 PWATER AGWI        9.45833       COPY     1     INPUT  MEAN   5
PERLND 330 PWATER TAET        9.45833       COPY     1     INPUT  MEAN   6
PERLND 330 SNOW   SNOWE       9.45833       COPY     1     INPUT  MEAN   6
PERLND 334 PWATER SURO        2.55833       COPY     1     INPUT  MEAN   4
PERLND 334 PWATER IFWO        2.55833       COPY     1     INPUT  MEAN   4
PERLND 334 PWATER AGWI        2.55833       COPY     1     INPUT  MEAN   5
PERLND 334 PWATER TAET        2.55833       COPY     1     INPUT  MEAN   6
PERLND 334 SNOW   SNOWE       2.55833       COPY     1     INPUT  MEAN   6
PERLND 344 PWATER SURO        0.96667       COPY     1     INPUT  MEAN   4
PERLND 344 PWATER IFWO        0.96667       COPY     1     INPUT  MEAN   4
PERLND 344 PWATER AGWI        0.96667       COPY     1     INPUT  MEAN   5
PERLND 344 PWATER TAET        0.96667       COPY     1     INPUT  MEAN   6
PERLND 344 SNOW   SNOWE       0.96667       COPY     1     INPUT  MEAN   6
PERLND 361 PWATER SURO       14.50833       COPY     1     INPUT  MEAN   4
PERLND 361 PWATER IFWO       14.50833       COPY     1     INPUT  MEAN   4
PERLND 361 PWATER AGWI       14.50833       COPY     1     INPUT  MEAN   5
PERLND 361 PWATER TAET       14.50833       COPY     1     INPUT  MEAN   6
PERLND 361 SNOW   SNOWE      14.50833       COPY     1     INPUT  MEAN   6
PERLND 364 PWATER SURO       15.11667       COPY     1     INPUT  MEAN   4
PERLND 364 PWATER IFWO       15.11667       COPY     1     INPUT  MEAN   4
PERLND 364 PWATER AGWI       15.11667       COPY     1     INPUT  MEAN   5
PERLND 364 PWATER TAET       15.11667       COPY     1     INPUT  MEAN   6
PERLND 364 SNOW   SNOWE      15.11667       COPY     1     INPUT  MEAN   6
PERLND 367 PWATER SURO        5.53333       COPY     1     INPUT  MEAN   4
PERLND 367 PWATER IFWO        5.53333       COPY     1     INPUT  MEAN   4
PERLND 367 PWATER AGWI        5.53333       COPY     1     INPUT  MEAN   5
PERLND 367 PWATER TAET        5.53333       COPY     1     INPUT  MEAN   6
PERLND 367 SNOW   SNOWE       5.53333       COPY     1     INPUT  MEAN   6
PERLND 370 PWATER SURO        9.19167       COPY     1     INPUT  MEAN   4
PERLND 370 PWATER IFWO        9.19167       COPY     1     INPUT  MEAN   4
PERLND 370 PWATER AGWI        9.19167       COPY     1     INPUT  MEAN   5
PERLND 370 PWATER TAET        9.19167       COPY     1     INPUT  MEAN   6
PERLND 370 SNOW   SNOWE       9.19167       COPY     1     INPUT  MEAN   6
***Basin water balance information
    *** Total ppt. Mfact is fraction of basin area for each elevation zone.
  ***dry2
PERLND 101 SNOW   RAINF        .469         COPY     1     INPUT  MEAN   7
PERLND 101 SNOW   SNOWF        .469         COPY     1     INPUT  MEAN   7
PERLND 201 SNOW   RAINF        .353         COPY     1     INPUT  MEAN   7
PERLND 201 SNOW   SNOWF        .353         COPY     1     INPUT  MEAN   7
PERLND 304 SNOW   RAINF        .178         COPY     1     INPUT  MEAN   7
PERLND 304 SNOW   SNOWF        .178         COPY     1     INPUT  MEAN   7
  ***dry1
PERLND 101 SNOW   RAINF        .769         COPY     1     INPUT  MEAN   8
```

```
PERLND 101 SNOW   SNOWF         .769        COPY     1      INPUT  MEAN   8
PERLND 201 SNOW   RAINF         .171        COPY     1      INPUT  MEAN   8
PERLND 201 SNOW   SNOWF         .171        COPY     1      INPUT  MEAN   8
PERLND 304 SNOW   RAINF         .060        COPY     1      INPUT  MEAN   8
PERLND 304 SNOW   SNOWF         .060        COPY     1      INPUT  MEAN   8
    ***Convert ac-ft to inches for runoff, recharge, & ET.
  ***dry2, mfact =  (12/22237 acres)
COPY      1 OUTPUT MEAN   1    .000540      COPY     2      INPUT  MEAN   1
COPY      1 OUTPUT MEAN   2    .000540      COPY     2      INPUT  MEAN   2
COPY      1 OUTPUT MEAN   3    .000540      COPY     2      INPUT  MEAN   3
  ***dry1, mfact =  (12/17059 acres)
COPY      1 OUTPUT MEAN   4    .000703      COPY     2      INPUT  MEAN   4
COPY      1 OUTPUT MEAN   5    .000703      COPY     2      INPUT  MEAN   5
COPY      1 OUTPUT MEAN   6    .000703      COPY     2      INPUT  MEAN   6
    ***Basin water-balance displays.
COPY      1 OUTPUT MEAN   7 ***             DISPLY   1      INPUT  TIMSER 1
COPY      1 OUTPUT MEAN   1                 DISPLY   2      INPUT  TIMSER 1
COPY      2 OUTPUT MEAN   2 ***             DISPLY   3      INPUT  TIMSER 1
COPY      2 OUTPUT MEAN   3 ***             DISPLY   4      INPUT  TIMSER 1
COPY      1 OUTPUT MEAN   8 ***             DISPLY   5      INPUT  TIMSER 1
COPY      1 OUTPUT MEAN   4                 DISPLY   6      INPUT  TIMSER 1
COPY      2 OUTPUT MEAN   5 ***             DISPLY   7      INPUT  TIMSER 1
COPY      2 OUTPUT MEAN   6 ***             DISPLY   8      INPUT  TIMSER 1
END NETWORK

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd
***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg
strg***
COPY      1 OUTPUT MEAN   1             SAME WDM    444 RO2       ENGL      REPL
COPY      1 OUTPUT MEAN   3             SAME WDM    445 ET2       ENGL      REPL
COPY      1 OUTPUT MEAN   2             SAME WDM    446 DP2       ENGL      REPL
COPY      1 OUTPUT MEAN   7             SAME WDM    447 PT2       ENGL      REPL
COPY      1 OUTPUT MEAN   4             SAME WDM    448 RO1       ENGL      REPL
COPY      1 OUTPUT MEAN   6             SAME WDM    449 ET1       ENGL      REPL
COPY      1 OUTPUT MEAN   5             SAME WDM    450 DP1       ENGL      REPL
COPY      1 OUTPUT MEAN   8             SAME WDM    451 PT1       ENGL      REPL
END EXT TARGETS

DISPLY
  DISPLY-INFO1
*** # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2
YRND
    2     Dry2 -Upslope runoff(ac-ft)    SUM                     1    3
50    9
    6     Dry1 -Upslope runoff(ac-ft)    SUM                     1    3
50    9
  END DISPLY-INFO1
END DISPLY

COPY
  TIMESERIES
    # -  #  NPT  NMN ***
```

```
    1              8
    2              6
  END TIMESERIES
END COPY
SPEC-ACTIONS (Not shown)
END SPEC-ACTIONS

END RUN
```

Appendix 7.--*Final HSPF input file for combined Dry Creek model*

```
RUN
GLOBAL
  Dry Creek basin final model - hms.wdm data
  START       1957/10/01 00:00  END    1993/05/31 24:00
  RUN INTERP OUTPUT LEVEL    1
  RESUME     0 RUN     1 TSSFL    15 WDMSFL   16
END GLOBAL
OPN SEQUENCE
    INGRP              INDELT 01:00
      COPY        1
      RCHRES      1
      RCHRES      2
      RCHRES      3
      RCHRES      4
      RCHRES      5
      COPY        2
      PERLND      1
      COPY        3
      PERLND      2
      COPY        4
      PERLND      3
      PERLND      4
      PERLND      5
      PERLND      6
      COPY        5
      COPY        6
      COPY        7
      COPY        9
      COPY       10
      COPY       11
      DISPLY      4
      DISPLY     12
      DISPLY     31
      DISPLY     32
    END INGRP
END OPN SEQUENCE
PERLND
  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC
***
    1    3    0    1    1    0    0    0    0    0    0    0    0    0
    4    6    0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
  PRINT-INFO
    <PLS > ********************* Print-flags ************************ PIVL
PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC
*********
    1    3         5
5                                                           9
    4    6
```

```
5                                                    9
  END PRINT-INFO
  GEN-INFO
    <PLS ><-----Name--------->NBLKS   Unit-systems   Printer
***
    # -  #                          User  t-series Engl Metr.
***
                                           in  out
***
    1      recharge zone 1       1    1    1    1    6    0
    2      recharge zone 2       1    1    1    1    6    0
    3      recharge zone 3       1    1    1    1    6    0
    4      channel evap for 1    1    1    1    1    6    0
    5      channel evap for 2    1    1    1    1    6    0
    6      channel evap for 3    1    1    1    1    6    0
  END GEN-INFO
  ICE-FLAG
    <PLS > Value of 1 means ice will be simulated, 0 means not simulated
***
    # -  #ICEFG
***
    1    3    0
  END ICE-FLAG
  SNOW-PARM1
                 perlnd   perlnd    shaded  gage-catch  snow w.eq. needed for
***
    <PLS >    latitude  altitude fraction adjustment  complete snowcover
***
    # -  #        LAT      MELEV     SHADE     SNOWCF    COVIND
***
    1    3      46.6      820.        0.0      1.25       0.5
  END SNOW-PARM1
  SNOW-PARM2
               new snow   rain vs   sublim.  latent ht.  max AWC   ground
***
    <PLS >    density  snow tmp   adjust    adjust    of pack   melt
***
    # -  #     RDCSN      TSNOW     SNOEVP    CCFACT    MWATER    MGMELT
***
    1    3      0.05       32.      0.85       1.5      0.08      0.02
  END SNOW-PARM2
  SNOW-INIT1
    <PLS >  SNOW initial conditions
***
    # -  #  PACKSNOW   PACKICE PACKWATER    RDENPF      DULL    PAKTMP
***
    1    3       0.0       0.0       0.0       0.2      400.      32.0
  END SNOW-INIT1
  SNOW-INIT2
    <PLS >  SNOW initial conditions
***
    # -  #    COVINX   XLNMELT    SKYCLR
***
    1    3      0.50       0.0       1.0
```

```
  END SNOW-INIT2
  PWAT-PARM1
    <PLS > PWATER variable monthly parameter value flags
***
            Snow          cepsc uzns nsur intfw irc lzetp
***
    # -   # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE
***
    1    3    1    0    0    1    0    0    0    0    1
    4    6    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1
*** Grass parameters for soil type4 used for recharge zone perlnds, except
*** uzsn was cranked up to keep overland flow from leaving the area.
*** infilt was cranked up to represent sandy soils in the area.
  PWAT-PARM2
    <PLS > ***
    # -   # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY
AGWRC
    1    3       0.    9.2000    6.2500     600.0    0.0010    0.0000
0.9900
    4    6       0.    1.0000   25.0000     600.0    0.0010    0.0000
0.9900
  END PWAT-PARM2
  PWAT-PARM3
    <PLS >***
    # -   #*** PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP
AGWETP
    1    3       40.       35.    2.0000    2.0000       .00
0.        0.
    4    6       40.       35.    2.0000    2.0000       .00
0.        0.
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >                                                           ***
    # -   #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP***
    1    3               8.0000    0.3000     0.010    0.9900
    4    6    0.000    0.2500    0.3000     0.010    0.9900     0.100
  END PWAT-PARM4
  PWAT-STATE1
    <PLS >  PWATER state variables***
    # -   #***   CEPS      SURS       UZS      IFWS       LZS      AGWS
GWVS
    1    3       0.        0.    0.0010        0.     0.020     0.010
.010
    4    6       0.        0.    0.0010        0.     0.010     0.010
.010
  END PWAT-STATE1
  MON-INTERCEP
    <PLS>   Only required if VCSFG=1 in PWAT-PARM1                    ***
    # -   #  Interception storage capacity at start of each month     ***
*** grass parms used
            JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC ***
    1    3 0.03 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  END MON-INTERCEP
```

```
                                                                    ***
  MON-LZETPARM
    <PLS >  Only required if VLEFG=1 in PWAT-PARM1                  ***
    # -  #  Lower zone ET parameter at start of each month          ***
            JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC ***
    1    3 0.45 0.52 0.65 0.76 0.80 0.81 0.81 0.80 0.77 0.69 0.58 0.48
  END MON-LZETPARM
END PERLND

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->
***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #
***
*** Climate data to recharge perlnds (Elev.zone 1, HMS gage)
WDM       1 PREC     ENGL        1.120       COPY     2      INPUT  MEAN   1
WDM       1 PREC     ENGL        1.120       COPY     3      INPUT  MEAN   1
WDM       1 PREC     ENGL        1.120       COPY     4      INPUT  MEAN   1
WDM       5 WIND     ENGL                    PERLND   1    3 EXTNL  WINMOV
WDM       6 SOLR     ENGL                    PERLND   1    3 EXTNL  SOLRAD
WDM      12 TEMP     ENGL                    PERLND   1    3 ATEMP  AIRTMP
WDM      22 DEWP     ENGL                    PERLND   1    3 EXTNL  DTMPG
WDM      32 PET      ENGL                    PERLND   1    6 EXTNL  PETINP
*** Pet to riparian zones in rchres 4 and 5
WDM      32 PET      ENGL                    RCHRES   4    5 EXTNL  POTEV
*** Discharge to Rattlesnake springs(0.42 cfs x 1.07 converted to ac-ft/hr)
WDM     152 RSQ      ENGL      .088425       RCHRES   4      INFLOW IVOL   1
WDM      11 RSQ      ENGL      .088425       COPY     1      INPUT  MEAN   5
*** Upland runoff data for routing to channels (ac-ft)
WDM     436 RO4      ENGL                    COPY     1      INPUT  MEAN   1
WDM     440 RO3      ENGL                    COPY     1      INPUT  MEAN   2
WDM     444 RO2      ENGL                    COPY     1      INPUT  MEAN   3
WDM     448 RO1      ENGL                    COPY     1      INPUT  MEAN   4
*** aet data (ac-ft)
WDM     437 ET4      ENGL                    COPY     5      INPUT  MEAN   1
WDM     441 ET3      ENGL                    COPY     5      INPUT  MEAN   2
WDM     445 ET2      ENGL                    COPY     5      INPUT  MEAN   3
WDM     449 ET1      ENGL                    COPY     5      INPUT  MEAN   4
*** Upland deep percolation data (ac-ft)
WDM     438 DP4      ENGL                    COPY     5      INPUT  MEAN   5
WDM     442 DP3      ENGL                    COPY     5      INPUT  MEAN   6
WDM     446 DP2      ENGL                    COPY     5      INPUT  MEAN   7
WDM     450 DP1      ENGL                    COPY     5      INPUT  MEAN   8
*** Area weighted ppt data (inches)
WDM     439 PT4      ENGL                    COPY     6      INPUT  MEAN   1
WDM     443 PT3      ENGL                    COPY     6      INPUT  MEAN   2
WDM     447 PT2      ENGL                    COPY     6      INPUT  MEAN   3
WDM     451 PT1      ENGL                    COPY     6      INPUT  MEAN   4
END EXT SOURCES

***
NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->
***
```

```
<Name>   #         <Name> # #<-factor->strg <Name>   #   #        <Name> # #
***

***Basin geometry (all units are ac-ft)
  *** Channel inflows from direct runoff in cold4,cold3;cold2,cold1
COPY     1 OUTPUT MEAN   1                  RCHRES   1     INFLOW IVOL   1
COPY     1 OUTPUT MEAN   2                  RCHRES   2     INFLOW IVOL   1
COPY     1 OUTPUT MEAN   3                  RCHRES   3     INFLOW IVOL   1
COPY     1 OUTPUT MEAN   4                  RCHRES   5     INFLOW IVOL   1
  *** Channel connections-dry4 to dry3 to dry2a to dry2b to dry1
RCHRES   1 HYDR   OVOL   2                  RCHRES   2     INFLOW IVOL   1
RCHRES   2 HYDR   OVOL   2                  RCHRES   3     INFLOW IVOL   1
RCHRES   3 HYDR   OVOL   2                  RCHRES   4     INFLOW IVOL   1
RCHRES   4 HYDR   ROVOL                     RCHRES   5     INFLOW IVOL   1
    *** Channel discharge+ppt to recharge zone perlnds
      *** mfact for ovol to copy converts acft to inches
      *** mfact for suro to copy is the ratio of source area to target area
      *** Recharge zone perlnd areas are 34.4, 68.9, and 34.4 acres.
    *** Channel discharge to subsurface perlnds for channel et losses applied
    ***  to 'near max' channel areas of rchres 1,2,3 -- 30,40,28 acres.
RCHRES   5 HYDR   OVOL   2    0.34884       COPY     2     INPUT  MEAN   1
COPY     2 OUTPUT MEAN   1                  PERLND   1     EXTNL  PREC
PERLND   1 PWATER SURO        0.5           COPY     3     INPUT  MEAN   1
COPY     3 OUTPUT MEAN   1                  PERLND   2     EXTNL  PREC
PERLND   2 PWATER SURO        2.0           COPY     4     INPUT  MEAN   1
COPY     4 OUTPUT MEAN   1                  PERLND   3     EXTNL  PREC
RCHRES   1 HYDR   OVOL   1    0.40000       PERLND   4     EXTNL  PREC
RCHRES   2 HYDR   OVOL   1    0.30000       PERLND   5     EXTNL  PREC
RCHRES   3 HYDR   OVOL   1    0.42857       PERLND   6     EXTNL  PREC
*** End Basin Geometry

***Dry4 water balance (ac-ft and inches). Area = 36,446 acres.
   *** Precip (converts inches to ac-ft)
COPY     6 OUTPUT MEAN   1   3037.2         COPY     7     INPUT  MEAN   1
   *** ET losses (converts inches to acre-feet)
COPY     5 OUTPUT MEAN   1                  COPY     7     INPUT  MEAN   2
PERLND   4 PWATER TAET       2.500000       COPY     7     INPUT  MEAN   2
   *** Recharge (converts inches to acre-feet)
COPY     5 OUTPUT MEAN   5                  COPY     7     INPUT  MEAN   3
PERLND   4 PWATER SURO       2.500000       COPY     7     INPUT  MEAN   3
PERLND   4 PWATER IFWO       2.500000       COPY     7     INPUT  MEAN   3
PERLND   4 PWATER AGWI       2.500000       COPY     7     INPUT  MEAN   3
   *** Streamflow
RCHRES   1 HYDR   OVOL   2                  COPY     7     INPUT  MEAN   4

***Dry4+dry3 water balance (ac-ft and inches). Area = 55,378 acres.
   *** Precip (converts inches to ac-ft) - dry3=18932 ac
COPY     6 OUTPUT MEAN   1   3037.2         COPY     7     INPUT  MEAN   5
COPY     6 OUTPUT MEAN   2   1577.7         COPY     7     INPUT  MEAN   5
   *** ET losses (converts ac-ft to inches or visa-versa)
COPY     5 OUTPUT MEAN   1                  COPY     7     INPUT  MEAN   6
COPY     5 OUTPUT MEAN   2                  COPY     7     INPUT  MEAN   6
PERLND   4 PWATER TAET       2.500000       COPY     7     INPUT  MEAN   6
PERLND   5 PWATER TAET       3.333333       COPY     7     INPUT  MEAN   6
```

```
   *** Recharge (converts ac-ft to inches or visa-versa)
COPY      5 OUTPUT MEAN   5                   COPY     7      INPUT  MEAN   7
COPY      5 OUTPUT MEAN   6                   COPY     7      INPUT  MEAN   7
PERLND    4 PWATER SURO       2.500000        COPY     7      INPUT  MEAN   7
PERLND    4 PWATER IFWO       2.500000        COPY     7      INPUT  MEAN   7
PERLND    4 PWATER AGWI       2.500000        COPY     7      INPUT  MEAN   7
PERLND    5 PWATER SURO       3.333333        COPY     7      INPUT  MEAN   7
PERLND    5 PWATER IFWO       3.333333        COPY     7      INPUT  MEAN   7
PERLND    5 PWATER AGWI       3.333333        COPY     7      INPUT  MEAN   7
   *** Streamflow
RCHRES    2 HYDR   OVOL   2                   COPY     7      INPUT  MEAN   8

***Dry4+dry3+dry2 water balance (ac-ft and inches). Area = 77,615 acres.
   *** Precip (converts inches to ac-ft) - dry2=22237 ac
COPY      7 OUTPUT MEAN   5                   COPY     9      INPUT  MEAN   1
COPY      6 OUTPUT MEAN   3   1853.1          COPY     9      INPUT  MEAN   1
   *** ET losses (converts ac-ft to inches)
COPY      7 OUTPUT MEAN   6                   COPY     9      INPUT  MEAN   2
COPY      5 OUTPUT MEAN   3                   COPY     9      INPUT  MEAN   2
PERLND    6 PWATER TAET       2.333333        COPY     9      INPUT  MEAN   2
RCHRES    4 HYDR   VOLEV                      COPY     9      INPUT  MEAN   2
   *** Recharge (converts ac-ft to inches)
COPY      7 OUTPUT MEAN   7                   COPY     9      INPUT  MEAN   3
COPY      5 OUTPUT MEAN   7                   COPY     9      INPUT  MEAN   3
PERLND    6 PWATER SURO       2.333333        COPY     9      INPUT  MEAN   3
PERLND    6 PWATER IFWO       2.333333        COPY     9      INPUT  MEAN   3
PERLND    6 PWATER AGWI       2.333333        COPY     9      INPUT  MEAN   3
          ***subtract springflow
COPY      1 OUTPUT MEAN   5                   COPY     9      INPUT  MEAN   3
   *** Streamflow (converts ac-ft to inches)
RCHRES    4 HYDR   ROVOL                      COPY     9      INPUT  MEAN   4

***Whole basin water balance (ac-ft and inches). Area = 94,674 acres.
 *** Recharge zone perlnd areas are 34.4, 68.9, and 34.4 acres.
   *** Precip (converts inches to ac-ft) - dry1=17059 ac
COPY      7 OUTPUT MEAN   5                   COPY     9      INPUT  MEAN   5
COPY      6 OUTPUT MEAN   3   1853.1          COPY     9      INPUT  MEAN   5
COPY      6 OUTPUT MEAN   4   1421.6          COPY     9      INPUT  MEAN   5
   *** ET losses (converts ac-ft to inches)
PERLND    1 PWATER TAET       2.866667        COPY     9      INPUT  MEAN   6
PERLND    2 PWATER TAET       5.741667        COPY     9      INPUT  MEAN   6
PERLND    3 PWATER TAET       2.866667        COPY     9      INPUT  MEAN   6
PERLND    1 SNOW   SNOWE      2.866667        COPY     9      INPUT  MEAN   6
PERLND    2 SNOW   SNOWE      5.741667        COPY     9      INPUT  MEAN   6
PERLND    3 SNOW   SNOWE      2.866667        COPY     9      INPUT  MEAN   6
RCHRES    4 HYDR   VOLEV                      COPY     9      INPUT  MEAN   6
RCHRES    5 HYDR   VOLEV                      COPY     9      INPUT  MEAN   6
COPY      7 OUTPUT MEAN   6                   COPY     9      INPUT  MEAN   6
COPY      5 OUTPUT MEAN   3                   COPY     9      INPUT  MEAN   6
PERLND    6 PWATER TAET       2.333333        COPY     9      INPUT  MEAN   6
COPY      5 OUTPUT MEAN   4                   COPY     9      INPUT  MEAN   6
   *** Recharge (inches to ac-ft, then ac-ft to inches)
PERLND    1 PWATER AGWI       2.866667        COPY     9      INPUT  MEAN   7
PERLND    2 PWATER AGWI       5.741667        COPY     9      INPUT  MEAN   7
```

```
PERLND    3 PWATER AGWI       2.866667      COPY     9      INPUT  MEAN   7
PERLND    3 PWATER SURO       2.866667      COPY     9      INPUT  MEAN   7
PERLND    3 PWATER IFWO       2.866667      COPY     9      INPUT  MEAN   7
            *** above assigns any runoff from final recharge perlnd to recharge
COPY      7 OUTPUT MEAN   7                 COPY     9      INPUT  MEAN   7
COPY      5 OUTPUT MEAN   7                 COPY     9      INPUT  MEAN   7
COPY      5 OUTPUT MEAN   8                 COPY     9      INPUT  MEAN   7
COPY      1 OUTPUT MEAN   5                 COPY     9      INPUT  MEAN   7
PERLND    6 PWATER PERO       2.333333      COPY     9      INPUT  MEAN   7
RCHRES    5 HYDR   OVOL   1                 COPY     9      INPUT  MEAN   7

***Simulated flow at gages (cfs) and from recharge zone (inches)
RCHRES    1 HYDR   OVOL   2     12.1        COPY     9      INPUT  MEAN   8
RCHRES    4 HYDR   ROVOL        12.1        COPY    10      INPUT  MEAN   1

***Recharge from runoff
  ** Dry4, Dry3, Dry2, and Dry1
PERLND    4 PWATER SURO       2.50000       COPY    11      INPUT  MEAN   1
PERLND    4 PWATER IFWO       2.50000       COPY    11      INPUT  MEAN   1
PERLND    4 PWATER AGWI       2.50000       COPY    11      INPUT  MEAN   1
PERLND    5 PWATER SURO       3.33333       COPY    11      INPUT  MEAN   2
PERLND    5 PWATER IFWO       3.33333       COPY    11      INPUT  MEAN   2
PERLND    5 PWATER AGWI       3.33333       COPY    11      INPUT  MEAN   2
PERLND    6 PWATER SURO       2.33333       COPY    11      INPUT  MEAN   3
PERLND    6 PWATER IFWO       2.33333       COPY    11      INPUT  MEAN   3
PERLND    6 PWATER AGWI       2.33333       COPY    11      INPUT  MEAN   3
RCHRES    5 HYDR   OVOL   1                 COPY    11      INPUT  MEAN   4
PERLND    1 PWATER AGWI       2.866667      COPY    11      INPUT  MEAN   4
PERLND    2 PWATER AGWI       5.741667      COPY    11      INPUT  MEAN   4
PERLND    3 PWATER AGWI       2.866667      COPY    11      INPUT  MEAN   4
PERLND    3 PWATER SURO       2.866667      COPY    11      INPUT  MEAN   4
PERLND    3 PWATER IFWO       2.866667      COPY    11      INPUT  MEAN   4
  ** Dry4+dry3
PERLND    4 PWATER SURO       2.50000       COPY    11      INPUT  MEAN   5
PERLND    4 PWATER IFWO       2.50000       COPY    11      INPUT  MEAN   5
PERLND    4 PWATER AGWI       2.50000       COPY    11      INPUT  MEAN   5
PERLND    5 PWATER SURO       3.33333       COPY    11      INPUT  MEAN   5
PERLND    5 PWATER IFWO       3.33333       COPY    11      INPUT  MEAN   5
PERLND    5 PWATER AGWI       3.33333       COPY    11      INPUT  MEAN   5
  ** Dry4+dry3+dry2
PERLND    4 PWATER SURO       2.50000       COPY    11      INPUT  MEAN   6
PERLND    4 PWATER IFWO       2.50000       COPY    11      INPUT  MEAN   6
PERLND    4 PWATER AGWI       2.50000       COPY    11      INPUT  MEAN   6
PERLND    5 PWATER SURO       3.33333       COPY    11      INPUT  MEAN   6
PERLND    5 PWATER IFWO       3.33333       COPY    11      INPUT  MEAN   6
PERLND    5 PWATER AGWI       3.33333       COPY    11      INPUT  MEAN   6
PERLND    6 PWATER SURO       2.33333       COPY    11      INPUT  MEAN   6
PERLND    6 PWATER IFWO       2.33333       COPY    11      INPUT  MEAN   6
PERLND    6 PWATER AGWI       2.33333       COPY    11      INPUT  MEAN   6
  ** Dry4+dry3+dry2+dry1
PERLND    4 PWATER SURO       2.50000       COPY    11      INPUT  MEAN   7
PERLND    4 PWATER IFWO       2.50000       COPY    11      INPUT  MEAN   7
PERLND    4 PWATER AGWI       2.50000       COPY    11      INPUT  MEAN   7
PERLND    5 PWATER SURO       3.33333       COPY    11      INPUT  MEAN   7
```

```
PERLND    5 PWATER IFWO        3.33333        COPY    11      INPUT  MEAN    7
PERLND    5 PWATER AGWI        3.33333        COPY    11      INPUT  MEAN    7
PERLND    6 PWATER SURO        2.33333        COPY    11      INPUT  MEAN    7
PERLND    6 PWATER IFWO        2.33333        COPY    11      INPUT  MEAN    7
PERLND    6 PWATER AGWI        2.33333        COPY    11      INPUT  MEAN    7
RCHRES    5 HYDR   OVOL    1                  COPY    11      INPUT  MEAN    7
PERLND    1 PWATER AGWI        2.866667       COPY    11      INPUT  MEAN    7
PERLND    2 PWATER AGWI        5.741667       COPY    11      INPUT  MEAN    7
PERLND    3 PWATER AGWI        2.866667       COPY    11      INPUT  MEAN    7
PERLND    3 PWATER SURO        2.866667       COPY    11      INPUT  MEAN    7
PERLND    3 PWATER IFWO        2.866667       COPY    11      INPUT  MEAN    7
  ** Dry3+dry2+dry1
PERLND    5 PWATER SURO        3.33333        COPY    11      INPUT  MEAN    8
PERLND    5 PWATER IFWO        3.33333        COPY    11      INPUT  MEAN    8
PERLND    5 PWATER AGWI        3.33333        COPY    11      INPUT  MEAN    8
PERLND    6 PWATER SURO        2.33333        COPY    11      INPUT  MEAN    8
PERLND    6 PWATER IFWO        2.33333        COPY    11      INPUT  MEAN    8
PERLND    6 PWATER AGWI        2.33333        COPY    11      INPUT  MEAN    8
RCHRES    2 HYDR   OVOL    1                  COPY    11      INPUT  MEAN    8
RCHRES    3 HYDR   OVOL    1                  COPY    11      INPUT  MEAN    8
RCHRES    5 HYDR   OVOL    1                  COPY    11      INPUT  MEAN    8
PERLND    1 PWATER AGWI        2.866667       COPY    11      INPUT  MEAN    8
PERLND    2 PWATER AGWI        5.741667       COPY    11      INPUT  MEAN    8
PERLND    3 PWATER AGWI        2.866667       COPY    11      INPUT  MEAN    8
PERLND    3 PWATER SURO        2.866667       COPY    11      INPUT  MEAN    8
PERLND    3 PWATER IFWO        2.866667       COPY    11      INPUT  MEAN    8

***Displays***
***Upper basin (dry4) water balance (ac-ft and inches).
   *** Precip
COPY      7 OUTPUT MEAN    1    **            DISPLY   1      INPUT  TIMSER 1
   *** ET losses
COPY      7 OUTPUT MEAN    2    **            DISPLY   2      INPUT  TIMSER 1
   *** Recharge
COPY      7 OUTPUT MEAN    3    **            DISPLY   3      INPUT  TIMSER 1
   *** Streamflow
COPY      7 OUTPUT MEAN    4                  DISPLY   4      INPUT  TIMSER 1

***Dry4+dry3 water balance (ac-ft and inches).
   *** Precip
COPY      7 OUTPUT MEAN    5    **            DISPLY   5      INPUT  TIMSER 1
   *** ET losses
COPY      7 OUTPUT MEAN    6    **            DISPLY   6      INPUT  TIMSER 1
   *** Recharge
COPY      7 OUTPUT MEAN    7    **            DISPLY   7      INPUT  TIMSER 1
   *** Streamflow
COPY      7 OUTPUT MEAN    8    **            DISPLY   8      INPUT  TIMSER 1

***Dry4+dry3+dry2 water balance (ac-ft and inches).
   *** Precip
COPY      9 OUTPUT MEAN    1    **            DISPLY   9      INPUT  TIMSER 1
   *** ET losses
COPY      9 OUTPUT MEAN    2    **            DISPLY  10      INPUT  TIMSER 1
   *** Recharge
```

```
COPY      9 OUTPUT MEAN   3     **             DISPLY  11     INPUT  TIMSER 1
   *** Streamflow
COPY      9 OUTPUT MEAN   4                    DISPLY  12     INPUT  TIMSER 1

***Whole basin (dry4-dry1 and recharge zone) water balance (ac-ft and inches)
   *** Precip
COPY      9 OUTPUT MEAN   5     **             DISPLY  13     INPUT  TIMSER 1
   *** ET losses
COPY      9 OUTPUT MEAN   6     **             DISPLY  14     INPUT  TIMSER 1
   *** Recharge
COPY      9 OUTPUT MEAN   7     **             DISPLY  15     INPUT  TIMSER 1
   *** Streamflow - none

***Simulated flow at gages (cfs)
COPY      9 OUTPUT MEAN   8                    DISPLY  31     INPUT  TIMSER 1
COPY     10 OUTPUT MEAN   1                    DISPLY  32     INPUT  TIMSER 1

END NETWORK

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd
***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg
strg***
***Upper basin (dry4) water balance (ac-ft and inches).
   *** Precip
COPY      7 OUTPUT MEAN   1            SAME WDM    453 PT4A     ENGL      REPL
   *** ET losses
COPY      7 OUTPUT MEAN   2            SAME WDM    455 ET4A     ENGL      REPL
   *** Recharge
COPY      7 OUTPUT MEAN   3            SAME WDM    457 DP4A     ENGL      REPL
   *** Streamflow
COPY      7 OUTPUT MEAN   4            SAME WDM    459 Q4A      ENGL      REPL

***Dry4+dry3 water balance (ac-ft and inches).
   *** Precip
COPY      7 OUTPUT MEAN   5            SAME WDM    461 P34A     ENGL      REPL
   *** ET losses
COPY      7 OUTPUT MEAN   6            SAME WDM    463 E34A     ENGL      REPL
   *** Recharge
COPY      7 OUTPUT MEAN   7            SAME WDM    465 D34A     ENGL      REPL
   *** Streamflow
COPY      7 OUTPUT MEAN   8            SAME WDM    467 Q34A     ENGL      REPL

***Dry4+dry3+dry2 water balance (ac-ft and inches).
   *** Precip
COPY      9 OUTPUT MEAN   1            SAME WDM    469 P24A     ENGL      REPL
   *** ET losses
COPY      9 OUTPUT MEAN   2            SAME WDM    471 E24A     ENGL      REPL
   *** Recharge
COPY      9 OUTPUT MEAN   3            SAME WDM    473 D24A     ENGL      REPL
   *** Streamflow
COPY      9 OUTPUT MEAN   4            SAME WDM    475 Q24A     ENGL      REPL
```

```
***Whole basin (dry4-dry1 and recharge zone) water balance (ac-ft and inches)
   *** Precip
COPY      9 OUTPUT MEAN   5             SAME WDM    477 P14A      ENGL      REPL
   *** ET losses
COPY      9 OUTPUT MEAN   6             SAME WDM    479 E14A      ENGL      REPL
   *** Recharge
COPY      9 OUTPUT MEAN   7             SAME WDM    481 D14A      ENGL      REPL
   *** Streamflow - none

***Simulated flow at gages (cfs)
COPY      9 OUTPUT MEAN   8             SAME WDM    483 UQC       ENGL      REPL
COPY     10 OUTPUT MEAN   1             SAME WDM    484 LQC       ENGL      REPL

***Recharge from runoff
  ** Dry4, Dry3, Dry2, and Dry1
COPY     11 OUTPUT MEAN   1             SAME WDM    601 TL4       ENGL      REPL
COPY     11 OUTPUT MEAN   2             SAME WDM    602 TL3       ENGL      REPL
COPY     11 OUTPUT MEAN   3             SAME WDM    603 TL2       ENGL      REPL
COPY     11 OUTPUT MEAN   4             SAME WDM    804 TL1       ENGL      REPL
  ** Dry4+dry3
COPY     11 OUTPUT MEAN   5             SAME WDM    605 TL43      ENGL      REPL
  ** Dry4+dry3+dry2
COPY     11 OUTPUT MEAN   6             SAME WDM    606 TL42      ENGL      REPL
  ** Dry4+dry3+dry2+dry1
COPY     11 OUTPUT MEAN   7             SAME WDM    607 TL41      ENGL      REPL
  ** Dry3+dry2+dry1
COPY     11 OUTPUT MEAN   8             SAME WDM    608 TL31      ENGL      REPL

END EXT TARGETS

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer
***
    # -  #<------------------><---> User T-series  Engl Metr LKFG
***
                                             in  out
***
    1     Channel - Dry4          2    1    1    1    6    0    0
    2     Channel - Dry3          2    1    1    1    6    0    0
    3     Channel - Dry2          2    1    1    1    6    0    0
    4     Channel - Rat.Sprg.     1    1    1    1    6    0    0
    5     Channel - Dry1          2    1    1    1    6    0    0
  END GEN-INFO
  ACTIVITY
    RCHRES *************** Active Sections *****************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG
***
    1    5    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
  PRINT-INFO
    RCHRES *************** Printout Flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB *********
    1    5    5    0    0    0    0    0    0    0    0    0    1    9
```

```
  END PRINT-INFO
  HYDR-PARM1
    RCHRES  Flags for each HYDR Section
***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each      FUNCT  for
each
             FG FG FG FG  possible  exit  *** possible  exit      possible
exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
    1    3   0  0  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2
2  2
    4        0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2
2  2
    5        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2
2  2
  END HYDR-PARM1
  HYDR-PARM2
    RCHRES
***
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50
***
  <------><--------><--------><--------><--------><--------><-------->
***
    1              1   8.39                             0.5
    2              2   6.80                             0.5
    3              3   3.47                             0.5
    4              4   0.45                             0.5
    5              5   2.08                             0.5
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section
***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of
OUTDGT
           *** ac-ft     for each possible exit       for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--
->
    1     0.0             4.0  5.0
    2     0.0             4.0  5.0
    3     0.0             4.0  5.0
    4     0.017           4.0
    5     0.0             4.0  5.0
  END HYDR-INIT
END RCHRES

***
FTABLES
  FTABLE      1
 Rows Cols   (Dry4 reach - headwaters to upstream gage @ hwy 241 -
12510650)***
    6    5
*** Outflow 1 is channel loss (4 cfs per acre = 4 in/hr channel infilt rate)
*** Reach length = 44,300 ft - last row extrapolated
     Depth      Area    Volume  Outflow1 Outflow2
```

```
***
      (ft)   (acres) (acre-ft)   (cfs)    (cfs)
***
     0.0      0.0      0.0       0.0      0.0
     0.50     14.      3.4       56.      0.0
     1.00     22.      13.       88.      16.
     2.00     26.      37.       104.     180.
     3.00     30.      64.       120.     450.
     6.00     30.      400.      120.     3900.
  END FTABLE  1
  FTABLE      2
 Rows Cols   (Dry3 reach - hwy 241 to D1 nuetron tubes)
***
    7    5
*** Outflow 1 is channel loss (4 cfs per acre = 4 in/hr channel infilt rate)
*** Reach length = 35,900 ft - last row extrapolated
     Depth      Area    Volume  Outflow1 Outflow2
***
      (ft)   (acres) (acre-ft)   (cfs)    (cfs)
***
     0.0      0.0      0.0       0.0      0.0
     0.50     18.1     4.53      72.4     0.0
     0.75     24.0     11.9      96.0     6.5
     1.00     27.9     19.3      112.     23.0
     2.00     30.9     48.7      124.     172.
     5.00     41.2     157.      165.     1300.
     6.00     44.6     193.      179.     1676.
  END FTABLE  2
  FTABLE      3
 Rows Cols   (Dry2a reach - D1 tubes to Rattlesnake springs)
***
    7    5
*** Outflow 1 is channel loss (4 cfs per acre = 4 in/hr channel infilt rate)
*** Reach length = 18,300 ft - last row extrapolated
     Depth      Area    Volume  Outflow1 Outflow2
***
      (ft)   (acres) (acre-ft)   (cfs)    (cfs)
***
     0.0      0.0      0.0       0.0      0.0
     0.50     7.56     1.89      30.2     0.0
     0.55     8.13     2.54      32.5     0.0
     0.75     10.4     5.13      41.6     4.9
     4.50     18.5     53.8      74.0     880.
     7.00     29.4     113.      118.     1600.
     8.00     33.8     137.      136.     1890.
  END FTABLE  3
  FTABLE      4
 Rows Cols   (Dry2b reach - springs to wier at 12510655)
***
   10    4
*** No channel loss - it's a discharge zone
*** Reach length = 2400 ft - last row extrapolated
     Depth      Area    Volume  Outflow1
***
```

```
      (ft)    (acres) (acre-ft)    (cfs)
***
     0.0      4.4      0.0       0.0
     0.38     4.4      0.04      0.97
     0.50     4.4      0.10      2.39
     1.00     4.4      0.29      13.9
     1.50     4.4      0.65      38.5
     2.00     4.4      1.20      78.7
     2.34     4.4      1.60      115.
     2.70     4.4      4.30      215.
     5.00     4.4      9.90      1420.
     6.00     4.4      12.3      1940.
  END FTABLE  4
  FTABLE      5
 Rows Cols    (Dry1 reach - wier to recharge zone 500' d.s. of 119d40m30s
***
    8    5
*** Outflow 1 is channel loss (4 cfs per acre = 4 in/hr channel infilt rate)
*** Reach length = 23,000 ft - last row extrapolated
*** Area represents riparian zone - wetted areas=2.3/3.3/4.04/6.3/10.1
&10.1ac.
     Depth      Area    Volume  Outflow1  Outflow2
***
      (ft)    (acres) (acre-ft)    (cfs)     (cfs)
***
     0.0      10.1     0.0       0.0       0.0
     0.50     10.1     0.80      9.2       0.0
     1.00     10.1     1.64      13.2      .21
     2.00     10.1     4.04      16.2      18.2
     5.00     10.1     15.8      25.2      190.
     7.00     10.1     78.8      40.4      720.
     8.00     10.1     142.      40.4      1900.
     9.00     10.1     205.      40.4      3400.
  END FTABLE  5
END FTABLES

DISPLY
  DISPLY-INFO1
*** # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2
YRND
    4     Simq-upper Dry (hi) ac-ft      SUM                       1    1
50    9
   12     Simq-lower Dry (hi) ac-ft      SUM                       1    1
50    9
   31     SimQ-upper Dry  max cfs(hi)    MAX                       1    2
50    9
   32     SimQ-lower Dry  max cfs(hi)    MAX                       1    2
50    9
  END DISPLY-INFO1
END DISPLY

COPY
  TIMESERIES
    # -  #  NPT  NMN ***
```

```
    1                 5
    2     4           1
    5                 8
    6                 4
    7                 8
    9                 8
   10                 1
   11                 8
  END TIMESERIES
END COPY

END RUN
```


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