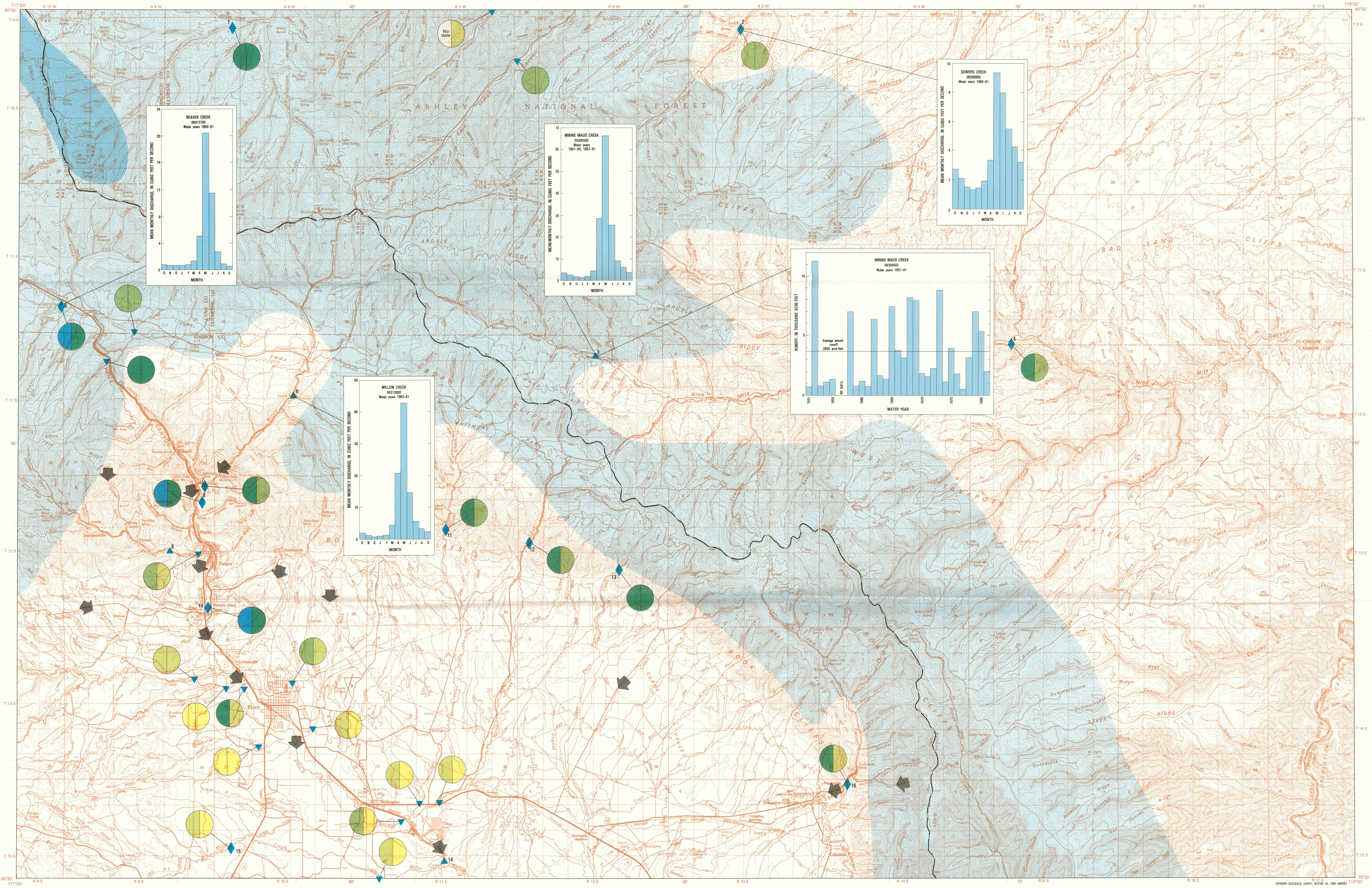

Base from U.S. Geological Survey 1:100,000 metric topographic series, 1980

APPROXIMATE MEAN DECLINATION, 1984

SCALE 1:100 000

CONTOUR INTERVAL 50 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

INTRODUCTION

This is one of a series of maps that describe the geology and related natural resources of the Price 30 x 60-minute quadrangle. Streamflow records used to compile this map were collected by the U.S. Geological Survey in cooperation with the Utah Department of Natural Resources, Division of Water Rights, and the Utah Department of Transportation. The principal runoff-producing areas shown on the map were delineated from a work map (scale 1:250,000) compiled to estimate water yields in Utah (Bagley and others, 1964). Sources of information about recorded floods resulting from cloudbursts included Woolley (1946) and Butler and Marsell (1972); sources of information about the chemical quality of streamflow included Mundorff (1972; 1977) and Waddell and others (1982).

DRAINAGE BASINS

The Price 30 x 60-minute quadrangle comprises about 1,840 square miles. About 60 percent of the area is in the Uinta Basin, and the remaining 40 percent is in the Price River basin. The entire area drains to the Green River, a major tributary of the Colorado River.

Principal streams in the Uinta Basin segment of the quadrangle are Avintaquin, Indian Canyon, Sowers, Antelope, and Minnie Maud Creeks. Principal streams in the Price River basin segment of the quadrangle are the Price River and Beaver, Willow, Spring Canyon, Miller, Coal, Soldier, and Grassy Trail Creeks.

RUNOFF

Estimated mean annual runoff in the area ranges from less than 1 inch (less than 54 acre-feet per square mile) in the lower parts of the Uinta Basin and Price River basin to about 12 inches (about 640 acre-feet per square mile) in the headwaters of Avintaquin Creek. Average annual gaged runoff originating chiefly within the area ranged from about 64 acre-feet per square mile in Minnie Maud Creek at site 4 to about 190 acre-feet per square mile in West Fork Avintaquin Creek at site 1. (See following table.) Most of the runoff in the Price River originates on the high Wasatch Plateau west of the map area; that runoff is regulated in Scofield Reservoir (usable capacity about 65,780 acre-feet), which is about 20 miles northwest of Price.

Runoff produced in the map area varies considerably from year to year depending on the annual variability of precipitation. As shown by the annual runoff graph for Minnie Maud Creek (site 3), for example, total annual runoff ranged from about 500 acre-feet during water year 1977 to more than 11,000 acre-feet during water year 1952. Most runoff occurs during April-June, as shown by the monthly runoff graphs. This seasonal peak runoff is due chiefly to melting of the winter snowpack, which usually accumulates to depths of several feet each year at the highest altitudes.

Many of the streams that originate at lower altitudes in the area are intermittent or ephemeral. Runoff in those streams (and much of the runoff in the perennial streams), results from summer cloudbursts. Although these storms usually are localized and generally last less than an hour, the rainfall intensity is great enough to produce floodflows of more than 1,000 cubic feet per second from drainage basins of only a few square miles. As shown in the following table, for example, a discharge of 5,000 cubic feet per second occurred in Miller Creek at site 15 on September 14, 1969. The drainage area upstream from that site is 62 square miles, but the cloudburst that caused the flood may have passed over only a part of that drainage area.

Floods resulting from cloudbursts have occurred or will occur in most drainages in the map area at one time or another. Because of their large volumes of water, rapid velocities, and intensive erosive power, they commonly cause damage to the natural environment. They also can cause considerable property damage in populated areas. As shown on this map, at least one flood resulting from cloudbursts has been recorded in or near virtually every community in the area since 1850.

The small scale of this map precludes delineation of flood-prone areas within the communities; however, large-scale maps showing such areas are published and distributed by the U.S. Department of Housing and Urban Development. Readers are referred to that agency for the most recent information about flood-prone areas in the communities shown on this map. Alluvial plains and channels of most streams (including dry washes) may be considered as flood-prone areas subject to flooding during cloudbursts. Because of this, travelers especially need to avoid deep, narrow canyons during cloudbursts.

The U.S. Geological Survey, under its cooperative program with the Utah Department of Natural Resources, continues to collect streamflow records at a number of the gaging stations listed in the following table. These records are available in the files of the U.S. Geological Survey, Salt Lake City, Utah, and in the U.S. Geological Survey report series "Water Resources Data for Utah," of which the most recent edition (1982) is included in the list of references cited.

SURFACE-WATER QUALITY

Surface water in the area ranges from fresh to moderately saline according to the following classification commonly used by the U.S. Geological Survey:

Class	Dissolved-solids concentration (milligrams per liter)
Fresh	Less than 1,000
Slightly saline	1,000 to 3,000
Moderately saline	3,000 to 10,000
Very saline	10,000 to 35,000
Briny	More than 35,000

Fresh water locally containing less than 500 milligrams per liter of dissolved solids occurs in the headwaters of some streams along the divide between the Uinta Basin and the Price River basin. Slightly to moderately saline water is common in the lower Price River basin where dissolved-solids concentrations of the surface water locally exceed 6,000 milligrams per liter.

The principal source of the large dissolved-solids concentrations in the lower Price River basin is the Mancos Shale of Cretaceous age, which crops out extensively in the area. The formation and soils developed on it contain large quantities of soluble salt. Natural runoff from the formation and irrigation water applied to soils developed on it readily dissolve and transport the salt to the Price River and its tributaries. Shale strata of Tertiary age also contribute significantly to the salinity of the lower stream reaches in the Uinta Basin.

Considerably more water-quality data for the area are available than are shown on this map. Readers interested in more detailed information about the chemical quality of surface water in the Uinta Basin segment of the area are referred to Price and Miller (1975) and Mundorff (1977). Readers interested in more detailed information about surface-water quality (including biological quality and sediment) in the Price River basin segment of the area are referred to Mundorff (1972) and Waddell and others (1982).

EXPLANATION

MILLIGRAMS PER LITER

MINIMUM		MAXIMUM
	<250	
	250-500	
	500-1000	
	1000-3000	
	3000-10,000	

GENERAL CHEMICAL QUALITY OF STREAMFLOW—Minimum and maximum concentrations of dissolved solids in streamflow at the designated sites generally are in the ranges shown

INCHES

<1
1-8
8-12

PRINCIPAL RUNOFF-PRODUCING AREAS—Theoretical mean annual runoff is in the ranges indicated. (Adapted from Bagley and others, 1964)

AREA OF RECORDED FLOOD RESULTING FROM CLOUDBURSTS—General area in which at least one flood resulting from a cloudburst has been recorded since 1850. (After Woolley, 1946, and Butler and Marsell, 1972)

10 EXISTING OR DISCONTINUED STREAMFLOW-GAGING STATION—Number corresponds to site number in table

SURFACE-WATER-QUALITY SAMPLING SITE—See References Cited for additional and more detailed water-quality data

DRAINAGE DIVIDE—Approximately located between the Uinta Basin and the Price River basin

SELECTED DATA FOR STREAMFLOW-GAGING STATIONS IN THE PRICE 30 x 60-MINUTE QUADRANGLE

Site No.: See map.
Station No.: U.S. Geological Survey downstream-order number; see U.S. Geological Survey (1982, p. 24) for explanation of numbering system.
Recorded extremes: d, daily value; otherwise instantaneous or observed values.
Remarks: Crest-stage gage indicates record from a gage installed to record annual-peak discharges, the gaged stream in most cases is intermittent or ephemeral.

Site No.	Station No.	Station name	Drainage area (square miles)	Period of record (water years)	Average annual discharge: Cubic feet per second	Acre-feet per year	Years of record	Recorded extremes (cubic feet per second): Maximum	Date	Minimum	Date	Remarks
1	09288150	West Fork Avintaquin Creek near Fruitland	56.1	1964–81	14.4	10,430	17	1,830	Aug. 22, 1971	0.2	Jan. 4, 1965	Formerly published as Cottonwood Creek near Fruitland; small diversion upstream from station.
2	09288900	Sowers Creek near Duchesne	40.6	1965–81	3.80	2,750	17	350	July 24, 1974	(1)	–	No diversions upstream from station.
3	09308500	Minnie Maud Creek near Myton	32.0	1951–55; 1957–81	5.03	3,640	29	[2]1,370	Aug. 25, 1961	(1)	–	Do.
4	09309000	Minnie Maud Creek at Nutter Ranch, near Myton	231	1947–55; 1960–73	20.4	14,770	8	1,380	June 1973	(1)	–	Continuous record 1947–55; crest-stage gage 1960–73; day of peak discharge not determined.
5	09312700	Beaver Creek near Soldier Summit	26.1	1960–81	3.88	2,810	21	135	May 19, 1973 May 17, 1979	(1)	–	–
6	09312800	Willow Creek near Castle Gate	62.8	1963–81	8.15	5,900	19	836	Aug. 6, 1973	(1)	–	No regulation or diversion upstream from station.
7	09312900	Willow Creek at Castle Gate	77.4	1979–81	–	–	–	210d	May 23, 1980	.6d	Dec. 13–26, 1980	–
8	09313000	Price River near Heiner	415	1934–69; 1979–81	112	81,140	37	9,340	Sept. 13, 1940	.4	Aug. 21, 1961	Discharge affected by regulation in upstream reservoirs.
9	09313040	Spring Canyon below Sowbelly Gulch, at Helper	23.0	1978–81	–	–	–	271	July 12, 1981	.02	July 2, 1979	Station discontinued in 1981.
10	09313500	Price River near Helper	530	1904–34	143	103,600	29	12,000	Sept. 8, 1919	2.0	Nov. 18, 1930 June 15, 16, Sept. 2–6, 1934	Discharge regulated in upstream reservoirs since 1917.
11	09313965	Coal Creek near Helper	25.3	1978–81	–	–	–	458	Aug. 13, 1979	(1)	–	Seasonal record only, discontinued in 1981.
12	09313975	Soldier Creek below mine, near Wellington	17.7	1978–81	–	–	–	789	Aug. 25–Sept. 10, 1980	.08d	Aug. 5, 1981	Seasonal record only.
13	09313985	Dugout Creek near Sunnyside	5.8	1979–81	–	–	–	127	Sept. 5, 1981	(1)	–	Seasonal record only, discontinued in 1981.
14	09314000	Price River near Wellington	850	1949–58	75.4	54,590	9	4,190	Aug. 28, 1953	2.4	Nov. 19, 1956	Reservoir regulation and irrigation diversions upstream from station.
15	09314200	Miller Creek near Price	62	1960–74	–	–	–	5,000	Sept. 14, 1969	–	–	Crest-stage gage.
16	09314340	Grassy Trail Creek at Sunnyside	40.1	1978–81	–	–	–	138	May 23, 1980	(3)	–	–

[1] No flow recorded on several to many days during period of record.
[2] Maximum exceeded by unknown discharge Oct. 13, 1975.
[3] No flow during several days in February 1981.

CONVERSION TABLE

MULTIPLY INCH-POUND UNIT	BY	TO OBTAIN SI UNIT
acre-foot	0.001233	cubic hectometer
acre-foot per square mile	0.00047	cubic hectometer per square kilometer
cubic foot per second	0.02832	cubic meter per second
inch	2.540	centimeter
inch	25.40	millimeter
mile	1.609	kilometer
square mile	2.590	square kilometer

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MAP SHOWING SELECTED SURFACE-WATER DATA FOR THE PRICE 30 x 60-MINUTE QUADRANGLE, UTAH

By
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1984

For sale by Branch of Distribution, U.S. Geological Survey, Box 25286, Federal Center, Denver, CO 80225