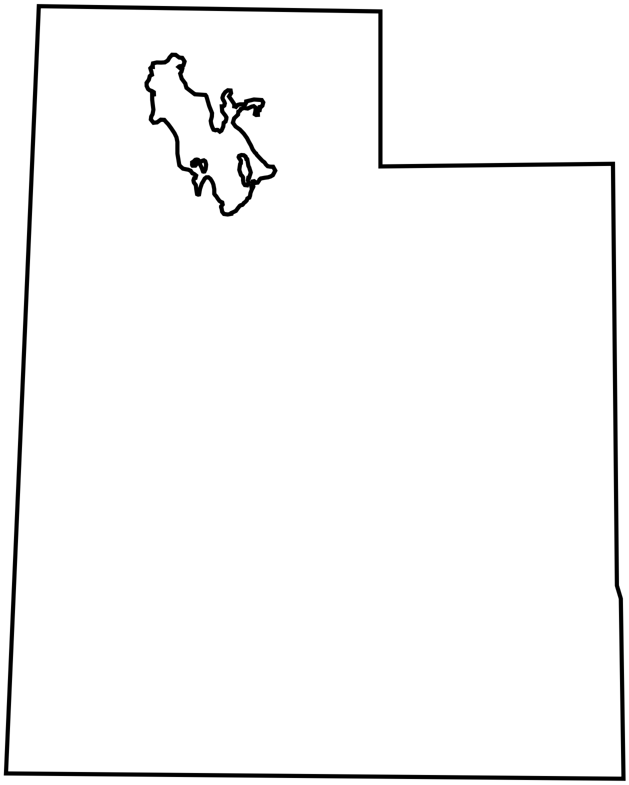
Water Resources Data
Utah
Water Year 2003

By J.R. Tibbetts, Michael Enright, and D.E. Wilberg

Water-Data Report UT-03-1



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This volume of the annual hydrologic data report of Utah is one of a series of annual reports that document hydrologic data gathered from the U.S. Geological Survey's surface- and ground-water data-collection networks in each State, Puerto Rico, and the Trust Territories. These records of streamflow, ground-water levels, and quality of water provide the hydrologic information needed by State, local, and Federal agencies, and the private sector for developing and managing our Nations land and water resources. Hydrologic data for Utah are contained in one volume.

This report is the culmination of a concerted effort by dedicated personnel of the U.S. Geological Survey who collected, compiled, analyzed, verified, and organized the data, and who typed, edited, and assembled the report. In addition to the authors, who had primary responsibility for assuring that the information contained herein is accurate, complete, and adheres to Geological Survey policy and established guidelines, the following individuals contributed significantly to the collection, processing, and tabulation of the data:

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13. ABSTRACT *(Maximum 200 words)*

Water-resources data for the 2003 water year (WY) for Utah consist of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality of ground water. This report contains discharge records for 169 gaging stations; stage and contents for 10 lakes and reservoirs; water quality for 22 hydrologic stations, and 36 wells; water levels for 68 observation wells; and precipitation for 2 stations. Additional water data were collected at various sites not involved in the systematic data-collection program and are published as miscellaneous measurements. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Utah.

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ILLUSTRATIONS

TABLE

[Letter after station name designates type of data: (d) discharge, (e) elevation or contents, (c) chemical, (b) biological, (t) water temperature, (s) sediment, (p) precipitation]

THE GREAT BASIN--Continued

GREAT SALT LAKE BASIN--Continued

BEAR RIVER BASIN--Continued

WEBER RIVER BASIN

TRIBUTARIES BETWEEN WEBER AND JORDAN RIVERS:

JORDAN RIVER BASIN

Station Number Page

THE GREAT BASIN--Continued
GREAT SALT LAKE BASIN--Continued
JORDAN RIVER BASIN--Continued

RUSH VALLEY

TOOELE VALLEY

TRIBUTARIES BETWEEN GREAT SALT LAKE DESERT AND BEAR RIVER

SEVIER LAKE BASIN

BEAVER RIVER BASIN

CEDAR VALLEY, IRON COUNTY

GROUND WATER LEVELS

Page

BEAVER COUNTY

BOX ELDER COUNTY

IRON COUNTY

JUAB COUNTY

KANE COUNTY

MILLARD COUNTY

SALT LAKE COUNTY

SAN JUAN COUNTY

TOOELE COUNTY

UINTAH COUNTY

UTAH COUNTY

WASATCH COUNTY

GROUND WATER LEVELS—Continued

Page

WASATCH COUNTY—Continued

WEBER COUNTY

Miscellaneous Water-Quality data

DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS

The following continuous-record surface-water gaging stations in Utah and parts of surrounding states have been discontinued. Daily streamflow (d) and reservoir elevation (e) records were collected and published for the period of record, expressed in water years. Discontinued project stations with less than 2 years of data have not been included. Stations shown in bold were discontinued at end of the previous water year. Information regarding these stations may be obtained from the District Office at the address given on the back side of the title page of this report.

Station name	Station number	Drainage area (sq mi)	Period of record
COLORADO RIVER BASIN			
Cottonwood Wash at I-70 near Cisco, UT (d)	09163675	170	1983-86
Twomile Creek near LaSal, UT (d)	09169000	269	1944-51
Taylor Creek near Gateway, CO (d)	09177500	12	1944-67
Deep Creek near Paradox, CO (d)	09178000	—	1944-53
TRIBUTARIES BETWEEN DOLORES RIVER AND GREEN RIVER			
Geyser Creek near Paradox, CO (d)	09178500	—	1944-51
Onion Creek above Onion Creek Bridge near Moab, UT (d)	09180920	—	1979-81
Onion Creek below Onion Creek Bridge near Moab, UT (d)	09180970	—	1979-81
Onion Creek near Moab, UT (d)	09181000	18.8	1950-55
Professor (Rock) Creek near Moab, UT (d)	09181500	33.6	1950-53
Castle Creek above diversions, near Moab, UT (d)	09182000	7.58	1951-55 1958-75
Castle Creek below Castleton near Moab, Utah (d)	09182200	17.6	1992-2001
Castle Creek near Moab, UT (d)	09182500	53.1	1950-55 1957-58
Courthouse Wash at Arches Hwy Crossing near Moab, UT (d)	09182900	143	1959-66
Courthouse Wash near Moab, UT (d)	09183000	162	1950-55 1957 1966-89
Mill Creek near Moab, UT (d)	09184000	74.9	1949-71 1972-93
Pack Creek at M4 Ranch, near Moab, UT (d)	09184500	15.8	1955-59
Pack Creek near Moab, UT (d)	09185000	57.4	1955-59
Hatch Wash near LaSal, UT (d)	09185500	378	1951-71
Indian Creek Tunnel near Monticello, UT (d)	09185800	—	1958-80
Indian Creek near Monticello, UT (d)	09186000	4.70	1950-57
Indian Creek above Cottonwood Creek near Monticello, UT (d)	09186500	31.2	1949-71 1988-91
Cottonwood Creek near Monticello, UT (d)	09187000	115	1950-57
Indian Creek above Harts Draw near Monticello, UT (d)	09187500	258	1949-57
Indian Creek below Bogus Pocket near Monticello, UT (d)	09187550	262	1983-88
GREEN RIVER BASIN			
Blacks Fork above Blacks Fork Ranger Station, UT (d)	09217500	48.8	1937-39
Blacks Fork at Blacks Fork Ranger Station, UT (d)	09218000	a130	1937-39
Blacks Fork near Millburne, Wyoming (d)	09218500	152	1939-98
Green River near Linwood, UT (d)	09225500	a14,300	1928-63
Middle Fork Beaver Creek near Lonetree, WY (d)	09226500	a28	1948-70
East Fork Beaver Creek near Lonetree, WY (d)	09227000	a8.2	1949-62
West Fork Beaver Creek near Lonetree, WY (d)	09227500	a23	1949-62
Burnt Fork near Burntfork, WY (d)	09228500	52.8	1943-83
Henrys Fork near Manila (d)	09229500	520	1928-93
Green River at Flaming Gorge near Linwood, UT (d)	09230500	a14,900	1923-38
Sheep Creek Upper Canal near Manila, UT (d)	09231000	—	1950-61
Carter Creek Canal near Manila, UT (d)	09231200	—	1956-61
Sheep Creek Lower Canal near Manila, UT (d)	09231500	—	1950-61
Sheep Creek near Manila, UT (d)	09232000	a42	1943-61
Sheep Creek at mouth near Manila, UT (d)	09232500	111	1947-61
Carter Creek near Manila, UT (d)	09233000	a19	1949-54
Red Lake Outlet near Manila, UT (d)	09233500	a19	1946-49
Carter Creek at mouth near Manila, UT (d)	09234000	a110	1946-55
Red Creek near Dutch John, UT (d)	09234700	140	1971-76
Green River at (near) Bridgeport, UT (d)	09235000	a15,700	1912-15

Station name	Station number	Drainage area (sq mi)	Period of record
GREEN RIVER BASIN--Continued			
Crouse Creek near Vernal, UT (d)	09235100	30.2	1986-90
Pot Creek above diversions, near Vernal (d)	09235600	24.6	1957-93
Pot Creek near Vernal, UT (d)	09235800	107	1958-82
Jones Hole Creek near Jensen, UT (d)	09260500	a120	1950-56 1960-61
Brush Creek above cave near Vernal, UT (d)	09261500	a23	1946-55
Big Brush Creek near Vernal, UT (d)	09262000	79.6	1940-79
Little Brush Creek below East Park Reservoir near Vernal, UT (d)	09262500	a20	1949-55
Little Brush Creek near Vernal, UT (d)	09263000	a28	1946-52
Brush Creek near Jensen, UT (d)	09263500	255	1940-65
ASHLEY CREEK BASIN			
Ashley Creek below Trout Creek near Vernal, UT (d)	09264000	a27	1944-54
South Fork Ashley Creek near Vernal, UT (d)	09264500	a20	1944-55
Oaks Park Canal near Vernal, UT (d)	09265000	—	1946-69
Ashley Creek above Red Pine Creek near Vernal, UT (d)	09265300	55.8	1965-75
Ashley Creek above Spring near Vernal, UT (d)	09265500	a100	1941-45
Ashley Creek Spring near Vernal, UT (d)	09266000	—	1944-45 1954-55
U.P.&L. Co.'s Tailrace near Vernal, UT (d)	09267000	—	1917 1920-31
Ashley Creek above Dry Fork, near Vernal, UT (d)	09267100	110	1969-72
Dry Fork above sinks, near Dry Fork, UT (d)	09268000	44.4	1940-75
North Fork of Dry Fork near Dry Fork, UT (d)	09268500	8.62	1947-89
Brownie Canyon above sinks, near Dry Fork, UT (d)	09268900	8.24	1961-89
East Fork of Dry Fork near Dry Fork, UT (d)	09269000	a12	1947-63
East Fork of Dry Fork at mouth near Dry Fork, UT (d)	09269500	a18	1950-52
Dry Fork below springs near Dry Fork, UT (d)	09270000	97.4	1904 1941-45 1954-69
Dry Fork at mouth near Dry Fork, UT (d)	09270500	116	1954-89
Ashley Creek at Sign of the Maine, near Vernal, UT (d)	09271000	241	1900-04 1939-65
Highline Canal below Mantle Gulch near Jensen, UT (d)	09271070	—	1969-72
Steinaker Reservoir near Vernal, UT (e)	09271300	—	1962-68
River Irrigation Company Canal near Jensen, UT (d)	09271470	—	1969-72
Ashley Creek near Jensen, UT (d)	09271500	383	1947-83
Ashley Creek below Union Canal diversion near Jensen, UT (d)	**09271550**	**389**	**1991-2002**
Stewart Lake Outflow near Jensen, UT (d)	09271600	—	1990-94
TRIBUTARIES BETWEEN ASHLEY CREEK AND DUCHESNE RIVER			
Halfway Hollow Tributary near LaPoint, UT (d)	09271800	a5.6	1960-74
DUCHESNE RIVER BASIN			
Duchesne Tunnel near Kamas, UT (d)	09272500	—	1954-69
Duchesne River at Provo River Trail near Hanna, UT (d)	09273000	a39	1930-33 1935-54
Duchesne River below Little Deer Creek, near Hanna, UT (d)	09273200	a39	1965-68
Hades Creek near Hanna, UT (d)	09273500	a75	1950-68
Duchesne River (North Fork) near Hanna, UT (d)	09274000	a78	1922-23 1929-30 1946-63
West Fork Duchesne River below Vat Diversion near Hanna, UT (d)	09274900	37.0	1989-94
West Fork Duchesne River below Dry Hollow near Hanna, UT (d)	09275000	43.8	1950-68 1974-81
West Fork Duchesne River near Hanna, UT (d)	09275500	61.6	1945-94
Wolf Creek above Rhoades Canyon near Hanna, UT (d)	09276000	10.6	1946-84
Wolf Creek near Hanna, UT (d)	09276500	a19	1922-23

Station name	Station number	Drainage area (sq mi)	Period of record
DUCHESNE RIVER BASIN--Continued			
Duchesne River at Hanna, UT (d)	09277000	a230	1953-61
Comb. flow Duchesne River & Duchesne Tunnel near Tabiona, UT (d)	09277501	—	1919-67
Rock Creek above South Fork, near Hanna, UT (d)	09277800	98.9	1965-84 1988-94
South Fork Rock Creek near Hanna, UT (d)	09278000	15.7	1953-92
Rock Creek near Hanna, UT (d)	09278500	122	1950-69 1974-88
Rock Creek below Miners Gulch near Hanna, UT (d)	09278700	133	1974-81
Rock Creek near Talmage, UT (d)	09279100	238	1963-94
Duchesne River at Duchesne, UT (d)	09279500	a660	1918-70
Strawberry River and Willow Creek Ditches near Heber, UT (d)	09280000	—	1950-60
Hobble Creek at Daniels Summit near Wallsburg, UT (d)	09280400	2.89	1964-84
Upper Hobble Creek Ditch near Heber, UT (d)	09280500	—	1950-52
Lower Hobble Creek Ditch near Heber, UT (d)	09281000	—	1950-52
Hobble Creek Ditch (Upper & Lower) near Heber, UT (d)	09281500	—	1949-60
Strawberry Tunnel at West Portal near Thistle, UT (d)	09282000	—	1915-25 1932-34 1935-68
Strawberry Reservoir near Soldier Springs, UT (e)	09282500	170	1913-68
Indian Creek in Strawberry Valley, UT (d)	09284000	a50	1905-06 1909-10
Strawberry River below mouth of Indian Creek, Strawberry Valley, UT (d)	09284500	182	1903-06 1909
Strawberry River near Soldier Springs, UT (d)	09285000	213	1942-56 1963-94
Willow Creek near Soldier Springs, UT (d)	09285500	a44	1943-47
Strawberry River above Red Creek near Fruitland, UT (d)	09285700	363	1964-81
Strawberry River at Pinnacles near Fruitland, UT (d)	09285900	372	1989-94
Red Creek above reservoir, near Fruitland, UT (d)	09286100	31.4	1986-98
Red Creek near Fruitland, UT (d)	09286500	a89	1918-22 1956-61
Currant Creek below Currant Creek Dam, near Fruitland, UT (d)	09286700	48.0	1983-94
Currant Creek below Red Ledge Hollow near Fruitland, UT (d)	09287000	50.1	1946-68 1974-83
Water Hollow near Fruitland, UT (d)	09287500	a14	1946-84
Red Creek below Currant Creek near Fruitland, UT (d)	09288100	297	1964-81
West Fork Avintaquin Creek near Fruitland, UT (d)	09288150	56.1	1964-86
Starvation Reservoir near Duchesne, UT (e)	09288395	1,058	1989-94
Strawberry River below Starvation Reservoir near Duchesne, UT (d)	09288400	1,059	1989-94
Strawberry River at Duchesne (Theodore), UT (d)	09288500	1,066	1908-10 1915-68
Sowers Creek near Duchesne, UT (d)	09288900	40.6	1964-86
Antelope Creek near Myton, UT (d)	09289000	a198	1918-21
Brown Duck Creek near Mountain Home, UT (d)	09290000	a15	1933-34 1943-55
Lake Fork River below Taskeech Damsite near Mt Home, UT (d)	09291200	138	1977-84
Yellowstone Creek below Swift Creek near Altonah, UT (d)	09291500	a99	1950-55
Yellowstone River at mouth near Altonah, UT (d)	09293000	142	1943-44 1976-81
Lake Fork River (below Forks) near Altonah, UT (d)	09293500	304	1904 1907-10 1917-20 1976-81
Lake Fork River at Hwy 87 near Altamont, UT (d)	09293600	318	1976-81
Pigeon Water Creek near Altamont, UT (d)	09293700	95.5	1976-79
Lake Fork River near Upalco, UT (d)	09294000	427	1943-55 1976-81

Station name	Station number	Drainage area (sq mi)	Period of record
DUCHESNE RIVER BASIN--Continued			
Lake Fork (Creek) near Myton, UT (d)	09294500	484	1900-03 1907-36 1976-81
Uinta River below Gilbert Creek near Neola, UT (d)	09295500	a33	1951-55
Uinta River above Clover Creek near Neola, UT (d)	09296000	132	1946-55
Clover Creek near Neola, UT (d)	09296500	a9.5	1950-55
Uinta River near Neola, UT (d)	09297000	163	1922-27 1930-83
Uinta River near Whiterocks, UT (d)	09297500	218	1899-1903 1907-10 1917-20
West Channel Uinta River below diversion works near Whiterocks, UT (d)	09297600	216	1976-81
East Channel Uinta River below diversion works near Whiterocks, UT (d)	09297700	215	1977-81
East Channel Uinta River at County Road Bridge near Whiterocks, UT (d)	09297800	253	1976-81
East Channel Uinta River at LaPoint Road near LaPoint, UT (d)	09297900	382	1976-82
Farm Creek near Whiterocks, UT (d)	09298000	14.9	1950-81
Whiterocks River above Paradise Creek near Whiterocks, UT (d)	09298500	a90	1946-55
Paradise Creek near Whiterocks, UT (d)	09299000	a10	1946-55
Whiterocks River below damsite near Whiterocks, UT (d)	09299400	110	1976-81
Whiterocks River below Farm Creek Canal near Whiterocks, UT (d)	09299600	120	1976-81
Whiterocks River 1 mile east of Whiterocks, UT (d)	09299700	124	1976-81
Deep Creek at State Highway 246 near LaPoint, UT (d)	09299900	72.2	1976-79
Deep Creek near LaPoint, UT (d)	09300000	a75	1943-45 1950-55
Uinta River at Fort Duchesne, UT (d)	09300500	557	1899-1904 1907-10 1917-20 1943-58 1976-81
Dry Gulch near Neola, UT (d)	09301000	a67	1951-58
Dry Gulch near Fort Duchesne, UT (d)	09301200	469	1976-81
WHITE RIVER BASIN			
White River near Colorado State Line, UT (d)	09306395	3,680	1977-86
White River above Hells Hole Canyon near Watson, UT (d)	09306400	a3,700	1974-76
Hells Hole Canyon Creek at mouth near Watson, UT (d)	09306405	24.5	1975-83
Evacuation Creek above Missouri Creek near Dragon, UT (d)	09306410	100	1975-83
Evacuation Creek below Park Canyon near Watson, UT (d)	09306415	246	1975-76
Thimble Rock Canyon near Watson, UT (d)	09306417	1.7	1975-76
Evacuation Creek at Watson, UT (d)	09306420	259	1975-75
Evacuation Creek Tributary near Watson, UT (d)	09306425	12.4	1974-76
Evacuation Creek near mouth near Watson, UT (d)	09306430	284	1975-81
White River below Southam Canyon near Watson, UT (d)	09306600	a4,030	1975-76
Southam Canyon Wash near Watson, UT (d)	09306605	2.5	1974-76
Southam Canyon Wash at mouth near Watson, UT (d)	09306610	8.3	1974-76
Asphalt Wash below Center Fork near Watson, UT (d)	09306620	94.4	1975-76
Asphalt Wash near mouth near Watson, UT (d)	09306625	97.5	1974-83
White River below Asphalt Wash near Watson, UT (d)	09306700	a4,130	1974-77
Bitter Creek above Dick Canyon near Watson, UT (d)	09306740	11.7	1975-78
Sweetwater Canyon below South Canyon near Watson, UT (d)	09306760	22.6	1975-78
Sweetwater Canyon Creek near mouth near Watson, UT (d)	09306780	124	1975-78
Bitter Creek near Bonanza, UT (d)	09306800	324	1971-89
Bitter Creek at mouth near Bonanza, UT (d)	09306850	398	1975-83
Sand Wash near Ouray, UT (d)	09306870	59.7	1975-81
Sand Wash at mouth near Ouray, UT (d)	09306872	71.1	1977-81
Coyote Wash near mouth near Ouray, UT (d)	09306878	228	1977-83
North Wash near Ouray, UT (d)	09306880	11.0	1980-81
Cottonwood Wash near mouth near Ouray, UT (d)	09306885	70.6	1977-81
White River at mouth near Ouray, UT (d)	09306900	5,120	1974-86

Station name	Station number	Drainage area (sq mi)	Period of record
TRIBUTARIES BETWEEN DUCHESNE RIVER AND PRICE RIVER			
Green River near Ouray, UT (d)	09307000	a35,500	1948-66
Pariette Draw near Ouray, UT (d)	09307200	153	1976-84
Combined flow Pariette Draw at mouth and Lambs Diversion (d)	09307290	—	1978-80
Lambs Diversion from Pariette Draw near Ouray, UT (d)	09307295	—	1978-82
Pariette Draw at mouth near Ouray, UT (d)	09307300	298	1975-84
Willow Creek above diversions near Ouray, UT (d)	09307500	297	1951-55 1958-70 1975-83
Hill Creek above Towave Reservoir near Ouray, UT (d)	09307800	89.7	1975-81
Hill Creek near mouth near Ouray, UT (d)	09307900	288	1975-81
Willow Creek near Ouray, UT (d)	09308000	897	1948-55 1975-83
Minnie Maud Creek near Myton, UT (d)	09308500	32.0	1950-55 1957-89
Minnie Maud Creek at Nutter Ranch near Myton, UT (d)	09309000	231	1948-55
PRICE RIVER BASIN			
Fairview Ditch near Fairview, UT (d)	09309500	—	1950-65
Gooseberry Creek near Fairview, UT (d)	09309800	a7.51	1960-69
Boardinghouse Creek at mouth near Scofield, UT (d)	09310575	2.04	1983-84
Eccles Canyon near Scofield, UT (d)	09310600	5.5	1980-84
Price River near Scofield, UT (d)	09311500	a155	1918-21 1925-31 1939-69 1979-80
Price River near Soldier Summit, UT (d)	09311700	a180	1962-63
North Fork White River near Soldier Summit, UT (d)	09312000	23.3	1942-47
White River near Soldier Summit, UT (d)	09312500	52.8	1938-67
Beaver Creek near Soldier Summit, UT (d)	09312700	26.1	1961-89
Willow Creek near Castle Gate, UT (d)	09312800	62.8	1963-89
Willow Creek at Castle Gate, UT (d)	09312900	77.4	1980-81
Spring Canyon below Sowbelly Gulch at Helper, UT (d)	09313040	23.0	1979-81
Price River near Helper, UT (d)	09313500	a530	1904-34
Coal Creek near Helper, UT (d)	09313965	25.3	1978-81
Soldier Creek below Mine near Wellington, UT (d)	09313975	17.7	1978-84
Dugout Creek near Sunnyside, UT (d)	09313985	5.8	1980-81
Price River near Wellington, UT (d)	09314000	853	1950-58
Price River below Miller Creek near Wellington, UT (d)	09314250	956	1972-86
Desert Seep Wash near Wellington, UT (d)	09314280	191	1972-86
Grassy Trail Creek at Sunnyside, UT (d)	09314340	40.1	1978-85
Horse Canyon near Sunnyside, UT (d)	09314374	12.5	1978-81
TRIBUTARIES BETWEEN PRICE RIVER AND SAN RAFAEL RIVER			
Saleratus Wash at Green River, UT (d)	09315500	a180	1949-70
Browns Wash near Green River, UT (d)	09316000	a75	1950-68
Floy Wash near Green River, UT (d)	09316100	56.6	1983-86
Boulger Creek near Fairview, UT (d)	09317000	a1.9	1938-40 1942-49
Candland Ditch near Mt. Pleasant, UT (d)	09317500	—	1950-58
Crandall Canyon at mouth near Huntington, UT (d)	09317919	5.70	1978-84
Tie Fork Canyon near Huntington, UT (d)	09317920	11.7	1978-81
Huntington Creek near Huntington, UT (d)	09318000	187	1909-79
Huntington Creek near Castle Dale, UT (d)	09318500	325	1911-17 1919-21
Horseshoe Tunnel near Ephraim, UT (d)	09320000	—	1950-58
Larsen Tunnel near Ephraim, UT (d)	09320500	—	1949-58
Coal Fork Ditch near Mount Pleasant, UT (d)	09321000	—	1950-58 1976

Station name	Station number	Drainage area (sq mi)	Period of record
TRIBUTARIES BETWEEN PRICE RIVER AND SAN RAFAEL RIVER--Continued			
Twin Creek Tunnel near Mount Pleasant, UT (d)	09321500	—	1950-58
Black Canyon Ditch near Spring City, UT (d)	09322000	—	1950-58
Cedar Creek Tunnel near Spring City, UT (d)	09322500	—	1950-58
Reeder Ditch near Spring City, UT (d)	09323500	—	1950-58
Seely Creek near Orangeville, UT (d)	09324000	a150	1954-57
Cottonwood Creek above Straight Canyon near Orangeville, UT (d)	09324200	21.9	1978-81
Cottonwood Creek near Orangeville, UT (d)	09324500	208	1910-27 1933-70 1975-85
Cottonwood Creek near Castle Dale, UT (d)	09325000	261	1947-58
San Rafael River above Ferron Creek near Castle Dale, UT (d)	09325100	a680	1965-70
John August Ditch near Ephraim, UT (d)	09325500	—	1949-58
Madsen Ditch near Ephraim, UT (d)	09326000	—	1950-58
Ferron Creek near Ferron, UT (d)	09327000	159	1909-11
Ferron Creek near Castle Dale, UT (d)	09327500	a210	1912-14 1948-58
Ferron Creek below Paradise Ranch near Clawson, UT (d)	09327550	221	1976-86
San Rafael River near Castle Dale, UT (d)	09328000	930	1948-64 1972-86
San Rafael River at San Rafael Bridge Campground, near Castle Dale, UT (d)	09328100	1,284	1975-86
Cresent Wash Reservoir, UT (e)	09328870	19.0	1954-57
DIRTY DEVIL RIVER BASIN			
Fremont River below Fish Lake near Fremont, UT (d)	09329000	a27	1939-45
Seven Mile Creek near Fish Lake, UT (d)	09329050	24.0	1964-98
Fremont River near Fremont, UT (d)	09329500	205	1949-58
Pine Creek near Bicknell, UT (d)	09329900	104	1965-80
Pleasant Creek near Caineville, UT (d)	09330210	115	1969-72
Bull Creek near Hanksville, UT (d)	09330410	7.53	1983-91
Muddy Creek (Lower Station) near Emery, UT (d)	09331000	114	1911-14
Ivie Creek above diversions near Emery, UT (d)	09331500	a50	1951-61
Convulsion Canyon near Emery, UT (d)	09331850	21.6	1981-84
Quitchupah Creek near Emery, UT (d)	09331900	104	1978-81
Christiansen Wash near Emery, UT (d)	09331950	13.6	1978-84
Muddy Creek below I-70 near Emery, UT (d)	09332100	418	1973-86
Muddy Creek below Ivie Creek near Emery, UT (d)	09332500	a440	1950-61
Muddy Creek at Delta Mine near Hanksville, UT (d)	09332700	841	1975-86
Muddy Creek at mouth near Hanksville, UT (d)	09332800	1,552	1976-80
Dirty Devil River near Hanksville, UT (d)	09333000	a3,490	1946-48
North Wash near Hanksville, UT (d)	09334000	136	1951-70
White Canyon near Hanksville (Hite), UT (d)	09334500	276	1951-70
Colorado River at Hite, UT (d)	09335000	a76,600	1948-58
ESCALANTE RIVER BASIN			
North Creek near Escalante, UT (d)	09335500	a90	1950-55
Birch Creek near Escalante, UT (d)	09336000	a36	1950-51
Birch Creek at mouth near Escalante, UT (d)	09336500	a100	1952-55
East Fork Boulder Creek near Boulder, UT (d)	09338000	21.4	1951-55 1958-72
East Fork Deer Creek near Boulder, UT (d)	09338500	a1.9	1950-55
Escalante River at mouth near Escalante, UT (d)	09339500	a1,770	1951-55
SAN JUAN RIVER BASIN			
McElmo Creek near Bluff, UT (d)	09372200	—	1981-82
Spring Creek above diversions near Monticello, UT (d)	09376900	4.95	1966-72
Davenport and Campbell Canal near Monticello, UT (d)	09377500	—	1914-16
Spring (Vaga) Creek near Monticello, UT (d)	09377000	a8.5	1914-16
Green Canal near Monticello, UT (d)	09378000	—	1914-16

Station name	Station number	Drainage area (sq mi)	Period of record
SAN JUAN RIVER BASIN--Continued			
North Creek above Ranger Station near Monticello, UT (d)	09378100	8.68	1980-85
Montezuma Creek at Golf Course, at Monticello, UT (d)	09378200	17.6	1979-92
Montezuma Creek near Bluff, UT (d)	09378600	1,154	1985-93
Recapture Creek below Johnson Creek, near Blanding, UT (d)	09378650	50.2	1975-93
Cottonwood Wash near Blanding, UT (d)	09378700	205	1965-87
Comb Wash near Bluff, UT (d)	09379000	278	1959-68
COMBINED INFLOW ABOVE GLEN CANYON DAM			
Colorado plus Green plus San Juan (temp) (d)	09379505	—	1928-84
COLORADO RIVER TRIBUTARIES BELOW GLEN CANYON DAM			
Henrieville Creek near Henrieville, UT (d)	09381000	a29	1950-55
Paria River near Cannonville, UT (d)	09381500	a220	1951-55
Mill Creek above study area near Glendale, UT (d)	09403620	4.81	1976-77
Skutumpah Creek below study area near Glendale, UT (d)	09403630	16.0	1976-77
Intermediate Drainage near Glendale, UT (d)	09403640	2.49	1976-77
Thompson Creek above study area near Glendale, UT (d)	09403650	9.80	1976-77
Thompson Creek below study area near Glendale, UT (d)	09403660	16.6	1976-77
Johnson Wash above Flood Canyon, near Kanab, UT (d)	09403690	237	1994-97
East Fork Virgin River near Mount Carmel Junction, UT (d)	**09404700**	**179**	**1993-2002**
VIRGIN RIVER BASIN			
Deep Creek near Cedar City, UT (d)	09405200	6.72	1987-93
East Fork Deep Creek near Cedar City, UT (d)	09405250	7.82	1987-93
Crystal Creek near Cedar City, UT (d)	09405300	10.2	1957-61
North Fork Virgin River near Glendale, UT (d)	09405400	5.65	1973-78
North Fork Virgin River below Bulloch Canyon near Glendale, UT (d)	09405420	29.6	1975-84
North Fork Virgin River above Zion Narrows near Glendale, UT (d)	09405450	45.5	1979-84
North Fork Virgin River above Big Bend near Springdale, UT (d)	09405490	311	1991-94
Springdale Canal near Springdale, UT (d)	09405499	—	1969-89
North Creek near Virgin, UT (d)	09405900	110	1984-93
LaVerkin Creek near LaVerkin, UT (d)	09406150	91.3	1984-91
Kanarra Creek at Kanarraville, UT (d)	09406300	9.85	1960-82
Ash Creek near New Harmony, UT (d)	09406500	a133.9	1939-48
Ash Creek Reservoir near New Harmony, UT (e)	09406600	—	1973-82
Leap Creek below Maple Hollow, near Pintura, UT (d)	09406640	9.19	1994-2001
South Ash Creek below Mill Creek near Pintura, UT (d)	09406700	11.0	1966-82
Wet Sandy Creek near Pintura, UT (d)	09406900	5.02	1994-2001
Ash Creek above Toquerville, UT (d)	09407000	201	1941-42 1984-91
West Field Ditch at Toquerville, UT (d)	09407150	—	1973-82
Ash Creek below West Field Ditch at Toquerville, UT (d)	09407200	201	1973-82
Ash Creek below diversion dam at Toquerville, UT (d)	09407201	—	1973-82
Ash Creek near Toquerville, UT (d)	09407600	213	1956-58
Ash Creek near LaVerkin, UT (d)	09407800	215	1957-58
Virgin River above Quail Creek near Hurricane, UT (d)	09408135	1,381	1989-90 1992-93
Santa Clara-Pinto Diversion near Pinto, UT (d)	09408500	—	1954-62 1970-95
Santa Clara River near Central, UT (d)	09409000	a97	1909-30 1939-61
Moody Wash near Veyo, UT (d)	09409500	a33	1939-42 1955-69
Santa Clara River above Winsor Dam near Santa Clara, UT (d)	09410000	338	1942-71
Santa Clara River below Winsor Dam near Santa Clara (d)	09410100	378	1972-2001
Santa Clara River near Santa Clara, UT (d)	09410400	410	1965-74
Santa Clara River (Creek) near St. George, UT (d)	09412500	502	1909-13

DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS

Station name	Station number	Drainage area (sq mi)	Period of record
THE GREAT BASIN			
Great Salt Lake at Promontory Point, UT (e)	10010050	—	1969-82 1997-99
Great Salt Lake at AIC near Syracuse, UT (e)	10010300	—	1975-82
BEAR RIVER BASIN			
East Fork Bear River near Evanston, WY (d)	10010400	34.6	1974-86
Hilliard East Fork Canal near State Line near Evanston, WY (d)	10010500	—	1944-47 1953-56
West Fork Bear River at Whitney Dam, near Oakley, UT (d)	10011200	a7.5	1964-86
West Fork Bear River below Deer Creek near Evanston, WY (d)	10011400	52.2	1974-86
Mill Creek at Utah-Wyoming State Line (d)	10012000	a59	1950-62
Mill Creek near Evanston, WY (d)	10012500	60.6	1942-48
Bear River above Sulphur Creek near Evanston, WY (d)	10014000	282	1946-56
Sulphur Creek above reservoir, below LaChapelle Creek, near Evanston, WY (d)	10015700	64.2	1957-97
Sulphur Creek below reservoir, near Evanston, WY (d)	10015900	69.2	1958-92
Sulphur Creek near Evanston, WY (d)	10016000	80.5	1942-59
Bear River at Millis, near Evanston, WY (d)	10016500	a420	1942-46
Yellow Creek near Evanston, WY (d)	10017000	a80	1943-45 1950-78
Coyote Creek near Evanston, WY (d)	10017500	a28	1942-45
Bear River near Evanston, WY (d)	10019000	715	1913-56
Chapman Canal at State Line near Evanston, WY (d)	10019500	—	1942-86
Woodruff Narrows Reservoir near Woodruff, UT (e)	10020200	784	1966-96
Bear River near Woodruff, UT (d)	10020500	a870	1943-61
Woodruff Creek below reservoir near Woodruff, UT (d)	10020900	50.0	1971-86
Woodruff Creek near Woodruff, UT (d)	10021000	a65	1938-43 1950-75
Birch Creek near Woodruff, UT (d)	10021500	a17	1949-56
Randolph Creek near Randolph, UT (d)	10024000	30.3	
Otter Creek near Randolph, UT (d)	10025000	36.2	1939-44
Bear River near Randolph, UT (d)	10026500	1,616	1943-92
Rock Creek near Fossil, WY (d)	10026800	49.0	1961-66
Twin Creek at Sage, WY (d)	10027000	246	1946-62
Bear River above Sublette Creek near Cokeville, WY (d)	10029500	a2,110	1948-55
Smiths Fork above Hobble Creek near Geneva, ID (d)	10031000	—	1944-46
Hobble Creek near Geneva, Id (d)	10031500	86.1	1943-46
Coal (Howland) Creek near Cokeville, WY (d)	10032500	—	1944-48 1953-56
Muddy Creek above Mill Creek near Cokeville, WY (d)	10032700	20.7	1964-69
Mill Creek near Cokeville, WY (d)	10032800	8.07	1965-69
Grade Creek near Cokeville, WY (d)	10033000	—	1944-48
Pine Creek above Diversions near Cokeville, WY (d)	10033500	—	1944-48 1953-56
Pine Creek above Covey Canal near Cokeville, WY (d)	10034500	—	1944-48 1953-56
Smiths Fork at Cokeville, WY (d)	10035000	275	1942-52
Spring Creek to Collette Creek near Cokeville, WY (d)	10036000	—	1944-45 1953-56
Birch Creek near Cokeville, WY (d)	10036500	—	1944-45
Hickman Canal near Cokeville, WY (d)	10037000	—	1944-48
George Bourne Canal near Cokeville, WY (d)	10037500	—	1944-48
Thomas Fork near Geneva, ID (d)	10040000	45.3	1939-51
Salt Creek near Geneva, ID (d)	10040500	37.6	1939-51
Thomas Fork near Wyoming-Idaho state line (d)	10041000	113	1949-92
Thomas Fork above Diversions near Geneva, ID (d)	10041500	—	1944-46
Thomas Fork near Raymond, ID (d)	10042500	202	1942-52
Bear River at Harer, ID (d)	10044000	2,839	1913-86
Dingle Inlet Canal near Dingle, ID (d)	10044300	—	1911-92

Station name	Station number	Drainage area (sq mi)	Period of record
BEAR RIVER BASIN--Continued			
Bear River at Dingle, ID (d)	10044500	a2,810	1903-14
Bear River below Stewart Dam near Montpelier, ID (d)	10046500	2,853	1922-92
Montpelier Creek near Montpelier, ID (d)	10047000	28.2	1939-44
Montpelier Creek below Diversions at Montpelier, ID (d)	10048500	—	1944-47
St. Charles Creek above Diversions near St. Charles, ID (d)	10054600	17.4	1944-45 1961-66
Bloomington Creek near Bloomington, ID (d)	10058500	22.1	1942-47
Bloomington Creek at Bloomington, ID (d)	10058600	24.0	1960-86
Paris Power Canal near Paris, ID (d)	10060000	—	1943-47
Paris Creek near Paris, ID (d)	10060500	18.6	1943-47
Slight Canyon Creek near Paris, ID (d)	10062000	6.81	1943-45
Mill Creek above West Fork near Liberty, ID (d)	10062500	18.4	1944-47
Mill Creek near Liberty, ID (d)	10063000	27.2	1943-47
Georgetown Creek near Georgetown, ID (d)	10069000	22.2	1911-14 1939-56
Georgetown Creek below diversions at Georgetown, ID (d)	10070500	—	1944-47
Skinner Creek at Nounan, ID (d)	10071500	5.41	1939-45
Stauffer Creek near Nounan, ID (d)	10072000	—	1939-44
Eightmile Creek near Soda Springs, ID (d)	10072800	22.6	1960-86
Eightmile Creek below Diversions near Soda Springs, ID (d)	10073500	31.0	1944-47
Soda Creek at Fivemile Meadow near Soda Springs, ID (d)	10076400	a49	1964-86
Soda Creek at Lau Ranch near Soda Springs, ID (d)	10076500	a49	1923-26
Soda Creek near Soda Springs, ID (d)	10077000	54.6	1913-26 1928-29
Soda Creek below Diversions at Soda Springs, ID (d)	10078000	—	1945-47
Treasureton Canal near Swan Lake, ID (d)	10083500	—	1939-46
Cottonwood Creek near Swan Lake, ID (d)	10084000	42.6	1939-46
Cottonwood Creek near Cleveland, ID (d)	10084500	61.7	1938-86
Mink Creek Canal near Mink Creek, ID (d)	10087000	—	1949-52
Mink Creek below Dry Fork near Mink Creek, ID (d)	10087500	19.3	1947-52 1955-62
Twin Lakes Canal near Mink Creek, ID (d)	10088000	—	1943-52
Preston Riverdale and Mink Creek Canal near Mink Creek, ID (d)	10088500	—	1943-52
Mink Creek near Mink Creek, ID (d)	10089500	58.7	1943-52
Bear River near Preston (at Battlecreek), ID (d)	10090500	4,545	1889-1919 1944-45 1981-86
Deep Creek near Clifton, ID (d)	10091200	107	1966-78
Bear River near Weston, ID (d)	10091500	4,880	1919-44
Weston Creek at Weston, ID (d)	10092000	a63	1942-44
Cub River Irrigation Company Pump Canal near Weston, ID (d)	10092500	—	1934-44
Cub River near Preston, ID (d)	10093000	19.4	1940-52 1955-86
Cub River-Worm Creek Canal near Preston, ID (d)	10094000	—	1943-52
Preston-Whitney Canal near Preston, ID (d)	10095000	—	1944-45 1946-52
Cub River Canal near Preston, ID (d)	10095500	—	1944-52
East Branch Cub River Canal near Lewiston, UT (d)	10095900	—	1962-63
Cub River above Maple Creek near Franklin, ID (d)	10096000	53.7	1940-52
Maple Creek near Franklin, ID (d)	10096500	21.2	1946-52
Worm Creek near Preston, ID (d)	10098500	11.0	1943-46
High Creek near Richmond, UT (d)	10099000	16.2	1944-52 1971-72 1978-89
Cub River near Richmond, UT (d)	10102200	222	1962-63 1999-2000
Bear River near Smithfield, UT (d)	10102250	5,193	1964-78 1990-95

Station name	Station number	Drainage area (sq mi)	Period of record
BEAR RIVER BASIN--Continued			
Summit Creek above diversions near Smithfield, UT (d)	10102300	11.6	1944-45 1961-79
Birch Creek at mouth near Smithfield, UT (d)	10103000	—	1944-45
South Fork Little Bear River near Avon, UT (d)	10104600	26.0	1966-74
Little Bear River below Davenport Creek near Avon, UT (d)	10104700	61.6	1960-92
East Fork Little Bear River above Reservoir near Avon, UT (d)	10104900	56.7	1964-86
East Fork Little Bear River (below Pole Creek) near Avon, UT (d)	10105000	49.7	1938-50
East Fork Little Bear River below Pole Creek near Avon, UT (d)	10105500	a67	1927-30
Little Bear River near Paradise, UT (d)	10106000	203	1937-86
Hyrum Reservoir near Hyrum, UT (e)	10107000	220	1938-80
Little Bear River near Hyrum, UT (d)	10107500	222	1938-74
Little Bear River at Wellsville, UT (d)	10107600	245	1966-68
Utah Power and Light Tailrace near Logan, UT (d)	10108000	—	1913-70
Logan, Hyde Park and Smithfield Canal near Logan, UT (d)	10108500	—	1904-07 1909-10 1912-64
Logan River near Logan, UT (d)	10109500	—	1896-1912
Logan Northern Canal near Logan, UT (d)	10110500	—	1913-16 1944-45
Logan River below Logan Northern Canal near Logan, UT (d)	10111000	—	1915-17
Blacksmith Fork below Mill Creek near Hyrum, UT (d)	10111700	78.0	1965-69 1985-92
Blacksmith Fork at Hardware Ranch near Hyrum, UT (d)	10112000	a130	1944-50
Blacksmith Fork at Municipal Powerplant near Hyrum, UT (d)	10112500	153	1929-35
Hyrum City Power Canal near Hyrum, UT (d) (Blacksmith Fork Municipal Powerplant Race)	10113000	—	1904-10 1914-17
Blacksmith Fork at U.P. & L. Plant near Hyrum, UT (d)	10114000	—	1914-16
Blacksmith Fork below U.P. & L. Plant near Hyrum, UT (d) (Blacksmith Fork at Hyrum)	10114500	286	1900-02 1904-10 1914-16
Logan River below Blacksmith Fork near Logan, UT (d)	10115200	524	1964-80
Clarkston Creek near Newton, UT (d)	10115500	a43	1939-47
Cutler Reservoir at Cache Junction, UT (e)	10116000	—	1944-50
West Canal above Salt Creek diversion near Tremonton, UT (d)	10117510	—	1980-84 1986
West Canal below Salt Creek diversion near Tremonton, UT (d)	10117530	—	1980-84 1986
Malad River below Springs near Malad City, ID (d)	10118200	a3.3	1931-32 1940-47
Warm Springs Canal near Samaria, ID (d)	10118300	—	1940-45
Malad River near Samaria, ID (d)	10118400	a31	1941-45
Little Malad River above Elkhorn Reservoir near Malad, ID (d)	10119000	a120	1911-13
Elkhorn Reservoir near Malad City (near Malad), ID (e)	10119500	153	1940-53
Little Malad River below Elkhorn Reservoir near Malad, ID (d)	10120000	153	1940-53
Little Malad River below Sand Ridge Dam near Malad, ID (d)	10120500	223	1945-51
Devil Creek above Campbell Creek near Malad City, ID (d)	10122500	a13	1938-61
Devil Creek above Evans Dividers near Malad City, ID (d)	10123000	a36	1940-43 1946-53
Devil Creek near Malad City (near Malad), ID (d)	10123500	a39	1931-40
Deep Creek below First Creek near Malad City, ID (d)	10125000	a32	1931-48
Malad River at Woodruff, ID (d)	10125500	a485	1938-82
Malad river near Plymouth, UT (d)	10125600	a632	1964-80
Bear River Duck Club near Bear River City, UT (d)	10125700	—	1964-73
Malad River below Bear River Duck Club Canal near Bear River City, UT (d)	10125800	a698	1964-74

Station name	Station number	Drainage area (sq mi)	Period of record
TRIBUTARIES TO GREAT SALT LAKE BETWEEN BEAR RIVER AND WEBER RIVER			
Sulphur Creek near Corinne, UT (d)	10126180	15.4	1972-86
Box Elder Creek at Mantua, UT (d)	10126400	14.0	1960-63
Box Elder Creek near Brigham City, UT (d)	10126500	33.4	1918-21
Box Elder Creek at Brigham City, UT (d)	10127000	34.2	1909-12
Salt Spring near Tremonton, UT (d)	10127040	—	1979-86
Salt Creek below Salt Spring near Tremonton, UT (d)	10127050	—	1979-86
Black Slough near Brigham City, UT (d)	10127100	31.1	1972-86
Highway 83 Culverts (d)	10127107	—	1980-86
Sulphur Creek & Black Slough (d)	10127108	—	1980-86
Culverts & Sulphur Creek & Black Slough (d)	10127109	—	1980-86
Bear River Basin outflow across State Hwy 83 near Corinne, UT (d)	10127110	—	1972-86
WEBER RIVER BASIN			
Smith and Morehouse Creek near Oakley, UT (d)	10128000	33.8	1947 1976-86
South Fork Weber River near Oakley, UT (d)	10128200	a16	1965-74
Weber Provo Diversion Canal at Oakley, UT (d)	10129000	—	1931-69
Weber River near Peoa, UT (d)	10129300	296	1957-77
Crandall Creek near Peoa, UT (d)	10129350	11.8	1963-73
Rockport Reservoir near Wanship, UT (e)	10129400		1957-99
Silver Creek near Wanship, UT (d)	10130000	27.9	1942-46 1982-85 1990-96
East Fork Chalk Creek near Coalville, UT (d)	10130700	a35	1965-74
Echo Reservoir at Echo (e)	10131500		1931-99
Lost Creek Reservoir near Croydon (e)	10132490		1967-99
Lost Creek at Croydon, UT (d)	10132900	a220	1966-67
Lost Creek at Devils Slide (near Croydon), UT (d)	10133000	223	1905 1921-33
Weber River at Devils Slide, UT (d)	10133500	1,192	1905-55
Kimball Creek above East Canyon Creek near Park City, UT (d)	10133540	12.2	1990-96
Threemile Creek near Park City, UT (d)	10133700	2.68	1964-74 1982-84
East Canyon Cr above Big Bear Hollow, near Park City, UT	10133895	75.0	1990-96
East Canyon Creek near Park City, UT (d)	10133900	68.9	1982-84
East Canyon Reservoir near Morgan, UT (e)	10134000		1932-99
Hardscrabble Creek near Porterville, UT (d)	10135000	28.0	1937-40 1941-70
East Canyon Creek below diversions near Morgan, UT (d)	10135500	—	1951-55
Weber River near Morgan, UT (d)	10136000	a1,500	1951-55
Weber River at Ogden, UT (d)	10137000	a1,670	1951-58
Causey Reservoir near Huntsville, UT (e)	10137290	92.2	1966-68
South Fork Ogden River below Causey Dam near Huntsville, UT (d)	10137300	92.3	1966-67
South Fork Ogden River at Huntsville, UT (d)	10137600	a170	1937-57 1959-65
North Fork Ogden River near Eden, UT (d)	10137680	6.03	1964-74
North Fork River near Huntsville, UT (d)	10137700	61.4	1960-65
Middle Fork Ogden River above diversion near Huntsville, UT (d)	10137780	31.3	1964-74
Middle Fork Ogden River at Huntsville, UT (d)	10137800	32.9	1958-65
Spring Creek at Huntsville, UT (d)	10137900	a7.2	1958-65
Pineview Reservoir near Ogden, UT (e)	10139000		1937-68 1990-99
Wheeler Creek near Huntsville, UT (d)	10139300	11.1	1959-95
Ogden River near Ogden, UT (d)	10139500	321	1904-12 1931-59
Ogden River below Pineview Dam near Ogden, UT (d)	10140000	321	1937-59
Ogden River at Powder Mill near Ogden, UT (d)	10140500	a360	1889-90 1897-98

WEBER RIVER BASIN—Continued

Station name	Station number	Drainage area (sq mi)	Period of record
Willard Bay Reservoir near Plain City, UT (e)	10408000	—	1965-81
Hooper Slough near Hooper, UT (d)	10141040	13.0	1975-83
South Fork Weber Canal near Hooper, UT (d)	10141050	—	1972-76
South Fork Weber River near Hooper, UT (d)	10141100	—	1972-75
Middle Fork Weber River near Hooper, UT (d)	10141150	—	1971-75
North Fork Weber River near Hooper, UT (d)	10141200	—	1971-75

TRIBUTARIES TO GREAT SALT LAKE BETWEEN WEBER RIVER AND JORDAN RIVER

Station name	Station number	Drainage area (sq mi)	Period of record
Storm Drain at 1700 North 475 West, Sunset, UT (d)	10141395	0.28	1948-83
Howard Slough at Hooper, UT (d)	10141400	—	1952-55 1972-84
Holmes Creek near Kaysville, UT (d)	10141500	2.49	1951-66
Farmington Creek above diversions near Farmington, UT (d)	10142000	10.0	1950-71
Ricks Creek above diversions, near Centerville, UT (d)	10142500	2.35	1951-66
Parrish Creek above diversions near Centerville, UT (d)	10143000	2.08	1950-68
Stone Creek above diversions near Bountiful, UT (d)	10144000	4.48	1951-66
Mill Creek at Mueller Park near Bountiful, UT (d)	10145000	8.88	1951-68
Storm Drain east of Orchard Drive at Bountiful, UT (d)	10145125	0.80	1949-83
Storm Drain to Mill Creek, 620 South 200 West, Bountiful, UT (d)	10145126	0.28	1949-83
Salt Creek near Nephi, UT (d)	10145500	a95	1925-38

JORDAN RIVER BASIN

Station name	Station number	Drainage area (sq mi)	Period of record
Currant Creek near Goshen, UT (d)	10146500	303	1954-60
Summit Creek near Santaquin, UT (d)	10147000	19.2 14.6	1911-16 1955-66
Payson Creek above diversions, near Payson, UT (d)	10147500	18.8	1948-62
Payson Creek (Peteetneet Creek) near Payson, UT (d)	10148000	25.6	1910-16
Tie Fork near Soldier Summit, UT (d)	10148200	19.4	1964-96
Nebo Creek near Thistle, UT (d)	10148400	36.7	1964-73
Spanish Fork at Thistle, UT (d)	10148500	450	1908-25 1932-74
Spanish Fork below Halls Falls near Thistle, UT (d)	10148510	452	1983-92
Diamond Fork below Red Hollow, near Thistle, UT (d)	10149500	107	1953-69 1989-2001
Diamond Fork near Thistle, UT (d)	10150000	141	1908-17 1940-55
U.S. Bureau of Reclamation Power Canal near Spanish Fork, UT (d)	10151000	—	1909-17
Spanish Fork near Spanish Fork, UT (d)	10151500	a670	1909-17
Spanish Fork near Lakeshore, UT (d)	10152000	675	1904-07 1909-25 1938-88
Spanish Fork at mouth near Lake Shore, UT (d)	10152001	—	1978-82
Hobble Creek near Springville, UT (d)	10152500	105	1904-16 1945-74
Maple Creek near Mapleton, UT (d)	10152700	3.13	1965-72
Maple Creek near Springville, UT (d)	10153000	10.8	1912-13
Provo River near Kamas, UT (d)	10153500	29.6	1950-69
North Fork Provo River near Kamas, UT (d)	10153800	24.4	1964-96
Shingle Creek near Kamas, UT (d)	10154000	a8.4	1963-73
Weber-Provo diversion canal near Woodland, UT (d)	10154500	---	1989-98
Provo River below Jordanelle Dam, near Heber, UT (d)	10155100	252	1991-94
Daniels Creek above diversions near Heber City (d)	10157000	37.2	1992-98
Round Valley Creek near Wallsburg, UT (d)	10158500	71.9	1938-50
Deer Creek Reservoir near Charleston, UT (e)	10159000	560	1940-68
Deer Creek near Wildwood, UT (d)	10160000	a26	1939-50
Provo River near Wildwood, UT (d)	10160500	574	1939-49
North Fork Provo River at Wildwood, UT (d)	10160800	12.3	1965-74
Provo River at Vivian Park, UT (d)	10161000	598	1912-63

Station name	Station number	Drainage area (sq mi)	Period of record
JORDAN RIVER BASIN-—Continued			
South Fork Provo River at Vivian Park, UT (d)	10161500	33.4	1912-62
Provo River above Telluride Power Company Dam near Provo, UT (d)	10162000	a640	1905-11
Provo River at mouth of canyon near Provo, UT (d)	10162500	a640	1889-1906
Rock Creek Overflow east of Highway 189 near Provo, UT (d)	10162850	0.66	1948-83
South Fork of American Fork near American Fork, UT (d)	10164000	8.87	1912-14
American Fork (River) near American Fork, UT (d)	10165000	a66	1889-90 1897 1900-01 1903-05
Dry Creek near Alpine, UT (d)	10165500	9.82	1948-55
Fort Creek at Alpine, UT (d)	10166000	6.55	1947-55
Utah Lake near Lehi (at Geneva) (near Spanish Fork), UT (e)	10166500	2,965	1883-1960
Jordan River at Narrows, near Lehi, UT (d)	10167000	3,010	1904 1913-88
Jordan River Station No. 1 at Narrows, UT (d)	10167001	—	1980-83
East Jordan Canal at Jordan Narrows near Bluffdale, UT (d)	10167100	—	1980-83
East Jordan Canal at Little Cottonwood Creek near Sandy, UT (US) (d)	10167105	—	1980-82
East Jordan Canal at Little Cottonwood Creek near Sandy, UT (DS) (d)	10167106	—	1980-82
East Jordan Canal at pumphouse at 6200 South near Murray, UT (d)	10167115	—	1980-82
Upper Canal at 5800 South (Tolcate Lane) near Murray, UT (d)	10167122	—	1980-82
Upper Canal at Wild Rose Lane near Salt Lake City, UT (d)	10167125	—	1980-82
Faust Creek below Tooele City well near Vernon, UT (d)	10172726	—	1992-96
Upper Canal at Mill Creek (2000 East) near Salt Lake City, UT (d)	10167127	—	1980-81
Jordan & Salt Lake Canal at Little Cottonwood Creek near SLC, UT (US) (d)	10167141	—	1980-82
Jordan & Salt Lake Canal at Little Cottonwood Creek near SLC, UT (DS) (d)	10167142	—	1980-82
Jordan & Salt Lake Canal at Big Cottonwood Creek near Murray, UT (US) (d)	10167145	—	1980-81
Jordan & Salt Lake Canal at Big Cottonwood Creek near Murray, UT (DS) (d)	10167146	—	1980-81
Jordan & Salt Lake Canal at Mill Creek near Salt Lake City, UT (US) (d)	10167147	—	1980-82
Jordan & Salt Lake Canal at Mill Creek near Salt Lake City, UT (DS) (d)	10167148	—	1980-82
Jordan & Salt Lake Canal at Zenith Avenue near Salt Lake City, UT (d)	10167149	—	1980-81
Utah & Salt Lake Canal at Jordan Narrows near Bluffdale, UT (d)	10167160	—	1980-83
Jordan River at 9400 South near South Jordan, UT (d)	10167200	q3,130	1965-67
Bells Canyon Conduit 1000 East 110000 South (d)	10167220	—	1948-81 1982-86
Jordan River at 90th South near Midvale, UT (d)	10167230	q3,130	1980-84 1986-89
90th South Conduit at Jordan River near Midvale, UT (d)	10167240	—	1980-84
I-215 Median Drain at Jordan River near Murray, UT (d)	10167242	0.20	1984-86
Jordan River at 5800 South near Salt Lake City, UT (d)	10167300	q3,254	1965-68 1980-85
Little Cottonwood Creek (channel) near Salt Lake City, UT (d)	10167499	—	1980-88
Little Cottonwood Creek near Salt Lake City, UT (d)	10167500	27.4	1898-99 1904-68 1980
Little Cottonwood Creek at 2050 East near Salt Lake City, UT (d)	10167700	35.2	1963-67 1979-81 1983-87
Little Cottonwood Creek at Crestwood Park at Salt Lake City, UT (d)	10167800	36	1999-2000
Big Cottonwood Creek (Cottonwood Creek) near Salt Lake City, UT (d)	10168500	50.0	1898-1967
Big Cottonwood Creek at 5550 South near Salt Lake City, UT (d)	10168800	57.3	1964-68 1980-89
Neffs Creek above Wasatch Boulevard near Salt Lake City, UT (d)	10168832	—	1984-86
Spring Run at 9th East & 48th South near Murray, UT (d)	10169000	—	1933-35
Big Cottonwood Creek at Jordan River near Salt Lake City, UT (d) (at 2nd West near Murray, UT)	10169500	a78	1933-35 1980-82 1987-88
Mill Creek above Elbow Fork near Salt Lake City, UT (d)	10169800	7.7	1964-68

Station name	Station number	Drainage area (sq mi)	Period of record
JORDAN RIVER BASIN-—Continued			
Mill Creek near Salt Lake City, UT (d)	10170000	21.7	1964-68 1980
Boundry Springs near Salt Lake City, UT (d)	10170001	—	1963-67
Mill Creek at 2200 East near Salt Lake City, UT (d)	10170200	22.6	1963-67
Mill Creek at Jordan River near Salt Lake City, UT (d)	10170250	a32	1984 1986-88
North Point Canal below Goss Flume at Salt Lake City, UT (d)	10170700	—	1963-67 1979-83
Surplus Canal at North Temple at Salt Lake City, UT (d)	10170750	—	1976-82
Surplus Canal at Cohen Flume near Salt Lake City, UT (d)	10170800	—	1963-67
Parleys Creek near Salt Lake City, UT (d)	10171500	50.1	1898-1963
Parleys Creek at Suicide Rock near Salt Lake City, UT (d)	10171600	50.7	1964-68 1980-88
Emigration Creek below Burr Fork near Salt Lake City, UT (d)	10171900	5.9	1964-68
Emigration Creek near Salt Lake City, UT (d)	10172000	18.4	1898-1960 1960-68 1980-86
Emigration Creek below 1300 East at Salt Lake City, UT (d)	10172100	a9	1963-67
Red Butte Creek below reservoir near Salt Lake City, UT (d)	10172220	7.95	1942-67 1980-88
1300 South Conduits at Jordan River, combined flows (d)	10172350	—	1981 1987-88
South Conduit of 1300 South Conduit at Jordan River, Salt Lake City, UT (d)	10172351	—	1986-89
North Conduit of 1300 South Conduit at Jordan River, Salt Lake City, UT (d)	10172352	—	1980-81 1985-89
City Creek above Wasatch Drive, near Salt Lake City, UT (d)	10172400	17.0	1964-68
City Creek near Salt Lake City, UT (d)	10172500	19.2	1898-1960 1960-69 1980
Jordan River at 5th North at Salt Lake City, UT (d)	10172550	—	1975-86
Jordan River at Cudahy Lane near Salt Lake City, UT (d)	10172600	q3,590	1963-68 1974-76
Sewage Canal at Cudahy Lane near Salt Lake City, UT (d)	10172620	—	1963-67
Storm Drain at International Center near Salt Lake City, UT (d)	10172624	0.08	1984-86
Goggin Drain near Magna, UT (d)	10172630	—	1964-67 1972-84
Lee Creek near Magna, UT (d)	10172640	—	1972-82
Kennecott Drain near Magna, UT (d)	10172650	—	1964-67 1972-84
RUSH VALLEY			
East Government Creek Tributary near Vernon, UT (d)	10172720	a0.98	1961-74
TOOELE VALLEY			
Faust Creek below Tooele City Well near Vernon, UT (d)	10172726	—	1992-96
Clover Creek above Big Hollow, near Clover, UT (d)	10172765	6.71	1985-2001
Settlement Creek above reservoir near Tooele, UT (d)	10172791	16.8	1988-98
Middle Canyon Creek near Tooele, UT (d)	10172794	12.1	1984-86
Box Elder Wash near Grantsville, UT (d)	10172795	9.84	1986-94
North Willow Creek near Grantsville, UT (d)	10172805	5.38	1979-92
GREAT SALT LAKE DESERT			
Deep Creek near Goshute, UT (d)	10172893	a43	1964-68
Great Salt Lake West Pond near Wendover, UT (e)	10172903	—	1987-89
Pine Creek near Grouse Creek, UT (d)	10172921	—	1972-73
Dove Creek near Park Valley, UT (d)	10172940	33.2	1959-68 1971-73
Fisher Creek near Park Valley, UT (d)	10172950	—	1972-73

Station name	Station number	Drainage area (sq mi)	Period of record
GREAT SALT LAKE DESERT--Continued			
Indian Creek near Park Valley, UT (d)	10172955	—	1971-73
West Locomotive Spring at Locomotive Spring near Snowville, UT (d)	10172963	—	1969-73
Baker Spring at Locomotive Spring near Snowville, UT (d)	10172964	—	1969-73
Bar M Spring at Locomotive Spring near Snowville, UT (d)	10172965	—	1969-80
Off Spring at Locomotive Spring near Snowville, UT (d)	10172967	—	1969-80
Sparks Spring at Locomotive Spring near Snowville, UT (d)	10172968	—	1969-80
SEVIER LAKE BASIN			
Hatch Bence Canal near Hatch, UT (d)	10173000	—	1914 1916-19
Mammoth Creek near Hatch, UT (d)	10173500	151	1912-14 1915-19
Midway Creek near Hatch, UT (d)	10173600	25.7	1958-62
Navajo Lake west of Dyke near Hatch, UT (e)	10173700	—	1954-59
Duck Creek near Hatch, UT (d)	10173900	—	1954-59
Asay Creek above West Fork near Hatch, UT (d)	10174000	105	1954-59
Asay Creek near Hatch, UT (d)	10174200	a96	1912-14 1939-41
Red Canyon Tributary near Bryce Canyon, UT (d)	10174800	a2.2	1959-74
State Canal near Panquitch, UT (d)	10175500	—	1913-19
Long Canal near Panquitch, UT (d)	10176000	—	1914-19
Panquitch Creek near Panguitch, UT (d)	10176300	97.0	1961-80
East Panquitch Canal near Panguitch, UT (d)	10176500	—	1914-19
Panguitch Creek above Canals near Panguitch, UT (d)	10177000	a110	1915-20
Panguitch Creek below Canals at Panguitch, UT (d)	10177500	—	1915 1917-18
Barton and LeFevere Canal near Panguitch, UT (d)	10178000	—	1915-19
McEwen Canal near Panguitch, UT (d)	10178500	—	1914-19
Old Houston Canal near Panguitch, UT (d)	10179000	—	1915-19
Sevier River near Circleville, UT (d)	10180000	986	1912 1914-27 1950-95
Fox Canal near Circleville, UT (d)	10180500	—	1914-19
Circleville Canal near Circleville, UT (d)	10181000	—	1914-19
Old Kingston Canal near Circleville, UT (d)	10181500	—	1914-19
Dalton Canal at Circleville, UT (d)	10182000	—	1914-19
Mitchell Slough Canal near Junction, UT (d)	10182500	—	1914-19
Junction Middle Canal near Junction, UT (d)	10183000	—	1915-19
East Fork Sevier River near Ruby’s Inn, UT (d)	10183900	71.6	1962-95
Tropic and East Fork Canal near Tropic, UT (d)	10184000	—	1950-61
East Fork Sevier River near Antimony, UT (d)	10184450	a570	1961-66
Coyoto Canal near Coyoto, UT (d)	10184500	—	1916-19
Antimony Creek near Antimony, UT (d)	10185000	50.3	1946-48 1957-76
East Fork Sevier River at Antimony (Coyoto), UT (d)	10185500	—	1915-19
Otter Creek Reservoir Feeder Canal at mouth near Coyoto, UT (d)	10186500	—	1915-20
Otter Creek near Koosharem, UT (d)	10187300	23.5	1964-82
Otter Creek above reservoir near Antimony, UT (d)	10187500	322	1915-20 1961-64 1971-80
Otter Creek Reservoir near Antimony, UT (e)	10188000	373	1914-15 1934-95
Otter Creek near Antimony (Coyoto), UT (d)	10188500	—	1913-19
Combined Flow Sevier River and East Fork Sevier River (d)	10189001	—	1915-77
Kingston Canal at Kingston, UT (d)	10189500	—	1914-19
Sevier River near Junction, UT (d)	10190500	a2,390	1911-16
Piute Reservoir near Marysvale, UT (e)	10191000	2,438	1914-95
Sevier River near Marysvale, UT (d)	10192000	a2,560	1906-11

Station name	Station number	Drainage area (sq mi)	Period of record
SEVIER LAKE BASIN—Continued			
Sevier River at Marysvale, UT (d)	10192500	a2,580	1912-14
Pine (Bullion) Creek at Marysvale, UT (d)	10193500	a29	1914 1918-19
Sevier River above Clear Creek, near Sevier, UT (d)	10194000	2,707	1911-16 1939-55 1961-95
Cove Canal at Sevier, UT (d)	10194500	—	1914-19
Clear Creek at Sevier, UT (d)	10195000	169	1912-19 1934-58
Sevier River at Sevier, UT (d)	10195500	a2,850	1917-29
Monroe South Bend Canal near Joseph, UT (d)	10196000	—	1914-19
Sevier Valley Canal near Joseph, UT (d)	10196500	—	1912-19
Joseph Canal near Joseph, UT (d)	10197000	—	1914-19
Sevier Valley Canal near Richfield, UT (d)	10198000	—	1912-19
State Canal near Redmond, UT (d)	10200000	—	1913-19
Wells Canal near Joseph, UT (d)	10200500	—	1914-19
Monroe Canal near Elsinore, UT (d)	10201000	—	1914-19
Elsinore Canal near Elsinore, UT (d)	10201500	—	1914-19
Brooklyn Canal near Elsinore, UT (d)	10202000	—	1914-19
Richfield Canal near Elsinore, UT (d)	10202500	—	1914-19
Annabella Canal at Elsinore, UT (d)	10203000	—	1914-19
Vermilion Canal near Richfield, UT (d)	10203500	—	1914-19
Sevier River near Richfield, UT (d)	10204000	—	1916-18
Mill Creek near Glenwood, UT (d)	10204200	18.9	1963-74
Rockyford Canal near Vermilion, UT (d)	10204500	—	1914-35
Sheep Creek near Salina, UT (d)	10205100	0.30	1958-69
West Fork Sheep Creek near Salina, UT (d)	10205200	0.43	1958-69
Sheep Creek at mouth near Salina, UT (d)	10205300	1.47	1958-69
Salina Creek at Salina, UT (d)	10206000	292	1914-16 1918-19 1943-55 1960-95
Sevier River below Salina Creek near Salina, UT (d)	10206001	—	1985-86
West View Canal at Redmond, UT (d)	10206500	—	1914-19
Fayette Canal near Centerfield, UT (d)	10207000	—	1914-19
Dover Canal near Gunnison, UT (d)	10207500	—	1914-19
Sevier River near Gunnison, UT (d)	10208000	a3,990	1901-17
Oak Creek near Fairview, UT (d)	10208500	11.8	1965-89
Pleasant Creek near Mount Pleasant, UT (d)	10210000	—	1955-75
Twin Creek near Mount Pleasant, UT (d)	10211000	a5.9	1955-66
San Pitch River near Mount Pleasant, UT (d)	10210500	170	1988-89
Big Hollow at Fountain Green, UT (d)	10215500	—	1965-68
Oak Creek near Spring City, UT (d)	10215700	8.35	1964-74 1979-94
Gunnison Reservoir near Sterling, UT (e)	10216200	a670	1966-83
San Pitch River near Sterling, UT (d)	10216210	672	1965-80
Twelvemile Creek near Mayfield, UT (d)	10216400	59.4	1960-80
San Pitch River near Gunnison, UT (d)	10216500	886	1900-05 1912-18 1952
Sevier River at Clark’s Bridge near Fayette, UT (d)	10217500	a4,960	1914-16
Sevier Bridge Reservoir near Juab, UT (e)	10218500	5,155	1914-95
Wellington Canal near Mills, UT (d)	10219100	—	1914-18
Chicken Creek near Levan, UT (d)	10219200	27.9	1963-95
Sevier River near Mills, UT (d)	10220000	a5,800	1914-17
Sevier River Land and Water Company Canal near Leamington, UT (d)	10220500	—	1914-19
McIntyre Canal near Leamington, UT (d)	10222500	—	1914-18
Leamington Canal near Leamington, UT (d)	10223000	—	1914-19

Station name	Station number	Drainage area (sq mi)	Period of record
SEVIER LAKE BASIN—Continued			
Sevier River at Leamington, UT (d)	10223500	a5,860	1889-93 1912-14
Oak Creek above Little Creek, near Oak City, UT (d)	10224100	5.58	1964-97
Oak Creek below Big Spring near Oak City, UT (d)	10224300	17.8	1979-86
Delta and Melville Reservoir near Delta, UT (e)	10224500	—	1914-17
Canal A (Delta and Melville Canal) near Delta, UT (d)	10225000	—	1912-19
Sevier River near Delta, UT (d)	10228000	a7,380	1912-19
Gunnison Bend Reservoir near Delta, UT (e)	10228500	—	1914-19
Sevier River at Oasis, UT (d)	10231500	a8,080	1912-27
Chalk Creek near Fillmore, UT (d)	10232500	58.7	1914 1945-71
Meadow Creek near Meadow, UT (d)	10233000	11.6	1914 1965-75
Corn Creek near Kanosh, UT (d)	10233500	—	1914 1965-75
Three Creeks near Beaver, UT (d)	10234000	19.5	1947-61
South Creek near Beaver, UT (d)	10235000	14.7	1906 1965-76
North Fork North Creek above Pole Creek near Beaver, UT (d)	10235500	a6.9	1947-49
North Fork North Creek near Beaver, UT (d)	10236000	14.1	1906 1966-76
South Fork North Creek near Beaver, UT (d)	10236500	23.0	1906 1966-76
Indian Creek near Beaver, UT (d)	10237500	18.5	1906 1947-49 1965-76
Indian Creek at Adamsville, UT (d)	10238000	a180	1914-16
Minersville Reservoir near Minersville, UT (e)	10238500	534	1915-22 1938-95
Minersville Canal at Minersville, UT (d)	10239500	—	1906 1914 1951-55
Beaver River at Minersville, UT (d)	10240000	a560	1909-13 1951-55
Beaver River near Milford, UT (d)	10241000	a1,100	1952-55
PAROWAN VALLEY			
Little Creek near Paragonah, UT (d)	10241400	15.8	1960-80
Red Creek near Paragonah, UT (d)	10241430	a6.3	1965-75
Center Creek above Parowan Creek near Parowan, UT (d)	10241470	11.6	1965-87
Center Creek near Parowan, UT (d)	10241500	a60	1943-50
Summit Creek near Summit, UT (d)	10241600	24.0	1965-87
CEDAR VALLEY, IRON COUNTY			
Ashdown Creek near Cedar City, UT (d)	10241800	13.1	1958-61
Grassy Creek near Enterprise, UT (d)	10242430	a2.5	1965-68
SNAKE VALLEY			
Snake Creek near Baker, NV (d)	10243230	a30	1913-15
Baker Creek at Narrows near Baker, NV (d)	10243240	16.4	1947-55
Baker Creek near Baker, NV (d)	10243250	a10	1913-15
Lehman Creek near Baker, NV (d)	10243260	a11	1947-55
SNAKE RIVER BASIN			
George Creek near Yost, UT (d)	13077700	7.84	1959-89
Clear Creek near Naf, ID (d)	13079000	20.2	1910-11 1944-70

DISCONTINUED SURFACE-WATER-QUALITY STATIONS

The following stations were discontinued as continuous-record surface-water-quality stations prior to the 2003 water year. Records of (b) microbiological, (c) chemical and/or specific conductance, (s) sediment, or (t) water temperature were collected and published for each station. Period of record indicates first and last year of sampling. Sampling may not have occurred during every year indicated in the period of record. Abbreviation: a, approximate.

Station Name	Station Number	Drainage Area (sq mi)	Type of Water Quality	Period of Record
COLORADO RIVER BASIN				
Cottonwood Wash at I-70 near Cisco, UT	09163675	170	c,s,t	1983-86
TRIBUTARIES BETWEEN DOLORES RIVER AND GREEN RIVER				
Onion Creek above Onion Creek Bridge near Moab, UT	09180920	2.90	c,t	1980-81
Onion Creek below Onion Creek Bridge near Moab, UT	09180970	14.50	c,t	1980-81
Castle Creek above diversions, near Moab, UT	09182000	7.58	c,t	1971-75
Colorado River at Highway Bridge near Moab, UT	09182880	---	c,t	1974-79
Courthouse Wash near Moab, UT	09183000	162	c,t	1971-89
Colorado River above Mill Creek near Moab, UT	09183210	---	c,t	1974-81
Mill Creek near Moab, UT	09184000	74.90	c,s,t	1971-91
Indian Creek Tunnel near Monticello, UT	09185800	2.45	c,t	1971-80
Indian Creek above Cottonwood Creek, near Monticello, UT	09186500	31.20	c,t	1988-91
Indian Creek below Bogus Pocket, near Monticello, UT	09187550	262	c,s,t	1983-88
GREEN RIVER BASIN				
Red Creek near Dutch John, UT	09234700	140	c,s,t	1971-76
Crouse Creek near Vernal, UT	09235100	30.2	c,t	1987-90
Pot Creek above diversions, near Vernal, UT	09235600	24.6	c,t	1971-91
Pot Creek near Vernal, UT	09235800	107	c,t	1971-82
ASHLEY CREEK BASIN				
Big Brush Creek near Vernal, UT	09262000	79.6	c,t	1908-81
Ashley Creek above Red Pine Creek near Vernal, UT	09265300	55.8	c,t	1971-75
Dry Fork above sinks, near Dry Fork, UT	09268000	44.4	c,t	1954-75
North Fork of Dry Fork near Dry Fork, UT	09268500	8.62	c,t	1955-89
Brownie Canyon above sinks, near Dry Fork, UT	09268900	8.24	c,t	1971-89
Dry Fork at mouth near Dry Fork, UT	09270500	115	c,t	1954-89
Ashley Creek at Sign of the Maine, near Vernal, UT	09271000	241	c,t	1947-74
Ashley Creek near Jensen, UT	09271500	383	c,t	1947-91
DUCHESNE RIVER BASIN				
West Fork Duchesne River below Vat Diversion near Hanna, UT	09274900	40.0	c,t	1990-91
West Fork Duchesne River below Dry Hollow near Hanna, UT	09275000	43.8	c,t	1957-81
West Fork Duchesne River near Hanna, UT	09275500	61.6	c,t	1948-91
Wolf Creek above Rhoades Canyon near Hanna, UT	09276000	10.6	c,t	1951-84
Duchesne River at Hanna, UT	09277000	a230	c,t	1956-73
Rock Creek above South Fork, near Hanna, UT	09277800	98.9	c,t	1951-91
South Fork Rock Creek near Hanna, UT	09278000	15.7	c,t	1951-91
Rock Creek near Hanna, UT	09278500	122	c,t	1957-88
Rock Creek below Miners Gulch near Hanna, UT	09278700	133	c,t	1974-81
Duchesne River at Duchesne, UT	09279500	a660	c,t	1941-74
Hobble Creek at Daniels Summit near Wallsburg, UT	09280400	2.89	c,t	1971-84
Strawberry River near Soldier Springs, UT	09285000	213	c,t	1951-91
Strawberry River above Red Creek near Fruitland, UT	09285700	363	c,t	1941-81
Strawberry River at Pinnacles near Fruitland, UT	09285900	380	c,t	1990-91
Red Creek above reservoir, near Fruitland, UT	09286100	31.4	c,t	1987-91
Currant Creek below Currant Creek Dam, near Fruitland, UT	09286700	48.0	c,t	1983-91
Currant Creek below Red Ledge Hollow near Fruitland, UT	09287000	50.1	c,t	1951-83
Water Hollow near Fruitland, UT	09287500	13.8	c,t	1956-84
Red Creek below Currant Creek near Fruitland, UT	09288100	297	c,t	1971-81
West Fork Avintaquin Creek near Fruitland, UT	09288150	56.1	c,t	1971-86
Strawberry River below Starvation Reservoir near Duchesne, UT	09288400	1,059	c,t	1989-91
Strawberry River at Duchesne (Theodore), UT	09288500	1,066	c,t	1941-74
Sowers Creek near Duchesne, UT	09288900	40.6	c,t	1971-86
Lake Fork River below Taskeech Damsite near Mountain Home, UT	09291200	138	c,t	1977-84

Station Name	Station Number	Drainage Area (sq mi)	Type of Water Quality	Period of Record
DUCHESNE RIVER BASIN—Continued				
Yellowstone River at mouth near Altonah, UT	09293000	142	c,t	1977-81
Lake Fork River (below Forks) near Altonah, UT	09293500	304	c,t	1949-81
Lake Fork River at Highway 87 near Altamont, UT	09293600	318	c,t	1977-81
Pigeon Water Creek near Altamont, UT	09293700	95.5	c,t	1977-94
Lake Fork River near Upalco, UT	09294000	427	c,t	1941-81
Lake Fork River near Myton, UT	09294500	484	c,t	1941-94
Uinta River near Neola, UT	09297000	163	c,t	1941-83
West Channel Uinta River below diversion works near Whiterocks, UT	09297600	216	c,t	1977-81
East Channel Uinta River below diversion works near Whiterocks, UT	09297700	215	c,t	1977-81
East Channel Uinta River at county road bridge near Whiterocks, UT	09297800	253	c,t	1977-81
East Channel Uinta River at LaPoint Road near LaPoint, UT	09297900	382	c,t	1977-81
Farm Creek near Whiterocks, UT	09298000	14.9	c,t	1971-81
Whiterocks River below damsite near Whiterocks, UT	09299400	110	c,t	1977-81
Whiterocks River below Farm Creek Canal near Whiterocks, UT	09299600	120	c,t	1977-81
Whiterocks River 1 Mile East of Whiterocks, UT	09299700	124	c,t	1977-81
Deep Creek at State Highway 246 near LaPoint, UT	09299900	72.2	c,t	1977-79
Uinta River at Fort Duchesne, UT	09300500	557	c,t	1941-81
Dry Gulch near Fort Duchesne, UT	09301200	469	c,t	1977-81
Uinta River at Randlett, UT	09301500	1,064	c,s,t	1950-94
WHITE RIVER BASIN				
White River near Colorado State Line, UT	09306395	3,680	c,s,t	1976-85
White River above Hells Hole Canyon near Watson, UT	09306400	a3,700	c,s,t	1974-76
Hells Hole Canyon Creek at mouth near Watson, UT	09306405	24.5	c,s,t	1975-82
Evacuation Creek above Missouri Creek near Dragon, UT	09306410	100	c,s,t	1974-83
Evacuation Creek below Park Canyon near Watson, UT	09306415	246	c,s,t	1974-75
Evacuation Creek at Watson, UT	09306420	259	c,s,t	1948-77
Evacuation Creek near mouth near Watson, UT	09306430	284	c,s,t	1974-83
White River below Southam Canyon near Watson, UT	09306600	a4,030	c,s,t	1974-76
White River below Asphalt Wash near Watson, UT	09306700	a4,130	c,s,t	1974-83
Bitter Creek above Dick Canyon near Watson, UT	09306740	11.7	c,s,t	1974-78
Sweetwater Canyon below South Canyon near Watson, UT	09306760	22.6	c,s,t	1974-78
Sweetwater Canyon Creek near mouth near Watson, UT	09306780	124	c,s,t	1975-78
Bitter Creek near Bonanza, UT	09306800	324	c,s,t	1971-88
Bitter Creek at mouth near Bonanza, UT	09306850	398	c,s,t	1974-83
Coyote Wash near mouth near Ouray, UT	09306878	228	c,s,t	1976-83
White River at mouth near Ouray, UT	09306900	5,120	b,c,s,t	1974-86
TRIBUTARIES BETWEEN DUCHESNE RIVER AND PRICE RIVER				
Green River near Ouray, UT	09307000	a35,500	c,s,t	1950-66
Pariette Draw near Ouray, UT	09307200	153	c,s,t	1975-84
Pariette Draw near Eight Mile Flat, near Myton, UT	09307250	---	c,s,t	1975-82
Pariette Draw at mouth near Ouray, UT	09307300	298	c,s,t	1975-91
Willow Creek above diversions near Ouray, UT	09307500	297	c,s,t	1969-83
Hill Creek above Towave Reservoir near Ouray, UT	09307800	89.7	c,s,t	1974-81
Hill Creek near mouth near Ouray, UT	09307900	288	c,s,t	1975-81
Willow Creek near Ouray, UT	09308000	897	c,s,t	1950-83
Minnie Maud Creek near Myton, UT	09308500	32.0	c,t	1971-89
PRICE RIVER BASIN				
Boardinghouse Creek at mouth near Scofield, UT	09310575	2.04	c,s,t	1982-84
Eccles Canyon near Scofield, UT	09310600	5.5	b,c,s,t	1979-84
Price River near Scofield, UT	09311500	a155	c,t	1962-80
Beaver Creek near Soldier Summit, UT	09312700	26.1	c,t	1969-89
Willow Creek near Castle Gate, UT	09312800	62.8	c,t	1969-89
Willow Creek at Castle Gate, UT	09312900	77.4	b,c,s,t	1979-81
Spring Canyon below Sowbelly Gulch at Helper, UT	09313040	23.0	c,s,t	1978-81

Station Name	Station Number	Drainage Area (sq mi)	Type of Water Quality	Period of Record
Coal Creek near Helper, UT	09313965	25.3	b,c,s,t	1976-81
PRICE RIVER BASIN--Continued				
Soldier Creek below mine near Wellington, UT	09313975	17.7	b,c,s,t	1969-84
Dugout Creek near Sunnyside, UT	09313985	5.8	b,c,s,t	1979-81
Price River below Miller Creek near Wellington, UT	09314250	956	c,t	1969-86
Desert Seep Wash near Wellington, UT	09314280	191	c,t	1969-86
Grassy Trail Creek at Sunnyside, UT	09314340	40.1	b,c,s,t	1975-84
Horse Canyon near Sunnyside, UT	09314374	12.5	b,c,s,t	1975-81
TRIBUTARIES BETWEEN PRICE RIVER AND SAN RAFAEL RIVER				
Floy Wash near Green River, UT	09316100	56.6	c,s,t	1983-86
Crandall Canyon at mouth near Huntington, UT	09317919	5.7	b,c,s,t	1976-84
Tie Fork Canyon near Huntington, UT	09317920	11.7	b,c,s,t	1978-81
Huntington Creek near Huntington, UT	09318000	187	b,c,s,t	1949-81
Seely Creek near Orangeville, UT	09324000	a150	c,t	1956-75
Cottonwood Creek above Straight Canyon near Orangeville, UT	09324200	21.9	b,c,s,t	1978-81
Cottonwood Creek near Orangeville, UT	09324500	208	c,s,t	1949-83
Cottonwood Creek near Castle Dale, UT	09325000	261	c,t	1948-78
San Rafael River Above Ferron Creek near Castle Dale, UT	09325100	a680	c,t	1964-78
Ferron Creek near Castle Dale, UT	09327500	a210	c,t	1960-78
San Rafael River near Castle Dale, UT	09328000	930	c,t	1948-86
San Rafael River at San Rafael Bridge Campground, near Castle Dale, UT	09328100	1,284	c,s,t	1975-86
DIRTY DEVIL RIVER BASIN				
Seven Mile Creek near Fish Lake, UT	09329050	24.0	c,t	1971-91
Pine Creek near Bicknell, UT	09329900	104	c,t	1971-80
Pleasant Creek near Caineville UT	09330210	115	c,s,t	1969-76
Bull Creek near Hanksville, UT	09330410	7.53	c,s	1975-91
Convulsion Canyon near Emery, UT	09331850	21.6	c,s,t	1980-84
Quitchupah Creek near Emery, UT	09331900	104	b,c,s,t	1978-81
Christiansen Wash near Emery, UT	09331950	13.6	b,c,s,t	1978-84
Muddy Creek below I-70 near Emery, UT	09332100	418	c,s,t	1973-87
Muddy Creek at Delta Mine near Hanksville, UT	09332700	841	c,s,t	1975-86
Muddy Creek at mouth near Hanksville, UT	09332800	1,552	c,s,t	1975-80
Colorado River at Hite, UT	09335000	a6,600	c,s	1950-56
ESCALANTE RIVER BASIN				
Escalante River at mouth near Escalante, UT	09339500	a1,770	c	1951-53
SAN JUAN RIVER BASIN				
McElmo Creek near Bluff, UT	09372200	720	c,t	1978-82
Spring Creek above diversions near Monticello, UT	09376900	4.95	c,t	1971-72
North Creek above Ranger Station near Monticello, UT	09378100	8.68	c,t	1980-84
Montezuma Creek at golf course at Monticello, UT	09378200	17.6	c,t	1980-91
Montezuma Creek near Bluff, UT	09378600	1,154	c	1985-94
Recapture Creek below Johnson Creek near Blanding, UT	09378650	50.2	c,t	1977-94
Cottonwood Wash near Blanding, UT	09378700	205	c,s,t	1968-86
VIRGIN RIVER BASIN				
Deep Creek near Cedar City, UT	09405200	6.72	c,t	1987-91
East Fork Deep Creek near Cedar City, UT	09405250	7.82	c,t	1987-91
North Fork Virgin River near Glendale, UT	09405400	5.65	c,t	1973-78
North Fork Virgin River below Bulloch Canyon, near Glendale, UT	09405420	29.6	c,s,t	1974-86
North Fork Virgin River above Zion Narrows, near Glendale, UT	09405450	41.5	c,s,t	1979-86
North Creek near Virgin, UT	09405900	96.6	c,t	1985-91
LaVerkin Creek near LaVerkin, UT	09406150	91.3	c,t	1985-91
Kanarra Creek at Kanarraville, UT	09406300	9.85	c,t	1971-82
South Ash Creek below Mill Creek, near Pintura, UT	09406700	11.0	c,t	1971-82

Station Name	Station Number	Drainage Area (sq mi)	Type of Water Quality	Period of Record
Ash Creek above Toquerville, UT	09407000	201	c,t	1985-91
VIRGIN RIVER BASIN--Continued				
West Field Ditch at Toquerville, UT	09407150	---	c,t	1973-78
Ash Creek below West Field Ditch at Toquerville, UT	09407200	201	c,t	1973-82
Virgin River above Quail Creek near Hurricane, UT	09408135	1,381	t	1989-90
Santa Clara-Pinto Diversion near Pinto, UT	09408500	0.01	c,t	1973-91
Santa Clara River above Winsor Dam near Santa Clara, UT	09410000	338	c,s,t	1962-72
Santa Clara River below Winson Dam, near Santa Clara, UT	09410100	378	c,t	1973-91
Santa Clara River near Santa Clara, UT	09410400	410	c,t	1971-74
Virgin River at Littlefield, AZ	09415000	5,090	c,s,t	1947-86
THE GREAT BASIN				
Great Salt Lake at Promontory Point, UT	10010050	---	c,t	1997-99
Great Salt Lake at AIC near Syracuse, UT	10010300	—	c,t	1972
BEAR RIVER BASIN				
East Fork Bear River near Evanston, WY	10010400	34.6	c,t	1973-86
Hilliard East Fork Canal near State Line near Evanston, WY	10010500	—	c,t	1967-79
West Fork Bear River at Whitney Dam, near Oakley, UT	10011200	6.79	c,t	1965-86
West Fork Bear River below Deer Creek near Evanston, WY	10011400	52.2	c,t	1973-86
Sulphur Creek above reservoir, below LaChapelle Creek, near Evanston, WY	10015700	64.2	c,t	1961-91
Sulphur Creek below Reservoir, near Evanston, WY	10015900	69.2	c,t	1961-91
Yellow Creek near EvanstonWY	10017000	79.2	c,t	1958-78
Chapman Canal at State Line, near Evanston, WY	10019500	0.01	c,t	1957-84
Bear River near Woodruff, UT	10020500	a870	c,t	1957-61
Woodruff Creek below reservoir, near Woodruff, UT	10020900	50.0	c,t	1972-84
Woodruff Creek near Woodruff, UT	10021000	56.8	c,t	1961-75
Bear River near Randolph, UT	10026500	1,616	c,t	1956-91
Thomas Fork near Wyoming-Idaho state line, WY	10041000	113	c,t	1961-91
Montpelier Creek at irrigation weir, near Montpelier, ID	10047500	49.5	c,t	1961-79
Bloomington Creek at Bloomington, ID	10058600	24.0	c,t	1961-84
Eightmile Creek near Soda Springs, ID	10072800	22.6	c,t	1961-84
Soda Creek @ Fivemile Meadows near Soda Springs, ID	10076400	51.7	c,t	1967-84
Cottonwood Creek near Cleveland, ID	10084500	61.7	c,t	1961-84
Bear River near Preston (at Battlecreek), ID	10090500	4,545	c,t	1947-84
Deep Creek near Clifton, ID	10091200	107	c,t	1967-78
Cub River near Preston, ID	10093000	31.6	c,t	1958-84
Cub River at Franklin, ID	10098000	47.1	c,t	1969-72
High Creek near Richmond, UT	10099000	16.2	c,t	1978-89
Cub River near Richmond, UT	10102200	200	c,t	1959-2001
Bear River near Smithfield, UT	10102250	5,193	c,t	1964-91
Summit Creek above diversions, near Smithfield, UT	10102300	11.6	c,t	1967-79
South Fork Little Bear River near Avon, UT	10104600	26.0	c,t	1967-74
Little Bear River below Davenport Creek, near Avon, UT	10104700	61.6	s	1961-91
East Fork Little Bear River above Reservoir, near Avon, UT	10104900	56.7	c,t	1967-84
Little Bear River near Paradise, UT	10106000	198	c,t	1947-84
Blacksmith Fork below Mill Creek, near Hyrum, UT	10111700	78	c,t	1966-91
Logan River below Blacksmith Fork, near Logan, UT	10115200	524	c,t	1964-2001
West Canal above Salt Creek diversion, near Tremonton, UT	10117510	—	c,t	1979-83
West Canal below Salt Creek diversion, near Tremonton, UT	10117530	—	c,t	1979-83
Malad River near Plymouth, UT	10125600	a632	c,t	1964-80
TRIBUTARIES TO GREAT SALT LAKE BETWEEN BEAR RIVER AND WEBER RIVER				
Sulphur Creek near Corinne, UT	10126180	15.4	c,t	1963-89
Salt Creek below Salt Spring, near Tremonton, UT	10127050	0.01	c,t	1979-84
Black Slough near Brigham City, UT	10127100	31.1	c,t	1973-89
WEBER RIVER BASIN				
Smith and Morehouse Creek near Oakley, UT	10128000	33.8	c,t	1975-87

Station Name	Station Number	Drainage Area (sq mi)	Type of Water Quality	Period of Record
South Fork Weber River near Oakley, UT	10128200	a16	c,t	1971-74
TRIBUTARIES TO GREAT SALT LAKE BETWEEN BEAR RIVER AND WEBER RIVER--Conntinued				
WEBER RIVER BASIN--Continued				
Weber River near Peoa, UT	10129300	296	c,t	1971-77
Crandall Creek near Peoa, UT	10129350	11.8	c,t	1971-73
Silver Creek near Wanship, UT	10130000	27.5	c,t	1982-91
East Fork Chalk Creek near Coalville, UT	10130700	a35	c,t	1972-74
Kimball Creek above East Canyon Creek, near Park City, UT	10133540	12.2	c,t	1990-91
Threemile Creek near Park City, UT	10133700	2.68	c,t	1971-84
East Canyon Creek near Big Bear Hollow, near Park City, UT	10133895	75.0	c,t	1990-91
East Canyon Creek near Park City, UT	10133900	68.9	c,t	1982-84
North Fork Ogden River near Eden, UT	10137680	6.03	c,t	1971-74
Middle Fork Ogden River above diversion, near Huntsville, UT	10137780	31.3	c,t	1971-74
Wheeler Creek near Huntsville, UT	10139300	11.1	c,t	1971-91
Hooper Slough near Hooper, UT	10141040	13.0	c,t	1974-84
South Fork Weber Canal near Hooper, UT	10141050	—	c,t	1972-75
South Fork Weber River near Hooper, UT	10141100	—	c,t	1972-75
North Fork Weber River near Hooper, UT	10141200	—	c,t	1972-76
TRIBUTARIES TO GREAT SALT LAKE BETWEEN WEBER RIVER AND JORDAN RIVER				
Howard Slough at Hooper, UT	10141400	20.6	c,s,t	1972-84
Farmington Creek above diversion, near Farmington, UT	10142000	10.0	c,t	1978-81
JORDAN RIVER BASIN				
Tie Fork near Soldier Summit, UT	10148200	19.4	c,t	1928-91
Nebo Creek near Thistle, UT	10148400	36.7	c,t	1971-73
Spanish Fork at Thistle, UT	10148500	450	c,t	1971-74
Spanish Fork below Halls Falls, near Thistle, UT	10148510	452	c,t	1983-94
Diamond Fork below Red Hollow, near Thistle, UT	10149500	107	c,t	1988-91
Spanish Fork near Lakeshore, UT	10152000	675	b,c,t	1971-88
Hobble Creek near Springville, UT	10152500	105	c,t	1971-74
Maple Creek near Mapleton, UT	10152700	3.13	c,t	1971-72
North Fork Provo River near Kamas, UT	10153800	24.4	c,t	1971-91
Shingle Creek near Kamas, UT	10154000	a8.4	c,t	1971-73
Weber-Provo diversion canal near Woodland, UT	10154500	---	c,t	1971-91
North Fork Provo River at Wildwood, UT	10160800	12.3	c,t	1971-74
Jordan River at Narrows near Lehi, UT	10167000	3,010	c,t	1987-91
Jordan River Station No. 1 at Narrows, UT	10167001	—	c,s,t	1980-83
Upper Canal at Wild Rose Lane, near Salt Lake City, UT	10167125	—	c,s,t	1980-81
Jordan & Salt Lake Canal at Zenith Avenue near Salt Lake City, UT	10167149	—	c,s,t	1980-81
Jordan River at 9400 South near South Jordan, UT	10167200	3,130	c,s,t	1965-81
Bells Canyon Conduit 1000 East 110000 South	10167220	—	c,s,t	1981-82
Jordan River at 90th South near Midvale, UT	10167230	a3,130	c,s,t,	1980-99
90th South Conduit at Jordan River, near Midvale, UT	10167240	—	b,c,s,t	1980-82
Jordan River at 5800 South, near SLC, UT	10167300	3,254	b,c,s,t	1965-84
Little Cottonwood Creek (channel) near SLC, UT	10167499	27.4	c,s,t	1979-91
Little Cottonwood Creek at 2050 East, near SLC, UT	10167700	35.2	c,t	1973-80
Little Cottonwood Creek at Crestwood Park, at Salt Lake City, UT	10167800	37.0	c,t	1998-2001
Big Cottonwood Creek (Cottonwood Creek), near SLC, UT	10168500	50.0	c,s,t	1964-70
Holladay Drain @ 4800 So @ Big Cottonwood Creek near Murray, UT	10168840	---	b,c,s,t	1980-81
Big Cottonwood Creek at Jordan River, near SLC, UT	10169500	—	b,c,s,t	1980-81
Mill Creek near Salt Lake City, UT	10170000	21.7	b,c,s,t	1964-79
Mill Creek at Jordan River, near SLC, UT	10170250	a32	b,c,st	1979-82
JParleys Creek at Suicide Rock, near SLC, UT	10171600	50.7	b,c,s,t	1964-81
Emigration Creek near Salt Lake City, UT	10172000	18.4	b,c,s,t	1964-81
Red Butte Creek below reservoir, near SLC, UT	10172220	7.95	c,t	1980-81
City Creek above Wasatch Drive, near SLC, UT	10172400	17.0	c,s,t	1963-68
Jordan River at 5th North at SLC, UT	10172550	3,562	b,c,s,t	1970-84

Station Name	Station Number	Drainage Area (sq mi)	Type of Water Quality	Period of Record
Jordan River at Cudahy Lane, near SLC, UT	10172600	q3,590	b,c,t	1963-98
Goggin Drain near Magna, UT	10172630	0.01	c,t	1963-84
JORDAN RIVER BASIN—Continued				
Lee Creek near Magna, UT	10172640	—	c,t	1972-83
Kennecott Drain near Magna, UT	10172650	0.01	c,s,t	1962-84
Clover Creek above Big Hollow, near Clove, UT	10172765	6.71	c,t	1987-91
Settlement Creek above reservoir, near Tooele, UT	10172791	16.8	c,t	1988-91
Box Elder Wash near Grantsville, UT	10172795	9.84	c,t	1987-91
North Willow Creek near Grantsville, UT	10172805	5.38	c,t	1979-92
GREAT SALT LAKE DESERT				
Great Salt Lake West Pond near Wendover, UT	10172903	—	c,t	1988-90
West Locomotive Spring at Locomotive Spring, near Snowville, UT	10172963	—	c,t	1973-75
Baker Spring at Locomotive Spring, near Snowville, UT	10172964	—	c,t	1969-75
Bar M Spring at Locomotive Spring, near Snowville, UT	10172965	—	c,t	1969-80
Off Spring at Locomotive Spring, near Snowville, UT	10172967	—	c,t	1969-80
Sparks Spring at Locomotive Spring, near Snowville, UT	10172968	—	c,t	1969-80
SEVIER LAKE BASIN				
Panguitch Creek near Panguitch, UT	10176300	97.0	c,t	1971-80
Sevier River near Circleville, UT	10180000	986	c,t	1971-91
East Fork Sevier River near Ruby’s Inn, UT	10183900	71.6	c,t	1971-91
Antimony Creek near Antimony, UT	10185000	50.3	c,t	1971-76
Otter Creek near Koosharem, UT	10187300	23.5	c,t	1971-82
Otter Creek above Reservoir, near Antimony, UT	10187500	322	c,t	1971-80
Sevier River above Clear Creek, near Sevier, UT	10194000	2,707	c,t	1971-91
Salina Creek at Salina, UT	10206000	51.8	c,t	1971-91
Oak Creek near Fairview, UT	10208500	11.8	c,t	1971-89
Pleasant Creek near Mount Pleasant, UT	10210000	16.4	c,t	1971-75
San Pitch River near Mt Pleasant, UT	10210500		c,t	1988-89
Oak Creek near Spring City, UT	10215700	8.35	c,t	1971-91
San Pitch River near Sterling, UT	10216210	672	c,t	1971-80
Twelvemile Creek near Mayfield, UT	10216400	59.4	c,t	1971-80
Chicken Creek near Levan, UT	10219200	27.9	c,t	1971-94
Oak Creek above Little Creek, near Oak City, UT	10224100	5.58	c,t	1971-91
Oak Creek below Big Spring, near Oak City, UT	10224300	17.8	c,t	1979-83
Meadow Creek near Meadow, UT	10233000	11.6	c,t	1944-85
Corn Creek near Kanosh, UT	10233500	87.0	c,t	1944-85
South Creek near Beaver, UT	10235000	14.7	c,t	1965-76
North Fork North Creek near Beaver, UT	10236000	14.1	c,t	1971-76
South Fork North Creek near Beaver, UT	10236500	23.0	c,t	1971-76
Indian Creek near Beaver, UT	10237500	18.5	c,t	1965-76
PAROWAN VALLEY				
Little Creek near Paragonah, UT	10241400	15.8	c,t	1971-80
Red Creek near Paragonah, UT	10241430	a6.3	c,t	1971-75
Center Creek above Parowan Creek, near Parowan, UT	10241470	11.6	c,t	1971-83
Summit Creek near Summit, UT	10241600	24.0	c,s,t	1971-83
SNAKE RIVER VALLEY				
George Creek near Yost, UT	13077700	7.84	c,t	1965-89

DISCONTINUED SURFACE-WATER-QUALITY STATIONS

Station Name	Station Number	Drainage Area (sq mi)	Type of Water Quality	Period of Record

INTRODUCTION

Water-resources data for the 2003 water year (WY) for Utah consist of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality of ground water. This report contains discharge records for 169 gaging stations; stage and contents for 10 lakes and reservoirs; water quality for 22 hydrologic stations, and 36 wells; water levels for 68 observation wells; and precipitation for 2 stations. Additional water data were collected at various sites not involved in the systematic data-collection program and are published as miscellaneous measurements. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Utah.

Records of discharge or stage of streams, and contents or stage of lakes and reservoirs were first published in a series of U.S. Geological Survey Water-Supply Papers entitled, “Surface Water Supply of the United States.” Through September 30, 1969, these water-supply papers were in an annual series and then in a 5-year series for 1961-65 and 1966-70. Records of chemical quality, water temperature, and suspended sediment were published from 1941 to 1970 in an annual series of water-supply papers entitled, “Quality of Surface Waters of the United States.” Records of ground-water levels were published from 1935 to 1974 in a series of water-supply papers entitled, “Ground-Water Levels and Artesian Pressures in the United States.” Water-supply papers may be consulted in the libraries of the principal cities in the United States or may be purchased from Branch of Distribution, U.S. Geological Survey, 1200 South Eads Street, Arlington, Virginia, 22202.

For water years 1961 through 1974, streamflow data were released by the U.S. Geological Survey in annual reports on a State-boundary basis. Water-quality records for water years 1964 through 1974 were similarly released either in separate reports or in conjunction with streamflow records.

Beginning with the 1975 water year, water data for streamflow, water quality, and ground water have been published as an official Survey report on a State-boundary basis. These official Survey reports carry an identification number consisting of the two-letter State abbreviation, the last two digits of the water year, and the volume number. For example, this report is identified as “U.S. Geological Survey Water-Data Report UT-03-1.” For archiving and general distribution, the reports for water years 1971-74 are also identified as water-data reports. These water-data reports are for sale, in paper copy or in microfiche, by the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22161.

Additional information, including current prices, for ordering specific reports may be obtained from the District office at the address given on the back of the title page or by telephone (801) 908-5000.

COOPERATION

The U.S. Geological Survey and organizations of the State of Utah have had cooperative agreements for the systematic collection of streamflow records since 1909, for ground-water levels since 1935, and for water-quality records since 1941. Utah organizations that assisted in collecting data through cooperative agreement with the U.S. Geological Survey are:

Department of Natural Resources, R.L. Morgan, Executive Director
Division of Water Rights, J. Olds, State Engineer
Division of Water Resources, D. L. Anderson, Director
Bear River Commission, D. Hansen, Chairman
Salt Lake County Flood Control, Brent Overson, Chairman
Weber Basin Water Conservancy District, Ivan Flint
Ogden River Water Users, Terel Grimley
Weber River Water Users, Floyd Baham
Central Utah Water Conservancy District, Don Christiansen
Nephi City, Lee Fowkes
Davis County Public Works, Dave Adamson
Washington County Water Conservancy District, Ron Thompson
Centerville City, Steve Thacher
Snyderville Basin Water Reclamation District, Michael Luers
San Juan County, Lynn Stevens

Assistance in the form of funds was given by the Bureau of Reclamation and Bureau of Land Management for collecting data at 20 gaging stations. Records for nine gaging stations in Idaho in the Bear River Basin and eight in Utah were collected by Pacificorp under Federal Energy Regulatory Commission License.

Other district offices of the Geological Survey, Water Resources Discipline, obtained the records listed below:

Arizona District	Colorado River at Lees Ferry, AZ Paria River at Lees Ferry, AZ
Colorado District	Colorado River near Colorado-Utah State line Green River near Jensen, UT
Wyoming District	Bear River at Evanston, WY Blacks Fork near Robertson, WY East Fork of Smiths Fork near Robertson, WY Green River near Green River, WY

Records for all stream-gaging stations operated by the U.S. Geological Survey in the Bear River Basin in Utah, Idaho, and Wyoming are included in this report.

Organizations that supplied data are acknowledged in station descriptions.

SUMMARY OF HYDROLOGIC CONDITIONS

By Jeff Phillips, Chris Wilkowske, and David Allen

Hydrologic conditions for Utah can vary greatly across the State because of topography, geology, changing seasonal atmospheric conditions, and changes in climatic conditions from year to year. Mountain ranges and plateaus in many parts of Utah are characterized by steep slopes, sparse vegetation, thin soils, and, in areas such as the Colorado River Basin, large expanses of bedrock and steep-walled canyons. These conditions can lead to rapid runoff and flooding during much of the year. The large valleys and basins in the western part of Utah generally trend north, have a fairly flat topography, and are underlain with alluvial soils composed of clay, silt, sand, and gravel. Average annual precipitation in Utah ranges from about 5 inches in the Great Salt Lake Desert to about 60 inches on some of the State's highest mountains (Butler and Marsell, 1972). Precipitation in Utah results from three general atmospheric conditions: Pacific frontal systems (late fall through early spring), cutoff low-pressure systems (late spring and fall), and monsoonal thunderstorms (summer). Frontal systems usually move west-to-east across Utah and account for much of the mountain snowpack (U.S. Geological Survey, 1991). These systems can affect all or part of the State, depending on the prevailing jet stream (high-altitude winds). Before reaching Utah, Pacific frontal storms must first cross the Sierra and Cascade mountain ranges, where a large part of the original precipitation falls as rain and snow. Therefore, the storms are relatively dry upon reaching Utah, resulting in comparatively light precipitation over most of the State (Utah Climate Center, 2003). During some winters, a high-pressure ridge is dominant over the Western United States, and the jet stream is forced north or south of Utah, resulting in winter drought. When conducive, weather systems moving across Great Salt Lake acquire additional moisture from evaporation of lake water, enhancing precipitation in the local area. This is the so-called "lake effect."

Cutoff low-pressure systems generally originate in the Pacific Ocean, are widespread and slow moving, and can produce large amounts of precipitation over an extended time (U.S. Geological Survey, 1991). These are typically dissipating tropical cyclones, including tropical storms and hurricanes. One such storm in late-September 1982 resulted in a monthly record 7.04 inches of rain at Salt Lake City and 13.47 inches of precipitation (including 45 inches of snow) in the nearby mountains, at Alta. Monsoonal thunderstorms frequently occur during the summer months when high temperatures and heating of the Earth's surface produce strong thermals. Subtropical moisture originating in the Gulf of Mexico and Gulf of California can combine with these thermals and produce locally intense thunderstorms.

PRECIPITATION

The 2003 water year ended on September 30, 2003 and all of the reporting weather stations in Utah received below-normal precipitation. The driest area of the state was in the northwestern deserts where the year ended with about half the normal precipitation. The Wasatch Mountains and sections of southeastern Utah were the closest to normal with 90 percent of normal at Alta, 91 percent of normal at Richfield, and 90 percent of normal at Hanksville.

The Wasatch Front precipitation was between 65 and 95 percent of normal for the water year. The lowest percentages of normal were generally along the northern Wasatch Front and the higher percentages of normal were in the Salt Lake Valley. At the Salt Lake City airport, the total of 11.77 inches of precipitation made it the thirteenth driest water year in the past 75 years. The 2003 water year was the driest since the 1990 water year when 10.88 inches of precipitation were measured. It was the fifth consecutive water year with below normal precipitation (National Weather Service, 2003).

STREAMFLOW, FLOODING, AND RESERVOIR STORAGE

As a result of below-average precipitation and snowpack in much of the Utah and Upper Colorado River Basin at the close of the 2003 Water Year, streamflow conditions in most major rivers in Utah have been below normal for the past 5 to 6 years. Selected U.S. Geological Survey streamflow gaging stations are shown in figure 1. This section presents data from eight long-term streamflow-gaging stations that are maintained by the U.S. Geological Survey Utah District as part of a national streamflow-gaging station network (fig. 2). The stations were selected from a local network of more than 140 stations in Utah, Wyoming, and Idaho (fig. 1). Major dams have regulated flow on the Colorado, Green, and San Juan Rivers since the early 1960s. The Beaver, Virgin, and Weber Rivers are slightly regulated by small headwater reservoirs or power-generating facilities. Smiths Fork and the Whiterocks River have small diversions in upper watershed areas but are not regulated upstream from the stations. Despite the modifications to the drainages, these sites generally reflect hydrologic conditions in their respective watersheds, including snowpack and the amount of water stored in reservoirs.

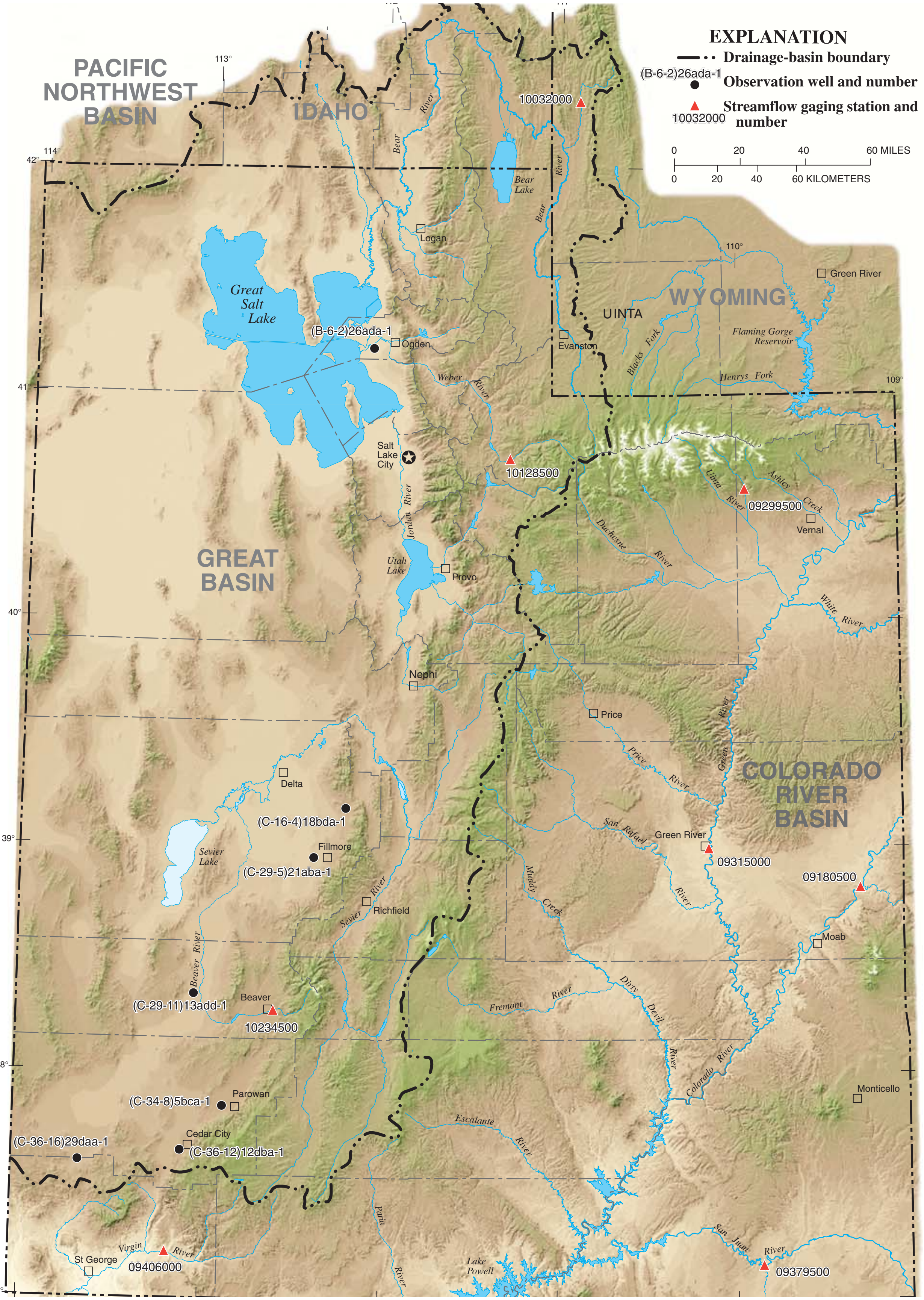

Figure 1. Selected U.S. Geological Survey streamflow-gaging stations and observation wells in Utah.

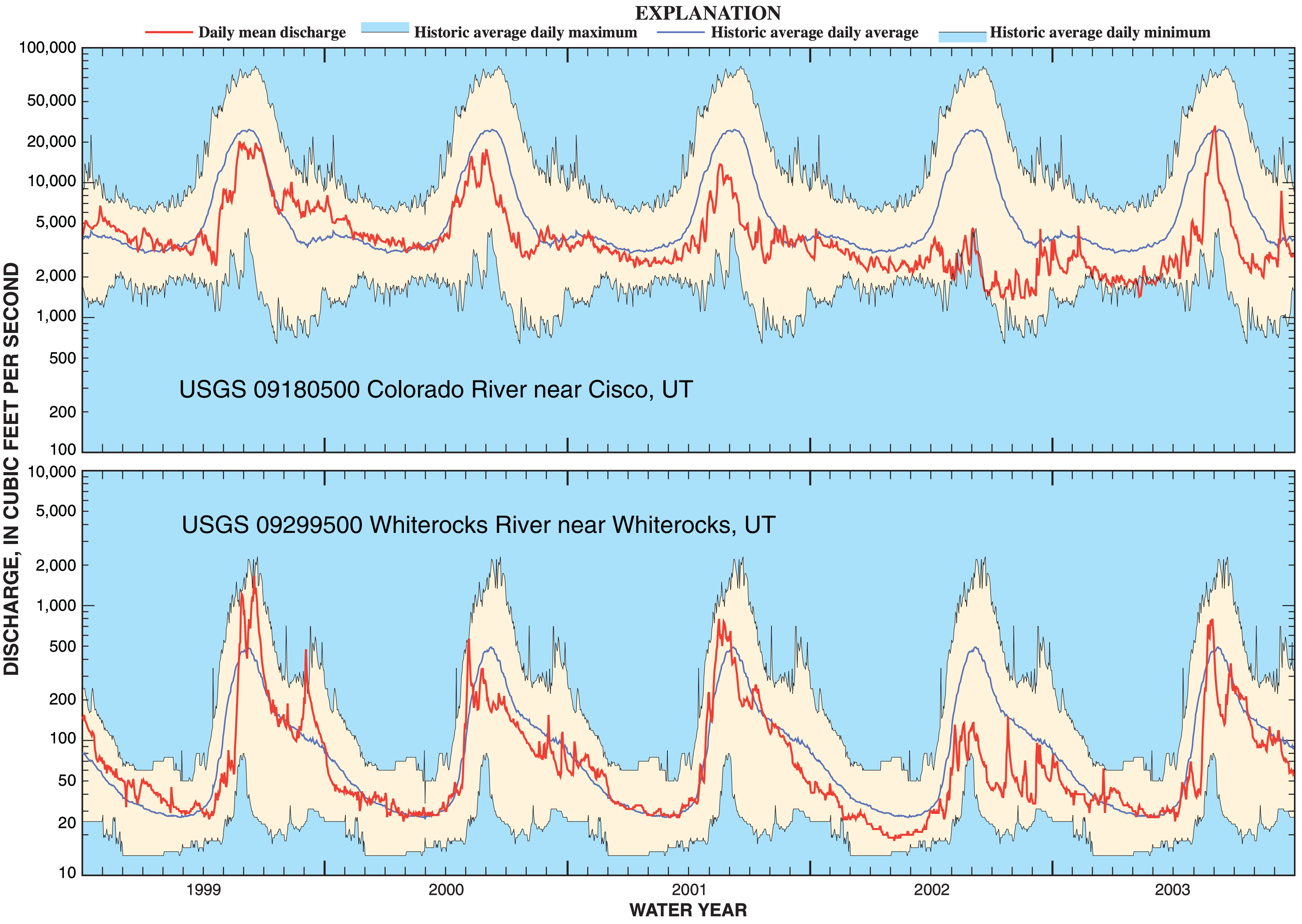

Figure 2. Daily mean discharge for water years 1999-2003 with maximum, average, and minimum daily mean discharges for period of record at eight long-term U.S. Geological Survey streamflow-gaging stations, Utah and Wyoming

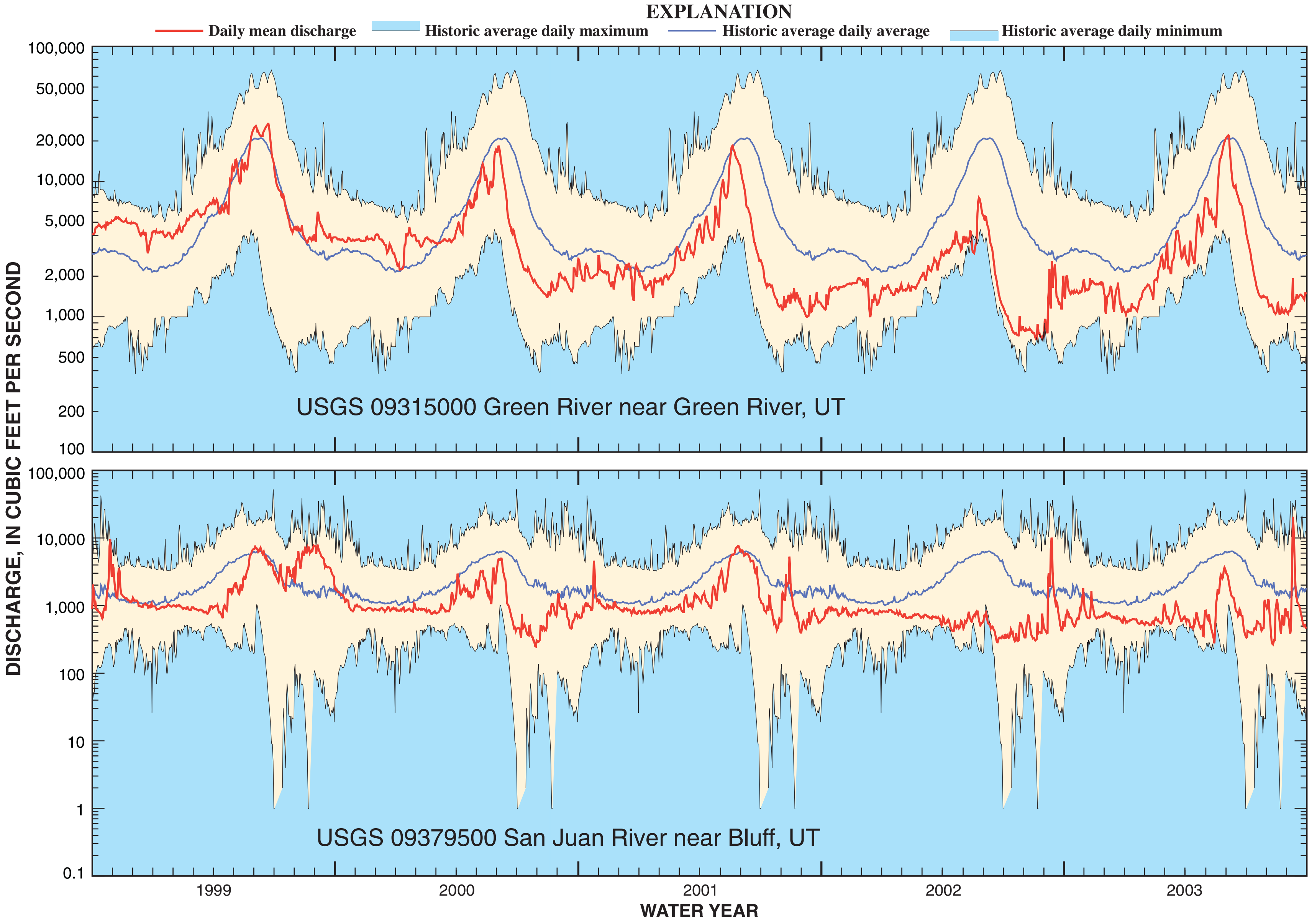

Figure 2. Daily mean discharge for water years 1999-2003 with maximum, average, and minimum daily mean discharges for period of record at eight long-term U.S. Geological Survey streamflow-gaging stations, Utah and Wyoming—Continued.

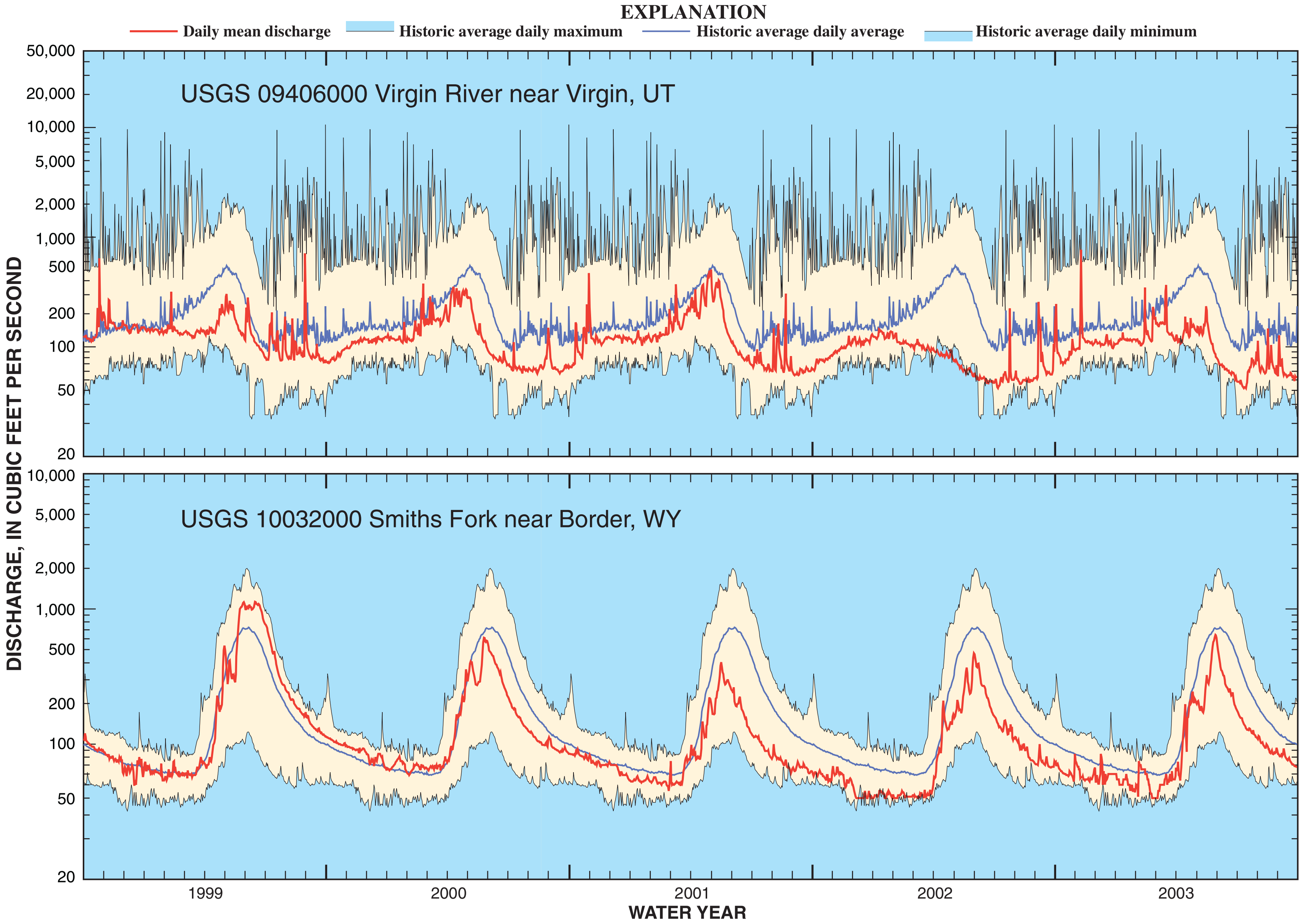

Figure 2 Daily mean discharge for water years 1999-2003 with maximum, average, and minimum daily mean discharges for period of record at eight long-term U.S. Geological Survey streamflow-gaging stations, Utah and Wyoming—Continued.

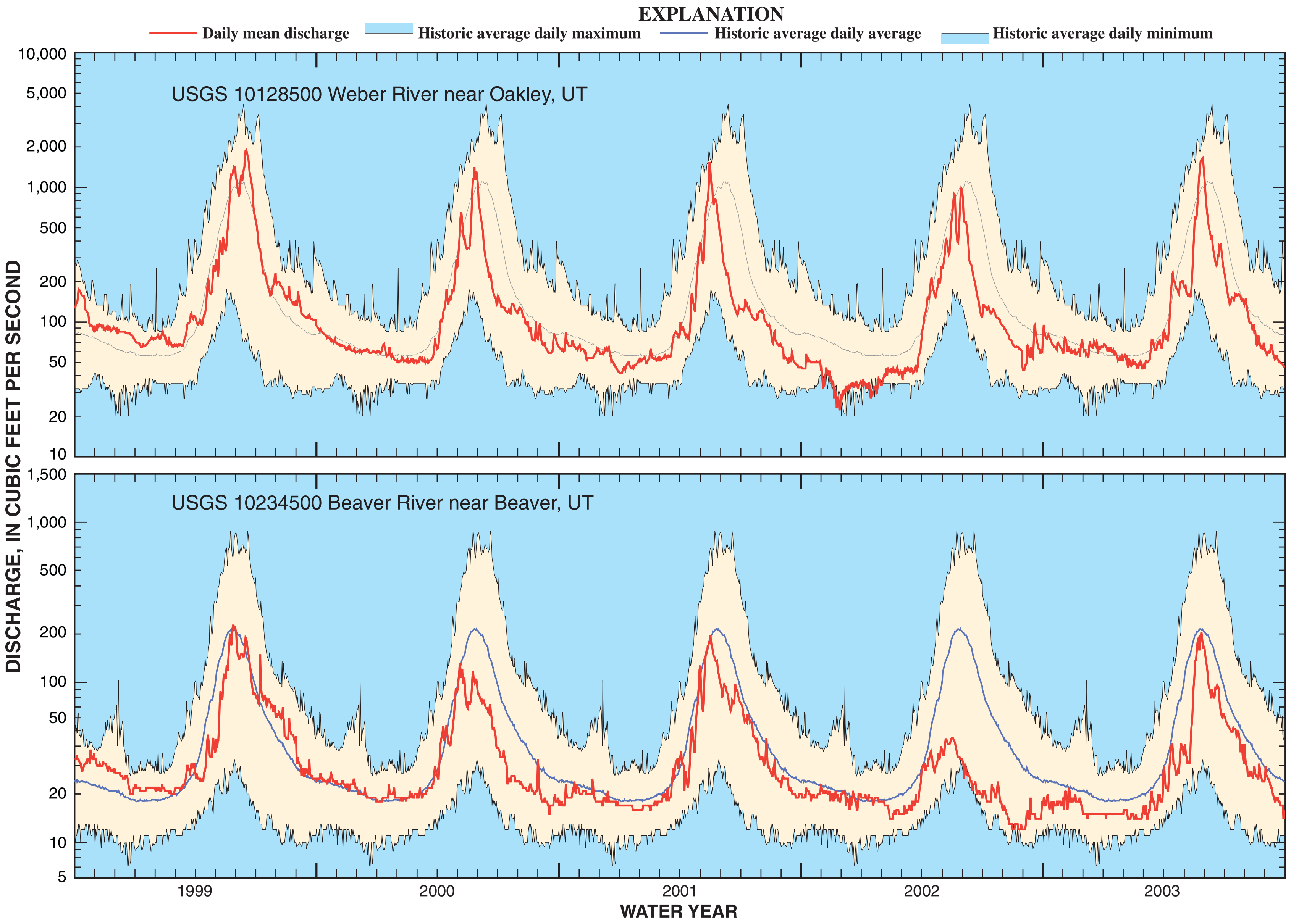

Figure 2. Daily mean discharge for water years 1999-2003 with maximum, average, and minimum daily mean discharges for period of record at eight long-term U.S. Geological Survey streamflow-gaging stations, Utah and Wyoming—Continued.

Daily mean discharge for 2003 in relation to the average, minimum, and maximum daily mean discharge for the period of record (through 2003WY) for the eight stations is shown in figure 2. The plots indicate 2002 had the lowest volume of water for the sites for the 5-year period (Wilberg and others, 2002). Although annual flow for these eight stations in 2003 was greater than total flow during 2002, there still was a significant departure from average conditions (fig. 2, table 1). For example, average annual flow for the period of record for Colorado River near Cisco, UT is 5,266,000 acre-feet. This figure, for the 2002 water year, was 1,856,000 acre-feet, or 35 percent of average. Although the volume increased during the 2003 water year, it only rose to 2,736,000 ac-ft, or 52 percent of average for the period of record (table 1). The other two stations located on mainstem systems that drain to Lake Powell are Green River near Green River and San Juan River near Bluff. Annual flow characteristics over the last several years for these stations were quite similar to those at Colorado River near Cisco. Annual flow volume for Green River near Green River and San Juan River near Bluff for the 2002 water year was 36 and 33 percent of average, respectively. During the 2003 water year, flow volume for Green River near Green River and San Juan River near Bluff was 55 and 40 percent of average, respectively. Although annual volume of flow to Lake Powell was greater in 2003 than 2002, there still was insufficient input to keep reservoir levels from dropping. At the end of the 2002 water year (September 30, 2002), the level of water in Lake Powell was 3,626 feet, and 3,604 ft at the end of the 2003 water year. The continued drop in the water surface or lake level has substantially exposed the Colorado River delta near the northern end of Lake Powell (fig. 3).

Table 1. Streamflow data for eight long-term U.S. Geological Survey streamflow-gaging stations used as representative index sites in Utah and Wyoming, 1999-2003.

Site ID	Station Name	Period of Record	Average total annual runoff (kac-ft/yr)	1999 total annual runoff (kac-ft/yr)	1999 percent average	2000 total annual runoff (kac-ft/yr)	2000 percent average	2001 total annual runoff (kac-ft/yr)	2001 percent average	2002 total annual runoff (kac-ft/yr)	2002 percent average	2003 total annual runoff (kac-ft/yr)	2003 percent average
09180500	Colorado River near Cisco, UT	1914-2003	5266	4807	91	3856	73	3003	57	1856	35	2736	52
09299500	Whiterocks River near Whiterocks, UT	1930-2003	81.74	115.7	142	61.68	75	87.33	107	32.84	40	70.11	86
09315000	Green River near Green River, UT	1906-2003	4441	5392	121	3206	72	2464	55	1591	36	2435	55
09379500	San Juan River near Bluff, UT	1915-17, 1927-2003	1625	1837	113	838.1	52	1161	71	538.2	33	657.7	40
09406000	Virgin River near Virgin, UT	1910-2003	143.2	101.7	71	90.53	63	99.63	70	61.24	43	77.12	54
10032000	Smiths Fork near Border, WY	1943-2003	138.5	179.2	129	107.1	77	72.12	52	74.26	54	83.22	60
10128500	Weber River near Oakley, UT	1905-2003	158.1	184.1	116	109.1	69	100.3	63	93.67	59	116.5	74
10234500	Beaver River near Beaver, UT	1915-2003	37.54	36.86	98	24.71	66	29.07	77	15.55	41	25.45	68

GROUND WATER

Prolonged droughts have a primary and secondary effect on ground-water resources. First, decreased runoff and decreased recharge to aquifers. Second, decreased surface-water resources generally lead to increased ground-water withdrawals, as well as to increased requests for water-well construction permits (Gates and Allen, 1996). Seven wells were selected to show trends in ground-water levels for the period of water-level record for each well (fig. 1).

Aquifers in arid to semiarid regions typically are recharged from higher-altitude areas that receive more precipitation. Decreased precipitation and snowpack runoff in these areas lead to a decrease in aquifer recharge. In addition, dry conditions deplete soil moisture. This moisture needs to be replaced before recharge conditions can return to normal. Aquifers also can be recharged by seepage from lakes and streams. As these surface-water sources of recharge dry up during a drought, recharge to aquifers is again decreased (Wilkowske and others, 2003).

Water-level hydrographs (fig. 4) show that statewide water-level trends generally continue to decline. Period of water-level record for the seven selected wells ranges from 1960 to 2003 for well (C-16-4)18bda- 1 in Sevier Desert, and 1930 to 2003 for well (C-21-5)21aba-1 in Pahvant Valley. Water levels in all seven wells declined compared to the 2002 water year. One well, (C-21-5)21aba-1 in Pahvant Valley, reached its record low water level since the late 1960s. Another well, (C-34-8)5bca- 1 in Parowan Valley, reached a record low elevation for the first time since measurements started. The other five wells (fig. 4) already were at record low levels in 2002, and elevation of the water surface decreased in all wells to reach new record lows.

Estimated total ground-water withdrawals in Utah in 2002 were 947,000 acre-feet compared to 883,000 acre-feet in 2001 (Burden and others, 2003). Withdrawals for public supply decreased from 292,000 acre-feet in 2001 to 263,000 acre-feet in 2002, while withdrawals for irrigation increased from 453,000 acre-feet in 2001 to 554,000 acre-feet in 2002.

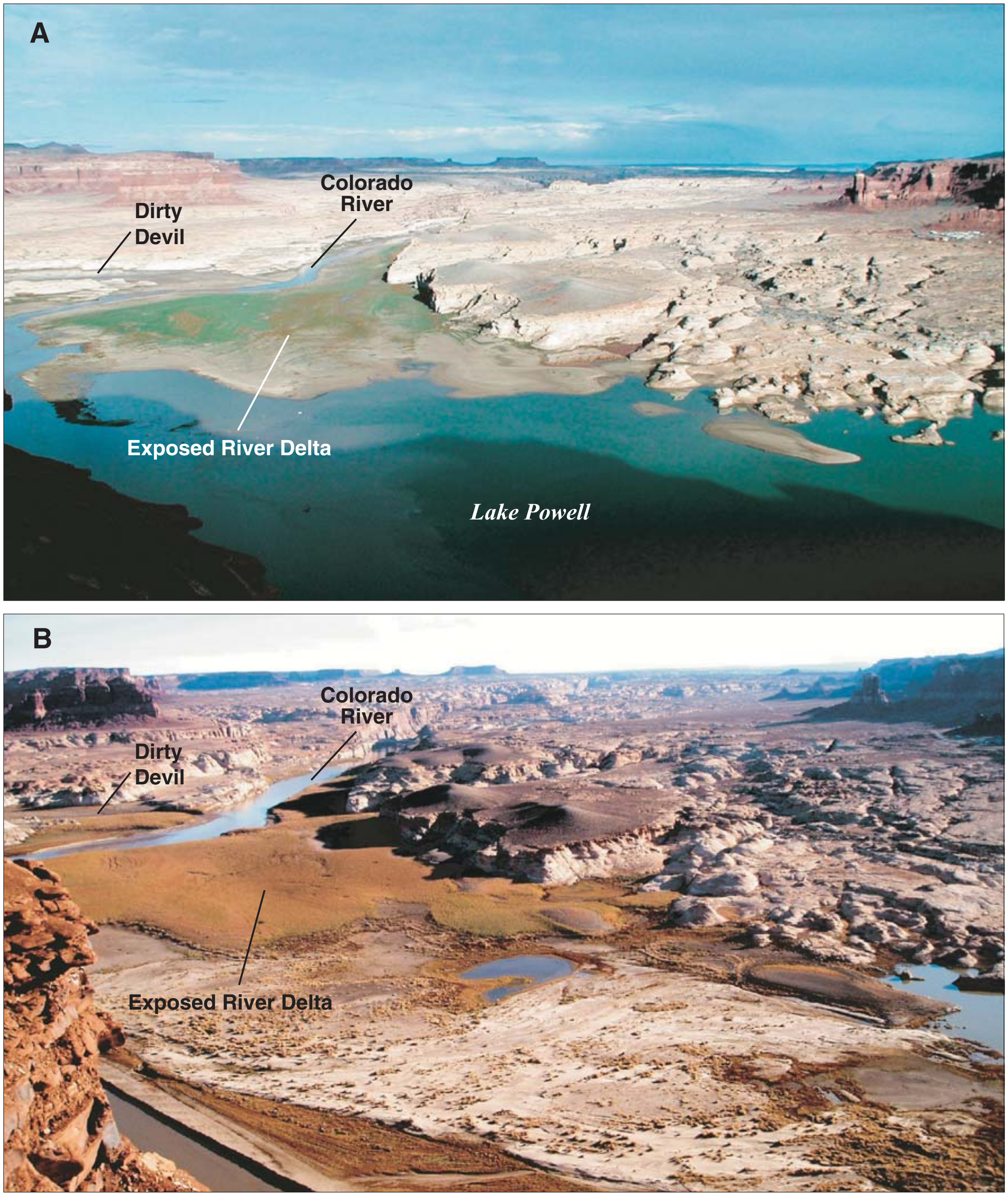

Figure 3. Lake Powell near Hite Marina, Utah, showing exposed channel of the Colorado and Dirty Devil Rivers, which are normally flooded by the lake, as well as the deltaic sediments that are deposited at the upper end of the lake. Photograph A taken in October 2002 and photograph B in December 2003.

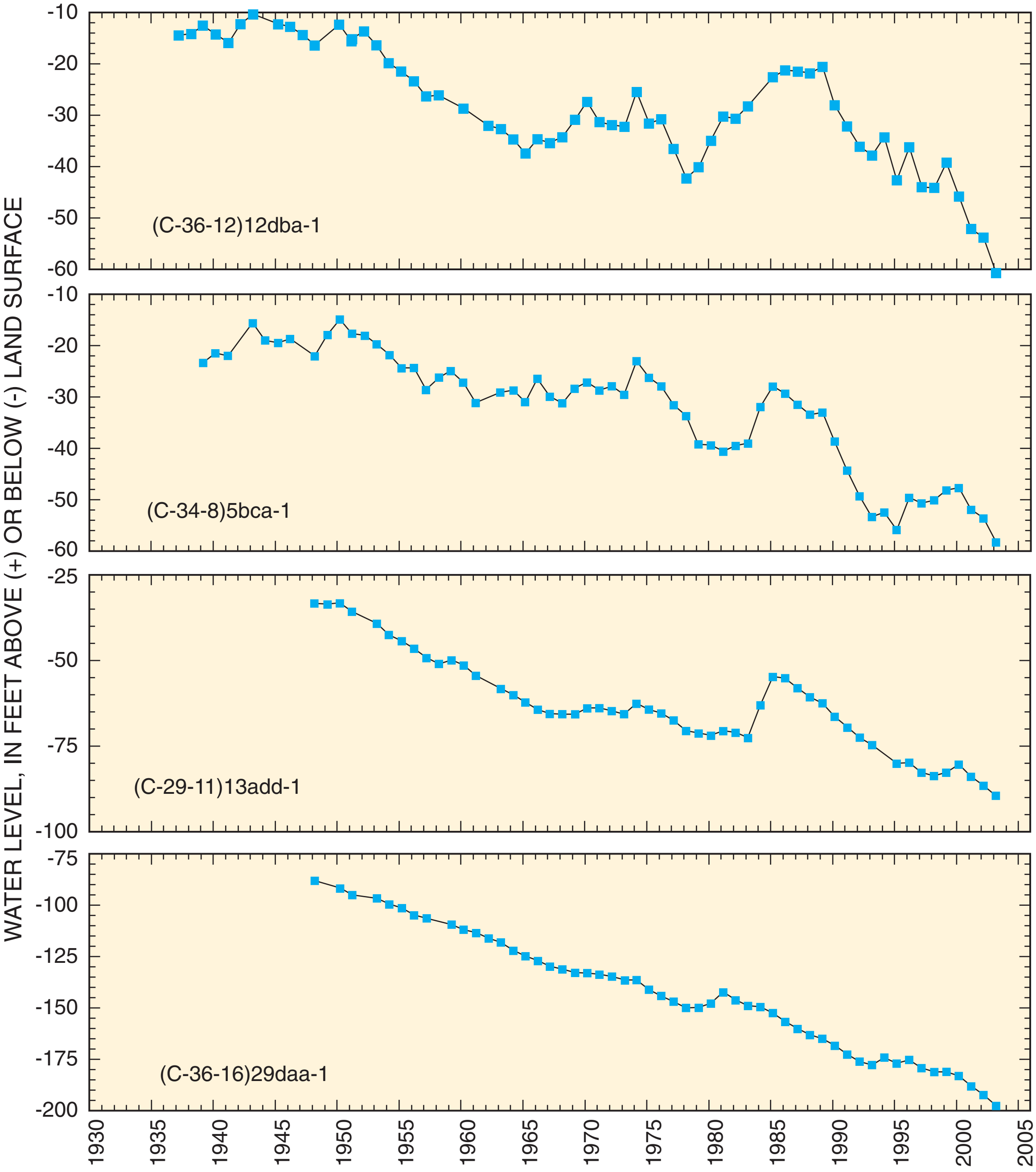

Figure 4. Water-level fluctuations in selected wells in Utah for the period of record through 2003 water year.

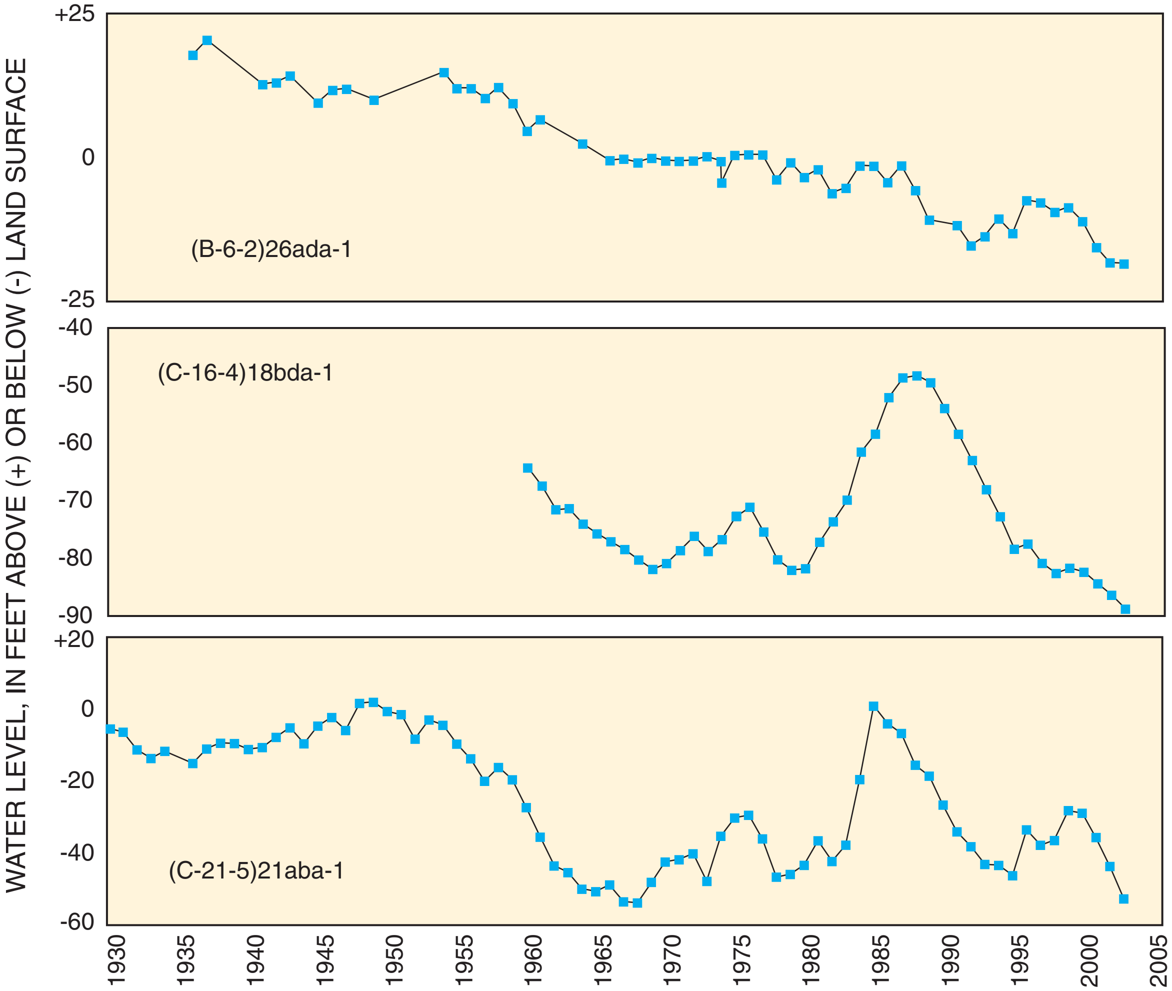

Figure 4. Water-level fluctuations in selected wells in Utah for the period of record through the 2003 water year—Continued.

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DOWNSTREAM ORDER AND STATION NUMBER

Since October 1, 1950, the order of listing hydrologic-station records in Survey reports is in a downstream direction along the main stream. All stations on a tributary entering upstream from a main-stream station are listed before that station. A station on a tributary entering between two main-stream stations is listed between. A similar order is followed in listing stations on first rank, second rank, and other ranks of tributaries. The rank of any tributary on which a station is situated with respect to the stream to which it is immediately tributary is indicated by an indention in a list of stations in the front of the report. Each indentation represents one rank. This downstream order and system of indentation show which stations are on tributaries between any two stations and the rank of the tributary on which each station is situated.

As an added means of identification, each hydrologic station and partial-record station has been assigned a station number. These are in the same downstream order used in this report. In assigning station number, no distinction is made between partial-record stations and other stations; therefore, the station number for a partial-record station indicates downstream-order position in a list made up of both types of stations. Gaps are consecutive. The complete 8-digit number for each station such as 09004100, which appears just to the left of the station name, includes a 2-digit part number "09" plus the 6-digit downstream order number "041010."

NUMBERING SYSTEM FOR WELLS AND MISCELLANEOUS SITES

The 8-digit, downstream order station numbers are not assigned to wells and miscellaneous sites where only random water-quality samples or discharge measurements are taken.

The well and miscellaneous site number system of the U.S. Geological Survey is based on the grid system of latitude and longitude. The system provides the geographic location of the well or miscellaneous site and a unique number for each site. The number consists of 15 digits. The first 6 digits denote the degrees, minutes, and seconds of latitude, and the next 7 digits denote degrees, minutes, and seconds of longitude, and the last 2 digits are a sequential number for wells within a 1-second grid. In the event that the latitude-longitude coordinates for a well and miscellaneous site are the same, assign sequential numbers "01," "02," etc. as one would for wells. See figure 6.

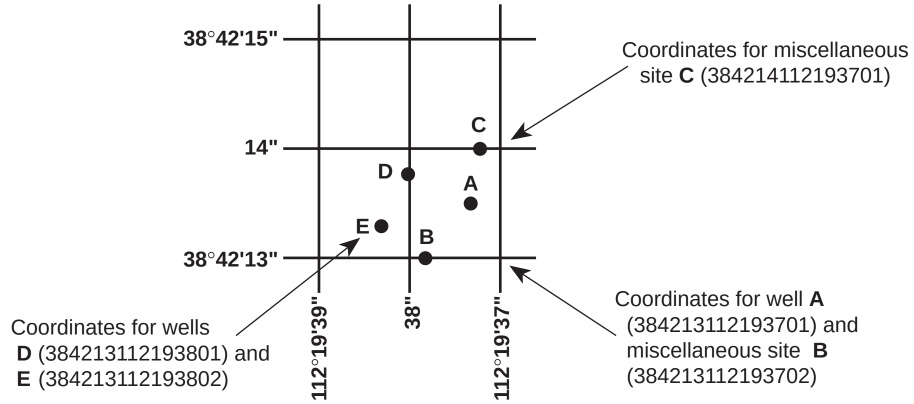

Figure 5. System for numbering wells and miscellaneous sites (latitude and longitude).

In addition to the well number that is based on latitude and longitude given for each well, another well number is given that is based on the U.S. Bureau of Land Management's system of land subdivision. This well number is familiar to the water users of Utah and shows the location of the well by quadrant, township, range section, and position within the section. See figure 6. The capital letter at the beginning of the location number indicates the quadrant in which the well is located. Four quadrants are formed by the intersection of the base line and the principal meridian--A indicates the northeast quadrant, B the northwest, C the southwest, and D the southeast. The first numeral indicates the township, the second the range, and the third the section in which the well is located. Lowercase letters following the section number locate the well within the section. The first letter denotes the quarter section, the second the quarter-quarter section, and the third the quarter-quarter-quarter section. The letters are assigned within the section in a counter-clockwise direction beginning with (a) in the northeast quarter of the section. Letters are assigned within each quarter section and quarter-quarter section in the same manner. Where two or more locations are within the smallest subdivision, consecutive numbers beginning with 1 are added to the letters in the order in which the wells are inventoried. For example, (C-16-9) 15daa-2 indicates a well in the northeast quarter of the northeast quarter of the southeast quarter of sec. 15, T. 16 S., R.9 W., and shows that this is the second well inventoried in the quarter-quarter-quarter section. The capital letter C indicates that the township is south of the Salt Lake Base Line and that the range is west of the Salt Lake Meridian.

In addition to the Salt Lake Base Line and Salt Lake Meridian, which apply to most of Utah, the Uintah Base Line and Meridian are the basis for describing locations in a small, irregularly shaped area of north-eastern Utah. The quadrants, townships, ranges, sections, and parts of sections are designated in the same way as for the Salt Lake Base Line and Meridian. For any location in the Uintah area, however, the letter "U" precedes the parenthesis.

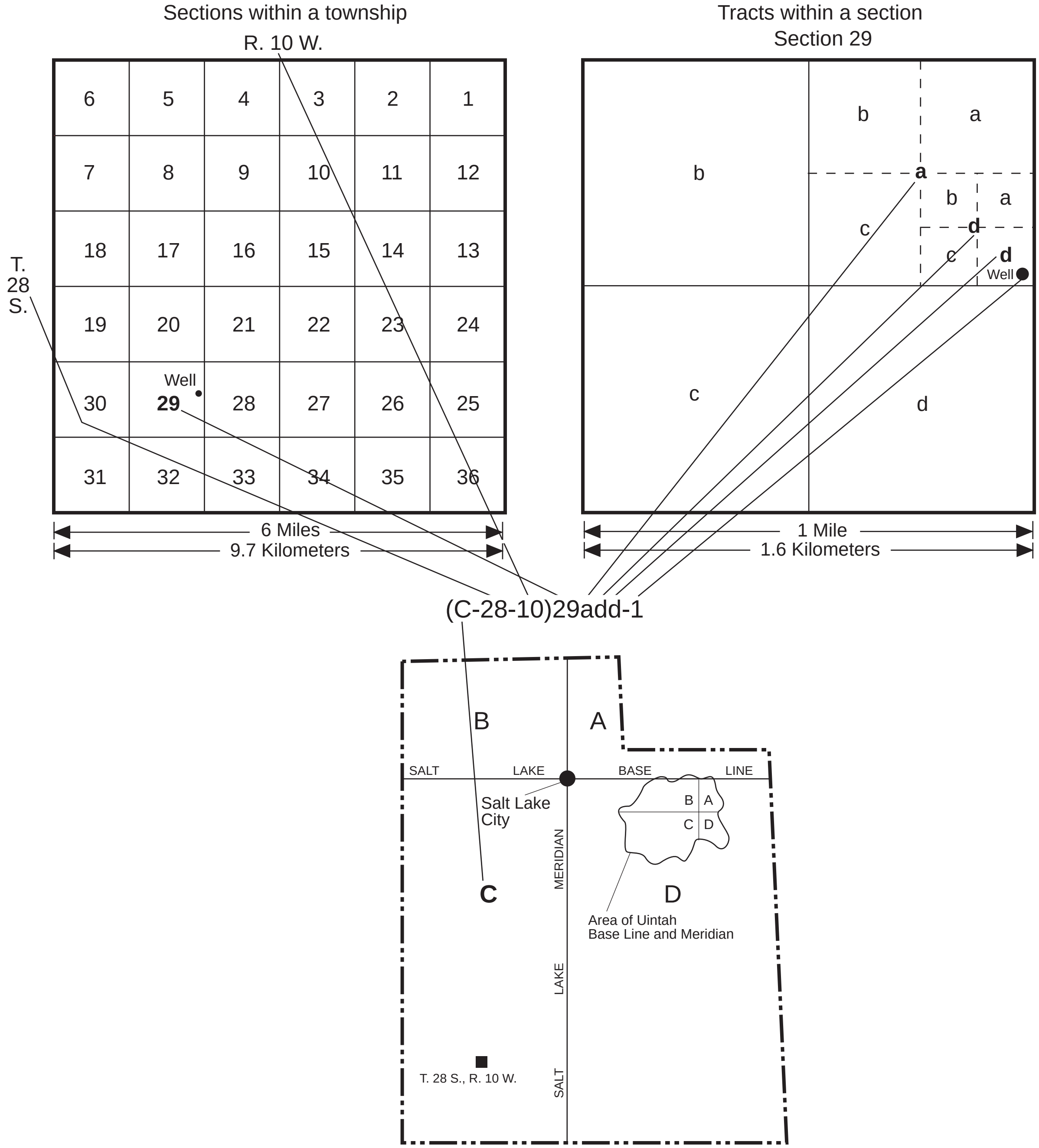

Figure 6. System for numbering wells and miscellaneous sites (township and range).

SPECIAL NETWORKS AND PROGRAMS

Hydrologic Benchmark Network is a network of 50 sites in small drainage basins around the country whose purpose is to provide consistent data on the hydrology, including water quality, and related factors in representative undeveloped watersheds nationwide, and to provide analyses on a continuing basis to compare and contrast conditions observed in basins more obviously affected by human activities.

National Stream-Quality Accounting Network (NASQAN) monitors the water quality of large rivers within four of the Nation's largest river basins--the Mississippi, Columbia, Colorado, and Rio Grande. The network consists of 39 stations. Samples are collected with sufficient frequency that the flux of a wide range of constituents can be estimated. The objective of NASQAN is to characterize the water quality of these large rivers by measuring concentration and mass transport of a wide range of dissolved and suspended constituents, including nutrients, major ions, dissolved and sediment-bound heavy metals, common pesticides, and inorganic and organic forms of carbon. This information will be used (1) to describe the long-term trends and changes in concentration and transport of these constituents; (2) to test findings of the National Water-Quality Assessment Program (NAWQA); (3) to characterize processes unique to large-river systems such as storage and re-mobilization of sediments and associated contaminants; and (4) to refine existing estimates of off-continent transport of water, sediment, and chemicals for assessing human effects on the world's oceans and for determining global cycles of carbon, nutrients, and other chemicals.

The National Atmospheric Deposition Program/National Trends Network (NADP/NTN) provides continuous measurement and assessment of the chemical climate of precipitation throughout the United States. As the lead federal agency, the USGS works together with over 100 organizations to accomplish the following objectives; (1) Provide a long-term, spatial and temporal record of atmospheric deposition generated from a network of 191 precipitation chemistry monitoring sites. (2) Provide the mechanism to evaluate the effectiveness of the significant reduction in SO2 emissions that began in 1995 as implementation of the Clean Air Act Amendments (CAAA) occurred. (3) Provide the scientific basis and nationwide evaluation mechanism for implementation of the Phase II CAAA emission reductions for SO2 and NOx scheduled to begin in 2000.

Data from the network, as well as information about individual sites, are available through the world wide web at:

http://nadp.sws.uiuc.edu/

The National Water-Quality Assessment (NAWQA) Program of the U.S. Geological Survey is a long-term program with goals to describe the status and trends of water-quality conditions for a large, representative part of the Nation's ground- and surface-water resources; provide an improved understanding of the primary natural and human factors affecting these observed conditions and trends; and provide information that supports development and evaluation of management, regulatory, and monitoring decisions by other agencies.

Assessment activities are being conducted in 53 study units (major watersheds and aquifer systems) that represent a wide range of environmental settings nationwide and that account for a large percentage of the Nation's water use. A wide array of chemical constituents will be measured in ground water, surface water, streambed sediments, and fish tissues. The coordinated application of comparative hydrologic studies at a wide range of spatial and temporal scales will provide information for decision making by water-resources managers and a foundation for aggregation and comparison of findings to address water-quality issues of regional and national interest.

Communication and coordination between USGS personnel and other local, State, and federal interests are critical components of the NAWQA Program. Each study unit has a local liaison committee consisting of representatives from key federal, State, and local water resources agencies, Indian nations, and universities in the study unit. Liaison committees typically meet semiannually to discuss their information needs, monitoring plans and progress, desired information products, and opportunities to collaborate efforts among the agencies.

Additional information about the NAWQA Program is available through the world wide web at:

http://wwwrvares.er.usgs.gov/nawqa/nawqa_home.html

EXPLANATION OF STAGE- AND WATER-DISCHARGE RECORDS

Collection and Computation of Data

The base data collected at gaging stations (fig. 7) consist of records of stage and measurements of discharge of streams or canals, and stage, surface area, and contents of lakes or reservoirs. In addition, observations of factors affecting the stage-discharge relation or the stage-capacity relation, weather records and other information are used to supplement base data in determining the daily flow or volume of water in storage. Records of stage are obtained from either direct readings on a nonrecording gage or from a water-stage recorder that gives either a continuos graph of the fluctuations or a tape punched at selected time intervals. Measurements of discharge are made with a current meter, using the general methods adopted by the Geological Survey. These methods are described in standard textbooks, Water-Supply Paper 2175, and the U.S. Geological Survey Techniques of Water Resources Investigations (TWRI's), Book 3, Chapter A1 through A19 and Book 8, Chapters A2 and B2. The methods are consistent with the American Society for Testing and Materials (ASTM) standards and generally follow the standards of the International Organization for Standards (ISO).

For stream-gaging stations, rating tables giving the discharge for any stage are prepared from stage-discharge curves. If extensions to the rating curves are necessary to express discharge greater than measured, they are made on the basis of indirect measurements of peak discharge (such as slope-area or contracted-opening measurements, computation of flow over dams and weirs), step-backwater techniques, velocity-area studies, and logarithmic plotting. The daily mean discharge is computed from gage heights and rating tables, then the monthly and yearly mean discharge are computed from the daily figures. If the stage-discharge relation is subject to change because of frequent or continual change in the physical features that form the control, the daily mean discharge is computed by the shifting-control method in which correction factors based on individual discharge measurements and notes by engineers and observers are sued applying the gage heights to the rating tables. If the stage-discharge relation for a station is temporarily changed by a the presence of aquatic growth or debris on the control, the daily mean discharge is computed by what is basically the shifting-control method.

At some stream-gaging stations, the stage-discharge relation is affected by the backwater from reservoirs, tributary streams, or other sources. This necessitates the use of the slope method in which the slope or fall in a reach of the stream is a factor in computing discharge. The slope or fall is obtained by means of an auxiliary gage set at some distance from the base gage. At some stations stage-discharge relation is affected by changing stage; at these stations the rate of change in stage is used as a factor in computing discharge.

At some northern stream-gaging stations the stage-discharge relation is affected by ice in the winter, and computation of the discharge in the usual manner is impossible. Discharge for periods of ice effect is computed on the basis of gage height record and occasional winter discharge measurements. Consideration is given to the available information on temperature and precipitation, notes by gage observers and hydrologists, and comparable records of discharge for other stations in the same or nearby basins.

For a lake or reservoir station, capacity tables giving the contents for any stage are prepared from stage-area relation curves defined by surveys. The application of the stage to the capacity table gives the contents, from which the daily, monthly, or yearly change in contents is computed.

If the stage-capacity curve is subject to changes because of deposition of sediment in the reservoir, periodic resurveys of the reservoir are necessary to define new stage-capacity curves. During the period between reservoir surveys, the computed contents may be increasingly in error due to the gradual accumulation of sediment.

For some gaging stations there are periods when no gage-height record is obtained or the recorded gage height is so faulty that it cannot be used to compute daily discharge or contents. This happens when the recorder stops or otherwise fails to operate properly, intakes are plugged, the float is frozen in the well, or for various other reasons. For such periods, the daily discharges are estimated on the basis of recorded range in stage, prior and subsequent records, discharge measurements, weather records, and comparison with records for other stations in the same or nearby basins. Likewise, daily contents may be estimated on the basis of operator’s log, prior and subsequent records, inflow-outflow studies, and other information.

Data Presentation

Streamflow data in this report are presented in a new format that is considerably different from the format in data reports prior to the 1991 water year. The major changes are that statistical characteristics of discharge now appear in tabular summaries following the water-year data table and less information is provided in the text or station manuscript above the table. These changes represent the results of a pilot program to reformat the annual water-data report to meet current user needs and data preferences.

The records published for each continuous-record surface-water discharge station (gaging station) now consist of four parts, the manuscript or station description; the data table of daily mean values of discharge for the current water year with summary data; a tabular statistical summary of monthly mean flow data for a designated period, by water year; and a summary statistics table that includes statistical data of annual, daily, and instantaneous flows as well as data pertaining to annual runoff, 7-day low-flow minimums, and flow duration.

Station Manuscript

The manuscript provides, under various heading, descriptive information, such as station location; period of record; historical extremes outside the period of record; record accuracy; and other remarks pertinent to station operation and regulation. The following information, as appropriate, is provided with each continuous record of discharge or lake content. Comments to follow clarify information presented under the various headings of the station description.

LOCATION.--Information on locations is obtained from the most accurate maps available. The location of the gaging station with respect to the cultural and physical features in the vicinity and with respect to the reference place mentioned in the station name is given. River mileages, given for only a few stations, were determined by methods given in “River Mileage Measurement,” Bulletin 14, Revision of October 1968, prepared by the Water Resources Council or were provided by the U.S. Army Corps of Engineers.

DRAINAGE AREA.--Drainage areas are measured using the most accurate maps available. Because the type of maps available varies from one drainage basin to another, the accuracy of drainage areas likewise varies. drainage areas are updated as better maps become available.

PERIOD OF RECORD.--This indicates the period for which records have been published for the station or for an equivalent station. An equivalent station is one that was in operation at a time that the present station was not and whose location was such that flow at it can reasonably be considered equivalent to flow at the present station.

REVISIONS.--If errors in published water-quality records are discovered after publication, appropriate updates are made in the U.S. Geological Survey’s distributed data system, NWIS, and subsequently to its web-based National data system, NWISWeb [http://water.usgs.gov/nwis/nwis]. Because the usual volume of updates makes it impractical to document individual changes in the State data-report series or elsewhere, potential users of U.S. Geological Survey water-quality data are encouraged to obtain all required data from NWIS or NWISWeb to ensure the most recent updates. Updates to NWISWeb are currently made on an annual basis.

GAGE.--The type of gage in current use, the datum of the current gage referred to sea level (see glossary), and a condensed history of the types, locations, and datums of previous gages are given under this heading.

REMARKS.--All periods of estimated daily discharge will either be identified by date in this paragraph of the station description for water-discharge stations or flagged in the daily discharge table. (See next section, “Identifying Estimated Daily Discharge.”) If a REMARKS paragraph is used to identify estimated record, the paragraph will begin with this information presented as the first entry. The paragraph is also used to present information relative to the accuracy of the records, to special methods of computation, and to conditions that affect natural flow at the station. In addition, information may be presented pertaining to average discharge data for the period of record; to extremes data for the period of record and the current year; and, possibly, to other pertinent items. For reservoir stations, information is given on the dam forming the reservoir, the capacity, outlet works and spillway, and purpose and use of the reservoir.

COOPERATION.--Records provided by a cooperating organization or obtained for the U.S. Geological Survey by a cooperating organization are identified here.

EXTREMES OUTSIDE PERIOD OF RECORD.--Included here is information concerning major floods or unusually low flows that occurred outside the stated period of record. The information may or may not have been obtained by the U.S. Geological Survey.

REVISIONS.--If a critical error in published records is discovered, a revision is included in the first report published following discovery of the error.

Although rare, occasionally the records of a discontinued gaging station may need revision. Because, for these stations, there would be no current or, possibly, future station manuscript published to document the revision in a “Revised Records” entry, users of data for these stations who obtained the record from previously published data reports may wish to contact the District Office (address given on the back of the title page of this report) to determine if the published records were ever revised after the station was discontinued. Of course, if the data for a discontinued station were obtained by computer retrieval, thee data would be current and there would be no need to check because any published revision of data is always accompanied by revision of the corresponding data in computer storage.

Manuscript information for lake or reservoir stations differs from that for stream stations in the nature of the “Remarks” and in the inclusion of a skeleton stage-capacity table when daily contents are given. No changes have been made to the data presentations of lake contents.

Data Table of Daily Mean Values

The daily table of discharge records for stream-gaging stations gives mean discharge for each day of the water year. In the monthly summary for the table, the line headed “TOTAL” gives the sum of the daily figures for each month; the line headed “MEAN” gives the average flow in cubic feet per second for the month; and the lines headed “MAX” and “MIN” give the maximum and minimum daily mean discharges, respectively, for each month. Discharge for the month also is usually expressed in cubic feet per second per square mile (line headed “CFSM”) or in inches (line headed “IN”); or in acre-feet (line headed “AC-FT”). Figures for cubic feet per second per square mile and runoff in inches or in acre-feet may be omitted if there is extensive regulation or diversion or if the drainage area includes large noncontributing areas. At some stations monthly and (or) yearly observed discharges are adjusted for reservoir storage or diversion, or diversion data or reservoir contents are given. These figures are identified by a symbol and corresponding footnote.

Statistics of Monthly Mean Data

A tabular summary of the mean (line headed “MEAN”), maximum (line headed “MAX”), and minimum (line headed “MIN”) of monthly mean flows for each month for a designated period is provided below the mean values table. The water years of the first occurrence of the maximum and minimum monthly flows are provided immediately below those figures. The designated period will be expressed as “FOR WATER YEARS - , BY WATER YEAR (WY),” and will list the first and last water years of the range of years selected from the PERIOD OF RECORD paragraph in the station manuscript. It will consist of all of the station record within the specified water years, inclusive, including complete months of record for partial water years, if any, and may coincide with the period of record for the station. The water years for which the statistics are computed will be consecutive, unless a break in the station record is indicated in the manuscript.

Summary Statistics

A table titled “SUMMARY STATISTICS” follows the statistics of monthly mean data tabulation. This table consists of four columns, with the first column containing the line headings of the statistics being reported. The table provides a statistical summary of yearly daily and instantaneous flows, not only for the current water year but also for the previous calendar year and for a designated period, as appropriate. The designated period selected, “WATER YEARS - ,” will consist of all of the station record within the specified water years, inclusive, including complete months of record for partial water years, if any, and may coincide with the period of record for the station. The water years for which the statistics are computed will be consecutive, unless a break in the station record is indicated in the manuscript. All of the calculations for the statistical characteristics designated ANNUAL (see line headings below), except for the “ANNUAL 7-DAY MINIMUM” statistic, are calculated for the designated period using complete water years. The other statistical characteristics may be calculated using partial water years.

The date or water year, as appropriate, of the first occurrence of each statistic reporting extreme values of discharge is provided adjacent to the statistic. Repeated occurrences may be noted in the REMARKS paragraph of the manuscript or in footnotes. Because the designated period may not be the same as the station period of record published in the manuscript, occasionally the dates of occurrence listed for the daily and instantaneous extremes in the designated-period column may not be within the selected water years listed in the heading. When this occurs, it will be noted in the REMARKS paragraph or in footnotes. Selected streamflow duration curve statistics and runoff data are also given. Runoff data may be omitted if there is extensive regulation or diversion of flow in the drainage basin.

The following summary statistics data, as appropriate, are provided with each continuous record of discharge. Comments to follow clarify information presented under the various line headings of the summary statistics table.

ANNUAL TOTAL.--The sum of the daily mean values of discharge for the year.

ANNUAL MEAN.--The arithmetic mean for the individual daily mean discharges for the year noted or for the designated period.

HIGHEST ANNUAL MEAN.--The maximum annual mean discharge occurring for the designated period.

LOWEST ANNUAL MEAN.--The minimum annual mean discharge occurring for the designated period.

HIGHEST DAILY MEAN.--The maximum daily mean discharge for the year or for the designated period.

LOWEST DAILY MEAN.--The minimum daily mean discharge for the year or for the designated period.

ANNUAL 7-DAY MINIMUM.--The lowest mean discharge for 7 consecutive days for a calendar year or a water year. Note that most low-flow frequency analyses of annual 7-day minimum flows use a climatic year (April 1-March 31). The date shown in the summary statistics table is the initial date of the 7-day period. this value should not be confused with the 7-day 10-year low-flow statistic.)

INSTANTANEOUS PEAK FLOW.--The maximum instantaneous discharge occurring for the water year or for the designated period. Note that secondary instantaneous peak discharges above a selected base discharge are stored in District computer files for stations meeting certain criteria. Those discharge values may be obtained by writing to the District Office. (See address on back of title page of this report.)

INSTANTANEOUS PEAK STAGE.--The maximum instantaneous stage occurring for the water year or for the designated period. If the dates of occurrence for the instantaneous peak flow and instantaneous peak stage differ, the REMARKS paragraph in the manuscript for a footnote may be used to provide further information.

INSTANTANEOUS LOW FLOW.--The minimum instantaneous discharge occurring for the water year or for the designated period.

ANNUAL RUNOFF.--Indicates the total quantity of water in runoff for a drainage area for the year. Data reports may use any of the following units of measurement in presenting annual runoff data:

Acre-foot (AC-FT) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.

Cubic feet per square mile (CFSM) is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming the runoff is distributed uniformly in time and area.

Inches (INCHES) indicates the depth to which the drainage area would be covered if all of the runoff for a given time period were uniformly distributed on it.

10 PERCENT EXCEEDS.--The discharge that has been exceeded 10 percent of the time for the designated period.

50 PERCENT EXCEEDS.--The discharge that has been exceeded 50 percent of the time for the designated period.

90 PERCENT EXCEEDS.--The discharge that has been exceeded 90 percent of the time for the designated period.

Data collected at partial-record stations follow the information for continuous-record sites. Data for partial-record discharge stations are presented in two tables. The first is a table of annual maximum stage and discharge at crest-stage stations, and the second is a table of discharge measurements at low-flow partial-record stations. The tables of partial-record stations are followed by a listing of discharge measurements made at sites other than continuous-record or partial-record stations. These measurements are generally made in times of drought or flood to give better areal coverage to those events. Those measurements and others collected for some special reason are called measurements at miscellaneous sites.

Accuracy of Field Data and Computed Results

The accuracy of streamflow data depends primarily on (1) the stability of the stage-discharge relation or, if the control is unstable, the frequency of discharge measurements, and (2) the accuracy of observations of stage, measurements of discharge, and interpretations of records.

The station description under “REMARKS” states the degree of accuracy of the records. “Excellent” means that about 95 percent of the daily discharges are within 5 percent; “good” within 10 percent; and “fair,” within 15 percent. “Poor” means that daily discharges have less that “fair” accuracy. Figures of daily mean discharge in this report are shown to the nearest hundredth of a cubic foot per second for discharges of less than 1 cfs; to tenths between 1.0 and 10 cfs; to whole numbers between 10 and 1,000 cfs; and to 3 significant figures above 1,000 cfs. The number of significant figures used is based solely on the magnitude of the figure. The same rounding rules apply to discharge figures listed for partial-record stations.

Discharge at many stations, as indicated by the monthly mean, may not reflect natural runoff due to the effects of diversion, consumption, regulation by storage, increase or decrease in evaporation due to artificial causes, or to other factors. For such stations, figures of cubic feet per second per square mile and of runoff in inches are not published unless satisfactory adjustments can be made for diversions, for changes in contents of reservoirs, or for other changes incident to use and control. Evaporation from a reservoir is not included in the adjustments for changes in reservoir contents, unless it is so stated. Even at those stations where adjustments are made, large errors in computed runoff may occur if adjustments or losses are large in comparison with the observed discharge.

Other Data Available

Information of a more detailed nature than that published for most of the gaging stations such as discharge measurements, gage-height records, and rating tables is available from the District office. Also, most gaging-station records are available in computer-usable form and many statistical analysis have been made.

Information on the availability of unpublished data or statistical analyses may be obtained from the District office.

EXPLANATION OF WATER-QUALITY RECORDS

Collection and Examination of Data

Surface-water samples for analyses usually are collected at or near gaging stations. The quality-of-water records are given immediately following the discharge records at these stations.

The descriptive heading for water-quality records gives the period of record for all water-quality data; the period of daily record for parameters that are measured on a daily basis (specific conductance, water temperature, sediment discharge, etc.); extremes for the current year; and general remarks.

For ground-water records, no descriptive statements are given; however, the well number, depth of well, date of sampling, or other pertinent data are given in the table containing the chemical analyses of the ground water.

Water Analysis

Most methods for collecting and analyzing water samples are described in the U.S. Geological Survey Techniques of Water-Resources Investigations listed on a following page.

One sample can define adequately the water quality at a given time if the mixture of solutes throughout the stream cross section is homogeneous. However, the concentration of solutes at different locations in the cross section may vary widely with different rates of water discharge, depending on the source of material and the turbulence and mixing of the stream. Some streams must be sampled at several verticals to obtain a representative sample needed for an accurate mean concentration and for use in calculating load.

Chemical-quality data published in this report are considered to be the most representative values available for the stations listed. The values reported represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. In the rare case where an apparent inconsistency exists between a reported pH value and the relative abundance of carbon dioxide species (carbonate and bicarbonate), the inconsistency is the result of a slight uptake of carbon dioxide from the air by the sample between measurement of pH in the field and determination of carbonate and bicarbonate in the laboratory.

For chemical-quality stations equipped with digital monitors, the records consist of daily maximum and minimum values for each constituent measured, and are based upon hourly punches beginning at 0l00 hours and ending at 2400 hours for the day of record.

SURFACE-WATER-DISCHARGE AND SURFACE-WATER-QUALITY RECORDS

Remarks Codes

The following remark codes may appear with the water-quality data in this section:

PRINT OUTPUT	REMARK
E or e	Estimated value.
>	Actual value is known to be greater than the value shown.
<	Actual value is known to be less than the value shown.
K	Results based on colony count outside the acceptance range (non-ideal colony count).
L	Biological organism count less than 0.5 percent (organism may be observed rather than counted).
D	Biological organism count equal to or greater than 15 percent (dominant).
V	Analyte was detected in both the environmental sample and the associated blanks
&	Biological organism estimated as dominant.

Dissolved Trace-Element Concentrations

Traditionally, dissolved trace-element concentrations have been reported at the microgram per liter (ug/L) level. Recent evidence, mostly from large rivers, indicates that actual dissolved-phase concentrations for a number of trace elements are within the range of 10's to 100's of nanograms per liter (ng/L). Data above the ug/L level should be viewed with caution. Such data may actually represent elevated environmental concentrations from natural or human causes; however, these data could reflect contamination introduced during sampling, processing, or analysis. To confidently produce dissolved trace-element data with insignificant contamination, the U.S. Geological Survey began using new trace-element protocols at some stations in water year 1994.

Change in National Trends Network Procedures

Sample handling procedures at all National Trends Network stations were changed substantially on January 11, 1994, in order to reduce contamination from the sample shipping container. The data for samples before and after that date are different and not directly comparable. A tabular summary of the differences based on a special intercomparison study, is available from the NADP Program Office, Illinois State Water Survey, 2204 Griffith Drive, Champaign, IL 61820-7495 (217-333-7873).

Water Quality-Control Data

Data generated from quality-control (QC) samples are a requisite for evaluating the quality of the sampling and processing techniques as well as data from the actual samples themselves. Without QC data, environmental sample data cannot be adequately interpreted because the errors associated with the sample data are unknown. The various types of QC samples collected by this District office are described in the following section. Procedures have been established for the storage of water-quality-control data within the USGS. These procedures allow for storage of all derived QC data and are identified so that they can be related to corresponding environmental samples.

Blank Samples

Blank samples are collected and analyzed to ensure that environmental samples have not been contaminated by the overall data-collection process. The blank solution used to develop specific types of blank samples is a solution that is free of the analytes of interest. Any measured value signal in a blank sample for an analyte (a specific component measured in a chemical analysis) that was absent in the blank solution is believed to be due to contamination. There are many types of blank samples possible, each designed to segregate a different part of the overall data-collection process. The types of blank samples collect in this district are:

Field blank - a blank solution that is subjected to all aspects of sample collection, field processing preservation, transportation, and laboratory handling as an environmental sample.

Trip blank - a blank solution that is put in the same type of bottle used for an environmental sample and kept with the set of sample bottles before and after sample collection.

Equipment blank - a blank solution that is processed through all equipment used for collecting and processing an environmental sample (similar to a field blank but normally done in the more controlled conditions of the office).

Sampler blank - a blank solution that is poured or pumped through the same field sampler used for collecting an environmental sample.

Filter blank - a blank solution that is filtered in the same manner and through the same filter apparatus used for an environmental sample.

Splitter blank - a blank solution that is mixed and separated using a field splitter in the same manner and through the same apparatus used for an environmental sample.

Preservation blank - a blank solution that is treated with the sampler preservatives used for an environmental sample.

Reference Samples

Reference material is a solution or material prepared by a laboratory whose composition is certified for one or more properties so that it can be used to assess a measurement method. Samples of reference material are submitted for analysis to ensure that an analytical method is accurate for the known properties of the reference material. Generally, the selected reference material properties are similar to the environmental sample properties.

Replicate Samples

Replicate samples are a set of environmental samples collected in a manner such that the samples are thought to be essentially identical in composition. Replicate is the general case for which a duplicate is the special case consisting of two samples. Replicate samples are collected and analyzed to establish the amount of variability in the data contributed by some part of the collection and analytical process. There are many types of replicate samples possible, each of which may yield slightly different results in a dynamic hydrologic setting, such as a flowing stream. The types of replicate samples collected in this district are:

Sequential samples - a type of replicate sample in which the samples are collected one after the other, typically over a short time.

Split sample - a type of replicate sample in which a sample is split into subsamples contemporaneous in time and space.

Spike samples - samples to which known quantities of a solution with one or more well-established analyte concentrations have been added. These samples are analyzed to determine the extent of matrix interference or degradation on the analyte concentration during sample processing and analysis.

Water Temperature

Water temperatures are measured at most of the water-quality stations. In addition, water temperatures are taken at time of discharge measurements for water-discharge stations. For stations where water temperatures are taken manually once daily, the water temperatures are taken at about the same time each day. Large streams have a small diel temperature change; shallow streams may have a daily range of several degrees and may follow closely the changes in air temperature. Some streams may be affected by waste-heat discharges.

At stations where recording instruments are used, maximum and minimum temperatures for each day are published.

Sediment

Suspended-sediment concentrations are determined from samples collected by using depth-integrating samplers. Samples usually are obtained at several verticals in the cross section, or a single sample may be obtained at a fixed point and a coefficient applied to determine the mean concentration in the cross sections. During periods of rapidly changing flow or rapidly changing concentration samples may have been collected more frequently (twice daily). The published sediment discharges for days of rapidly changing flow or concentration were computed by the subdivided-day method (time-discharge weighted average). Therefore, for those days when the published sediment discharge value differs from the value computed as the product of discharge times mean concentration times 0.9927, the reader can assume that the sediment discharge for that day was computed by the subdivided-day method. For periods when no samples were collected, daily loads of suspended sediment were estimated on the basis of water discharge, sediment concentrations observed immediately before and after the periods, and suspended-sediment loads for other periods of similar discharge.

At other stations, suspended-sediment data were collected periodically at many verticals in the stream cross section. Although data collected periodically may represent conditions only at the time of observations, such data are useful in establishing seasonal relations between quality and streamflow in predicting long-term sediment-discharge characteristics of the streams. Methods used in the computation of sediment records are described in the TWRI Book 3, Chapters C1 and C3. These methods are consistent with ASTM standards and generally follow ISO standards.

In addition to the records of the quantities of suspended sediment, records of the periodic measurements of the particle-size distribution of the suspended sediment and bed material are included.

Laboratory Analysis

Methods used to analyze sediment samples and to compute sediment records are described in the TWRI Book 54, chapter C1. Methods used by the U.S. Geological Survey laboratories are given in the TWRI Book 1, Chapter D2; Book 3, Chapter C2; and Book 5, Chapters A1, A3, A4, and A5. These methods are consistent with ASTM standards and generally follow ISO standards.

Accuracy of Laboratory Analysis

In March 1989 the National Water-Quality Laboratory discovered a bias in the turbidimetric method for sulfate analysis, indicating that values below 75 mg/L gave a median positive bias of 2 mg/L above the true value for the period between 1982 and 1989. Sulfate values in this report have not been corrected for this bias.

EXPLANATION OF GROUND-WATER LEVEL RECORDS

Collection of the Data

Generally, only ground-water level data from selected wells with continuous recorders from a basic network of observation wells are published herein (fig. 10). This basic network contains observation wells so located that the most significant data are obtained from the fewest wells in the most important aquifers. In addition to the wells with continuous recorders, water-level data collected on a monthly basis for 26 selected wells in Wasatch County are also published.

Each well is identified by means of (1) a15-digit number that is based on latitude and longitude and (2) a local number that is produced for local needs (see figures 7 and 8).

Measurements are made in many types of wells, under varying conditions of access and at different temperatures; hence, neither the method of measurement nor the equipment can be standardized. At each observation well, however, the equipment and techniques used are those that will ensure that measurements at each well are consistent.

Most methods for collecting and analyzing water samples are described in the U.S. Geological Survey TWRI publications referred to in the “On-site Measurements and Sample Collection” and the “Laboratory Measurements” sections in this data report. In addition, the TWRI Book 1, Chapter D2, describes guidelines for the collection and field analysis of ground-water samples for selected unstable constituents. Procedures for on-site measurements and for collecting, treating, and shipping samples are given in publications on "Techniques of Water-Resources Investigations, Book 1, Chap. D2; Book 3, Chap. A1, A3, and A4; Book 9, Chap. A1-A9. The values reported in this report represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. These methods are consistent with ASTM standards and generally follow ISO standards. All samples were obtained by trained personnel. The wells sampled were pumped long enough to assure that the water collected came directly from the aquifer and had not stood for a long time in the well casing where it would have been exposed to the atmosphere and to the material, possibly metal, comprising the casings.

Water-level measurements in this report are given in feet with reference to land-surface datum (lsd). Land surface datum is a datum plane that is approximately at land surface at each well. If known, the elevation of the land-surface datum above sea level is given in the well description. The height of the measuring point (MP) above or below land-surface datum is given in each well description. Water levels in wells equipped with recording gages are reported for every fifth day and the end of each month (EOM).

Water levels are reported to as many significant figures as can be justified by the local conditions. For example, in a measurement of a depth of water of several hundred feet, the error in determining the absolute value of the total depth to water may be a few tenths of a foot, whereas the error in determining the net change of water level between successive measurements may be only a hundredth or a few hundredths of a foot. For lesser depths to water the accuracy is greater. Accordingly, most measurements are reported to a hundredth of a foot, but some are given only to a tenth of a foot or a larger unit.

Access to WATSTORE Data

The USGS provides near real-time stage and discharge data for many of the gaging stations equipped with the necessary telemetry and historic daily-mean and peak-flow discharge data for most current or discontinued gaging stations through the world wide web (WWW). These data may be accessed at

http://water.usgs.gov

Some water-quality and ground-water data also are available through the WWW. In addition, data can be provided in various machine-readable formats on various media. Information about the availability of specific types of data or products, and user charges, can be obtained locally from each of the Water Resources Division District Offices (See address on the back of the title page.)

DEFINITION OF TERMS

Specialized technical terms related to streamflow, water-quality, and other hydrologic data, as used in this report, are defined below. Terms such as algae, water level, and precipitation are used in their common everyday meanings, definitions of which are given in standard dictionaries. Not all terms defined in this alphabetical list apply to every State. See also table for converting English units to International System (SI) Units. Other glossaries that also define water-related terms are accessible from *http://water.usgs.gov/glossaries.html*.

Acid neutralizing capacity (ANC) is the equivalent sum of all bases or base-producing materials, solutes plus particulates, in an aqueous system that can be titrated with acid to an equivalence point. This term designates titration of an “unfiltered” sample (formerly reported as alkalinity).

Acre-foot (AC-FT, acre-ft) is a unit of volume, commonly used to measure quantities of water used or stored, equivalent to the volume of water required to cover 1 acre to a depth of 1 foot and equivalent to 43,560 cubic feet, 325,851 gallons, or 1,233 cubic meters. (See also “Annual runoff”)

Adenosine triphosphate (ATP) is an organic, phosphate-rich compound important in the transfer of energy in organisms. Its central role in living cells makes ATP an excellent indicator of the presence of living material in water. A measurement of ATP therefore provides a sensitive and rapid estimate of biomass. ATP is reported in micrograms per liter.

Adjusted discharge is discharge data that have been mathematically adjusted (for example, to remove the effects of a daily tide cycle or reservoir storage).

Algal growth potential (AGP) is the maximum algal dry weight biomass that can be produced in a natural water sample under standardized laboratory conditions. The growth potential is the algal biomass present at stationary phase and is expressed as milligrams dry weight of algae produced per liter of sample. (See also “Biomass” and “Dry weight”)

Alkalinity is the capacity of solutes in an aqueous system to neutralize acid. This term designates titration of a “filtered” sample.

Annual runoff is the total quantity of water that is discharged (“runs off”) from a drainage basin in a year. Data reports may present annual runoff data as volumes in acre-feet, as discharges per unit of drainage area in cubic feet per second per square mile, or as depths of water on the drainage basin in inches.

Annual 7-day minimum is the lowest mean value for any 7-consecutive-day period in a year. Annual 7-day minimum values are reported herein for the calendar year and the water year (October 1 through September 30). Most low-flow frequency analyses use a climatic year (April 1-March 31), which tends to prevent the low-flow period from being artificially split between adjacent years. The date shown in the summary statistics table is the initial date of the 7-day period. (This value should not be confused with the 7-day, 10-year low-flow statistic.)

Aroclor is the registered trademark for a group of poly-chlorinated biphenyls that were manufactured by the Monsanto Company prior to 1976. Aroclors are assigned specific 4-digit reference numbers dependent upon molecular type and degree of substitution of the biphenyl ring hydrogen atoms by chlorine atoms. The first two digits of a numbered aroclor represent the molecular type, and the last two digits represent the percentage weight of the hydrogen-substituted chlorine.

Artificial substrate is a device that purposely is placed in a stream or lake for colonization of organisms. The artificial substrate simplifies the community structure by standardizing the substrate from which each sample is collected. Examples of artificial substrates are basket samplers (made of wire cages filled with clean streamside rocks) and multiplate samplers (made of hardboard) for benthic organism collection, and plexiglass strips for periphyton collection. (See also “Substrate”)

Ash mass is the mass or amount of residue present after the residue from a dry-mass determination has been ashed in a muffle furnace at a temperature of 500 °C for 1 hour. Ash mass of zooplankton and phytoplankton is expressed in grams per cubic meter (g/m^3), and periphyton and benthic organisms in grams per square meter (g/m^2). (See also “Biomass” and “Dry mass”)

Aspect is the direction toward which a slope faces with respect to the compass.

Bacteria are microscopic unicellular organisms, typically spherical, rodlike, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease, whereas others perform an essential role in nature in the recycling of materials; for example, by decomposing organic matter into a form available for reuse by plants.

Bankfull stage, as used in this report, is the stage at which a stream first overflows its natural banks formed by floods with 1- to 3-year recurrence intervals.

Base discharge (for peak discharge) is a discharge value, determined for selected stations, above which peak discharge data are published. The base discharge at each station is selected so that an average of about three peak flows per year will be published. (See also “Peak flow”)

Base flow is sustained flow of a stream in the absence of direct runoff. It includes natural and human-induced streamflows. Natural base flow is sustained largely by ground-water discharge.

Bed material is the sediment mixture of which a stream-bed, lake, pond, reservoir, or estuary bottom is composed. (See also “Bedload” and “Sediment”)

Bedload is material in transport that primarily is supported by the streambed. In this report, bedload is considered to consist of particles in transit from the bed to the top of the bedload sampler nozzle (an elevation ranging from 0.25 to 0.5 foot). These particles are retained in the bedload sampler. A sample collected with a pressure-differential bedload sampler also may contain a component of the suspended load.

Bedload discharge (tons per day) is the rate of sediment moving as bedload, reported as dry weight, that passes through a cross section in a given time. NOTE: Bedload discharge values in this report may include a component of the suspended-sediment discharge. A correction may be necessary when computing the total sediment discharge by summing the bedload discharge and the suspended-sediment discharge. (See also “Bedload,” “Dry weight,” “Sediment,” and “Suspended-sediment discharge”)

Benthic organisms are the group of organisms inhabiting the bottom of an aquatic environment. They include a number of types of organisms, such as bacteria, fungi, insect larvae and nymphs, snails, clams, and crayfish. They are useful as indicators of water quality.

Biochemical oxygen demand (BOD) is a measure of the quantity of dissolved oxygen, in milligrams per liter, necessary for the decomposition of organic matter by microorganisms, such as bacteria.

Biomass is the amount of living matter present at any given time, expressed as mass per unit area or volume of habitat.

Biomass pigment ratio is an indicator of the total proportion of periphyton that are autotrophic (plants). This also is called the Autotrophic Index.

Blue-green algae (*Cyanophyta*) are a group of phytoplankton and periphyton organisms with a blue pigment in addition to a green pigment called chlorophyll. Blue-green algae can cause nuisance water-quality conditions in lakes and slow-flowing rivers; however, they are found commonly in streams throughout the year. The abundance of blue-green algae in phytoplankton samples is expressed as the number of cells per milliliter (cells/mL) or biovolume in cubic micrometers per milliliter (μm^3/mL). The abundance of blue-green algae in periphyton samples is given in cells per square centimeter (cells/cm^2) or biovolume per square centimeter ($\mu m^3/cm^2$). (See also “Phytoplankton”and “Periphyton”)

Bottom material (See “Bed material”)

Bulk electrical conductivity is the combined electrical conductivity of all material within a doughnut-shaped volume surrounding an induction probe. Bulk conductivity is affected by different physical and chemical properties of the material including the dissolved-solids content of the pore water, and the lithology and porosity of the rock.

Canadian Geodetic Vertical Datum 1928 is a geodetic datum derived from a general adjustment of Canada’s first order level network in 1928.

Cell volume (biovolume) determination is one of several common methods used to estimate biomass of algae in aquatic systems. Cell members of algae are used frequently in aquatic surveys as an indicator of algal production. However, cell numbers alone cannot represent true biomass because of considerable cell-size variation among the algal species. Cell volume (μm^3) is determined by obtaining critical cell measurements or cell dimensions (for example, length, width, height, or radius) for 20 to 50 cells of each important species to obtain an average biovolume per cell. Cells are categorized according to the correspondence of their cellular shape to the nearest geometric solid or combinations of simple solids (for example, spheres, cones, or cylinders). Representative formulae used to compute biovolume are as follows:

sphere $4/3\ \pi r^3$ cone $1/3\ \pi r^2 h$ cylinder $\pi r^2 h$.

pi (π) is the ratio of the circumference to the diameter of a circle; pi = 3.14159….

From cell volume, total algal biomass expressed as biovolume (μm^3/mL) is thus determined by multiplying the number of cells of a given species by its average cell volume and then summing these volumes for all species.

Cells/volume refers to the number of cells of any organism that is counted by using a microscope and grid or counting cell. Many planktonic organisms are multicelled and are counted according to the number of contained cells per sample volume, and generally are reported as cells or units per milliliter (mL) or liter (L).

Cfs-day (See “Cubic foot per second-day”)

Channel bars, as used in this report, are the lowest prominent geomorphic features higher than the channel bed.

Chemical oxygen demand (COD) is a measure of the chemically oxidizable material in the water and furnishes an approximation of the amount of organic and reducing material present. The determined value may correlate with BOD or with carbonaceous organic pollution from sewage or industrial wastes. [See also “Biochemical oxygen demand (BOD)”]

***Clostridium perfringens** (C. perfringens)* is a spore-forming bacterium that is common in the feces of human and other warm-blooded animals. Clostridial spores are being used experimentally as an indicator of past fecal contamination and the presence of microorganisms that are resistant to disinfection and environmental stresses. (See also “Bacteria”)

Coliphages are viruses that infect and replicate in coliform bacteria. They are indicative of sewage contamination of water and of the survival and transport of viruses in the environment.

Color unit is produced by 1 milligram per liter of platinum in the form of the chloroplatinate ion. Color is expressed in units of the platinum-cobalt scale.

Confined aquifer is a term used to describe an aquifer containing water between two relatively impermeable bound-aries. The water level in a well tapping a confined aquifer stands above the top of the confined aquifer and can be higher or lower than the water table that may be present in the material above it. In some cases, the water level can rise above the ground surface, yielding a flowing well.

Contents is the volume of water in a reservoir or lake. Unless otherwise indicated, volume is computed on the basis of a level pool and does not include bank storage.

Continuous-record station is a site where data are collected with sufficient frequency to define daily mean values and variations within a day.

Control designates a feature in the channel that physically affects the water-surface elevation and thereby determines the stage-discharge relation at the gage. This feature may be a constriction of the channel, a bedrock outcrop, a gravel bar, an artificial structure, or a uniform cross section over a long reach of the channel.

Control structure, as used in this report, is a structure on a stream or canal that is used to regulate the flow or stage of the stream or to prevent the intrusion of saltwater.

Cubic foot per second (CFS, ft^3/s) is the rate of discharge representing a volume of 1 cubic foot passing a given point in 1 second. It is equivalent to approximately 7.48 gallons per second or approximately 449 gallons per minute, or 0.02832 cubic meters per second. The term “second-foot” sometimes is used synonymously with “cubic foot per second” but is now obsolete.

Cubic foot per second-day (CFS-DAY, Cfs-day, [(ft^3/s)/d]) is the volume of water represented by a flow of 1 cubic foot per second for 24 hours. It is equivalent to 86,400 cubic feet, 1.98347 acre-feet, 646,317 gallons, or 2,446.6 cubic meters. The daily mean discharges reported in the daily value data tables numerically are equal to the daily volumes in cfs-days, and the totals also represent volumes in cfs-days.

Cubic foot per second per square mile [CFSM, (ft^3/s)/mi^2] is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming the runoff is distributed uniformly in time and area. (See also "Annual runoff")

Daily mean suspended-sediment concentration is the time-weighted mean concentration of suspended sediment passing a stream cross section during a 24-hour day. (See also "Sediment" and "Suspended-sediment concentration")

Daily record station is a site where data are collected with sufficient frequency to develop a record of one or more data values per day. The frequency of data collection can range from continuous recording to data collection on a daily or near-daily basis.

Data collection platform (DCP) is an electronic instrument that collects, processes, and stores data from various sensors, and transmits the data by satellite data relay, line-of-sight radio, and/or landline telemetry.

Data logger is a microprocessor-based data acquisition system designed specifically to acquire, process, and store data. Data usually are downloaded from onsite data loggers for entry into office data systems.

Datum is a surface or point relative to which measurements of height and/or horizontal position are reported. A vertical datum is a horizontal surface used as the zero point for measurements of gage height, stage, or elevation; a horizontal datum is a reference for positions given in terms of latitude-longitude, State Plane coordinates, or Universal Transverse Mercator (UTM) coordinates. (See also "Gage datum," "Land-surface datum," "National Geodetic Vertical Datum of 1929," and "North American Vertical Datum of 1988")

Diatoms *(Bacillariophyta)* are unicellular or colonial algae with a siliceous cell wall. The abundance of diatoms in phytoplankton samples is expressed as the number of cells per milliliter (cells/mL) or biovolume in cubic micrometers per milliliter (μm^3/mL). The abundance of diatoms in periphyton samples is given in cells per square centimeter (cells/cm^2) or biovolume per square centimeter ($\mu m^3/cm^2$). (See also "Phytoplankton" and "Periphyton")

Diel is of or pertaining to a 24-hour period of time; a regular daily cycle.

Discharge, or **flow**, is the rate that matter passes through a cross section of a stream channel or other water body per unit of time. The term commonly refers to the volume of water (including, unless otherwise stated, any sediment or other constituents suspended or dissolved in the water) that passes a cross section in a stream channel, canal, pipeline, and so forth, within a given period of time (cubic feet per second). Discharge also can apply to the rate at which constituents, such as suspended sediment, bedload, and dissolved or suspended chemicals, pass through a cross section, in which cases the quantity is expressed as the mass of constituent that passes the cross section in a given period of time (tons per day).

Dissolved refers to that material in a representative water sample that passes through a 0.45-micrometer membrane filter. This is a convenient operational definition used by Federal and State agencies that collect water-quality data. Determinations of "dissolved" constituent concentrations are made on sample water that has been filtered.

Dissolved oxygen (DO) is the molecular oxygen (oxygen gas) dissolved in water. The concentration in water is a function of atmospheric pressure, temperature, and dissolved-solids concentration of the water. The ability of water to retain oxygen decreases with increasing temperature or dissolved-solids concentration. Photosynthesis and respiration by plants commonly cause diurnal variations in dissolved-oxygen concentration in water from some streams.

Dissolved solids concentration in water is the quantity of dissolved material in a sample of water. It is determined either analytically by the "residue-on-evaporation" method, or mathematically by totaling the concentrations of individual constituents reported in a comprehensive chemical analysis. During the analytical determination, the bicarbonate (generally a major dissolved component of water) is converted to carbonate. In the mathematical calculation, the bicarbonate value, in milligrams per liter, is multiplied by 0.4926 to convert it to carbonate. Alternatively, alkalinity concentration (as mg/L $CaCO_3$) can be converted to carbonate concentration by multiplying by 0.60.

Diversity index (H) (Shannon index) is a numerical expression of evenness of distribution of aquatic organisms. The formula for diversity index is:

$$\bar{d} = -\sum_{i \approx 1}^{s} \frac{n_i}{n} \log_2 \frac{n_i}{n},$$

where n_i is the number of individuals per taxon, n is the total number of individuals, and s is the total number of taxa in the sample of the community. Index values range from zero, when all the organisms in the sample are the same, to some positive number, when some or all of the organisms in the sample are different.

Drainage area of a stream at a specific location is that area upstream from the location, measured in a horizontal plane, that has a common outlet at the site for its surface runoff from precipitation that normally drains by gravity into a stream. Drainage areas given herein include all closed basins, or noncontributing areas, within the area unless otherwise specified.

Drainage basin is a part of the Earth's surface that contains a drainage system with a common outlet for its surface runoff. (See "Drainage area")

Dry mass refers to the mass of residue present after drying in an oven at 105 °C, until the mass remains unchanged. This mass represents the total organic matter, ash and sediment, in the sample. Dry-mass values are expressed in the same units as ash mass. (See also "Ash mass," "Biomass," and "Wet mass")

Dry weight refers to the weight of animal tissue after it has been dried in an oven at 65 ˚C until a constant weight is achieved. Dry weight represents total organic and inorganic matter in the tissue. (See also "Wet weight")

Embeddedness is the degree to which gravel-sized and larger particles are surrounded or enclosed by finer-sized particles. (See also "Substrate embeddedness class")

Enterococcus bacteria commonly are found in the feces of humans and other warmblooded animals. Although some strains are ubiquitous and not related to fecal pollution, the presence of enterococci in water is an indication of fecal pollution and the possible presence of enteric pathogens. Enterococcus bacteria are those bacteria that produce pink to red colonies with black or reddish-brown precipitate after incubation at 41 °C on mE agar (nutrient medium for bacterial growth) and subsequent transfer to EIA medium. Enterococci include *Streptococcus feacalis, Streptococcus feacium, Streptococcus avium,* and their variants. (See also "Bacteria")

EPT Index is the total number of distinct taxa within the insect orders Ephemeroptera, Plecoptera, and Trichoptera. This index summarizes the taxa richness within the aquatic insects that generally are considered pollution sensitive; the index usually decreases with pollution.

Escherichia coli (E. coli) are bacteria present in the intestine and feces of warmblooded animals. *E. coli* are a member species of the fecal coliform group of indicator bacteria. In the laboratory, they are defined as those bacteria that produce yellow or yellow-brown colonies on a filter pad saturated with urea substrate broth after primary culturing for 22 to 24 hours at 44.5 ˚C on mTEC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample. (See also "Bacteria")

Estimated (E) value of a concentration is reported when an analyte is detected and all criteria for a positive result are met. If the concentration is less than the method detection limit (MDL), an E code will be reported with the value. If the analyte is identified qualitatively as present, but the quantitative determination is substantially more uncertain, the National Water Quality Laboratory will identify the result with an E code even though the measured value is greater than the MDL. A value reported with an E code should be used with caution. When no analyte is detected in a sample, the default reporting value is the MDL preceded by a less than sign (<). For bacteriological data, concentrations are reported as estimated when results are based on non-ideal colony counts.

Euglenoids (*Euglenophyta*) are a group of algae that usually are free-swimming and rarely creeping. They have the ability to grow either photosynthetically in the light or heterotrophically in the dark. (See also "Phytoplankton")

Extractable organic halides (EOX) are organic compounds that contain halogen atoms such as chlorine. These organic compounds are semivolatile and extractable by ethyl acetate from air-dried streambed sediment. The ethyl acetate extract is combusted, and the concentration is determined by microcoulometric determination of the halides formed. The concentration is reported as micrograms of chlorine per gram of the dry weight of the streambed sediment.

Fecal coliform bacteria are present in the intestines or feces of warmblooded animals. They often are used as indicators of the sanitary quality of the water. In the laboratory, they are defined as all organisms that produce blue colonies within 24 hours when incubated at 44.5 °C plus or minus 0.2 °C on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample. (See also “Bacteria”)

Fecal streptococcal bacteria are present in the intestines of warmblooded animals and are ubiquitous in the environment. They are characterized as gram-positive, cocci bacteria that are capable of growth in brain-heart infusion broth. In the laboratory, they are defined as all the organisms that produce red or pink colonies within 48 hours at 35 °C plus or minus 1.0 °C on KF-streptococcus medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample. (See also “Bacteria”)

Fire algae (*Pyrrhophyta*) are free-swimming unicells characterized by a red pigment spot. (See also “Phytoplankton”)

Flow-duration percentiles are values on a scale of 100 that indicate the percentage of time for which a flow is not exceeded. For example, the 90th percentile of river flow is greater than or equal to 90 percent of all recorded flow rates.

Gage datum is a horizontal surface used as a zero point for measurement of stage or gage height. This surface usually is located slightly below the lowest point of the stream bottom such that the gage height is usually slightly greater than the maximum depth of water. Because the gage datum is not an actual physical object, the datum is usually defined by specifying the elevations of permanent reference marks such as bridge abutments and survey monuments, and the gage is set to agree with the reference marks. Gage datum is a local datum that is maintained independently of any national geodetic datum. However, if the elevation of the gage datum relative to the national datum (North American Vertical Datum of 1988 or National Geodetic Vertical Datum of 1929) has been determined, then the gage readings can be converted to elevations above the national datum by adding the elevation of the gage datum to the gage reading.

Gage height (G.H.) is the water-surface elevation, in feet above the gage datum. If the water surface is below the gage datum, the gage height is negative. Gage height often is used interchangeably with the more general term “stage,” although gage height is more appropriate when used in reference to a reading on a gage.

Gage values are values that are recorded, transmitted, and/or computed from a gaging station. Gage values typically are collected at 5-, 15-, or 30-minute intervals.

Gaging station is a site on a stream, canal, lake, or reservoir where systematic observations of stage, discharge, or other hydrologic data are obtained.

Gas chromatography/flame ionization detector (GC/FID) is a laboratory analytical method used as a screening technique for semivolatile organic compounds that are extractable from water in methylene chloride.

Geomorphic channel units, as used in this report, are fluvial geomorphic descriptors of channel shape and stream velocity. Pools, riffles, and runs are types of geomorphic channel units considered for National Water-Quality Assessment (NAWQA) Program habitat sampling.

Green algae *(Chlorophyta)* are unicellular or colonial algae with chlorophyll pigments similar to those in terrestrial green plants. Some forms of green algae produce mats or floating “moss” in lakes. The abundance of green algae in phytoplankton samples is expressed as the number of cells per milliliter (cells/mL) or biovolume in cubic micrometers per milliliter (μm^3/mL). The abundance of green algae in periphyton samples is given in cells per square centimeter (cells/cm^2) or biovolume per square centimeter ($\mu m^3/cm^2$). (See also “Phytoplankton” and “Periphyton”)

Habitat, as used in this report, includes all nonliving (physical) aspects of the aquatic ecosystem, although living components like aquatic macrophytes and riparian vegetation also are usually included. Measurements of habitat typically are made over a wider geographic scale than are measurements of species distribution.

Habitat quality index is the qualitative description (level 1) of instream habitat and riparian conditions surrounding the reach sampled. Scores range from 0 to 100 percent with higher scores indicative of desirable habitat conditions for aquatic life. Index only applicable to wadable streams.

Hardness of water is a physical-chemical characteristic that commonly is recognized by the increased quantity of soap required to produce lather. It is computed as the sum of equivalents of polyvalent cations (primarily calcium and magnesium) and is expressed as the equivalent concentration of calcium carbonate ($CaCO_3$).

High tide is the maximum height reached by each rising tide. The high-high and low-high tides are the higher and lower of the two high tides, respectively, of each tidal day. *See NOAA Web site: http://www.co-ops.nos.noaa.gov/tideglos.html*

Hilsenhoff's Biotic Index (HBI) is an indicator of organic pollution that uses tolerance values to weight taxa abundances; usually increases with pollution. It is calculated as follows:

$$HBI = sum\frac{(n)(a)}{N},$$

where n is the number of individuals of each taxon, a is the tolerance value of each taxon, and N is the total number of organisms in the sample.

Horizontal datum (See "Datum")

Hydrologic index stations referred to in this report are continuous-record gaging stations that have been selected as representative of streamflow patterns for their respective regions. Station locations are shown on index maps.

Hydrologic unit is a geographic area representing part or all of a surface drainage basin or distinct hydrologic feature as defined by the former Office of Water Data Coordination and delineated on the State Hydrologic Unit Maps by the USGS. Each hydrologic unit is identified by an 8-digit number.

Inch (IN., in.), in reference to streamflow, as used in this report, refers to the depth to which the drainage area would be covered with water if all of the runoff for a given time period were distributed uniformly on it. (See also "Annual runoff")

Instantaneous discharge is the discharge at a particular instant of time. (See also "Discharge")

International Boundary Commission Survey Datum refers to a geodetic datum established at numerous monuments along the United States-Canada boundary by the International Boundary Commission.

Island, as used in this report, is a mid-channel bar that has permanent woody vegetation, is flooded once a year, on average, and remains stable except during large flood events.

Laboratory reporting level (LRL) generally is equal to twice the yearly determined long-term method detection level (LT-MDL). The LRL controls false negative error. The probability of falsely reporting a nondetection for a sample that contained an analyte at a concentration equal to or greater than the LRL is predicted to be less than or equal to 1 percent. The value of the LRL will be reported with a "less than" (<) remark code for samples in which the analyte was not detected. The National Water Quality Laboratory (NWQL) collects quality-control data from selected analytical methods on a continuing basis to determine LT-MDLs and to establish LRLs. These values are reevaluated annually on the basis of the most current quality-control data and, therefore, may change. The LRL replaces the term 'non-detection value' (NDV).

Land-surface datum (lsd) is a datum plane that is approximately at land surface at each ground-water observation well.

Latent heat flux (often used interchangeably with latent heat-flux density) is the amount of heat energy that converts water from liquid to vapor (evaporation) or from vapor to liquid (condensation) across a specified cross-sectional area per unit time. Usually expressed in watts per square meter.

Light-attenuation coefficient, also known as the extinction coefficient, is a measure of water clarity. Light is attenuated according to the Lambert-Beer equation:

$$I = I_o e^{-\lambda L},$$

where I_o is the source light intensity, I is the light intensity at length L (in meters) from the source, λ is the light-attenuation coefficient, and e is the base of the natural logarithm. The light-attenuation coefficient is defined as

$$\lambda = -\frac{1}{L}\log_e\frac{I}{I_o}.$$

Lipid is any one of a family of compounds that are insoluble in water and that make up one of the principal components of living cells. Lipids include fats, oils, waxes, and steroids. Many environmental contaminants such as organochlorine pesticides are lipophilic.

Long-term method detection level (LT-MDL) is a detection level derived by determining the standard deviation of a minimum of 24 method detection limit (MDL) spike-sample measurements over an extended period of time. LT-MDL data are collected on a continuous basis to assess year-to-year variations in the LT-MDL. The LT-MDL controls false positive error. The chance of falsely reporting a concentration at or greater than the LT-MDL for a sample that did not contain the analyte is predicted to be less than or equal to 1 percent.

Low tide is the minimum height reached by each falling tide. The high-low and low-low tides are the higher and lower of the two low tides, respectively, of each tidal day. *See NOAA Web site: http://www.co-ops.nos.noaa.gov/tideglos.html*

Macrophytes are the macroscopic plants in the aquatic environment. The most common macrophytes are the rooted vascular plants that usually are arranged in zones in aquatic ecosystems and restricted in the area by the extent of illumination through the water and sediment deposition along the shoreline.

Mean concentration of suspended sediment (Daily mean suspended-sediment concentration) is the time-weighted concentration of suspended sediment passing a stream cross section during a given time period. (See also “Daily mean suspended-sediment concentration” and “Suspended-sediment concentration”)

Mean discharge (MEAN) is the arithmetic mean of individual daily mean discharges during a specific period. (See also “Discharge”)

Mean high or **low tide** is the average of all high or low tides, respectively, over a specific period.

Mean sea level is a local tidal datum. It is the arithmetic mean of hourly heights observed over the National Tidal Datum Epoch. Shorter series are specified in the name; for example, monthly mean sea level and yearly mean sea level. In order that they may be recovered when needed, such datums are referenced to fixed points known as benchmarks. (See also “Datum”)

Measuring point (MP) is an arbitrary permanent reference point from which the distance to water surface in a well is measured to obtain water level.

Megahertz is a unit of frequency. One megahertz equals one million cycles per second.

Membrane filter is a thin microporous material of specific pore size used to filter bacteria, algae, and other very small particles from water.

Metamorphic stage refers to the stage of development that an organism exhibits during its transformation from an immature form to an adult form. This developmental process exists for most insects, and the degree of difference from the immature stage to the adult form varies from relatively slight to pronounced, with many intermediates. Examples of metamorphic stages of insects are egg-larva-adult or egg-nymph-adult.

Method detection limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99-percent confidence that the analyte concentration is greater than zero. It is determined from the analysis of a sample in a given matrix containing the analyte. At the MDL concentration, the risk of a false positive is predicted to be less than or equal to 1 percent.

Method of Cubatures is a method of computing discharge in tidal estuaries based on the conservation of mass equation.

Methylene blue active substances (MBAS) indicate the presence of detergents (anionic surfactants). The determination depends on the formation of a blue color when methylene blue dye reacts with synthetic anionic detergent compounds.

Micrograms per gram (UG/G, µg/g) is a unit expressing the concentration of a chemical constituent as the mass (micrograms) of the element per unit mass (gram) of material analyzed.

Micrograms per kilogram (UG/KG, µg/kg) is a unit expressing the concentration of a chemical constituent as the mass (micrograms) of the constituent per unit mass (kilogram) of the material analyzed. One microgram per kilogram is equivalent to 1 part per billion.

Micrograms per liter (UG/L, µg/L) is a unit expressing the concentration of chemical constituents in water as mass (micrograms) of constituent per unit volume (liter) of water. One thousand micrograms per liter is equivalent to 1 milligram per liter. One microgram per liter is equivalent to 1 part per billion.

Microsiemens per centimeter (US/CM, µS/cm) is a unit expressing the amount of electrical conductivity of a solution as measured between opposite faces of a centimeter cube of solution at a specified temperature. Siemens is the International System of Units nomenclature. It is synonymous with mhos and is the reciprocal of resistance in ohms.

Milligrams per liter (MG/L, mg/L) is a unit for expressing the concentration of chemical constituents in water as the mass (milligrams) of constituent per unit volume (liter) of water. Concentration of suspended sediment also is expressed in milligrams per liter and is based on the mass of dry sediment per liter of water-sediment mixture.

Minimum reporting level (MRL) is the smallest measured concentration of a constituent that may be reliably reported by using a given analytical method.

Miscellaneous site, miscellaneous station, or miscellaneous sampling site is a site where streamflow, sediment, and/or water-quality data or water-quality or sediment samples are collected once, or more often on a random or discontinuous basis to provide better areal coverage for defining hydrologic and water-quality conditions over a broad area in a river basin.

Most probable number (MPN) is an index of the number of coliform bacteria that, more probably than any other number, would give the results shown by the laboratory examination; it is not an actual enumeration. MPN is determined from the distribution of gas-positive cultures among multiple inoculated tubes.

Multiple-plate samplers are artificial substrates of known surface area used for obtaining benthic invertebrate samples. They consist of a series of spaced, hardboard plates on an eyebolt.

Nanograms per liter (NG/L, ng/L) is a unit expressing the concentration of chemical constituents in solution as mass (nanograms) of solute per unit volume (liter) of water. One million nanograms per liter is equivalent to 1 milligram per liter.

National Geodetic Vertical Datum of 1929 (NGVD 29) is a fixed reference adopted as a standard geodetic datum for elevations determined by leveling. It formerly was called "Sea Level Datum of 1929" or "mean sea level." Although the datum was derived from the mean sea level at 26 tide stations, it does not necessarily represent local mean sea level at any particular place. *See NOAA Web site: http://www.ngs.noaa.gov/faq.shtml#WhatVD29VD88* (See "North American Vertical Datum of 1988")

Natural substrate refers to any naturally occurring immersed or submersed solid surface, such as a rock or tree, upon which an organism lives. (See also "Substrate")

Nekton are the consumers in the aquatic environment and consist of large, free-swimming organisms that are capable of sustained, directed mobility.

Nephelometric turbidity unit (NTU) is the measurement for reporting turbidity that is based on use of a standard suspension of formazin. Turbidity measured in NTU uses nephelometric methods that depend on passing specific light of a specific wavelength through the sample.

North American Datum of 1927 (NAD 27) is the horizontal control datum for the United States that was defined by a location and azimuth on the Clarke spheroid of 1866.

North American Datum of 1983 (NAD 83) is the horizontal control datum for the United States, Canada, Mexico, and Central America that is based on the adjustment of 250,000 points including 600 satellite Doppler stations that constrain the system to a geocentric origin. NAD 83 has been officially adopted as the legal horizontal datum for the United States by the Federal government.

North American Vertical Datum of 1988 (NAVD 88) is a fixed reference adopted as the official civilian vertical datum for elevations determined by Federal surveying and mapping activities in the United States. This datum was established in 1991 by minimum-constraint adjustment of the Canadian**,** Mexican, and United States first-order terrestrial leveling networks.

Open or **screened interval** is the length of unscreened opening or of well screen through which water enters a well, in feet below land surface.

Organic carbon (OC) is a measure of organic matter present in aqueous solution, suspension, or bottom sediment. May be reported as dissolved organic carbon (DOC), particulate organic carbon (POC), or total organic carbon (TOC).

Organic mass or **volatile mass** of a living substance is the difference between the dry mass and ash mass and represents the actual mass of the living matter. Organic mass is expressed in the same units as for ash mass and dry mass. (See also “Ash mass,” “Biomass,” and “Dry mass”)

Organism count/area refers to the number of organisms collected and enumerated in a sample and adjusted to the number per area habitat, usually square meter (m^2), acre, or hectare. Periphyton, benthic organisms, and macrophytes are expressed in these terms.

Organism count/volume refers to the number of organisms collected and enumerated in a sample and adjusted to the number per sample volume, usually milliliter (mL) or liter (L). Numbers of planktonic organisms can be expressed in these terms.

Organochlorine compounds are any chemicals that contain carbon and chlorine. Organochlorine compounds that are important in investigations of water, sediment, and biological quality include certain pesticides and industrial compounds.

Parameter code is a 5-digit number used in the USGS computerized data system, National Water Information System (NWIS), to uniquely identify a specific constituent or property.

Partial-record station is a site where discrete measurements of one or more hydrologic parameters are obtained over a period of time without continuous data being recorded or computed. A common example is a crest-stage gage partial-record station at which only peak stages and flows are recorded.

Particle size is the diameter, in millimeters (mm), of a particle determined by sieve or sedimentation methods. The sedimentation method uses the principle of Stokes Law to calculate sediment particle sizes. Sedimentation methods (pipet, bottom-withdrawal tube, visual-accumulation tube, sedigraph) determine fall diameter of particles in either distilled water (chemically dispersed) or in native water (the river water at the time and point of sampling).

Particle-size classification, as used in this report, agrees with the recommendation made by the American Geophysical Union Subcommittee on Sediment Terminology. The classification is as follows:

Classification	Size (mm)	Method of analysis
Clay	>0.00024 - 0.004	Sedimentation
Silt	>0.004 - 0.062	Sedimentation
Sand	>0.062 - 2.0	Sedimentation/sieve
Gravel	>2.0 - 64.0	Sieve
Cobble	>64 - 256	Manual measurement
Boulder	>256	Manual measurement

The particle-size distributions given in this report are not necessarily representative of all particles in transport in the stream. For the sedimentation method, most of the organic matter is removed, and the sample is subjected to mechanical and chemical dispersion before analysis in distilled water. Chemical dispersion is not used for native water analysis.

Peak flow (peak stage) is an instantaneous local maximum value in the continuous time series of streamflows or stages, preceded by a period of increasing values and followed by a period of decreasing values. Several peak values ordinarily occur in a year. The maximum peak value in a year is called the annual peak; peaks lower than the annual peak are called secondary peaks. Occasionally, the annual peak may not be the maximum value for the year; in such cases, the maximum value occurs at midnight at the beginning or end of the year, on the recession from or rise toward a higher peak in the adjoining year. If values are recorded at a discrete series of times, the peak recorded value may be taken as an approximation of the true peak, which may occur between the recording instants. If the values are recorded with finite precision, a sequence of equal recorded values may occur at the peak; in this case, the first value is taken as the peak.

Percent composition or **percent of total** is a unit for expressing the ratio of a particular part of a sample or population to the total sample or population, in terms of types, numbers, weight, mass, or volume.

Percent shading is a measure of the amount of sunlight potentially reaching the stream. A clinometer is used to measure left and right bank canopy angles. These values are added together, divided by 180, and multiplied by 100 to compute percentage of shade.

Periodic-record station is a site where stage, discharge, sediment, chemical, physical, or other hydrologic measurements are made one or more times during a year but at a frequency insufficient to develop a daily record.

Periphyton is the assemblage of microorganisms attached to and living upon submerged solid surfaces. Although primarily consisting of algae, they also include bacteria, fungi, protozoa, rotifers, and other small organisms. Periphyton are useful indicators of water quality.

Pesticides are chemical compounds used to control undesirable organisms. Major categories of pesticides include insecticides, miticides, fungicides, herbicides, and rodenticides.

pH of water is the negative logarithm of the hydrogen-ion activity. Solutions with pH less than 7.0 standard units are termed “acidic,” and solutions with a pH greater than 7.0 are termed “basic.” Solutions with a pH of 7.0 are neutral. The presence and concentration of many dissolved chemical constituents found in water are affected, in part, by the hydrogen-ion activity of water. Biological processes including growth, distribution of organisms, and toxicity of the water to organisms also are affected, in part, by the hydrogen-ion activity of water.

Phytoplankton is the plant part of the plankton. They usually are microscopic, and their movement is subject to the water currents. Phytoplankton growth is dependent upon solar radiation and nutrient substances. Because they are able to incorporate as well as release materials to the surrounding water, the phytoplankton have a profound effect upon the quality of the water. They are the primary food producers in the aquatic environment and commonly are known as algae. (See also “Plankton”)

Picocurie (PC, pCi) is one-trillionth (1×10^{-12}) of the amount of radioactive nuclide represented by a curie (Ci). A curie is the quantity of radioactive nuclide that yields 3.7×10^{10} radioactive disintegrations per second (dps). A picocurie yields 0.037 dps, or 2.22 dpm (disintegrations per minute).

Plankton is the community of suspended, floating, or weakly swimming organisms that live in the open water of lakes and rivers. Concentrations are expressed as a number of cells per milliliter (cells/mL) of sample.

Polychlorinated biphenyls (PCBs) are industrial chemicals that are mixtures of chlorinated biphenyl compounds having various percentages of chlorine. They are similar in structure to organochlorine insecticides.

Polychlorinated naphthalenes (PCNs) are industrial chemicals that are mixtures of chlorinated naphthalene compounds. They have properties and applications similar to polychlorinated biphenyls (PCBs) and have been identified in commercial PCB preparations.

Pool, as used in this report, is a small part of a stream reach with little velocity, commonly with water deeper than surrounding areas.

Primary productivity is a measure of the rate at which new organic matter is formed and accumulated through photo-synthetic and chemosynthetic activity of producer organisms (chiefly, green plants). The rate of primary production is estimated by measuring the amount of oxygen released (oxygen method) or the amount of carbon assimilated (carbon method) by the plants.

Primary productivity (carbon method) is expressed as milligrams of carbon per area per unit time [mg C/(m^2/time)] for periphyton and macrophytes or per volume [mg C/(m^3/time)] for phytoplankton. The carbon method defines the amount of carbon dioxide consumed as measured by radioactive carbon (carbon-14). The carbon-14 method is of greater sensitivity than the oxygen light- and dark-bottle method and is preferred for use with unenriched water samples. Unit time may be either the hour or day, depending on the incubation period. (See also “Primary productivity”)

Primary productivity (oxygen method) is expressed as milligrams of oxygen per area per unit time [mg O/(m^2/time)] for periphyton and macrophytes or per volume [mg O/(m^3/time)] for phytoplankton. The oxygen method defines production and respiration rates as estimated from changes in the measured dissolved-oxygen concentration. The oxygen light- and dark-bottle method is preferred if the rate of primary production is sufficient for accurate measurements to be made within 24 hours. Unit time may be either the hour or day, depending on the incubation period. (See also “Primary productivity”)

Radioisotopes are isotopic forms of elements that exhibit radioactivity. Isotopes are varieties of a chemical element that differ in atomic weight but are very nearly alike in chemical properties. The difference arises because the atoms of the isotopic forms of an element differ in the number of neutrons in the nucleus; for example, ordinary chlorine is a mixture of isotopes having atomic weights of 35 and 37, and the natural mixture has an atomic weight of about 35.453. Many of the elements similarly exist as mixtures of isotopes, and a great many new isotopes have been produced in the operation of nuclear devices such as the cyclotron. There are 275 isotopes of the 81 stable elements, in addition to more than 800 radioactive isotopes.

Reach, as used in this report, is a length of stream that is chosen to represent a uniform set of physical, chemical, and biological conditions within a segment. It is the principal sampling unit for collecting physical, chemical, and biological data.

Recoverable from bed (bottom) material is the amount of a given constituent that is in solution after a representative sample of bottom material has been digested by a method (usually using an acid or mixture of acids) that results in dissolution of readily soluble substances. Complete dissolution of all bottom material is not achieved by the digestion treatment and thus the determination represents less than the total amount (that is, less than 95 percent) of the constituent in the sample. To achieve comparability of analytical data, equivalent digestion procedures would be required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results. (See also “Bed material”)

Recurrence interval, also referred to as return period, is the average time, usually expressed in years, between occurrences of hydrologic events of a specified type (such as exceedances of a specified high flow or nonexceedance of a specified low flow). The terms “return period” and “recurrence interval” do not imply regular cyclic occurrence. The actual times between occurrences vary randomly, with most of the times being less than the average and a few being substantially greater than the average. For example, the 100-year flood is the flow rate that is exceeded by the annual maximum peak flow at intervals whose average length is 100 years (that is, once in 100 years, on average); almost two-thirds of all exceedances of the 100-year flood occur less than 100 years after the previous exceedance, half occur less than 70 years after the previous exceedance, and about one-eighth occur more than 200 years after the previous exceedance. Similarly, the 7-day, 10-year low flow ($7Q_{10}$) is the flow rate below which the annual minimum 7-day-mean flow dips at intervals whose average length is 10 years (that is, once in 10 years, on average); almost two-thirds of the nonexceedances of the $7Q_{10}$ occur less than 10 years after the previous nonexceedance, half occur less than 7 years after, and about one-eighth occur more than 20 years after the previous nonexceedance. The recurrence interval for annual events is the reciprocal of the annual probability of occurrence. Thus, the 100-year flood has a 1-percent chance of being exceeded by the maximum peak flow in any year, and there is a 10-percent chance in any year that the annual minimum 7-day-mean flow will be less than the $7Q_{10}$.

Replicate samples are a group of samples collected in a manner such that the samples are thought to be essentially identical in composition.

Return period (See “Recurrence interval”)

Riffle, as used in this report, is a shallow part of the stream where water flows swiftly over completely or partially submerged obstructions to produce surface agitation.

River mileage is the curvilinear distance, in miles, measured upstream from the mouth along the meandering path of a stream channel in accordance with Bulletin No. 14 (October 1968) of the Water Resources Council and typically is used to denote location along a river.

Run, as used in this report, is a relatively shallow part of a stream with moderate velocity and little or no surface turbulence.

Runoff is the quantity of water that is discharged ("runs off") from a drainage basin during a given time period. Runoff data may be presented as volumes in acre-feet, as mean discharges per unit of drainage area in cubic feet per second per square mile, or as depths of water on the drainage basin in inches. (See also "Annual runoff")

Sea level, as used in this report, refers to one of the two commonly used national vertical datums (NGVD 1929 or NAVD 1988). See separate entries for definitions of these datums.

Sediment is solid material that originates mostly from disintegrated rocks; when transported by, suspended in, or deposited from water, it is referred to as "fluvial sediment." Sediment includes chemical and biochemical precipitates and decomposed organic material, such as humus. The quantity, characteristics, and cause of the occurrence of sediment in streams are affected by environmental and land-use factors. Some major factors are topography, soil characteristics, land cover, and depth and intensity of precipitation.

Sensible heat flux (often used interchangeably with latent sensible heat-flux density) is the amount of heat energy that moves by turbulent transport through the air across a specified cross-sectional area per unit time and goes to heating (cooling) the air. Usually expressed in watts per square meter.

Seven-day, 10-year low flow ($7Q_{10}$) is the discharge below which the annual 7-day minimum flow falls in 1 year out of 10 on the long-term average. The recurrence interval of the $7Q_{10}$ is 10 years; the chance that the annual 7-day minimum flow will be less than the $7Q_{10}$ is 10 percent in any given year. (See also "Annual 7-day minimum" and "Recurrence interval")

Shelves, as used in this report, are streambank features extending nearly horizontally from the flood plain to the lower limit of persistent woody vegetation.

Sodium adsorption ratio (SAR) is the expression of relative activity of sodium ions in exchange reactions within soil and is an index of sodium or alkali hazard to the soil. Sodium hazard in water is an index that can be used to evaluate the suitability of water for irrigating crops.

Soil heat flux (often used interchangeably with soil heat-flux density) is the amount of heat energy that moves by conduction across a specified cross-sectional area of soil per unit time and goes to heating (or cooling) the soil. Usually expressed in watts per square meter.

Soil-water content is the water lost from the soil upon drying to constant mass at 105 °C; expressed either as mass of water per unit mass of dry soil or as the volume of water per unit bulk volume of soil.

Specific electrical conductance (conductivity) is a measure of the capacity of water (or other media) to conduct an electrical current. It is expressed in microsiemens per centimeter at 25 °C. Specific electrical conductance is a function of the types and quantity of dissolved substances in water and can be used for approximating the dissolved-solids content of the water. Commonly, the concentration of dissolved solids (in milligrams per liter) is from 55 to 75percent of the specific conductance (in microsiemens). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water.

Stable isotope ratio (per MIL) is a unit expressing the ratio of the abundance of two radioactive isotopes. Isotope ratios are used in hydrologic studies to determine the age or source of specific water, to evaluate mixing of different water, as an aid in determining reaction rates, and other chemical or hydrologic processes.

Stage (See "Gage height")

Stage-discharge relation is the relation between the water-surface elevation, termed stage (gage height), and the volume of water flowing in a channel per unit time.

Streamflow is the discharge that occurs in a natural channel. Although the term "discharge" can be applied to the flow of a canal, the word "streamflow" uniquely describes the discharge in a surface stream course. The term "streamflow" is more general than "runoff" as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

Substrate is the physical surface upon which an organism lives.

Substrate embeddedness class is a visual estimate of riffle streambed substrate larger than gravel that is surrounded or covered by fine sediment (<2 mm, sand or finer). Below are the class categories expressed as the percentage covered by fine sediment:

0	no gravel or larger substrate	3	26-50 percent
1	> 75 percent	4	5-25 percent
2	51-75 percent	5	< 5 percent

Surface area of a lake is that area (acres) encompassed by the boundary of the lake as shown on USGS topographic maps, or other available maps or photographs. Because surface area changes with lake stage, surface areas listed in this report represent those determined for the stage at the time the maps or photographs were obtained.

Surficial bed material is the upper surface (0.1 to 0.2 foot) of the bed material that is sampled using U.S. Series Bed-Material Samplers.

Surrogate is an analyte that behaves similarly to a target analyte, but that is highly unlikely to occur in a sample. A surrogate is added to a sample in known amounts before extraction and is measured with the same laboratory procedures used to measure the target analyte. Its purpose is to monitor method performance for an individual sample.

Suspended (as used in tables of chemical analyses) refers to the amount (concentration) of undissolved material in a water-sediment mixture. It is defined operationally as the material retained on a 0.45-micrometer filter.

Suspended, recoverable is the amount of a given constituent that is in solution after the part of a representative suspended water-sediment sample that is retained on a 0.45-micrometer membrane filter has been digested by a method (usually using a dilute acid solution) that results in dissolution of only readily soluble substances. Complete dissolution of all the particulate matter is not achieved by the digestion treatment, and, thus, the determination represents something less than the "total" amount (that is, less than 95 percent) of the constituent present in the sample. To achieve comparability of analytical data, equivalent digestion procedures are required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results. Determinations of "suspended, recoverable" constituents are made either by directly analyzing the suspended mate-rial collected on the filter or, more commonly, by difference, on the basis of determinations of (1) dissolved and (2) total recoverable concentrations of the constituent. (See also "Suspended")

Suspended sediment is the sediment maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid. (See also "Sediment")

Suspended-sediment concentration is the velocity-weighted concentration of suspended sediment in the sampled zone (from the water surface to a point approximately 0.3 foot above the bed) expressed as milligrams of dry sediment per liter of water-sediment mixture (mg/L). The analytical technique uses the mass of all of the sediment and the net weight of the water-sediment mixture in a sample to compute the suspended-sediment concentration. (See also "Sediment" and "Suspended sediment")

Suspended-sediment discharge (tons/d) is the rate of sediment transport, as measured by dry mass or volume, that passes a cross section in a given time. It is calculated in units of tons per day as follows: concentration (mg/L) x discharge (ft^3/s) x 0.0027. (See also "Sediment," "Suspended sediment," and "Suspended-sediment concentration")

Suspended-sediment load is a general term that refers to a given characteristic of the material in suspension that passes a point during a specified period of time. The term needs to be qualified, such as "annual suspended-sediment load" or "sand-size suspended-sediment load," and so on. It is not synonymous with either suspended-sediment discharge or concentration. (See also "Sediment")

Suspended solids, total residue at 105 ˚C concentration is the concentration of inorganic and organic material retained on a filter, expressed as milligrams of dry material per liter of water (mg/L). An aliquot of the sample is used for this analysis.

Suspended, total is the total amount of a given constituent in the part of a water-sediment sample that is retained on a 0.45-micrometer membrane filter. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent determined. Knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to determine when the results should be reported as “suspended, total.” Determinations of “suspended, total” constituents are made either by directly analyzing portions of the suspended material collected on the filter or, more commonly, by difference, on the basis of determinations of (1) dissolved and (2) total concentrations of the constituent. (See also “Suspended”)

Synoptic studies are short-term investigations of specific water-quality conditions during selected seasonal or hydro-logic periods to provide improved spatial resolution for critical water-quality conditions. For the period and conditions sampled, they assess the spatial distribution of selected water-quality conditions in relation to causative factors, such as land use and contaminant sources.

Taxa (Species) richness is the number of species (taxa) present in a defined area or sampling unit.

Taxonomy is the division of biology concerned with the classification and naming of organisms. The classification of organisms is based upon a hierarchial scheme beginning with Kingdom and ending with Species at the base. The higher the classification level, the fewer features the organisms have in common. For example, the taxonomy of a particular mayfly, *Hexagenia limbata,* is the following:

Kingdom:	**Animal**
Phylum:	Arthropeda
Class:	Insecta
Order:	Ephemeroptera
Family:	Ephemeridae
Genus:	*Hexagenia*
Species:	*Hexagenia limbata*

Thalweg is the line formed by connecting points of minimum streambed elevation (deepest part of the channel).

Thermograph is an instrument that continuously records variations of temperature on a chart. The more general term “temperature recorder” is used in the table descriptions and refers to any instrument that records temperature whether on a chart, a tape, or any other medium.

Time-weighted average is computed by multiplying the number of days in the sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the total number of days. A time-weighted average represents the composition of water resulting from the mixing of flow proportionally to the duration of the concentration.

Tons per acre-foot (T/acre-ft) is the dry mass (tons) of a constituent per unit volume (acre-foot) of water. It is computed by multiplying the concentration of the constituent, in milligrams per liter, by 0.00136.

Tons per day (T/DAY, tons/d) is a common chemical or sediment discharge unit. It is the quantity of a substance in solution, in suspension, or as bedload that passes a stream section during a 24-hour period. It is equivalent to 2,000 pounds per day, or 0.9072 metric ton per day.

Total is the amount of a given constituent in a representative whole-water (unfiltered) sample, regardless of the constituent’s physical or chemical form. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent present in both the dissolved and suspended phases of the sample. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to judge when the results should be reported as “total.” (Note that the word “total” does double duty here, indicating both that the sample consists of a water-suspended sediment mixture and that the analytical method determined at least 95 percent of the constituent in the sample.)

Total coliform bacteria are a particular group of bacteria that are used as indicators of possible sewage pollution. This group includes coliforms that inhabit the intestine of warmblooded animals and those that inhabit soils. They are characterized as aerobic or facultative anaerobic, gram-negative, nonspore-forming, rod-shaped bacteria that ferment lactose with gas formation within 48 hours at 35 °C. In the laboratory, these bacteria are defined as all the organisms that produce colonies with a golden-green metallic sheen within 24 hours when incubated at 35 °C plus or minus 1.0 °C on M-Endo medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 milliliters of sample. (See also "Bacteria")

Total discharge is the quantity of a given constituent, measured as dry mass or volume, that passes a stream cross section per unit of time. When referring to constituents other than water, this term needs to be qualified, such as "total sediment discharge," "total chloride discharge," and so on.

Total in bottom material is the amount of a given constituent in a representative sample of bottom material. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent determined. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to judge when the results should be reported as "total in bottom material."

Total length (fish) is the straight-line distance from the anterior point of a fish specimen's snout, with the mouth closed, to the posterior end of the caudal (tail) fin, with the lobes of the caudal fin squeezed together.

Total load refers to all of a constituent in transport. When referring to sediment, it includes suspended load plus bed load.

Total organism count is the number of organisms collected and enumerated in any particular sample. (See also "Organism count/volume")

Total recoverable is the amount of a given constituent in a whole-water sample after a sample has been digested by a method (usually using a dilute acid solution) that results in dissolution of only readily soluble substances. Complete dissolution of all particulate matter is not achieved by the digestion treatment, and thus the determination represents something less than the "total" amount (that is, less than 95 percent) of the constituent present in the dissolved and suspended phases of the sample. To achieve comparability of analytical data for whole-water samples, equivalent digestion procedures are required of all laboratories performing such analyses because different digestion procedures may produce different analytical results.

Total sediment discharge is the mass of suspended-sediment plus bed-load transport, measured as dry weight, that passes a cross section in a given time. It is a rate and is reported as tons per day. (See also "Bedload," "Bedload discharge," "Sediment," "Suspended sediment," and "Suspended-sediment concentration")

Total sediment load or **total load** is the sediment in transport as bedload and suspended-sediment load. The term may be qualified, such as "annual suspended-sediment load" or "sand-size suspended-sediment load," and so on. It differs from total sediment discharge in that load refers to the material, whereas discharge refers to the quantity of material, expressed in units of mass per unit time. (See also "Sediment," "Suspended-sediment load," and "Total load")

Transect, as used in this report, is a line across a stream perpendicular to the flow and along which measurements are taken, so that morphological and flow characteristics along the line are described from bank to bank. Unlike a cross section, no attempt is made to determine known elevation points along the line.

Turbidity is the reduction in the transparency of a solution because of the presence of suspended and some dissolved substances. The measurement technique records the collective optical properties of the solution that cause light to be scattered and attenuated rather than transmitted in straight lines; the higher the intensity of scattered or attenuated light, the higher the value of the turbidity. Turbidity is expressed in nephelometric turbidity units (NTU). Depending on the method used, the turbidity units as NTU can be defined as the intensity of light of a specified wavelength scattered or attenuated by suspended particles or absorbed at a method specified angle, usually 90 degrees, from the path of the incident light. Currently approved methods for the measurement of turbidity in the USGS include those that conform to USEPA Method 180.1, ASTM D1889-00, and ISO 7027. Measurements of turbidity by these different methods and different instruments are unlikely to yield equivalent values.

Ultraviolet (UV) absorbance (absorption) at 254 or 280 nanometers is a measure of the aggregate concentration of the mixture of UV absorbing organic materials dissolved in the analyzed water, such as lignin, tannin, humic substances, and various aromatic compounds. UV absorbance (absorption) at 254 or 280 nanometers is measured in UV absorption units per centimeter of path length of UV light through a sample.

Unconfined aquifer is an aquifer whose upper surface is a water table free to fluctuate under atmospheric pressure. (See "Water-table aquifer")

Vertical datum (See "Datum")

Volatile organic compounds (VOCs) are organic compounds that can be isolated from the water phase of a sample by purging the water sample with inert gas, such as helium, and, subsequently, analyzed by gas chromatography. Many VOCs are human-made chemicals that are used and produced in the manufacture of paints, adhesives, petroleum products, pharmaceuticals, and refrigerants. They often are components of fuels, solvents, hydraulic fluids, paint thinners, and dry-cleaning agents commonly used in urban settings. VOC contamination of drinking-water supplies is a human-health concern because many are toxic and are known or suspected human carcinogens.

Water table is that surface in a ground-water body at which the water pressure is equal to the atmospheric pressure.

Water-table aquifer is an unconfined aquifer within which the water table is found.

Water year in USGS reports dealing with surface-water supply is the 12-month period October 1 through September 30. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. Thus, the year ending September 30, 2002, is called the "2002 water year."

Watershed (See "Drainage basin")

WDR is used as an abbreviation for "Water-Data Report" in the REVISED RECORDS paragraph to refer to State annual hydrologic-data reports. (WRD was used as an abbreviation for "Water-Resources Data" in reports published prior to 1976.)

Weighted average is used in this report to indicate discharge-weighted average. It is computed by multiplying the discharge for a sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the sum of the discharges. A discharge-weighted average approximates the composition of water that would be found in a reservoir containing all the water passing a given location during the water year after thorough mixing in the reservoir.

Wet mass is the mass of living matter plus contained water. (See also "Biomass" and "Dry mass")

Wet weight refers to the weight of animal tissue or other substance including its contained water. (See also "Dry weight")

WSP is used as an acronym for "Water-Supply Paper" in reference to previously published reports.

Zooplankton is the animal part of the plankton. Zooplankton are capable of extensive movements within the water column and often are large enough to be seen with the unaided eye. Zooplankton are secondary consumers feeding upon bacteria, phytoplankton, and detritus. Because they are the grazers in the aquatic environment, the zooplankton are a vital part of the aquatic food web. The zooplankton community is dominated by small crustaceans and rotifers. (See also "Plankton")

Techniques of Water-Resources Investigations of the U.S. Geological Survey

The USGS publishes a series of manuals, the Techniques of Water-Resources Investigations, describing procedures for planning and conducting specialized work in water-resources investigations. The material is grouped under major subject headings called books and is further divided into sections and chapters. For example, section A of book 3 (Applications of Hydraulics) pertains to surface water. The chapter, the unit of publication, is limited to a narrow field of subject matter. This format permits flexibility in revision and publication as the need arises.

Reports in the Techniques of Water-Resources Investigations series, which are listed below, are online at *http://water.usgs.gov/pubs/twri/*. Printed copies are for sale by the USGS, Information Services, Box 25286, Federal Center, Denver, Colorado 80225 (authorized agent of the Superintendent of Documents, Government Printing Office), telephone 1-888-ASK-USGS. Please telephone 1-888-ASK-USGS for current prices, and refer to the title, book number, chapter number, and mention the "U.S. Geological Survey Techniques of Water-Resources Investigations." Products can then be ordered by telephone, or online at http://www.usgs.gov/sales.html, or by FAX to (303)236-469 of an order form available online at *http://mac.usgs.gov/isb/pubs/forms/*. Prepayment by major credit card or by a check or money order payable to the "U.S. Geological Survey" is required.

Book 1. Collection of Water Data by Direct Measurement

Section D. Water Quality

1–D1. *Water temperature—Influential factors, field measurement, and data presentation*, by H.H. Stevens, Jr., J.F. Ficke, and G.F. Smoot: USGS–TWRI book 1, chap. D1. 1975. 65 p.
1–D2. *Guidelines for collection and field analysis of ground-water samples for selected unstable constituents*, by W.W. Wood: USGS–TWRI book 1, chap. D2. 1976. 24 p.

Book 2. Collection of Environmental Data

Section D. Surface Geophysical Methods

2–D1. *Application of surface geophysics to ground-water investigations,* by A.A.R. Zohdy, G.P. Eaton, and D.R. Mabey: USGS–TWRI book 2, chap. D1. 1974. 116 p.
2–D2. *Application of seismic-refraction techniques to hydrologic studies,* by F.P. Haeni: USGS–TWRI book 2, chap. D2. 1988. 86 p.

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2–E1. *Application of borehole geophysics to water-resources investigations,* by W.S. Keys and L.M. MacCary: USGS–TWRI book 2, chap. E1. 1971. 126 p.
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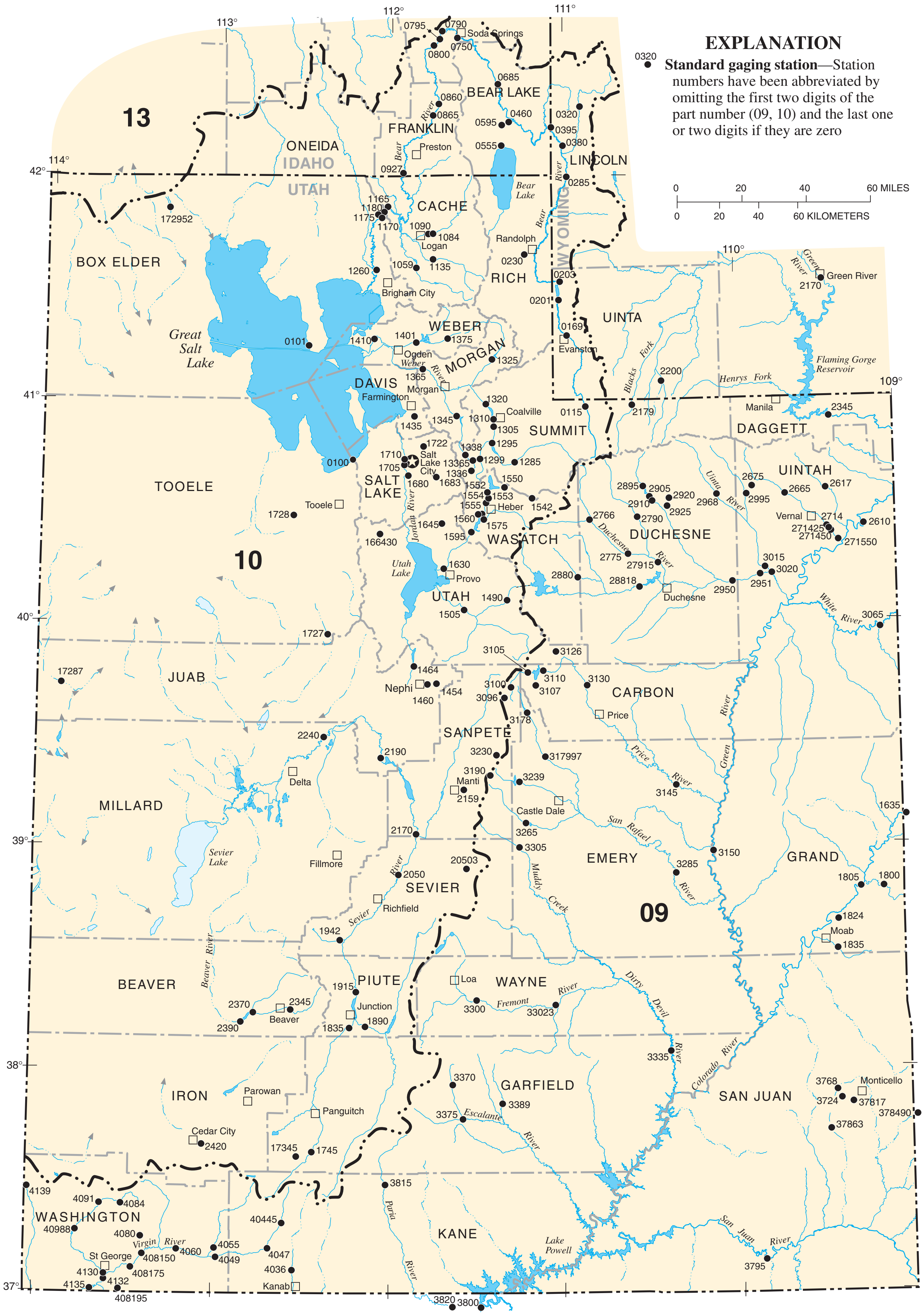

Figure 7. Location of U.S.G.S. gaging stations in Utah.

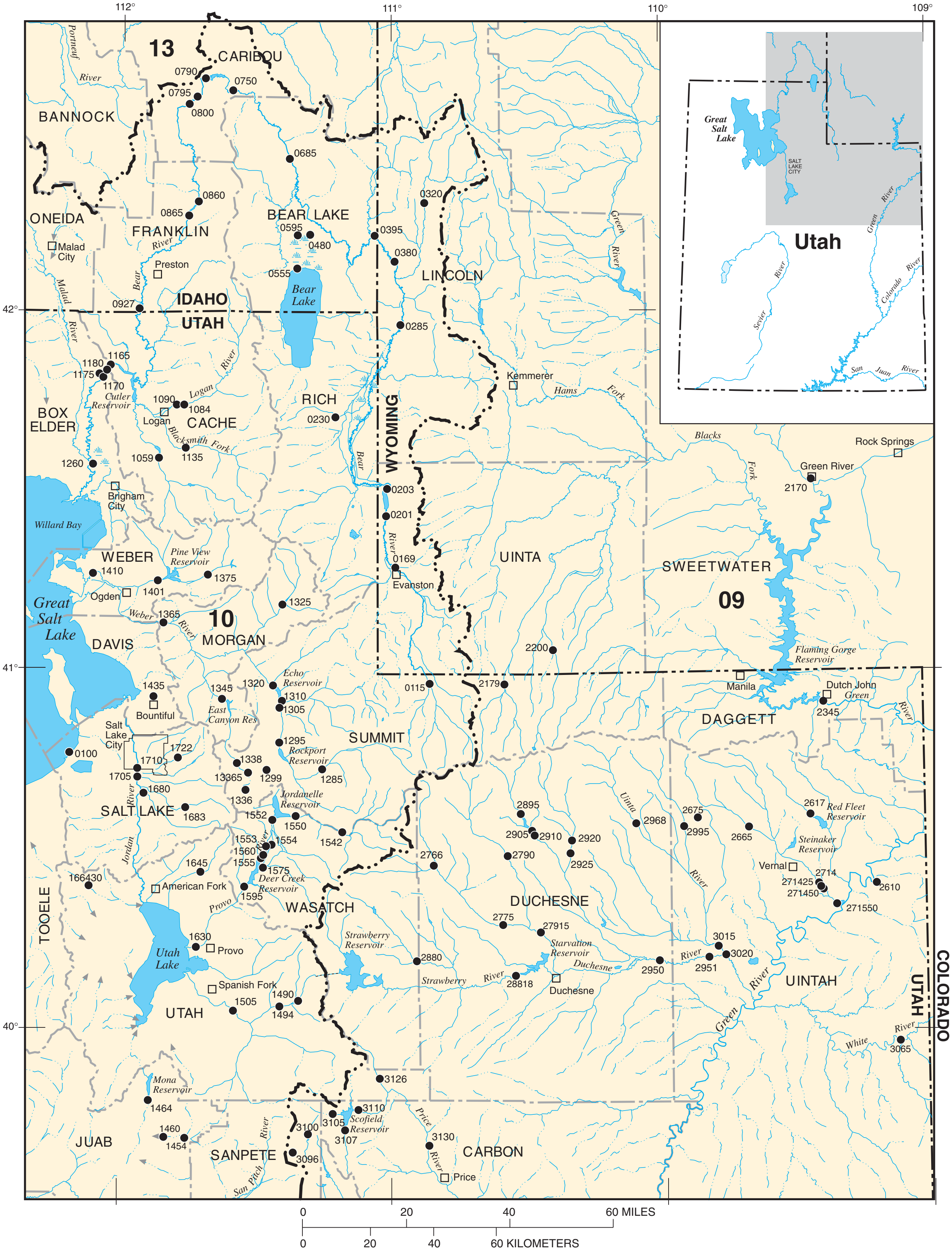

Figure 7. Location of U.S.G.S. gaging stations in Utah—Continued.

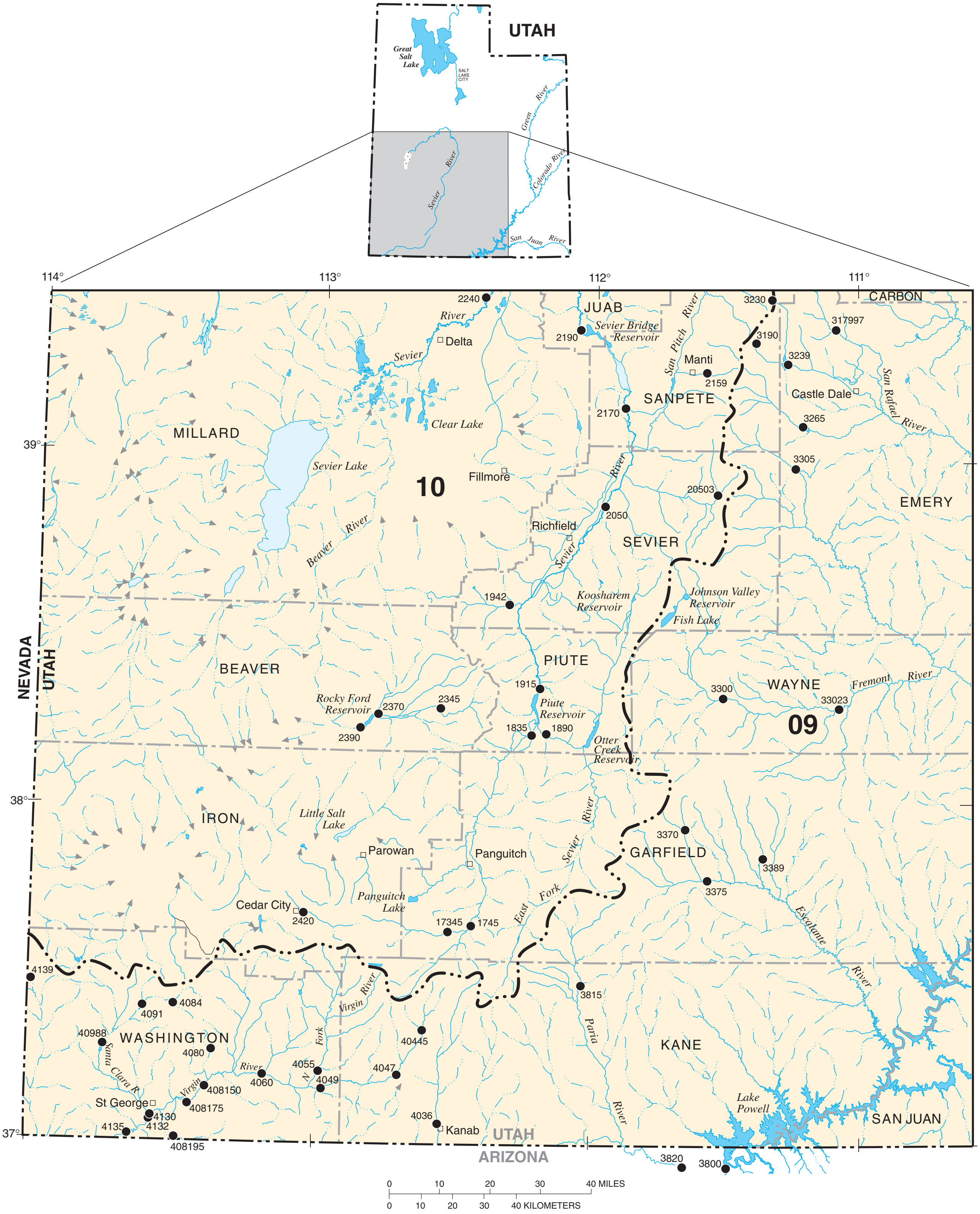

Figure 7. Location of U.S.G.S. gaging stations in Utah—Continued.