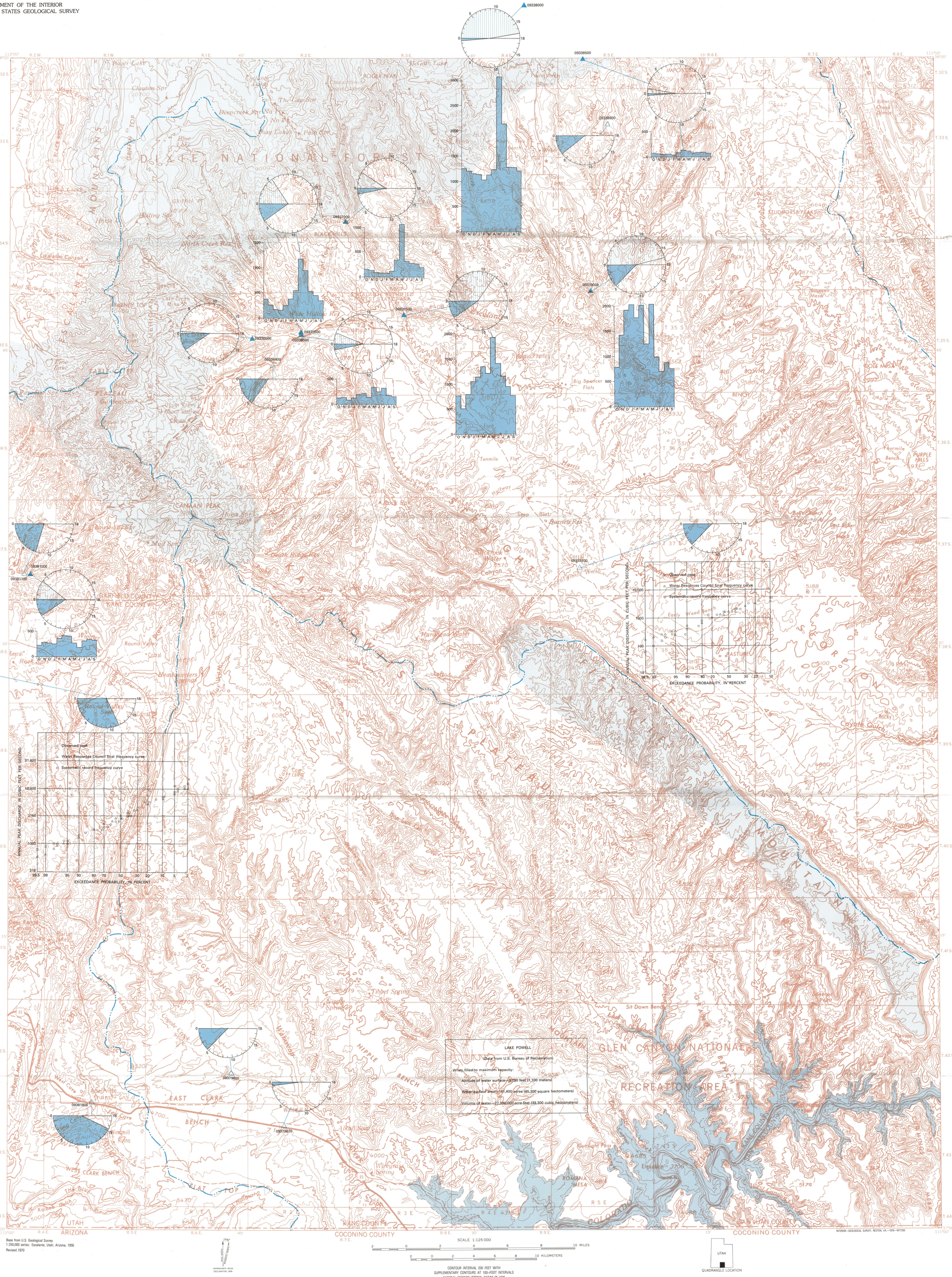
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS INVESTIGATIONS SERIES
MAP I–1033–E



Base from U.S. Geological Survey
1:250,000 series: Escalante, Utah; Arizona, 1956
Revised 1970

SCALE 1:125 000

CONTOUR INTERVAL 200 FEET WITH
SUPPLEMENTARY CONTOURS AT 100-FOOT INTERVALS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTAH
QUADRANGLE LOCATION

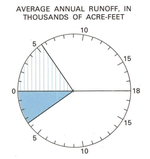
INTERIOR—GEOLOGICAL SURVEY, RESTON, VA.—1979—W77285

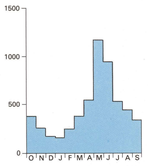
MAP SHOWING PRINCIPAL DRAINAGE BASINS, PRINCIPAL RUNOFF—PRODUCING AREAS, AND SELECTED STREAMFLOW DATA IN THE KAIPAROWITS COAL–BASIN AREA, UTAH

By
Don Price

1978

EXPLANATION





(Graphs represent complete record for respective stations)

PRINCIPAL RUNOFF–PRODUCING AREA—Average annual runoff ranges from 1 to 10 inches (Bagley and others, 1964).

09338500
▲ CONTINUOUS RECORD STREAMFLOW–GAGING STATION AND NUMBER

09338900
△ ANNUAL PEAK STREAMFLOW–GAGING STATION AND NUMBER

MAJOR DRAINAGE DIVIDE

CONVERSIONS

1 acre-foot equals 0.0012335 cubic hectometer
1 cubic foot equals 0.02382 cubic meter
1 inch equals 25.4 millimeters

INTRODUCTION

This is one of a series of maps that describe the geology and related natural resources of the Kaiparowits coal-basin area, Utah. Streamflow records used to compile this map and the accompanying table were collected by the U.S. Geological Survey in cooperation with the Utah State Engineer and the Utah Department of Transportation. The principal runoff-producing areas were delineated from a work map (scale 1:250,000) compiled to estimate water yields in Utah (Bagley and others, 1964). Information about Lake Powell was furnished by the U.S. Bureau of Reclamation.

DRAINAGE PATTERN

Of the approximately 3,830 square miles (9,920 km²) of the Kaiparowits coal-basin area, about 85 percent drains to Lake Powell on the Colorado River—mostly through the Escalante River and Wahweap, Warm, and Last Chance Creeks. Approximately 11 percent of the area drains to the Paria River, which empties into the Colorado River below Lake Powell. The remaining 4 percent drains to the Sevier River (East Fork), which is a major drainage in the Great Basin. East Fork of the Sevier River occupies an alluvial plain ranging up to about 3 miles (4.8 km) in width. Most other streams that drain the Kaiparowits coal-basin area occupy deep, narrow canyons generally less than 500 feet (152 m) wide.

RUNOFF

The Escalante River and several of its headwater tributaries are perennial in almost all reaches. The Paria River and East Fork of the Sevier River are intermittent in the map area, but are perennial in upstream and downstream reaches. All other streams that drain the Kaiparowits coal-basin area are intermittent or ephemeral; however, local springs and seeps in the bottoms of larger canyons, such as Wahweap, Warm, and Last Chance Creek canyons, provide perennial flow in short, widely separated reaches of the canyons.

Runoff occurs in response to precipitation which, in the Kaiparowits coal-basin area, normally ranges from less than 6 inches (152 mm) per year along the shore of Lake Powell to about 30 inches (762 mm) in the headwaters of the Escalante River (U.S. Weather Bureau, no date). According to Bagley, Jeppson, and Milligan (1964) the estimated average annual runoff in the Kaiparowits coal-basin area ranges from less than 1 inch (25 mm) in most places to about 10 inches (254 mm) in the headwaters of the Escalante River. Average annual runoff is probably less than 0.5 inch (13 mm) in the areas south of the Kaiparowits Plateau and adjacent to Lake Powell.

Most of the runoff occurs during late spring and early summer when streams are being fed by seasonal rains and melting of winter snowpack. Summer runoff in the Escalante River is prolonged by ground-water inflow from volcanic rocks and releases from several small headwater reservoirs.

Most of the runoff in the intermittent streams, and a significant amount of the runoff in perennial streams, is generated by localized summer thunderstorms or cloudbursts. Although such storms are of relatively short duration, commonly less than 2 hours, the rainfall intensity is great enough to generate floodflows of more than 3,000 cubic feet per second (85 m³/s) from drainage areas of less than 100 square miles (259 km²). For example, a floodflow of approximately 4,500 cubic feet per second (127 m³/s) has been recorded in Coyote Creek at gaging station 09379800 from a drainage basin of only 89 square miles (230 km²). The largest recorded cloudburst flood in the Kaiparowits coal-basin area was in the Paria River at gaging station 09381800, where a maximum floodflow of more than 15,000 cubic feet per second (425 m³/s) occurred on August 31, 1963.

Although all the larger canyons in the Kaiparowits coal-basin area are subject to cloudburst flooding, the magnitude and frequency of such flooding in most canyons is unpredictable because of inadequate data. Log-Pearson Type III analyses (U.S. Water Resources Council, 1976) of peak discharges recorded in Twentymile Wash at gaging station 09339200 and in the Paria River at gaging station 09381500 are shown on this map. According to those analyses, there is a 50-percent probability of a flood of magnitude 1,480 cubic feet per second (42 m³/s) or greater occurring in any year in Twentymile Wash at station 09339200, and a 50-percent probability of a flood of magnitude 3,000 cubic feet per second (85 m³/s) or greater occurring in any year in the Paria River at station 09381500. The accompanying table shows the ratio of the maximum recorded discharge to the discharge having a computed 10-year recurrence interval at those stations for which ten or more years of record are available.

Costly damage and loss of life resulting from cloudburst floods often occur in main-stem canyons far downstream from the actual cloudburst area. For this reason, travelers in the Kaiparowits coal-basin area should avoid entering deep, narrow canyons during periods of thunderstorm activity in the headwaters of those canyons.

REFERENCES CITED

Bagley, J. M., Jeppson, R. W., and Milligan, G. H., 1964, Water yields in Utah: Utah State Univ. Agr. Expt. Sta. Spec. Rept. 18.
U.S. Water Resources Council, 1976, Guidelines for estimating flood frequency: U.S. Water Resources Hydrol. Comm. Bull. 17, 193 p.
U.S. Weather Bureau, no date, Normal annual and May-September precipitation (1931–60) for the State of Utah: Map of Utah, scale 1:500,000.

SELECTED DATA FOR STREAM-GAGING STATIONS IN THE KAIPAROWITS COAL-BASIN AREA

Station number	Station name	Approximate drainage area (square miles)	Period of record	Average discharge			Extremes (cubic feet per second)				Ratio of maximum recorded discharge to discharge with a 10–year recurrence interval
				Cubic feet per second	Acre–feet per year	Years	Maximum	Date	Minimum	Date	
09335500	North Creek near Escalante	90	July 1950–Sept. 1955	7.64	5,530	5	3,610	8–21–52	0	(1)	–
09336000	Birch Creek near Escalante	36	July 1950–Sept. 1951; water years 1959–74[2]	.54	392	1	3,400	8–19–63	0	(1)	1.8
09336400	Upper Valley Creek near Escalante	53	Water years 1959–74[2]	–	–	–	5,560	8–2–59	0	(1)	2.3
09336500	Birch Creek at mouth, near Escalante	100	Oct. 1951–July 1955	3.26	2,366	3	1,010	7–12–54	0.1	7–13–55; 7–14–55	–
09337000	Pine Creek near Escalante	78	July 1950–Sept. 1955; July 1957–Oct. 1975	4.36	3,160	23	1,010	8–2–67	0	(1)	1.3
09337500	Escalante River near Escalante	310	Aug. 1909–Apr. 1913; Oct. 1942–Sept. 1955 Dec. 1971–Oct. 1975	17.2	12,460	19	3,450	8– –53	0.1	8–20–46; 7–15–50	1.1
09338000	East Fork Boulder Creek near Boulder	–	July 1950–Sept. 1955; July 1957–Sept. 1967	23.3	16,870	15	483	5–20–64	8.2	11–5–51	1.3
09338500	East Fork Deer Creek near Boulder	1.9	July 1950–Sept. 1955; water years 1959–74[2]	1.36	987	5	350	8–6–55	0	(1)	3.3
09338900	Deer Creek near Boulder	63	Water years 1959–74[2]	–	–	–	3,820	8–3–61	0	(1)	1.5
09339000	Boulder Creek near Boulder	175	July 1950–Sept. 1955	23.0	16,650	5	4,650	7–25–55	6.1	6–26–53	–
09339200	Twentymile Wash near Escalante	140	Water years 1959–68[2]	–	–	–	4,620	8–27–63	0	(3)	1.0
09379800	Coyote Creek near Kanab	89	Water years 1959–73[2]	–	–	–	4,590	6–22–72	0	(3)	1.0
09379820	Buck Tank Draw near Kanab	5.3	Water years 1959–68[2]	–	–	–	680	8–17–69	0	(3)	–
09381000	Henrieville Creek near Henrieville	29	Aug. 1950–July 1955	5.17	3,752	4	3,360	7–31–53	0	11–22–52; 12–22–52	–
09381100	Henrieville Creek at Henrieville	34	Waters years 1959–74[2]	–	–	–	7,360	8–4–61	0	(1)	2.3
09381500	Paria River near Cannonville	220	Water years 1959–74[2]	–	–	–	11,600	8–31–63	0	(1)	1.8
09381800	Paria River near Kanab	668	Water years 1959–73[2]	–	–	–	15,400	8–31–63	0	(3)	1.9

[1] Some flow throughout most years, but dry on occasions.
[2] Only annual-peak discharges gaged.
[3] Only intermittent or ephemeral flow.

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