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Water Resources Data Nevada Water Year 2002

By Steven N. Berris, E. James Crompton, Joseph D. Joyner, and Roslyn Ryan

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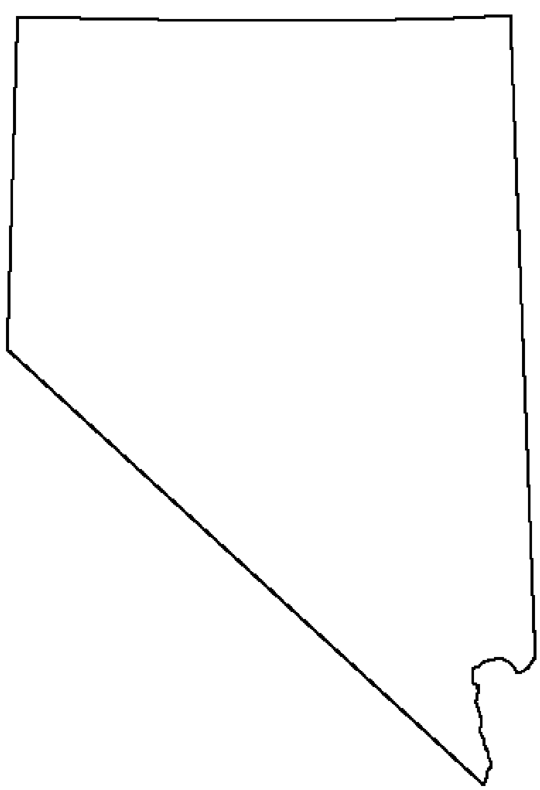

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and with other agencies

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GALE A. NORTON, Secretary

U.S. GEOLOGICAL SURVEY

Charles G. Groat, Director

For information regarding water-resources investigations
in Nevada, write to:
District Chief, Water Resources Division
U.S. Geological Survey
333 West Nye Lane
Carson City, Nevada 89706

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PREFACE

This report for Nevada is one of a series of annual reports that document hydrologic data gathered from the U.S. Geological Survey's surface-water and ground-water data-collection networks in each State, Puerto Rico, and the Trust Territories. These records of streams, canals, drains and springs, lakes and reservoirs, and observation wells provide the hydrologic information needed by Federal, State, and local agencies and the private sector for developing and managing our Nation's land and water resources.

This report is the culmination of a concerted effort by personnel of the U.S. Geological Survey who collected, analyzed, verified, and organized the data and who typed, edited, and assembled the report. The Nevada Data Management Unit had primary responsibility for assuring that the information contained herein is accurate, complete, and adheres to Geological Survey policy and established guidelines.

In addition to the authors, U.S. Geological Survey personnel in Nevada who contributed significantly to the collection and preparation of the data in this report were: Kip A. Allander, David L. Berger, Laurie J. Bonner, Robert E. Bostic, Peggy E. Elliott, Larry P. Etchemendy, Larry S. Feinson, Joseph M. Fenelon, Kerry T. Garcia, Gary Gortsema, Clifford Z. Jones, Randy S. Kyes, Richard A. LaCamera, Randell J. Laczniak, Michael S. Lico, Glenn L. Locke, Douglas K. Maurer, Rose L. Medina, Michael T. Moreo, Rod H. Munson, Walter E. Nylund, Gary L. Otto, Michael T. Pavelko, Robert N. Pennington, Russell W. Plume, Alan M. Preissler, Dave E. Prudic, Steve R. Reiner, George A. Roach, Timothy G. Rowe, Ron Spaulding, Donald H. Schaefer, Robert J. Sexton, Emil L. Stockton, J. Christopher Stone, James R. Swartwood, Daron J. Tanko, Carl E. Thodal, Karen A. Thomas, Sonya L. Vasquez, Craig L. Westenburg, Jon W. Wilson, and David B. Wood.

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Water resources data published herein for the 2002 water year comprise the following records:

- o Water discharge for 175 gaging stations on streams, canals and drains.
- o Discharge for 95 peak-flow stations and miscellaneous sites, and 16 springs.
- o Stage and contents for 20 ponds, lakes and reservoirs.
- o Water-quality data for 120 stream, lake, canal, spring, and drain sites, and 174 wells.
- o Water levels for 128 primary/continuous record wells, and 818 secondary observation wells.
- o Water withdrawals for 11 wells
- o Precipitation totals for 38 stations.

Additional water-data, collected at various sites that are not part of the systematic data-collection program, are published as miscellaneous measurements. These data represent that part of the National Water Information System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Nevada.

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NOTE.--Data for partial-record stations and miscellaneous sites for both surface-water discharge and quality are published in separate sections of the data report. See references at the end of this list for page numbers for these sections.

[Letters after station name designate type of data: (a) air temerature, (d) discharge, (p) precipitation, (c) chemical, (m) microbiological, (t) water temperature, (s) sediment, (e) elevation, gage heights, or contents.]

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DISCONTINUED SURFACE-WATER DISCHARGE STATIONS

The following continuous-record surface-water discharge stations (gaging stations) in Nevada and parts of California have been discontinued. Daily streamflow or stage records were collected and published for the period of record, expressed in water years, shown for each station. Those stations with an asterisk (*) after the station number are currently operated as crest-stage partial-record stations.

Station name	Station number	Drainage area (mi^2)	Period of record (water years)
Mesquite Canal near Mesquite, NV	09415060	--	1951-55
Bunkerville Canal near Bunkerville, NV	09415080	--	1951-55
Virgin River at Riverside, NV	09415190	5,890	1971-74
			1993-96
Virgin River above Halfway Wash near Riverside, NV	09415230	5,980	1978,
			1980-83
			1985
White River near Preston, NV	09415500	--	1914
Water Canyon Creek near Preston, NV	09415515	11.0	1983-87
			1990-94
Pahranagat Valley Trib near Hiko, NV	09415600	17.0	1964-77
White River above Upper Pahranagat Lake near Alamo, NV	09415700	2,630	1990-94
Pahranagat Wash near Moapa, NV	09415850	252	1988-93
Muddy River Power Diversion near Moapa, NV	09415950	--	1978-85
Muddy River above Moapa Indian Res near Moapa, NV	09416500	3,890	1914-18
Muddy River at Rr Pump Plant near Moapa, NV	09417000	3,900	1915-17
Muddy River at Weiser Ranch near Moapa, NV	09417400	4,360	1916-17
Meadow Valley Wash at Eagle Canyon, near Ursine, NV	09417500	293	1962-75
Meadow Valley Wash near Panaca, NV	09418000	450	1945-50
Mathews Canyon Wash near Caliente, NV	09418200	34.0	1958-84
Pine Canyon Wash near Caliente, NV	09418300	45.0	1958-84
Muddy River near Overton, NV	09419500	8,180	1913-16,
			1948-52
Muddy River above Lake Mead near Overton, NV	09419515	8,310	1979-93
Lee Canyon near Charleston Park, NV	09419610	9.20	1963-94
Las Vegas Wash above Detention Basin near North Las Vegas, NV	09419648	--	1988-93
North Las Vegas Detention Basin Outlet at Craig Road near North Las Vegas, NV	09419649	1,920	1992-99
Las Vegas Wash at North Las Vegas, NV	09419650	1,300	1962-78
Las Vegas Wash at Lake Mead Drive near North Las Vegas, NV	09419655	--	1988-96
Las Vegas Creek at Lamb Blvd near Las Vegas, NV	09419656	46.3	1988-92
Flamingo Wash Detention Basin Outlet at Las Vegas, NV	09419672	--	1992-96
Flamingo Wash near Torrey Pines Drive near Las Vegas, NV	09419673	93.6	1988-99
Tropicana Wash at Swenson Street Bridge at Las Vegas, NV	09419676	--	1989-96
Flamingo Wash at Maryland Parkway at Las Vegas, NV	09419677	106	1970-78
Flamingo Wash at Eastern Avenue near Las Vegas, NV	094196775	108	1990-99
Duck Creek at Eastern Avenue at Las Vegas, NV	09419688	--	1988-96
Pittman Wash at Wigmam Parkway near Henderson, NV	09419695	68.31	1989-99
Las Vegas Wash above Three Kids Wash below Henderson, NV	09419753	2,180	1988-98
Thousand Springs Creek near Wilkins, NV	10172907	--	1985-90
Thousand Springs Creek near Shores, NV	1017290880	--	1985-87
Thousand Springs Creek Blw Toano Draw near Shores, NV	1017290885	--	1987-89
Thousand Springs Creek near Tacoma, NV	10172910	--	1911-14
Thousand Springs Creek near Montello, NV	10172914	--	1985-90
Snake Creek near Baker, NV	10243230	30.0	1913-15,
			1916-17
Baker Creek at Narrows near Baker, NV	10243240	16.4	1947-55
			1993-97
Baker Creek near Baker, NV	10243250	10.0	1913-16
Franklin River near Arthur, NV	10244720	10.3	1964-83
Overland Creek near Ruby Valley, NV	10244745	9.00	1960-67,
			1977-82
Duck Creek near Cherry Creek, NV	10245005	--	1986-88
Currie Spring near Currie, NV	10245030	--	1983-86
Goshute Creek near Cherry Creek, NV	10245040	9.67	1983-86
Illipah Creek near Hamilton, NV	10245445	31.5	1983-87
			1990-94
Newark Valley Trib near Hamilton, NV	10245800	157	1962-86
Stoneberger Creek near Austin, NV	10245925	35.6	1978-97
Big Spring near Duckwater, NV	10246835	--	1970-71
Little Currant Creek near Currant, NV	10246846	12.9	1964-81
			1983-86
			1990-94
Currant Creek at Ranger Station near Currant, NV	10246850	--	1913
Currant Creek (at Cazier's Ranch) near Currant, NV	10246860	--	1913-17,
			1923
Big Warm Spring near Duckwater, NV	10246890	--	1915-16
Duckwater Creek near Duckwater, NV	10246900	--	1915-17
Upper Hot Creek Ranch Springs near Warm Springs, NV	10246910	0.07	1967-72
Hot Creek Ranch Springs near Warm Springs, NV	10246920	--	1967-73
Six Mile Creek near Warm Springs, NV	10246930	19	1967-68,
			1984-91
Moores Station Springs at Moores Station, NV	10246940	136	1967-73
Warm Springs at Warm Springs, NV	10246950	--	1967-73

DISCONTINUED SURFACE-WATER DISCHARGE STATIONS--Continued

Station name	Station number	Drainage area (mi^2)	Period of record (water years)
Hot Creek near Warm Springs, NV	10247050	1,030	1967-73
Big Creek near Warm Springs, NV	10247200	12.0	1991-94
Penoyer Valley Trib near Tempiute, NV	10247860	1.48	1966-77
Eldorado Valley Trib near Nelson, NV	10248510	1.41	1966-77
Willow Creek near Warm Springs, NV	10249190	16.4	1978-92
McClusky Creek near Austin, NV	10249200	11.6	1979, 1981-82
Campbell Creek Trib near Eastgate, NV	10249411	2.14	1964-82
Chiatovich Creek near Dyer, NV	10249900	37.3	1961-82
Beatty Wash near Beatty, NV	10251215	94.6	1989-95
Amargosa River at Highway 95 below Beatty, NV	10251218	470	1963-68 1991-95
Amargosa River near Beatty, NV	10251220	470	1964-68
Fortymile Wash above East Cat Canyon, Nevada Test Site, NV	10251242	40.8	1991-95
East Cat Canyon Wash at Fortymile Wash, Nevada Test Site, NV	10251243	13.3	1991-95
Unnamed Tributary to Stockade Wash near Rattlesnake Ridge Nevada Test Site, NV	10251248	3.9	1984-95
Stockade Wash near Fortymile Wash, Nevada Test Site, NV	10251249	68.2	1991-95
Fortymile Wash at Narrows, Nevada Test Site, NV	10251250	258	1983-97
Pagany Wash near the Prow, Nevada Test Site, NV	102512531	0.47	1994-95
Pagany Wash #1 near Well UZ-4, Nevada Test Site, NV	102512533	0.82	1992-95
Drillhole Wash above Well UZ-1, Nevada Test Site, NV	102512535	0.68	1994-95
Wren Wash at Yucca Mountain, Nevada Test Site, NV	1025125356	0.23	1994-95
Split Wash below Quac Canyon Wash, Nevada Test Site, NV	102512537	0.33	1993-95
Split Wash at Antler Ridge, Nevada Test Site, NV	1025125372	2.35	1993-95
Fortymile Wash near Well J-13, Nevada Test Site, NV	10251255	304	1983-97
Amargosa River at Highway 127, near CA-NV State Line	10251259	1,542	1993-95
Carson Slough at Ash meadows, NV	10251275	--	1993-97
Peak Spring Canyon Creek near Charleston Peak, NV	10251890	3.09	1977-83 1984-94
Lees Creek near Pahrump, NV	10251900	--	1916
Intermittent Springs near Pahrump, NV	10251950	--	1916
Lovell Wash near Blue Diamond, NV	10251980	52.8	1967-77
Virginia Creek near Bridgeport, CA	10289000	63.6	1954-75
Green Creek near Bridgeport, CA	10289500	19.5	1954-75
Summers Creek near Bridgeport, CA	10290000	8.26	1954-59
Robinson Creek near Bridgeport, CA	10291000	40.2	1911-12
Swauger Creek near Bridgeport, CA	10292000	52.8	1912-15, 1954-75
East Walker River below Sweetwater Creek near Bridgeport, CA	10293050	467	1974-82
East Walker River above Mason Valley near Mason, NV near Mason, NV	10294000	--	1916-18, 1921-24
East Walker River near Yerington, NV	10294500	--	1903-08
East Walker River near Mason, NV	10295000	1,230	1911-16
West Walker River at Leavitt Meadows, near Coleville, CA	10295200	73.0	1945-64
Saroni Canal near Wellington, NV	10298000	--	1920-23
West Walker River near Wellington, NV	10298500	521	1918-24
Desert Creek near Wellington, NV	10299100	50.4	1965-69
Walker River near Nordyke, NV	10300500	--	1895
Walker River near Mason, NV	10300600	2,400	1974-84
Walker River at Mason, NV	10301000	--	1911-16, 1921-23
Walker River above Little Dam near Schurz, NV	10301745	--	1995-2001
Walker River at Shurz, NV	10302000	2,850	1914-33
East Fork Carson River above Soda Springs Ranger Station, near Markleeville, CA	10302500	30	1947-51
Silver King Creek near Coleville, CA	10303000	31.6	1947-51
East Fork Carson River at Silver King Valley, near Markleeville, CA	10303500	--	1911-12
Wolf Creek near Markleeville, CA	10304000	11.7	1947-51
Silver Creek below Pennsylvania Creek, near Markleeville, CA	10304500	19.6	1947-67
Silver Creek near Markleeville, CA	10305000	27.3	1911-12
East Fork Carson River near Markleeville, CA	10305500	208	1911-31
Hot Springs Creek near Markleeville, CA	10306000	14.3	1947-57
Hot Springs Creek at Markleeville, CA	10306500	26.7	1912-30
Pleasant Valley Creek above Raymond Canyon Creek near Markleeville, CA	10307000	14.6	1947-50
Pleasant Valley Creek near Markleeville, CA	10307500	25.2	1911-12
Markleeville Creek at Markleeville, CA	10308000	53.7	1911-31
East Fork Carson River at California-Nevada State Line, CA	10308500	300	1911-14
Indian Creek at Woodfords, CA	10309025	1.7	1987-91
Indian Creek at Diamond Valley near Paynesville, CA	10309030	16.15	1987-91
Indian Creek above Mouth near Gardnerville, NV	10309035	25.4	1994-98
Pine Nut Creek near Gardnerville, NV	10309050	10.14	1980-97
Buckeye Creek near Minden, NV	10309070	46.3	1980-97
East Fork Carson River at Minden, NV	10309100	392	1974-84 1994-98
West Fork Carson River above Woodfords, CA	10309500	53	1947-51
Fredericksburg Canyon Creek near Fredericksburg, CA	10310300	3.71	1989-2000
Miller Spring near Sheridan, NV	10310350	--	1989-97

DISCONTINUED SURFACE-WATER DISCHARGE STATIONS--Continued

Station name	Station number	Drainage area (mi^2)	Period of record (water years)
West Fork Carson River at Muller Lane near Minden, NV	10310358	--	1994-98
East Branch Brockliss Slough at Muller Lane near Minden, NV	10310402	--	1994-98
West Branch Brockliss Slough at Muller Lane near Minden, NV	10310403	--	1994-98
Carson River at Genoa, NV	10310405	570	1974-82
Vicee Canyon Creek near Carson City, NV	10311250	1.30	1983-85
Vicee Canyon Creek near Sagebrush Ranch near Carson City, NV	10311260	1.83	1984-85 1989-97
Carson River near Empire, NV	10311500	988	1901-07, 1911-23
Carson River at Dayton, NV	10311700	1090	1**4-97
Buckland Ditch near Fort Churchill, NV	10311900	--	1962-72
Stillwater Slough Cutoff Drain near Stillwater, NV	10312220	--	1967-81
Paiute Diversion Drain near Stillwater, NV	10312240	--	1967-81
Paiute Drain above D-line Canal near Stillwater, NV	10312250	--	1989-90
Indian Lakes Canal near Fallon, NV	10312260	--	1967-81
Indian Lakes Canal below East Lake near Stillwater, NV	10312265	--	1979-82
D-line Canal below East Lake near Stillwater, NV	10312267	--	1989
Paiute Drain at Wildlife Entrance near Stillwater, NV	10312270	--	1980-82
TJ Drain at Wildlife Entrance near Stillwater, NV	10312274	--	1989-90
Carson River below Fallon, NV	10312280	--	1967-85
Bishop Creek near Wells, NV	10312500	125	1910-11
Starr Creek near Deeth, NV	10313000	--	1913-24
Marys River at Marys River Cabin, near Deeth, NV	10313500	--	1913-14
Hanks Creek near Deeth, NV	10314000	--	1913-14
Marys River at Buena Vista Ranch, near Deeth, NV	10314500	--	1913-14
Marys River near Deeth, NV	10315000	355	1903, 1912-28
Secret Creek near Halleck, NV	10316000	35.0	1917-24
Lamoille Creek near Halleck, NV	10317000	245	1913-19
North Fork Humboldt River near North Fork, NV	10317400	11.0	1965-82
Mahala Creek near Tuscarora, NV	10317420	4.48	1980-85
Mahala Creek at State Hwy 225 near Tuscarora, NV	10317430	22.9	1980-82
Gance Creek near Tuscarora, NV	10317450	6.45	1980-87
Gance Creek at State Hwy 225 near Tuscarora, NV	10317460	20.2	1980-82
North Fork Humboldt River at Devils Gate near Halleck, NV	10317500	830	1914-22, 1944-82
South Fork Humboldt River near Lee, NV	10319000	54.0	1945-55
Huntington Creek near Lee, NV	10319500	770	1949-73
Tenmile Creek above South Fork Humboldt River near Elko, NV	10319950	164	1989-90
Dixie Creek above South Fork Humboldt River near Elko, NV	10320100	159	1989-96
South Fork Humboldt River near Elko, NV	10320500	1,310	1896-1922, 1924-32, 1937-73
Susie Creek near Carlin, NV	10321500	82.5	1956-58
Jack Creek below Indian Creek near Carlin, NV	10321860	10.47	1991-93
Maggie Creek near Carlin, NV	10321970	--	1990-91
Pine Creek near Palisade, NV	10323000	999	1912-14, 1946-58
Humboldt River near Dunphy, NV	10323400	--	1981-83
Humboldt River near Argenta, NV	10323500	7,490	1946-83
Humboldt River below Slaven Ditch near Argenta, NV	10323600	--	1981-84
Rock Creek at Rock Creek Ranch near Battle Mountain, NV	10324000	--	1915, 1917
Reese River near Ione, NV	10325500	53.0	1951-80
Reese River near Berlin, NV	10326000	94.0	1913-16
Big Creek near Austin, NV	10326500	9.0	1914,1916
Reese River near Austin, NV	10326700	1,130	1964-68
Fish Creek near Battle Mountain, NV	10326800	64.7	1977-85
Humboldt River near Valmy, NV	10327000	--	1950-58
Pole Creek near Golconda, NV	10328000	10.7	1961-74
North Fork Little Humboldt River near Paradise Valley, NV	10328450	210	1976-82
South Fork Little Humboldt River near Paradise Valley, NV	10328475	431	1976-83
Little Humboldt River below Chimney Dam near Paradise Valley, NV	10328500	780	1942-51, 1975-82
Cottonwood Creek near Paradise Valley, NV	10330000	--	1925-34
Cottonwood Creek at Paradise Valley, NV	10330500	57.4	1945-51
Humboldt River near Winnemucca, NV	10330900	14,600	1961-64
Humboldt River near Rose Creek, NV	10331500	15,200	1948-70
H L I L & P Company Feeder Canal near Mill City, NV	10332490	--	1914-31, 1937-38
H L I L & P Company Feeder Canal near Imlay, NV	10332500	--	1947-77
Humboldt River near Humboldt, NV	10333500	--	1933
H L I L & P Company Outlet Canal near Humboldt, NV	10334000	--	1914-20, 1922-41
Humboldt River near Lovelock, NV	10336000	16,600	1912-27 1950-59 1998-2000
Toulon Drain at Derby Field Road near Toulon, NV	10336035	--	1998-2000
Army Drain above Iron Bridge near Lovelock, NV	10336039	--	1999-2000

DISCONTINUED SURFACE-WATER DISCHARGE STATIONS--Continued

Station name	Station number	Drainage area (mi^2)	Period of record (water years)
Lower Humboldt Drain near Lovelock, NV	10336050	--	1965-66
Grass Lake near Meyers, CA	10336593	6.99	1971-74
Upper Truckee River near Meyers, CA	10336600	33.1	1961-86
Fallen Leaf Lake near Camp Richardson, CA	10336625	16.7	1969-92
Taylor Creek near Camp Richardson, CA	10336626	16.7	1969-92
Carnelian Creek at Carnelian Bay, CA	10336686	2.93	1999-2000
Edgewood Creek Trib near Daggett Pass, NV	10336756	--	1981-83
Trib Of Edgewood Creek Trib near Tahoe Village, NV	10336757	--	1981-83
Edgewood Creek Trib at Highland Drive near Tahoe Village, NV	10336758	--	1981-83
Edgewood Creek near Stateline, CA	10336759	3.2	1983-87
Edgewood Creek at Lake Tahoe near Stateline, CA	10336765	5.50	1989-92
Summit Creek above Donnor Lake near Truckee, CA	10338100	4.96	1998
Donner Creek near Truckee, CA	10339000	29.4	1902-15, 1928-43
Truckee River above Prosser Creek near Truckee, CA	10339419	36.1	1993-98
South Fork Prosser Creek near Truckee, CA	10339500	6.37	1910
Prosser Creek at Hobart Mills, CA	10339700	27.4	1959-63
Alder Creek near Truckee, CA	10339900	7.47	1959-69, 1971-73
Prosser Creek near Truckee, CA	10340000	47.4	1904, 1908-12
Webber Creek near Truckee, CA	10341000	14.7	1910
Little Truckee River near Truckee, CA	10341500	32.3	1910
Little Truckee River below Diversion Dam near Sierraville, CA	10341950	36.1	1993-98
Little Truckee River near Hobart Mills, CA	10342000	37.1	1947-72
Little Truckee River at Highway 89 near Truckee, CA	10343200	59.0	1993-94
Bronco Creek at Floriston, CA	10345700	15.4	1993-98
Truckee River near Essex, NV	10347000	991	1889
Dog Creek near Verdi, CA	10347300	16.2	1956-61
Dog Creek at Verdi, CA	10347310	24.2	1993-98
Truckee River at Laughtons, CA	10347500	1,050	1890
Hunter Creek near Reno, NV	10347600	11.5	1962-72, 1978-81
Hunter Creek above Last Chance Ditch near Reno, NV	10347620	11.7	1993-95
Peavine Creek near Reno, NV	10347800	2.34	1963-74
Orr Ditch at Spanish Springs Valley near Sparks, NV	10348220	--	1992-95
Franktown Creek at Franktown, NV	10348500	14.0	1948-55, 1958
Galena Creek near Steamboat, NV	10348900	8.5	1961-94
Steamboat Creek at Steamboat Springs, NV	10349500	123	1900-2001
Whites Creek near Steamboat, NV	10349700	8.02	1962-66
Truckee River below Tracy, NV	10350400	1,590	1972-97
Truckee River at Clarks, NV	10350500	--	1907-15
Fernley A-Drain near Fernley, NV	10351350	--	1969-80
'A' Drain at Powerline Crossing near Fernley, NV	10351356	--	1989-90
Truckee River near Wadsworth, NV	10351800	--	1902-05
East Fork Quinn River near McDermitt, NV	10353000	140	1949-82
Quinn River near McDermitt, NV	10353500	1,100	1949-85
Kings River near Orvada, NV	10353600	20.5	1962-68 1976-95
Quinn River near Denio, NV	10353650	3,520	1964-67, 1978-81
Leonard Creek near Denio, NV	10353700	52.0	1961-83
South Willow Creek near Gerlach, NV	10353770	31.0	1973-2000
Red Mountain Creek near Gerlach, NV	10353790	30.0	1967-68
Badger Creek Trib near Vya, NV	10361700	7.70	1964-72
Wildhorse Reservoir near Gold Creek, NV	13174000	209	1938-96
Owyhee River at Patsville, NV	13174900	305	1972-75
Owyhee River at Mountain City, NV	13175000	350	1913-14, 1927-49
Owyhee River near Owyhee, NV	13175500	380	1914-26
Owyhee River above China Diversion Dam near Owyhee, NV	13176000	458	1939-84
Jack Creek below Schoonover Creek near Tuscarora, NV	13176900	19.8	1962-69
Jack Creek near Tuscarora, NV	13177000	31.0	1913-25
South Fork Owyhee River at Spanish Ranch near Tuscarora, NV	13177200	330	1959-74

DISCONTINUED SURFACE WATER-QUALITY STATIONS

The following surface water-quality sites have been discontinued. Water-quality data were collected and published for the period of record expressed in water years, shown for each station. Abbreviations: CH, chemical; TE, temperature; SE, sediment; BI, biological.

Station name	Station number	Type of data	Period of record (water years)
Virgin River at Bloomington, UT	09413300	CH, TE, SE, BI	1978-80
Virgin River above I15 Rest Area near Littlefield, AZ	09413600	CH, TE, SE, BI	1977-80
Virgin River below I15 Rest Area near Littlefield, AZ	09413650	CH, TE, SE, BI	1977-80
Virgin River at Mouth of Narrows near Littlefield, AZ	09413800	CH, TE, SE, BI	1977-80
Virgin River at Mesquite, NV	09415090	CH, TE, SE	1992-93
Virgin River at Riverside, NV	09415190	CH, TE, SE	1974-75 1992-95
Virgin River below Riverside, NV	09415200	CH, TE, BI	1969-74
Virgin River above Halfway Wash near Riverside, NV	09415230	CH, TE, SE, BI	1909, 1978-86 1992-95
Pahranagat Wash near Moapa, NV	09415850	CH, TE, SE	1991-93
Pahranagat Wash below Arrow Canyon near Moapa, NV	09415852	CH, TE, SE	1991-93
Muddy River near Moapa, NV	09416000	CH, TE, SE	1977-78, 1989-94
Muddy River at Weiser Ranch near Moapa, NV	09417400	CH, TE	1992
Meadow Valley Wash near Caliente, NV	09418500	CH, TE	1977-84 1990
Meadow Valley Wash below Lyman Crossing	09418670	CH, TE	1990-91
Meadow Valley Wash below Hoya Siding near Rox, NV	09418685	CH, TE	1992
Meadow Valley Wash 1.1 Miles above Rox, NV	09418690	CH	1991
Meadow Valley Wash Seep West Side RR .6 Miles above Rox	09418692	CH, TE	1992-93
Meadow Valley Wash above Rox, NV	09418693	CH, TE	1990-93
Meadow Valley Wash near Rox, NV	09418700	CH, TE, SE	1988-94
Meadow Valley Wash below Farrier Wash near Rox, NV	09418750	CH, TE, SE	1990, 1993
Muddy River near Glendale, NV	09419000	CH, TE	1977-83
Muddy River near Overton, NV	09419500	CH	1977
Muddy River at Overton NV	09419505	CH, TE	1992
Muddy River below Overton, NV	09419510	CH, TE, BI	1970-74
Muddy River above Lake Mead near Overton, NV	09419515	CH, TE, SE, BI	1973, 1979-93
Las Vegas Wash above Detention Basin near North Las Vegas, NV	09419648	CH, TE, SE	1989 1991-93
Las Vegas Wash at Vegas Valley Drive near Las Vegas, NV	094196784	CH, TE, SE, BI	1992
Las Vegas Wasteway near East Las Vegas, NV	09419679	CH, TE, SE	1979-80, 1994
Las Vegas Wash near Henderson, NV	09419700	CH, TE, SE, BI	1970-92
Las Vegas Wash below Henderson, NV	09419750	CH, TE, BI	1970-73
Las Vegas Wash above Three Kids Wash below Henderson, NV	09419753	CH, TE	1988-92, 1995
Las Vegas Wash below Lake Las Vegas below Henderson, NV	09419790	CH, TE, SE	1993-95
Las Vegas Wash near Boulder City, NV	09419800	CH, TE, SE, BI	1969-85, 1992
Lake Mead near Las Vegas Beach, NV	09420900	CH, TE	1973-83, 1985
Lake Mead at Saddle Island, NV	09420950	CH, TE	1973-83 1985
Colorado River at Willow Beach, AZ	09421900	CH, TE	1992
Colorado River below Davis Dam, NV-AZ	09423000	CH, TE, SE, BI	1969-87, 1992
Colorado River Lagoon North of Riviera, AZ	09423050	CH, TE	1973-85 1987-92
Colorado River below Lagoon North of Riviera, AZ	09423060	CH, TE	1973-85 1987-90
Thousand Springs Creek near Wilkins, NV	10172907	CH, TE	1985-90, 1986
Thousand Springs Creek above Toano Draw near Shores, NV	1017290840	CH, TE	
Thousand Springs Creek near Shores, NV	1017290880	CH, TE	1985-87
Thousand Springs Creek below Toano Draw near Shores, NV	1017290885	CH, TE	1987-90
Thousand Springs Creek below Toano Draw near Shores, NV	1017290890	CH, TE	1986
Rock Spring Creek near Shores, NV	1017290950	CH, TE	1986
Thousand Springs Creek near Tacoma, NV	10172910	CH, TE	1987
Thousand Springs Creek above Eighteen Mile Canyon near Montello, NV	1017291080	CH, TE	1986
Crittenden Springs above Crittenden Reservoir near Montello NV	1017291130	CH, TE	1985-87, 1989-90
Thousand Springs Creek below Crittenden Creek near Montello, NV	1017291190	CH, TE	1985-86
Thousand Springs Creek near Montello, NV	10172914	CH, TE	1985-90
Lehman Creek near Baker, NV	10243260	CH, TE	1987-88, 1990
Cleve Creek near Ely, NV	10243700	CH, TE	1978
Franklin River near Arthur, NV	10244720	CH, TE	1977-83
Overland Creek near Ruby Valley, NV	10244745	CH, TE	1977-81, 1987-88, 1990
Illipah Creek near Hamilton, NV	10245445	CH, TE	1988, 1990
Illipah Creek Tributary near Hamilton, NV	10245450	CH, TE	1987
Pine Creek near Belmont, NV	10245900	CH, TE	1969, 1979-84

DISCONTINUED SURFACE WATER-QUALITY STATIONS--Continued

Station name	Station number	Type of data	Period of record (water years)
Mosquito Creek near Belmont, NV	10245910	CH, TE	1979-84
Stoneberger Creek near Austin, NV	10245925	CH, TE	1979-84
Lower Currant Creek near Currant, NV	10246846	CH, TE	1977-81
Willow Creek near Warm Springs, NV	10249190	CH, TE	1979-84
McClusky Creek near Austin, NV	10249200	CH, TE	1978-81
Kingston Creek below Cougar Canyon near Austin, NV	10249280	CH, TE	1977-84
North Twin River near Round Mountain, NV	10249295	CH, TE, SE, BI	1986
South Twin River near Round Mountain, NV	10249300	CH, TE, SE, BI	1967-96
Chiatovich Creek near Dyer, NV	10249900	CH, TE, SE, BI	1974-82, 1987-88, 1990
Amargosa River at Highway 95 below Beatty, NV	10251218	CH, TE	1993
Amargosa River near Beatty, NV	10251220	CH	1993
Unnamed Tributary-Stockade Wash near Rattlesnake Ridge, NTS, NV	10251248	CH, TE	1992-93
Stockade Wash at Airport Road, NTS, NV	102512484	CH, TE	1993
Yucca Wash near Mouth, Nevada Test Site, NV	10251252	CH, TE	1993
Pagany Wash Number 1, NTS, NV	102512533	CH, TE	1993
Cane Spring Wash Tributary below Skull Mountain, NTS, NV	102512654	CH, TE	1993
Amargosa River near Eagle Mountain below Death Valley Junction, CA	10251280	CH, TE	1993
Robinson Creek at Twin Lakes Outlet near Bridgeport, CA	10290500	CH, TE	1994-95
Buckeye Creek near Bridgeport, CA	10291500	CH, TE, SE	1977-79, 1995
East Walker River near Bridgeport, CA	10293000	CH, TE, BI	1959-71, 1973-85, 1994-95
East Walker River above Strosnider Drive near Mason, NV	10293500	CH, TE	1977-80, 1994-95
West Walker River at Highway 108 Bridge below Pickel Meadow, CA	10295300	TE, SE	1995
Little Walker River near Bridgeport, CA	10295500	CH, TE, SE	1977-85, 1990, 1995
West Walker River below Little Walker River near Coleville, CA	10296000	CH, TE, SE	1961-66, 1969-71, 1973-80, 1987-88, 1990, 1994-95
West Walker River near Coleville, CA	10296500	CH, TE	1977-84, 1994-95
West Walker River above Topaz Lake at Topaz, CA	10296650	CH, TE	1990-96
Topaz Lake near Topaz, CA	10297000	CH, TE	1994
West Walker River at Hoye Bridge near Wellington, NV	10297500	CH, TE	1977-96
West Walker River near Hudson, NV	10300000	CH, TE	1977-80, 1982, 1994-95
Walker River near Mason, NV	10300600	CH, TE	1977-84
East Drain above Mason Valley Wildlife Management Area near Yerington, NV	10301180	CH, TE	1994
Perk Slough at Mason Valley Wildlife Management Area Boundary near Wabuska, NV	10301280	CH, TE	1994
West Branch Spragg-Alcorn-Bewley Ditch at Sierra Way near Wabuska, NV	10301470	CH, TE	1994
Wabuska Drain at Sierra Way near Wabuska, NV	10301480	CH, TE	1994
Wabuska Drain above Confluence Walker River near Parker Butte near Wabuska, NV	10301495	CH, TE	1994
Walker River near Wabuska, NV	10301500	CH, TE, SE, BI	1969-95
Walker River above Weber Reservoir near Schurz, NV	10301600	CH, TE	1976-81, 1994
Weber Reservoir near Schurz, NV	10301700	CH, TE	1994
Walker River below Weber Reservoir near Schurz, NV	10301710	CH, TE	1977-80
Walker River above Canal 1-2 Diversion Weir near Schurz, NV	10301740	CH, TE	1994
Walker River at Little Dam Weir above Schurz, NV	10301750	CH, TE	1977-81
Lateral 1A above Highway 95 at Schurz, NV	10301765	CH, TE	1994-95
Lateral 2A at Takeout near Schurz, NV	10301770	CH, TE	1994-95
Lateral 2D below Schurz, NV	10301780	CH, TE	1994
Walker River at Schurz, NV	10302000	CH, TE	1994-95
Walker River at Lateral 2-A Siphon near Schurz, NV	10302002	CH, TE, SE	1994-95
Walker River at Powerline Crossing near Schurz, NV	10302005	CH, TE, SE	1994-95
Walker River near Mouth at Walker Lake, NV	10302025	CH, TE	1994-95
East Fork Carson River Below Markleeville Creek near Markleeville, CA	10308200	CH, TE, SE, BI	1966-70, 1977-81, 1992, 1998
East Fork Carson River above Bryant Creek near Gardnerville, NV	10308525	CH, TE, SE	1998
Leviathan Creek above Mine near Markleeville, CA	10308783	CH, TE	1980-82
Leviathan Mine Tunnel Spring near Markleeville CA	10308784	CH, TE	1980-82
Leviathan Mine Pit Flow near Markleeville, CA	10308785	CH, TE	1980-82
Leviathan Mine Waste Flow near Markleeville, CA	10308786	CH, TE	1980-82
Leviathan Mine Seep below Crusher near Markleeville, CA	10308787	CH, TE	1981-82
Leviathan Creek below Delta near Markleeville, CA	10308788	CH, TE	1981-82
Leviathan Creek below Mine near Markleeville, CA	10308790	CH, TE	1980-82
Bryant Creek below Mountaineer Creek near Markleeville, CA	10308794	CH, TE, SE	1982, 1998
Bryant Creek near Gardnerville, NV	10308800	CH, TE, CH, SE	1979, 1982 1998
Bryant Creek above East Fork Carson River near Gardnerville, NV	10308875	CH, TE, SE	1998
East Fork Carson River below Bryant Creek near Gardnerville, NV	10308900	CH, TE, SE	1998

DISCONTINUED SURFACE WATER-QUALITY STATIONS--Continued

Station name	Station number	Type of data	Period of record (water years)
East Fork Carson River near Gardnerville, NV	10309000	CH, TE,	1977
		CH, TE, SE	1978-80
		CH, TE	1981-84, 1987-96
East Fork Carson River near Dresslerville, NV	10309010	CH, TE, SE, BI	1993-95, 1996, 1998
East Fork Carson River at Riverview Drive Bridge near Dresslerville, NV	10309089	CH, TE, SE	1998
East Fork Carson River at Minden, NV	10309100	CH, TE, BI	1977-84, 1994-95
West Fork Carson River above Woodfords, CA	10309500	BI	1994-95
West Fork Carson River at Woodfords, CA	10310000	CH, TE, SE	1961-84, 1987-88, 1990, 1994
West Fork Carson River at Paynesville, CA	10310200	CH, TE, BI	1992-97
West Fork Carson River near Dresslerville, NV	10310355	CH, TE	1990-91
West Fork Carson River at Muller Lane near Minden, NV	10310358	BI	1994-95
Daggett Creek near Genoa, NV	10310400	CH,TE	1981
Carson River at Genoa, NV	10310405	CH, TE	1977-81
Carson River at Cradlebaugh Bridge near Genoa, NV	10310450	CH, TE, SE	1983,
		CH, TE	1988
Clear Creek Near Carson City, NV	10310500	CH, TE	1987-89, 1996-97
Carson River at McTarnahan Bridge near Carson City, NV	10310800	CH	1992
Carson River near Carson City, NV	10311000	CH, TE, SE, BI	1977-84, 1990-97
North Fork Kings Canyon Creek near Carson City, NV	10311090	CH	1996-97
Kings Canyon Creek near Carson City, NV	10311100	CH, TE	1977-84 1996-97
Ash Canyon Creek near Carson City, NV	10311200	CH, TE	1977-84, 1996-97
Eagle Valley Creek at Carson City, NV	10311300	SE	1997
Carson River at Deer Run Road near Carson City, NV	10311400	CH, TE, SE	1979-84, 1993-95, 1998-99
Carson River at Dayton, NV	10311700	CH, TE, SE, BI	1994-95, 1997-98
Gold Canyon Creek at Dayton, NV	10311710	CH, TE, SE	1998
Carson River below Dayton, NV	10311715	CH, TE, SE	1998-99
Six Mile Canyon Creek at Highway 50 near Dayton, NV	10311725	CH, TE, SE	1998
Carson River at Chaves Ranch near Clifton, NV	10311860	CH, TE, SE	1998-99
Carson River 2.8 miles below Highway 95 near weeks, NV	10312025	CH, TE, SE	1998
Carson River near mouth at Lahontan Reservoir, NV	10312030	CH, TE, SE	1998
Carson River Diversion Dam Outflow at V-Canal near Fallon, NV	10312155	CH, TE, SE	1998
Sheckler Reservoir at Outlet near Fallon, NV	10312165	CH, TE, SE	1986-88
Upper Westside Drain at Candee Lane near Fallon, NV	10312167	CH, TE	1988
Holmes Drain at Gage near Fallon, NV	10312170	CH, TE	1987-89, 1994
G-line Extension on Drain at US 95 near Fallon, NV	10312171	CH, TE	1987-89
Sheckler Drain at St. Clair Road near Fallon, NV	10312172	CH, TE	1988
South Branch Carson River at St. Clair Road near Fallon, NV	10312173	CH, TE	1988
Harrigan Road Drain above Upper Diagonal Drain near Fallon, NV	10312176	CH, TE	1988
“L” Drain above Diagonal Drain near Fallon, NV	10312178	CH, TE	1988
Carson Lake Drain above Carson Lake near Fallon, NV	10312180	CH, TE, SE, BI	1986-87, 1989, 1994-97
Pasture Road Drain above Diagonal Drain near Fallon, NV	10312181	CH, TE	1988
Lower Diagonal Drain at Pasture Road near Fallon, NV	10312182	CH, TE, SE, BI	1988, 1994-97
“L” Drain above Lee Drain near Fallon, NV	10312183	CH, TE, BI, SE	1987-89, 1994-97
L 12 Canal above Macari Lane near Fallon, NV	1031218750	CH, TE, SE	1995-96
Lower Diagonal Drain at Highway 50 near Fallon, NV	10312190	CH, TE	1986-88 1995
Lower Diagonal Drain at Gage near Stillwater, NV	10312200	CH, TE	1988
S-Line Reservoir Outflow near Fallon, NV	1031220120	CH, TE. SE	1998
Harmon Reservoir Outflow near Fallon, NV	1031220130	CH, TE. SE	1998
New River Canal below New River Slough near Stillwater, NV	10312206	CH, TE	1988
Stillwater Point Diversion Drain near Stillwater, NV	10312215	CH, TE, SE	1986-90
Stillwater East-West Canal below Outlet near Stillwater, NV	10312216	CH, TE, SE	1988, 1998
Stillwater Slough Cutoff Drain near Stillwater, NV	10312220	CH, TE, SE	1971, 1977-78, 1986, 1996 1998
D-Line Canal at Sagouspe Dam near Fallon, NV	10312256	CH, TE, SE	1998
D-Line Canal below East Lake near Stillwater, NV	10312267	CH, TE, SE	1987-89
Carson River at Tarzyn Road near Fallon, NV	10312275	CH, TE, SE	1992-95, 1998
Dixie Creek above South Fork Humboldt River near Elko, NV	10320100	SE	1990-96
Fish Creek near Battle Mountain, NV	10326800	CH, TE	1977-84
Humboldt River near Golconda, NV	10327800	CH, TE	1990-91
North Fork Little Humboldt River near Paradise Valley, NV	10328450	CH, TE	1977-82

DISCONTINUED SURFACE WATER-QUALITY STATIONS--Continued

Station name	Station number	Type of data	Period of record (water years)
South Fork Little Humboldt River near Paradise Valley, NV	10328475	CH, TE	1978-82
Little Humboldt River below Chimney Dam near Paradise Valley, NV	10328500	CH, TE	1978, 1980-82
Little Humboldt River near Paradise Valley, NV	10329000	CH, TE	1977-84
Martin Creek near Paradise Valley, NV	10329500	CH, TE	1977-84
Cottonwood Creek near Paradise Valley, NV	10330000	CH, TE, SE	1977
Humboldt River near Humboldt, NV	10333500	CH, TE	1971
Rye Patch Reservoir near Rye Patch, NV	10334500	CH, TE	1990-91
Lovelock Drain above Graveyard Drain near Lovelock, NV	10335750	CH, TE	1990-91
Bradys Hot Springs Creek at Road Crossing at Bradys Hot Springs, NV	10336150	CH, TE	1988
Big Meadow Creek above Highway 89, CA	103365932	CH, TE, SE	1996-97
Upper Truckee River at mouth - east channel	103366117	CH, TE, SE	1996-97
Taylor Creek at Highway 89 near Camp Richardson	10336628	CH, TE, SE	1998
Blackwood Creek below North Fork Blackwood Creek near Tahoe City, CA	103366594	CH, TE, SE	1989
Blackwood Creek at Blackwood Canyon Road near Tahoe City, CA	103366596	CH, TE, SE	1989
First Creek above Len Way near Incline Village, NV	10336683	CH	1980
First Creek above Dale Drive near Incline Village, NV	10336685	CH, TE, SE	1980-81
Dale Drive Ditch at First Creek near Incline Village, NV	10336686	CH, TE, SE	1980-81
Dale Drive Ditch near Incline Village, NV	10336687	CH, TE, SE	1980-81
Second Creek near Crystal Bay, NV	10336690	CH, TE, SE	1970-73
West Fork Second Creek at Lakeshore Drive near Crystal Bay	103366905	CH, TE, SE	1995-97 2000
Second Creek at Lakeshore Drive near Crystal Bay, NV	10336691	CH, TE, SE	1991-2001
Burnt Creek at Lakeshore Drive at Incline Village, NV	103366913	CH, TE, SE	2000
Wood Creek above Jennifer Street near Incline Village, NV	10336692	CH, TE, SE	1991-2001
Wood Creek near Crystal Bay, NV	10336693	CH, TE, SE	1970-73
Third Creek below Unnamed Tributary near Incline Village, NV	103366958	CH, TE, SE	1989 1991-2001
Third Creek at Incline Village, NV	10336696	CH, TE, SE	1970-73
Third Creek at Village Boulevard at Incline Village, NV	103366965	CH, TE, SE	1989, 1991-2000
Third Creek at Highway 28 at Incline Village, NV	10336697	CH, TE, SE	1989
Incline Creek Tributary at Highway 28 at Incline Village, NV	103366999	CH, TE, SE	1989-90
Marlette Creek near Carson City, NV	10336715	CH, TE	1977-84, 1990-91
Glenbrook Creek at US 50 near Glenbrook, NV	10336720	CH, TE, SE	1989
Logan House Creek at Lake Tahoe near Glenbrook, NV	10336745	CH, TE, SE	1989
Glenbrook Creek at Old Highway 50 near Glenbrook, NV	10336725	CH, TE, SE	1972-74, 1989, 91, 2000
Edgewood Creek Tributary near Daggett Pass, NV	10336756	CH, TE, SE	1981-83 1991-2001
Tributary of Edgewood Creek Tributary near Tahoe Village, NV	10336757	CH, TE, SE	1982-83
Edgewood Creek Tributary at Highland Drive near Tahoe Village, NV	10336758	CH, TE, SE	1981-83
Sediment Catchment Basin near Tahoe Village, NV	103367595	CH, TE, SE	1985
Edgewood Creek below Highway 50 near Stateline, NV	10336761	CH, TE, SE	1984-85, 1989, 1992
Truckee River at Tahoe City, CA	10337500	CH, TE	1991-93
Squaw Creek at Squaw Valley Road at Squaw Valley, CA	10337850	CH, TE	1980
Squaw Creek at Highway 89, near Squaw Valley, CA	10337855	CH, TE	1991-92
Truckee River Tributary near Truckee, CA	10337900	CH, TE	1991
Truckee River near Truckee, CA	10338000	CH, TE	1992
Truckee River above Donner Creek, near Truckee, CA	10338010	CH	1991
Donner Creek at Donner Lake near Truckee, CA	10338500	CH, TE	1980
Donner Creek near Truckee, CA	10339000	CH, SE	1980
Donner Creek at Mouth, near Truckee, CA	10339003	CH, TE	1991-92
Truckee River at Highway 267, at Truckee, CA	10339010	CH, TE	1980, 1991-92
Martis Creek at Highway 267 near Truckee, CA	10339250	CH, TE, SE	1973-86
Martis Creek near Mouth, at Truckee River near Truckee, CA	10339405	CH, TE	1980, 1991-92
Truckee River above Prosser Creek near Truckee, CA	10339419	CH, TE	1994-98
Truckee River at Old US 40 Bridge, below Truckee, CA	10339498	CH, TE	1980, 1991-92
Prosser Creek below Prosser Creek Dam, CA	10340500	TE	1993-98
Little Truckee River below Boca Dam near Truckee, CA	10344500	TE	1993-98
Truckee River at Boca Bridge near Truckee, CA	10344505	CH, TE	1980
Truckee River near Hirschdale Dump near Hirschdale, CA	10344992	CH, SE	1980
Truckee River below Hirschdale Dump near Hirschdale, CA	10344993	CH, SE	1980
Truckee River at Floriston Dam, near Floriston, CA	10345909	CH, TE	1980, 1991-92
Truckee River below Farad Powerhouse at Farad, CA	10345980	CH, TE	1992
Truckee River at Farad, CA	10346000	CH, TE, SE, BI	1960-61, 1967-81, 1992-98
Truckee River near Essex, NV	10347000	BI	1994-95
Truckee River at Crystal Peak Park at Verdi, NV	10347050	CH, TE, BI	1980
Dog Creek at Verdi, NV	10347310	CH, TE	1991
Truckee River at Bridge Street Bridge at Verdi, NV	10347320	CH, TE	1980, 1992
Truckee River below Viking Plant near Verdi, NV	10347335	CH, SE	1980

DISCONTINUED SURFACE WATER-QUALITY STATIONS--Continued

Station name	Station number	Type of data	Period of record (water years)
Truckee River near Verdi, NV	10347336	CH, TE, SE	1980
Truckee River Intragravel near Verdi, NV	10347337	CH, TE	1980
Truckee River near Mogul, NV	10347460	CH, TE	1992
Hunter Creek Reservoir Drain at Mayberry Drive at Reno, NV	10347615	CH, TE	1992
Truckee River at Circle Creek Ranch near Reno, NV	10347640	CH, TE	1992
Truckee River at Mayberry Drive below Lawton, NV	10347690	CH, TE, SE, BI	1979-80, 1992
Truckee River at Idlewild Park at Reno, NV	10347705	CH, TE, BI	1992, 1994-95
Peavine Creek near Reno, NV	10347800	CH, TE, SE	1967, 1969-71, 1973-74
Truckee River in Wingfield Park at Reno, NV	10347861	CH, SE	1980
Highland Plant Spill at Arlington Bridge at Reno, NV	10347870	CH, TE	1992
Truckee River at Reno, NV	10348000	CH, TE, SE, BI	1977-84, 1989-94, 1996-98
Truckee River near Sparks, NV	10348200	CH, TE, SE, BI	1979-80 1992-95
Truckee River Intragravel near Sparks, NV	10348201	CH, TE	1980
Orr Ditch above Spanish Springs Valley near Sparks, NV	10348215	CH, TE	1980
Orr Ditch at Spanish Springs Valley near Sparks, NV	10348220	CH, TE	1995, 1998
North Truckee Drain at Spanish Springs Road near Sparks, NV	10348245	CH, TE	1980, 1995
Franktown Creek near Carson City, NV	10348460	CH, TE	1977-84
Washoe Lake near Carson City, NV	10349980	CH, TE	1980-84
Little Washoe Lake near Steamboat, NV	10348800	CH, TE	1980-83
Galena Creek near Steamboat, NV	10348900	CH, TE	1977-1984
Steamboat Creek at Steamboat, NV	10349300	CH, TE	1971, 1977-80, 1982-83
Steamboat Creek below Steamboat Ditch at Steamboat, NV	10349490	CH, TE	1980
Boynton Slough above Boynton Lane near Reno, NV	10349880	CH, TE	1980
Dry Creek above Steamboat Ditch near Reno, NV	10349910	CH, TE, SE	1995
Dry Creek at Huffaker Lane near Reno, NV	10349920	CH, TE	1980
Dry Creek at Boynton Slough near Reno, NV	10349960	CH, TE	1980
Pioneer Ditch at University Farms near Reno, NV	10349975	CH, TE	1980
FWM 31: Pioneer Ditch at Jones Ranch near Sparks, NV	10349979	CH, TE	1980
Steamboat Creek at Cleanwater Way near Reno, NV	10349980	CH, TE	1978-80, 1992
Pioneer Ditch Return No. 2 below Kimlick Lane near Reno, NV	10349986	CH	1980
Reno-Sparks STP Outfall near Reno, NV	10349989	CH, TE	1979-80
Reno-Sparks STP Outfall at Reno, NV	10349995	CH, TE	1994-1998
Truckee River at Vista, NV	10350000	CH, TE, SE, BI	1969, 1977-80, 1982-84, 1992-94
Truckee River at Rest Area near Vista, NV	10350010	CH, TE	1992
Truckee River at Lockwood, NV	10350050	CH, TE, SE, BI	1974-81, 1984, 1992, 1994-95
Diversion to Grass Field at Lockwood, NV	10350145	CH	1980
Return from Grass Field at Lockwood, NV	10350146	CH	1980
Truckee River at Mustang Bridge No. 1 near Hafed, NV	10350153	CH, TE	1984, 1991
Truckee River at Patrick, NV	10350200	CH, TE, BI	1979-80, 1984, 1992
Diversion to Grass Pasture below Patrick, NV	10350325	CH	1980
Return from Grass Pasture below Patrick, NV	10350326	CH	1980
Truckee River below Tracy, NV	10350400	CH, TE, BI	1979-80, 1982-84, 1992
Truckee River at Derby Dam, NV	10351000	CH, TE, BI	1979-80
Truckee Canal at US 95 alternate near Fernley, NV	10351320	CH, TE, BI	1979-80, 1988-89
Fernley Check Dam near Fernley, NV	10351322	CH, SE	1980
Fernley Drain at US 95-alternate near Fernley, NV	10351335	CH, TE	1988-89
“A” Drain at US 50-alternate near Fernley, NV	10351345	CH, TE	1988-89
Streiff Drain at US 50-alternate near Fernley, NV	10351353	CH, TE	1988-89
'A' Drain at Powerline Crossing near Fernley, NV	10351356	CH, TE, SE	1988-90
Truckee Canal at Allendale Check Dam near Hazen, NV	10351367	CH, TE, BI	1980
Truckee Canal near Hazen, NV	10351400	CH, TE, SE, BI	1979
Truckee Canal at US 50 above Lahontan Reservoir, NV	10351590	CH, TE, SE, BI	1979-81
Truckee River below Derby Dam near Wadsworth, NV	10351600	CH, TE, SE, BI	1978-80, 1983, 1992-95
Truckee River at Painted Rock Bridge, NV	10351619	CH, TE, BI	1980, 1992
Diversion to Alfalfa Field at Wadsworth, NV	10351643	CH, SE	1980
Return from Alfalfa Field at Wadsworth, NV	10351644	CH, SE	1980
Herman Return near Wadsworth, NV	10351646	CH, TE, BI	1980
Truckee River at Old US 40 Bridge at Wadsworth, NV	10351648	CH, TE, SE, BI	1979-80, 1992
Truckee River below S-S Ranch near Wadsworth, NV	10351684	CH, TE	1980, 1992

DISCONTINUED SURFACE WATER-QUALITY STATIONS--Continued

Station name	Station number	Type of data	Period of record (water years)
Truckee River Intragravel below S-S Ranch near Nixon, NV	10351685	CH, TE	1980
Truckee River at Dead OX Wash near Nixon, NV	10351690	CH, TE, SE, BI	1979-80 1991-95
Truckee River Intragravel at Dead Ox near Nixon, NV	10351691	CH, TE	1980
Truckee River near Nixon, NV	10351700	CH, TE, SE, BI	1960-98
Truckee River at Numana Dam near Nixon, NV	10351725	CH, SE	1980
Truckee River at Highway 447 at Nixon, NV	10351750	CH, TE, SE, BI	1964, 1968, 1978-80, 1988, 1991-95
Truckee River at Marble Bluff Dam near Nixon, NV	10351775	CH, TE, BI	1979-80, 1992
Truckee River Fishway at Marble Bluff Dam near Nixon, NV	10351778	CH, TE, BI	1979
Truckee River below Marble Bluff Dam near Nixon, NV	10351780	CH, TE, SE	1979
Truckee River Delta at Pyramid Lake, NV	10351793	CH, SE	1980
Truckee River Delta at Pyramid Lake, NV	10351795	SE	1979
McDermitt Creek near McDermitt, NV	10352500	CH, TE, SE, BI	1975-84
East Fork Quinn River near McDermitt, NV	10353000	CH, TE	1977-81
Quinn River near McDermitt, NV	10353500	CH, TE, SE, BI	1977-86
Kings River near Orovada, NV	10353600	CH, TE	1977-84
Quinn River near Denio, NV	10353650	CH, TE	1978
Leonard Creek near Denio, NV	10353700	CH, TE	1977-83, 1987-88
Mahogany Creek near Summit Lake, NV	10353750	CH, TE	1987-88, 1990
Smoke Creek at BM 4044 near Gerlach, NV	10353799	CH, TE	1990
Cottonwood Creek near Flanigan, NV	10353970	CH, TE	1988
Willow Spring Creek near Flanigan, NV	10353975	CH, TE	1988
Mullen Creek near Flanigan, NV	10353978	CH, TE	1988
Bruneau River at Rowland, NV	13161500	TE, SE	1977-84, 1988-2000
Jarbidge River below Jarbidge, NV	13162225	TE, SE	1988-2000
Owyhee River near Gold Creek, NV	13174500	CH, TE	1977-84
Owyhee River at Mountain City, NV	13175000	CH, TE	1985
Owyhee River above China Diversion Dam near Owyhee, NV	13176000	CH, TE	1977-85
South Fork Owyhee River near Whiterock, NV	13177800	CH, TE	1977-81
Las Vegas Bay Sample Site above Gypsum Wash	360748114520301	CH, TE, SE	1992
Amargosa River near Evelyn, CA	361012116192801	CH	1988
Carpenter Canyon Creek	361440115430901	CH, TE	1987-89
Carson Slough at Stateline Road near Death Valley Junction	361910116224201	CH, TE	1988, 1993
Carson Slough at Spring Meadow Road at Ash Meadows, NV	362453116214501	CH	1988
212 S17 E60 05	362957115172001	CH, SE	1986
212 S16 E59 15	363406115213401	CH, SE	1986
219 S14 E64 12	364357114460501	CH, SE	1986
40-mile Wash at J-12	364551116233700	CH	1984
Busted Butte Wash	364749116235100	CH	1984
40-mile Wash at Road H	364904116234700	CH, TE	1984
40-mile Wash above Drill Hole Wash	364908116234600	CH	1984
Drill Hole Wash at Mouth	364911116235200	CH	1984
222 S12 E69 32	365105114180701	CH, SE	1986
Delirium Canal at Mouth	365513116222901	CH	1993, 1995
Yucca Lake	365600116010000	CH, TE	1978
Pah Canyon above Mouth	365634116221501	CH	1993, 1995
Whiterock Creek	371209116075201	CH	1973
Meadow Valley Wash above Delmues Spring	375140114191801	TE	1985
Kawich Creek near Antler	375731116253800	CH, TE	1985-86
Kawich Creek above Weir	375736116252900	CH, TE	1985-92
Kawich Creek near Big Seep	375736116255201	CH, TE	1985-92
Lost Hammer	375739116253100	CH, TE	1985
MVW above Eagle Canyon River	380140114110901	CH	1985
Stream-Reveille V Ertec	380630116201901	CH	1981
Camp Creek	381437114150801	CH, TE	1985
Wilson Creek	381905114241201	CH, TE	1985
Creek near Upper Pony Spring	381917114383501	CH, TE	1985
B6-VFT-1/Ertec Big Sand	383131116022401	CH, TE	1981
Leviathan Creek 1200 Feet Upstream Site 10308783 above Leviathan Mine	384157119391301	CH, TE	1998
Aspen Creek above Leviathan Mine near Markleeville, CA	384235119385001	CH, TE	1998
Desert Creek at State Highway 22, NV	384250119190000	CH, TE	1973
Aspen Creek above Leviathan Creek near Markleeville, CA	384301119393001	CH, TE	1998
Leviathan Creek above Aspen Creek near Markleeville, CA	384303119393901	CH, TE	1998
Mountaineer Creek above Leviathan Creek near Markleeville, CA	384407119384101	CH, TE	1998
Leviathan Creek above Mountaineer Creek near Markleeville, CA	384407119384201	CH, TE	1998
Bryant Creek above Barney Riley Creek near Markleeville, CA	384505119384001	CH, TE	1998
Fredricksburg Canyon	384941119485101	TE	1981
Fredricksburg Canyon	384941119485102	TE	1981
Little Currant Creek	385004115212901	CH, TE	1983
Swallow Canyon, below	385030114205901	CH	1983
Swallow Canyon, above	385033114205201	CH	1983
Luther Canyon	385133119483001	CH	1981
Upper Angora Lake Sample Point near Angora Peak, CA	385145120040301	CH, TE	1997-98
Fallen Leaf Lake Site 2 at Fallen Leaf, CA	385256120040501	CH, TE	1998

DISCONTINUED SURFACE WATER-QUALITY STATIONS--Continued

Station name	Station number	Type of data	Period of record (water years)
East Stewart Creek at Trail	385318117213300	CH, TE	1984-87
East Stewart Creek above Weir	385323117213701	CH, TE	1986-92
Jobs Canyon	385327119502301	CH	1981
Monument Creek	385503119504501	TE	1981
Monument Creek	385503119504502	TE	1981
Culvert-Highway 50 Runoff into Upper Truckee-rb, downstream Highway 50, NV	385521119592201	CH, TE	1995
Mott Canyon	385545119505701	TE	1981
Cascade Lake Sample Site near Center	385618120053101	CH, TE	1997
Culvert-Highway 50 runoff at Edgewood Creek-left bank, upstream, Highway 50, NV	385758119561101	CH, TE, SE	1995-97, 2000
Edgewood Creek Tributary above Edgewood Clubhouse near Stateline	385758119564401	CH, TE, SE	1992, 1994
Edgewood Creek	385803119560901	CH, TE	1987
Minden Sewage Effluent Discharge to East Fork Carson River	385814119475101	CH, TE, BI	1980
Round Hill Sewage Effluent Discharge to East Fork Carson River	385815119475401	BI	1980
Burke Creek	385816119560001	CH, TE	1987
Round Hill Sewage Effluent Discharge to Williams Slough	385824119480301	CH, TE	1980
Kahle Creek	385833119565901	CH, TE	1987
Water Canyon	385902114572401	CH, TE	1983
Genoa Creek at Genoa, NV	390002119505401	CH	1957, 1976
Genoa Canyon	390003119505801	TE	1981
Genoa Canyon	390003119505802	TE	1981
Zephyr Creek	390028119565101	CH, TE	1987
90 N13 E18 03cac 1	390100119564701	CH, TE	1987
Sierra Canyon	390101119505701	CH	1981
Willow Creek	390223114514801	CH, TE	1983-84
Incline Sewage Effluent Discharge to Carson River	390426119460401	CH, TE, BI	1980
Lake Tahoe Sample Point near Chambers Lodge, CA	390427120082201	CH, TE	1998
Lake Tahoe Sample Point at Homewood, CA	390444120090901	CH, TE	1997
Incline Sewage Effluent Discharge near Snyder's Ranch	390523119493101	CH, TE	1980
Lake Tahoe Sample Point - Mid Lake	390618120021101	CH, TE	1997-98
Slaughterhouse Creek	390644119563101	CH, TE	1987
Skunk Creek	390744119563201	CH, TE	1987
Bliss Creek	390835119554801	CH, TE	1987
Carson City STP Discharge	390950119435201	CH, TE	1980
Truckee River at Rampart, near Tahoe City, CA	390954120103700	CH, TE	1991-92
Marlette Lake Sample Site near Center	391033119540301	CH, TE	1997
Carson City Sewage Effluent Discharge to Carson R	391036119422401	CH, TE, BI	1980
Truckee River above Bear Creek, near Alpine Meadows, CA	391108120113900	CH, TE	1991-92
Bear Creek at Mouth, near Alpine Meadows, CA	391125120114900	CH, TE	1991-92
Steptoe Creek	391135114414401	CH, TE	1983
Truckee River at Highway 89 Bridge, near Squaw Valley, CA	391146120115000	CH, TE	1991-92
Truckee River above Squaw Creek, near Squaw Valley, CA	391240120115000	CH, TE	1991-92
Truckee River below Squaw Creek near Squaw Valley, CA	391252120120000	CH, TE	1992
Deer Creek 200 feet above Mouth, near Squaw Valley, CA	391319120115500	CH, TE	1991-92
Silver Creek at Highway 89, near Squaw Valley, CA	391326120120900	CH, TE	1991
Truckee River Tributary 4 Miles Upstream Pole Creek near Squaw Valley, CA	391352120121300	CH, TE	1991
Lake Tahoe Sample Point at Kings Beach, CA	391359120012701	CH, TE	1997
Pole Creek at Mouth, near Squaw Valley, CA	391402120122100	CH, TE	1991-92
Campbell Creek, Smith Creek Valley	391426117394601	CH, TE	1982
Peterson Creek, Smith Creek Valley	391430117313801	CH, TE	1982
Cleve Creek	391446114285801	CH, TE	1983
Unnamed Tributary RB Upstream Deep Creek, near Truckee, CA	391513120123400	CH	1991
Deep Creek above Mouth, near Truckee, CA	391529120123300	CH, TE	1991-92
Truckee River above Rocky Wash, near Truckee, CA	391551120123200	CH, TE	1991
Rocky Wash at Mouth, near Truckee, CA	391557120123200	CH	1991
Cabin Creek at Highway 89, near Truckee, CA	391642120122100	CH, TE	1991-92
Upper Illipah Creek	391654115232401	CH, TE	1983
Carson River at Weeks, NV	391735119150200	CH, TE, SE	1973, 1993-94
Truckee River below Donner Creek near Truckee, CA	391859120115600	CH, TE	1992
Truckee River above Trout Creek, near Truckee, CA	391950120100200	CH, TE	1991-1992
Trout Creek at Mouth, near Truckee, CA	391956120095200	CH, TE	1991
Truckee River at Polaris, near Truckee, CA	392018120080300	CH, TE	1991-92
Carson Lake 1 on Pasture Road near Carson Lake, NV	392106118455601	CH, TE	1995
Lower Illipah Creek	392118115201201	CH, TE	1983
Union Valley Creek at Mouth, near Truckee, CA	392133120064000	CH, TE	1991
Juniper Creek at Mouth, near Hirschdale, CA	392152120041700	CH, TE	1991
Truckee River below Juniper Creek, near Hirschdale, CA	392156120041400	CH, TE	1991-92
DR-SG-NE, Fallon Arsenic	392210118463301	CH, TE	1985
Prosser Creek at Mouth, near Truckee, CA	392213120065800	CH	1991
Truckee River below Prosser Creek, near Truckee, CA	392215120065600	CH, TE	1991-92
Gray Creek at Mouth, near Floriston, CA	392224120014600	CH, TE	1991-92
Truckee River above Bronco Creek, near Floriston, CA	392257120011100	CH, TE	1991-92
Bronco Creek at Mouth, near Floriston, CA	392303120011000	CH, TE	1991-92
Truckee River below Little Truckee River, near Truckee, CA	392304120053400	CH, TE	1991-92
Smith Creek, Smith Creek Valley	392310117390401	CH, TE	1982
L-drain at Pasture Road near Depp Lane near Fallon, NV	392310118432601	CH, TE	1995
Unnamed Drain at Berney and Pasture Roads near Fallon	392410118432801	CH, TE	1995
Steamboat Ditch above Thomas Creek near Reno, NV	392537119474701	CH, TE, SE, BI	1993-95
Upper West Side Drain at Solias Road near Fallon, NV	392552118501101	CH, TE	1995
Lower Diagonal Drain No 1 at US 50 near Fallon, NV	392553118394901	CH, TE	1995
Canyon 24 at Mouth, near Floriston, CA	392555120014800	CH, TE	1991

DISCONTINUED SURFACE WATER-QUALITY STATIONS--Continued

Station name	Station number	Type of data	Period of record (water years)
Mystic Canyon Creek at Mouth, near Floriston, CA	392556120013000	CH, TE	1991
Last Chance Ditch at Thomas Creek Road near Reno, NV	392612119471801	CH, TE, SE, BI	1993-95
Lake Ditch at Holcomb Lane near Reno, NV	392637119465601	CH, TE, SE, BI	1993-95
Puny Dip Canyon at Mouth, near Floriston, CA	392639120002600	CH, TE	1991
Sheckler Drain at St. Clair Road near Fallon, NV	392643118501201	CH, TE	1995
New River Drain at US 50 near Fallon, NV	392646118401601	CH, TE	1995
Truckee River above Fleish Power Diversion, near Verdi, NV	392706120001500	CH, TE	1991
Dry Creek Diversion above Huffaker Lane near Reno, NV	392717119470301	CH, TE, SE, BI	1993-95
Dry Creek below Huffaker Lane near Reno, NV	392720119470101	CH, TE, SE, BI	1993-95
Deep Canyon Creek at Mouth, near Verdi, NV	392724120002300	CH	1991
Steamboat Ditch near Farretto Lane near Reno, NV	392729119485901	CH, TE, SE, BI	1993-95
Last Chance Ditch at Davis Lane near Reno, NV	392737119480801	CH, TE, SE, BI	1993-95
Lake Ditch at Del Monte Lane near Reno, NV	392744119480201	CH, TE, SE, BI	1993-95
New River Drain at Harrigan Road near Fallon, NV	392801118454001	CH, TE	1995
Unnamed Drain at Stuart Road near Harmon Reservoir	392831118385801	CH, TE	1995
Harmon Drain at Ditch House Road near Fallon, NV	392856118363801	CH, TE	1995
Harmon Drain at NV 116 near Fallon, NV	392857118400101	CH, TE	1995
14N43E28ACD	392900117030000	CH, TE	1967
Water from Surface of Carson River	392940118460000	CH	1969
Hunter Creek below Steamboat Ditch near Reno, NV	392942119533700	CH, TE	1992
Truckee River Tributary at Chalk Bluff near Reno, NV	393040119521200	CH, TE	1992
Pioneer Ditch above McCarren Boulevard near Sparks, NV	393055119442800	CH, TE	1992
S2 Canal X Fitz & Swope	393121118342701	CH, TE	1978
S5A Drain at Austin Road near Fallon, NV	393134118371401	CH, TE	1995
T-Line Canal	393143118533301	CH, TE	1984
A Drain above TJ-1 Drain near Stillwater, NV	393201118364901	CH, TE	1995
TJ-1 Drain below A Drain near Stillwater, NV	393202118364701	CH, TE	1995
Swope Drain at Freeman Lane near Stillwater, NV	393256118330201	CH, TE	1995
Paiute Diversion Drain near Fallon Indian Reservation	393331118341801	CH, TE	1995
Kalamazoo Creek	393417114314101	CH, TE	1983
101 N20 E27 19CCBA1	393448119001001	CH, TE	1988-89
Truckee River above Derby Dam near Wadsworth, NV	393520119270700	CH, TE	1992
Inflow to White Lake from Peavine Peak Area	393852119581501	CH, TE	1982
179 N23 E62 13b 1 Egan Creek	395152114552601	CH, TE	1983-84
Minden-Gardnerville STP Discharge	395756119464401	CH, TE	1980
Goshute Creek	400054114480001	CH, TE	1983
Snow Creek	400243114580301	CH, TE	1983
Clear Creek at Diversion Dam South of Winnemucca, NV	404355117392101	CH, TE	1979
Creek at Wheeler Ranch	410651119080001	CH, TE	1980
Louise Creek	411308118293501	CH, TE	1990
Big Creek	411559118215201	CH, TE	1990
Bottle Creek	411919118195701	CH, TE	1990

DISCONTINUED SURFACE-WATER-QUALITY CONTINUOUS RECORD STATIONS

The following stations were discontinued as continuous-record surface-water-quality stations in Nevada. Daily records of temperature, specific conductance, pH, or dissolved oxygen were collected and published for the period of record shown for each station. Abbreviations: DO, dissolved oxygen; SC, specific conductance; WT, water temperature.

Station name	Station number	Drainage area (mi^2)	Type of record	Period of record (water years)
Virgin River at Littlefield, AZ	09415000	5,090	WT, SC	1950-60, 1965-88
Virgin River above Halfway Wash near Riverside, NV	09415230	5,980	WT, SC	1978-82
Las Vegas Wasteway near East Las Vegas, NV	09419679	--	WT, SC	1980-87, 1979-87
Pahranagat Valley Wash near Moapa, NV	09415850	252	WT,SC	1988-93
Muddy River near Moapa, NV	09416000		WT, SC	1988-93
Meadow Valley Wash near Rox, NV	09418700	2,384	WT, SC	1988-93
Las Vegas Wash above detention basin near North Las Vegas, NV	09419648	--	WT, SC	1989-93
Las Vegas Wash near Henderson, NV	09419700	2,125	WT, SC	1986-87
Las Vegas Wash at powerline crossing below Henderson, NV	09419755	--	WT, SC	1986-87
Las Vegas Wash near Boulder City, NV	09419800	2,193	WT, SC	1979-86
Colorado River below Hoover Dam, AZ-NV	09421500	171,700	WT, SC	1976-77, 1979-86 1980, 1986-87 1986-87
Steptoe Creek near Ely, NV	10244950	11.1	WT	1967-83
South Twin River near Round Mountain, NV	10249300	20.0	WT	1966-68, 1970-83
Chiatovich Creek near Dyer, NV	10249900	37.3	WT	1975-82
Leviathan Creek above mine near Markleeville, CA	10308783	--	WT, SC	1981-82
Leviathan Mine tunnel spring near Markleeville, CA	10308784	--	WT, SC	1981-82
Leviathan Mine pit flow near Markleeville, CA	10308785	--	WT, SC	1982
Leviathan Mine waste flow near Markleeville, CA	10308786	--	WT, SC	1981
Leviathan Mine seep below crusher near Markleeville, CA	10308787	--	WT, SC	1982
Leviathan Creek below delta near Markleeville, CA	10308788	--	WT, SC	1982
Leviathan Creek below mine near Markleeville, CA	10308790	--	WT, SC	1981-82
Bryant Creek below Mountaineer Creek near Markleeville, CA	10308794	--	WT, SC	1982
Bryant Creek near Gardnerville, NV	10308800	31.5	WT, SC	1982-83
East Fork Carson River near Gardnerville, NV	10309000	356	WT, SC	1955-66 1967-72, 1993-96
Carson River near Fort Churchill, NV	10312000	1,302	WT, SC	1962-70, 1972-82, 1994-97
Carson River near Silver Springs, NV	10312020	1,450	WT, SC	1963-71
Carson River below Lahontan Reservoir near Fallon, NV	10312150	1,801	WT	1981-83
Carson Lake Drain above Carson Lake near Fallon, NV	10312180	--	WT, SC	1994-97
Rice Ditch at Gage near Fallon, NV	10312185	--	WT, SC	1994-97
Stillwater Point Diversion Drain near Stillwater, NV	10312215	--	WT, SC, pH, DO	1988-90
Stillwater Slough at Stillwater, NV	10312218	--	WT, SC	1994-97
Paiute Drain above D-line Canal near Stillwater, NV	10312250	--	WT, SC, pH, DO	1988-90 1988-89
D-line Canal below East Lake near Stillwater, NV	10312267	--	WT, SC, pH, DO	1989
TJ Drain at wildlife entrance near Stillwater, NV	10312274	--	WT, SC, pH, DO	1988-90
Humboldt River near Carlin, NV	10321000	4,310	WT	1966-68, 1981-83
Humboldt River at Palisade, NV	10322500	5,010	WT	1962-65
Reese River near Ione, NV	10325500	53	WT	1962
Humboldt River near Imlay, NV	10333000	15,504	WT, SC	1998-2000
Humboldt River near Rye Patch, NV	10335000	16,100	WT, SC	1952-58, 1960-81 1965-81
Humboldt River near Lovelock, NV	10336000	16,600	WT, SC	1998-2000
Toulon Drain at Derby Field Road near Toulon, NV	10336035	--	WT, SC	1998-2000
Army Drain above Iron Bridge near Lovelock, NV	10336039	--	WT, SC	1999-2000
Grass Lake Creek near Meyers, CA	10336593	6.4	WT	1997-2001
Upper Truckee River at Mouth near Venice Drive, CA	10336612	56.5	WT	1997-2001
Third Creek near Crystal Bay, NV	10336698	6.05	WT, SC	1980-85 1980-84
Incline Creek near Crystal Bay, NV	10336700	6.69	WT	1998-2001
Glenbrook Creek at Glenbrook, NV	10336730	4.11	WT	1998-2001
Trout Creek near Mouth East near Bellevue/ElDorado Avenue, CA	10336795	41	WT	1997-2001
Truckee River at Tahoe City, CA	10337500	507	WT	1993-94
Truckee River near Truckee, CA	10338000	553	WT	1977-82, 1993-94
Donner Creek at Highway 89 near Truckee, CA	10338700	29.1	WT	1993-1994
Martis Creek at Highway 267 near Truckee, CA	10339250	25.8	WT	1975-88
Martis Creek near Truckee, CA	10339400	39.9	WT	1975-2000
Little Truckee River below Diversion Dam near Sierraville, CA	10341950	36.1	WT	1994

DISCONTINUED SURFACE-WATER-QUALITY CONTINUOUS RECORD STATIONS--Continued

Station name	Station number	Drainage area (mi^2)	Type of record	Period of record (water years)
Little Truckee River at Highway 89 near Truckee, CA	10343200	59.0	WT	1994
Bronco Creek at Floriston, CA	10345700	15.4	WT	1993-94
Truckee River at Floriston, CA	10345900	932	WT, SC	1964-71
Truckee River at Farad, CA	10346000	932	WT, SC	1972-81
				1972-80
Dog Creek at Verdi, NV	10347310	--	WT	1993-94
Truckee River near Verdi, NV	10347336	--	WT	1980
Truckee River at Mogul, NV	10347460	1,035	WT	1994
Hunter Creek above Last Chance Ditch near Reno, NV	10347620	11.7	WT	1993-94
North Truckee Drain at Kleppe Lane nr Sparks, NV	10348300	--	WT, SC	1993-98
Steamboat Creek at Clearwater Way near Reno, NV	10349980	244	WT, SC	1993-1997
				1998
Reno-Sparks Sewer Treatment Plant Outfall at Reno, NV	10349995	--	WT, SC	1994-98
Truckee River at Vista, NV	10350000	1,430	WT, SC	1988-94
Truckee River at Lockwood, NV	10350050	1,433	WT	1980-81
Truckee River above Tracy, NV	10350390	1,590	WT	1972-82
Truckee River below Tracy, NV	10350400	1,590	WT	1972-82
Truckee River right bank below Tracy, NV	10350405	1,590	WT	1972-82
Truckee River at Clark, NV	10350500	1,600	WT, SC	1972-77
				1978-98
Truckee River at Derby Dam, NV	10351000	1,676	WT	1980-81, 1988-95
"A" Drain at powerline crossing near Fernley, NV	10351356	--	WT, SC, pH, DO	1988-90
Truckee Canal at U.S. 50 above Lahontan Reservoir, NV	10351590		WT	1980
Truckee River below Derby Dam near Wadsworth, NV	10351600	1,676	WT	1988-95
Truckee River near Nixon, NV	10351700	1,827	WT, SC	1988-98
McDermitt Creek near McDermitt, NV	10352500	225	WT	1975-78
Quinn River near McDermitt, NV	10353500	1,100	WT, SC	1980-83
South Lead Lake-Southwest landing	393652118311201	--	WT, pH, SC, DO	1988-90
				1988-89

INTRODUCTION

Water-resources data published herein for the 2002 water year comprise the following records:

Water discharge for 175 gaging stations on streams, canals, and drains.

Discharge data for 95 partial record stations and miscellaneous sites, and 16 springs.

Stage and contents for 20 ponds, lakes and reservoirs.

Water levels for 128 primary observation wells, and 818 secondary observation wells.

Water-quality data for 120 stream, canal, spring and drain sites and 174 wells.

Precipitation totals for 38 stations.

Water withdrawals for 11 wells.

Additional water data, collected at various sites that are not part of the systematic data-collection program, are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Nevada.

Records of stream discharge and content 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 water year 1960, these water-supply papers were in an annual series; for 1961-70, they were in a 5-year series. Records of water quality 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 through 1974 in a series of water-supply papers entitled “Ground-Water Levels in the United States.” Water-Supply Papers may be consulted at the libraries of principal cities in the United States, or, if not out of print, they may be purchased from the U.S. Geological Survey, Information Services, Federal Center, Box 25286, Denver, CO 80225-0046.

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

Beginning with the 1975 water year, surface-water, ground-water, and water-quality data have been published annually as official Geological Survey reports on a state basis. These 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 volume is identified as “U.S. Geological Survey Water Data Report NV-01-1.” For archiving and general distribution, the reports for water years 1971-74 are identified also as official water-data reports. The water-data reports are for sale, in paper copy or in microfiche, by the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161. For further ordering information, the Customer Inquiries telephone number is (703) 487-4650, between 8:30 am and 5:30 pm EST.

The computer age has led to the dissemination of information quickly and easily through the Internet, the worldwide computer network. Hydrologic information from the USGS is available on the World Wide Web (WWW). Included are water-related activities, information contacts, publications, and various other items that may be of interest to the general public, local State and other Federal agencies, and universities.

The USGS Nevada district has a web page for disseminating such information. The page can be accessed using the WWW address:

http://nevada.usgs.gov/

COOPERATION

The U.S. Geological Survey and organizations of the State of Nevada have had cooperative agreements for the systematic collection of streamflow records since 1909, and for water-quality records since 1951. Organizations that assisted in collecting data or funding through cooperative agreement with the Survey during 2002 are:

NEVADA STATE AGENCIES

Bureau of Mines and Geology
CA Department of Water Resources
Dayton Valley Conservation District
Department of Conservation and Natural Resources
Department of Transportation
Division of Environmental Protection
Division of Water Resources
UNR Agricultural Station

INDIAN TRIBES

Pyramid Lake Paiute Tribe
Duck Valley Reservation Shoshone-Paiute Tribes
Fallon Paiute-Shoshone Tribe
Summit Lake Paiute Tribe
Timbisha Shoshone Tribe
Walker River Paiute Tribe

OTHER FEDERAL AGENCIES

Department of Energy
Bureau of Reclamation
Bureau of Land Management
Bureau of Indian Affairs
Corps of Engineers
Environmental Protection Agency
Fallon Naval Air Station
Federal Emergency Management
Fish & Wildlife Service
Forest Service
National Park Service
Nuclear Regulatory Commission
U.S. Board of Water Commissioners
U.S. District Court Watermaster
U.S. Air Force

REGIONAL AGENCIES, CITIES, COUNTIES

Tahoe Regional Planning Agency
Inyo County (CA)
Carson City
Carson Water Subconservancy District
Carson-Truckee Water Conservancy District
Clark County Flood Control Authority
Clark County Sanitation District
City of Henderson
Churchill County
Desert Research Institute
El Dorado County (CA)
Elko County
Las Vegas Valley Water District
Lahontan Water-Quality Control Board
Pershing County Water Conservation District
Southern Nevada Water Authority
Storey County
Truckee Carson Irrigation District
Truckee Meadows Water Authority
Truckee Meadows Water Reclamation Facility
Walker River Irrigation District
Washoe County

Organizations that supplied data are acknowledged in station descriptions.

SUMMARY OF HYDROLOGIC CONDITIONS

Compiled by Robert E. Bostic, E. James Crompton, Kerry T. Garcia,
and Sonya L. Vasquez

Surface Water

Nevada has no truly large rivers. The largest streams in the State are the Humboldt, Truckee, Carson, Walker, Muddy, Virgin, and Colorado Rivers. The Colorado River, which is by far the largest, forms the boundary between southeastern Nevada and northwestern Arizona. Of the remaining listed rivers, only the Humboldt and Muddy begin and terminate in Nevada.

The larger rivers typically follow the flow pattern of a gaining stream in the well-watered mountain reaches and a losing stream in the lower-altitude reaches. Most of Nevada is typified by basin-and-range topography, and most Nevada rivers have no direct connection with the ocean. Downstream depletion of flow is caused by irrigation, public use, infiltration, and evapotranspiration. Characteristically, stream discharge is low in late summer, and then increases through the autumn and winter until the snowmelt season in the spring. Maximum discharge for the year normally can be expected in May and June, although floods have occurred from November through March as a result of rain or rain on snow.

Much of Nevada is drained by small streams that are dry most of the year. Typically, such streams respond only to intense precipitation, which generally occurs only a few times a year at the most. In many years, the streams have no flow, and even in relatively wet years, total flow duration in such streams can be measured in hours.

Streams and rivers in Nevada drainages for water year 2002, were generally below normal runoff and ranged from around 5 percent to about 75 percent depending on the particular area, elevation of the drainage and water usage in the system. Runoff this year on streams with little or no control was more typical of seasonal runoff, with the peaks generally occurring in mid April and early June.

The Humboldt River begins in northeastern Nevada and terminates in northwestern Nevada. For water year 2002, the discharge at Palisade (station 10322500) was 48 percent of the 95-year mean. Monthly and annual mean discharges for water year 2002 and for the period of record (water years 1903-06, 1912-2002) at the Palisade station are shown in figure 1. Rye Patch Reservoir (station 10334500), the last impoundment on the Humboldt River, at its highest level was 16 percent of full capacity in April, to a low of 5 percent the middle of September.

The Truckee River is a major western Nevada stream for which discharge is largely controlled by reservoirs and regulated lakes in the Sierra Nevada of California and Nevada. The Truckee River begins at Lake Tahoe (station 10337000) which is regulated above its natural rim (6,223 feet above NGVD of 1929). Lake Tahoe during water year 2002 remained above its rim, with the water surface ranging between 6,225.11 mid June to 6,223.52 feet above NGVD of 1929, September 30. The 2002 discharge at Reno (station 10348000) was 63 percent of the 75-year mean (water years 1907-21, 1926, 1931-34, 1947-2002). The river terminates in Pyramid Lake (station 10336500), a closed-basin water body which is a saline remnant of Pleistocene Lake Lahontan. Water-surface elevations, in figure 2, illustrate a decline from 1975 through 1981, an increase during 1982-84, which raised the lake level by 25 feet, a steady decline from 1986 through 1994 with slight increases from 1995-1999. Since 1999 the lake has continued to decline. The lake-surface elevation declined 2.6 feet from 3,814.0 in October 2001 to 3,811.4 feet above NGVD of 1929 the end of September 2002.

The Carson River is formed in Carson Valley by the confluence of the East Fork and West Fork Carson Rivers, with headwaters in the Sierra Nevada of California. The 2002 discharge at Carson City (station 10311000) was 54 percent of the 63-year mean. Monthly and annual mean discharges for water year 2002 and for the period of record (water years 1940-2002) at the Carson City station are shown in figure 1. Lahontan Reservoir (station 10312100), the major impoundment on the Carson River, at its highest level was 76 percent of full capacity mid June, and a low of 21 percent November 1.

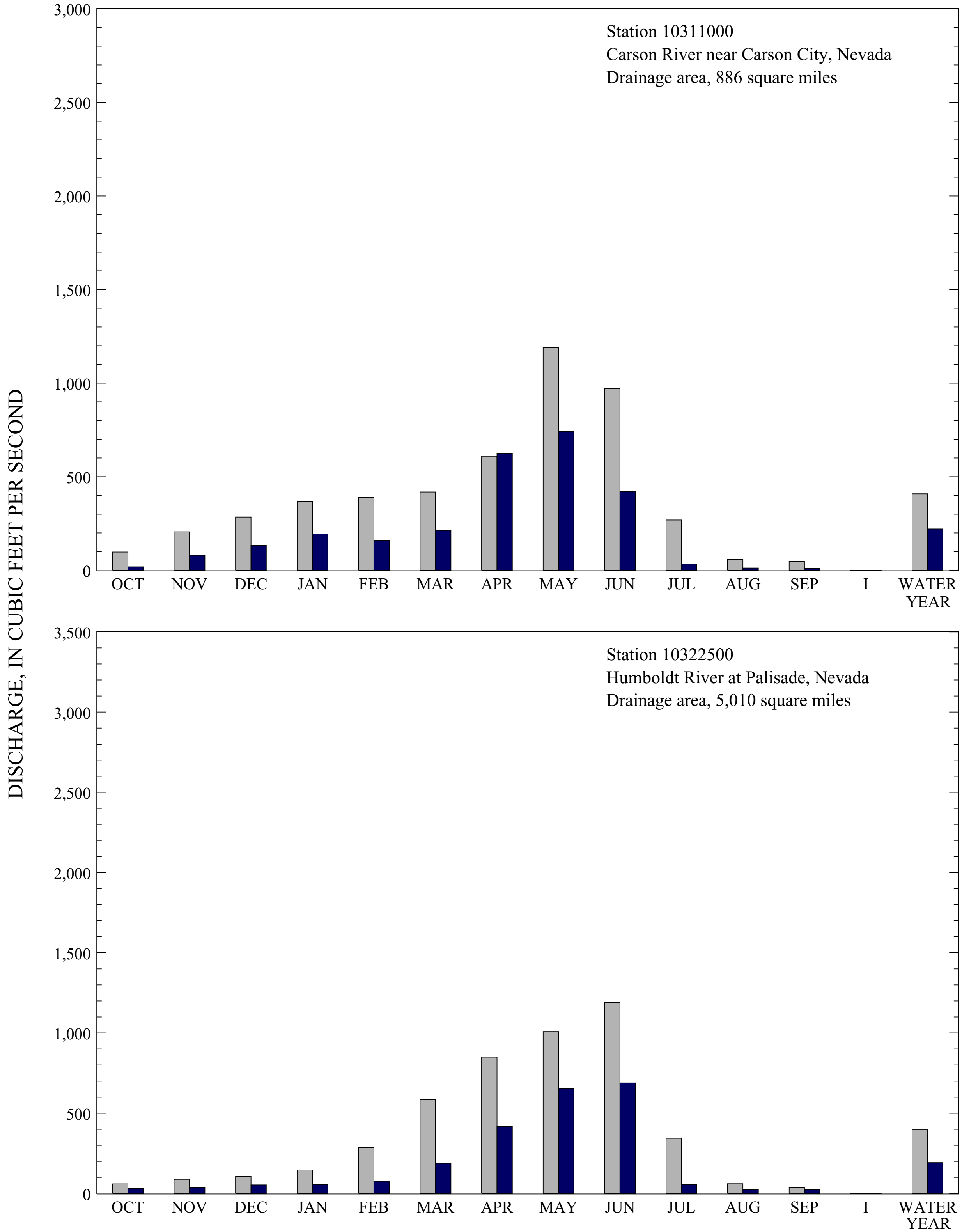
The Walker River is formed in Mason Valley by the confluence of the East and West Walker Rivers; both rivers originate in the Sierra Nevada of California. The East Walker River discharge is controlled by Bridgeport Reservoir and the West Walker River by Topaz Lake. The 2002 discharge of the Walker River at Wabuska (station 10301500) was 5 percent of the 77-year mean (water years 1904, 1921-35, 1940-41, 1943, 1945-2002). The river terminates in Walker Lake (station 10288500) north of Hawthorne, which is also a saline remnant of ancient Lake Lahontan similar to Pyramid Lake. Water-surface elevations for the lake are shown in figure 2 and illustrate a steady decline from 1969 through 1981 like that of Pyramid Lake. In contrast, the high discharges in the Walker River from 1982 through 1984 raised the lake level by about 14 feet. Lake levels have steadily declined since 1986 until May 1995, and increased slightly through 1999. Since 1999 the lake has continued to decline. The lake-surface elevation decreased 4.4 feet during the 2002 water year, from 3,947.5 in October to 3,943.1 feet above NGVD of 1929 the end of September.

The Colorado River in southeastern Nevada is completely controlled by a series of impoundments that includes Hoover Dam (station 09421000) and Davis Dam (station 09422500) in Nevada. Since 1935, the mean annual discharge of the river below Hoover Dam (station 09421500) is 13,970 cubic feet per second. Mean annual discharge fluctuates on the basis of upstream supply and downstream hydroelectric-power and irrigation requirements. The 2002 mean annual discharge of the Colorado River below Hoover Dam was 104 percent of the 68-year mean (water years 1935-2002).

The Virgin River is one of the major tributaries to Lake Mead on the Colorado River and has most of its drainage area in Utah and Arizona. The discharge at Littlefield, Arizona (station 09415000), was 43 percent of the 73-year mean (water years 1930-2002).

The Muddy River is another tributary to Lake Mead. The discharge at Glendale (station 09419000) was 74 percent of the 51-year mean (water years 1951-1983, 1985-2002).

Lake Mead, since it’s most recent high elevation in December 1997 of 1214.64 feet, has now dropped 59.22 feet at the end of September, to an elevation of 1155.42 feet.



MONTHLY AND YEARLY MEAN DISCHARGES: PERIOD OF RECORD, 1940-2002 FOR CARSON RIVER, AND 1903-06, 1912-2002 FOR HUMBOLDT RIVER

MONTHLY AND YEARLY MEAN DISCHARGES FOR WATER YEAR 2002

Figure 1. Comparison of discharge during water year 2002 with the long-term mean discharge at two representative gaging stations.

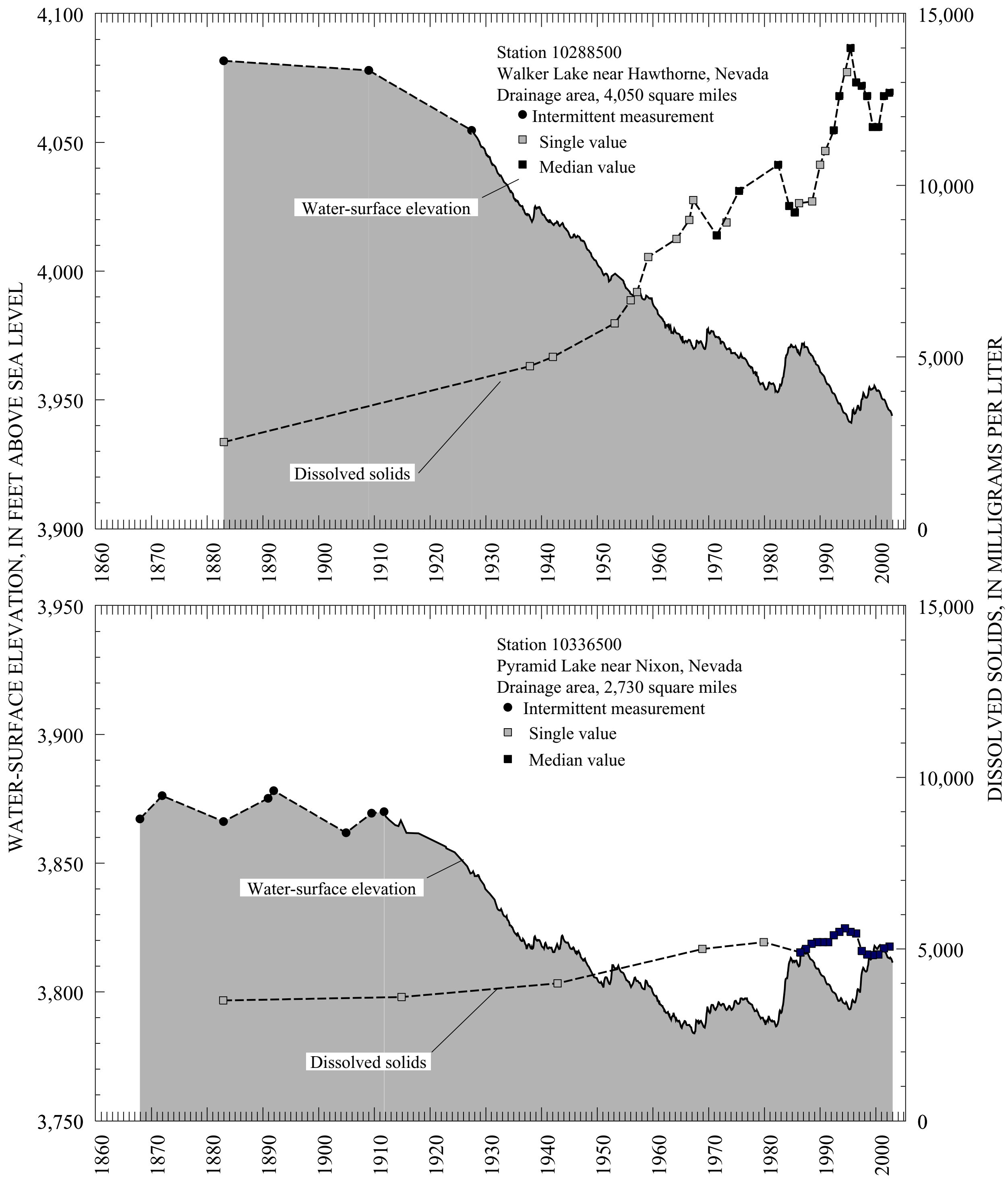


Figure 2. Water-surface elevation and dissolved-solids concentration at Walker and Pyramid Lakes (data from Desert Research Institute, Nevada Division of Wildlife, Pyramid Lake Fisheries, and U.S. Geological Survey).

Water Quality

The quality of surface water in Nevada varies greatly from place to place, as well as seasonally. Concentrations of dissolved solids generally are higher in the southern part of the state than in the northern part, and are dependent to a large extent upon water discharge. Concentrations usually are greatest during periods of low streamflow, and lowest during periods of high streamflow due to dilution by precipitation or snowmelt.

At two southern Nevada stations, Virgin River at Littlefield (station 09415000) and Colorado River below Hoover Dam (station 09421500), mean dissolved-solids concentrations for period of record were 1,990 mg/L and 692 mg/L, respectively. Mean dissolved-solids concentrations in the 2002 water year were 2,430 mg/L and 600 mg/L, respectively. Mean dissolved-solids concentrations in the 2002 water year were 122 and 87 percent, respectively, of the means for the period of record. For the Virgin River at Littlefield station, the mean discharge for the 2002 water year was 103 ft^3/s and 239 ft^3/s for the period of record. For the Colorado River below Hoover Dam station, the mean discharge for the 2002 water year was 14,510 ft^3/s and 13,970 ft^3/s for the period of record. Figure 3 shows the dissolved-solids concentrations measured at the Colorado River station since the 1971 water year. The downward trend in concentration during 1983-85 and again in 1997-2000 probably was the result of dilution by consecutive years of greater than average inflow to Lake Mead. During 1988-96 and 2001-2002, in contrast, the concentration increased, presumably because the amount of runoff from the upper basin was less than the long-term mean.

The quality of ground water in Nevada also varies greatly because of the various soil and rock types found in the state. Concentrations of dissolved solids generally are higher in the southern part of the state (latitude less than or equal to 38°00'00") than in the northern part (latitude greater than 38°00'00"), similarly to what occurs in surface water. Concentrations in the southern part of the state ranged from 5 to 102,000 mg/L with an average of 1,740 mg/L. Concentrations in the northern part of the state ranged from 10 to 94,700 mg/L with an average of 1,400 mg/L.

Ground water samples were collected from 229 wells in water year 2002. The constituents analyzed were nutrients, common ions, trace constituents, and organic substances. EPA's drinking water standards for nitrate (10 mg/L), fluoride (4.0 mg/L), and arsenic (0.01 mg/L in 2002 water year) were exceeded in 7 wells, 1 well, and 28 wells, respectively.

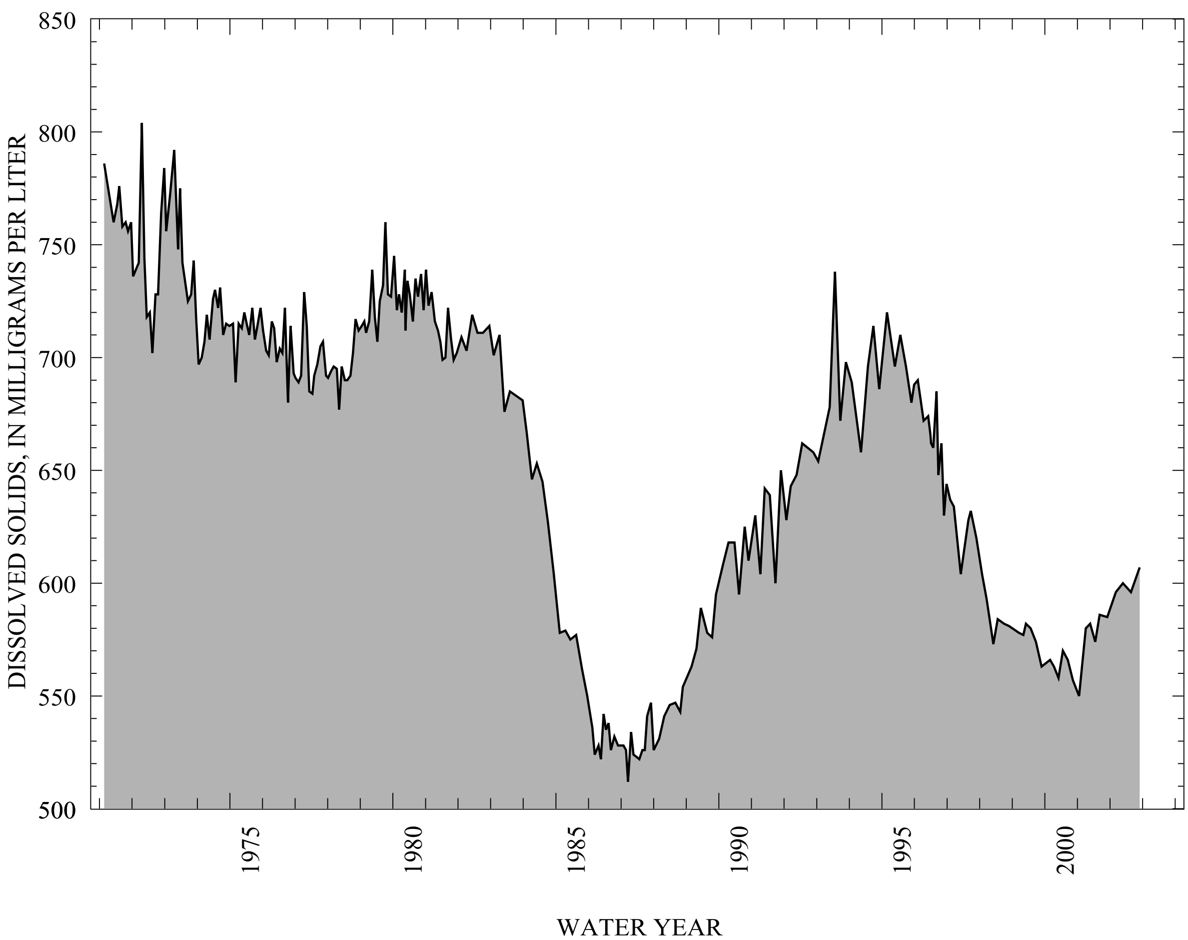


Figure 3. Dissolved-solids concentrations in the Colorado River below Hoover Dam (station 09421500) for water years 1971-2002.

Ground Water

Development of ground-water supplies in Nevada continued during water year 2002 with 1,950 Well Driller's Reports (well logs) submitted to the State Engineer's office. During 2002, 1,301 new wells were drilled and 696 existing wells were reworked or abandoned. The number of new wells drilled during water years 1971-2002 are shown on figure 4. New wells are grouped into 4 categories of proposed water use; domestic, irrigation, public supply and industrial, and other (which includes all other proposed uses). Half of the new wells were drilled for domestic use (figure 5). Most of the new wells represented in the other category were wells used for monitoring. The other category also includes wells drilled for artificial recharge, dewatering, livestock, and mining (figure 5).

Well drilling was concentrated in the northwestern and southern parts of the State. Drilling in northeastern and north-central Nevada was mainly for domestic use near the communities of Elko and Winnemucca and mainly mining and monitoring use in areas between Elko and Winnemucca. Drilling in northwestern Nevada was concentrated in and around the Reno-Lake Tahoe areas; particularly near the communities of Minden-Gardnerville, Fallon, and Reno. Drilling in southern Nevada was concentrated in and around the Las Vegas area and near the community of Pahrump. While monitor drilling was predominant in Las Vegas, domestic drilling was predominant in the outlying communities.

Nevada is almost entirely within the Great Basin Region of the Basin and Range physiographic province. The region is characterized by mountain ranges with a general north-south orientation separated by basins (valleys) that are filled by accumulations of unconsolidated to partly consolidated sedimentary deposits and underlain by consolidated rocks that also form the surrounding ranges (Stewart, 1980). Most wells have been drilled into unconsolidated basin-fill deposits. Some consolidated rocks yield substantial quantities of water, particularly in parts of eastern and southern Nevada where ground water flows through thick accumulations of limestone and dolomite. Locally, some fractured volcanic rocks also yield substantial quantities of water. Water wells, however, are not commonly drilled into consolidated rocks, because the well yields are less predictable and most present-day development is in basins where water is readily obtained from shallow depths in unconsolidated deposits.

The depths of the wells drilled in 2002 are shown in figure 6. Domestic wells were most commonly drilled to depths between 125 and 250 feet below land surface. Wells drilled for irrigation use were most commonly drilled to depths between 125 and 750 feet. Public supply and industrial wells were most commonly drilled to depths between 375 to 500 feet and 1,000 to 1,125 ft. Wells in the other category, primarily test holes, were most commonly drilled to depths between 0 and 125 feet.

Ground-water levels fluctuate seasonally and annually in response to changes in withdrawals and climatic conditions. These fluctuations can cause changes in natural recharge to and discharge from the ground-water reservoirs. Water levels generally rise from late winter to early summer, in response to (1) runoff from melting snow in the surrounding mountain ranges, particularly in the northern part of the State and (2) application of surface water for irrigation. Water levels generally decline from summer to early winter, when recharge is small and ground water is discharged by evapotranspiration, irrigation, and domestic use. Long-term climatic changes also can affect water-level trends, but the effects occur over a period of years. Superimposed on the natural fluctuations in water levels are changes caused by increasing or decreasing ground-water withdrawals.

Water-level trends for six selected observation wells are shown in figure 7. The well in Paradise Valley is close to a stream used for irrigation. The well in Eagle Valley taps aquifers used for public supply. The well in Pahrump Valley is in a basin undergoing transition from irrigation to domestic use. The well in Diamond Valley is in an area of intensive irrigation. The well in Steptoe Valley is in a relatively undeveloped basin. The well in Las Vegas Valley taps aquifers used for public supply.

The well in Paradise Valley is in the northwestern part of the basin. Water levels may fluctuate primarily in response to variations in nearby surface-water streamflow. The well probably does not reflect responses to ground-water withdrawals for agricultural irrigation in the central to southern parts of the basin.

The well in Eagle Valley is in the northern part of the basin north of Carson City. Water levels in the new Eagle Valley well may reflect responses to ground-water withdrawals for municipal use.

The well in Pahrump Valley is in the west-central part of the basin. Ground-water use has changed from historically agricultural to residential because Pahrump has become a bedroom community for Las Vegas. Water levels may reflect this transition.

The well in Diamond Valley is in the southern part of the basin in a farming area. Water levels may reflect responses to ground-water withdrawals for agricultural irrigation.

The well in Steptoe Valley is in the central part of the basin. Water levels may respond primarily to fluctuations in climatic conditions.

The well in Las Vegas Valley is in the northwestern part of the basin northwest of Las Vegas. Las Vegas has undergone a tremendous population increase and surface-water imports from Lake Mead have exceeded ground-water withdrawals since 1975. Water levels may reflect responses to ground-water withdrawals for municipal and commercial use.

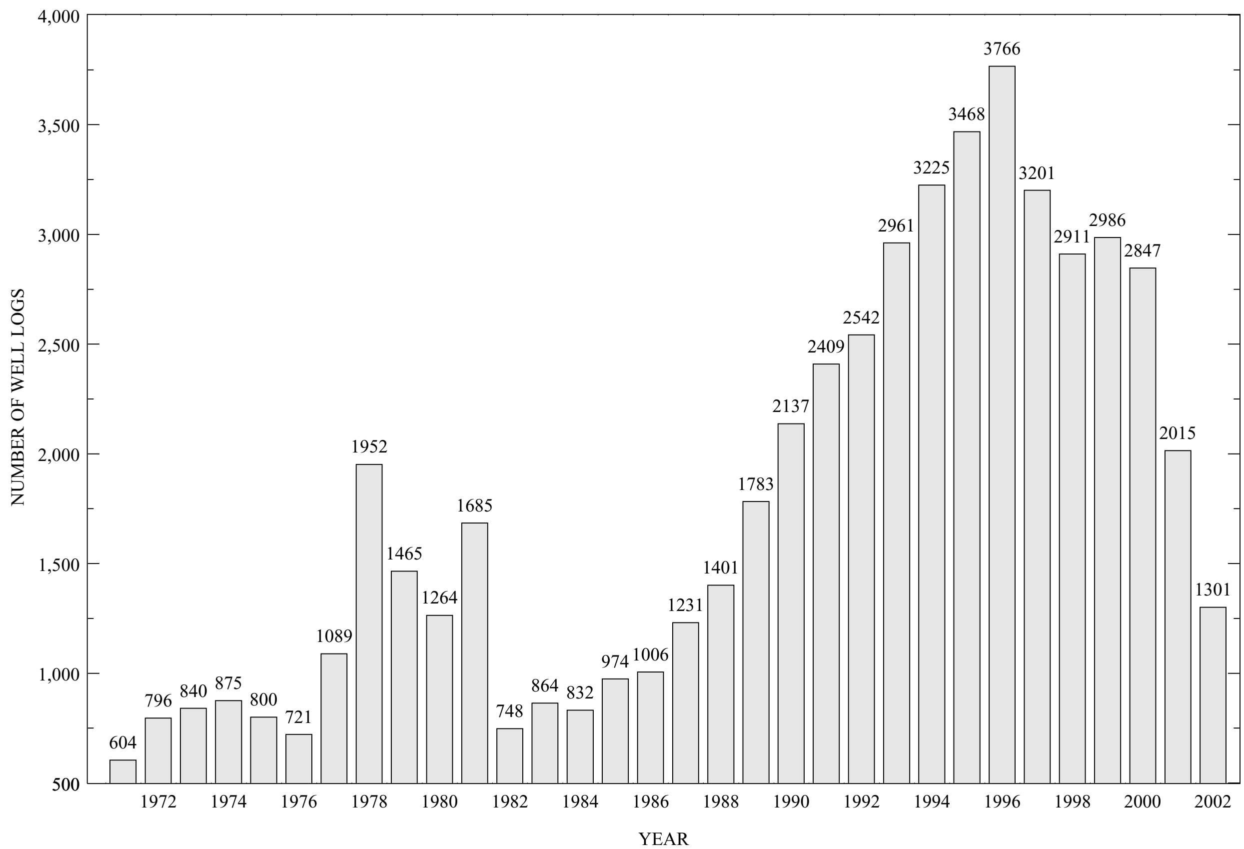


Figure 4. Number of new wells drilled based on number submitted to the Nevada State Engineer's Office during water years 1971-2002.

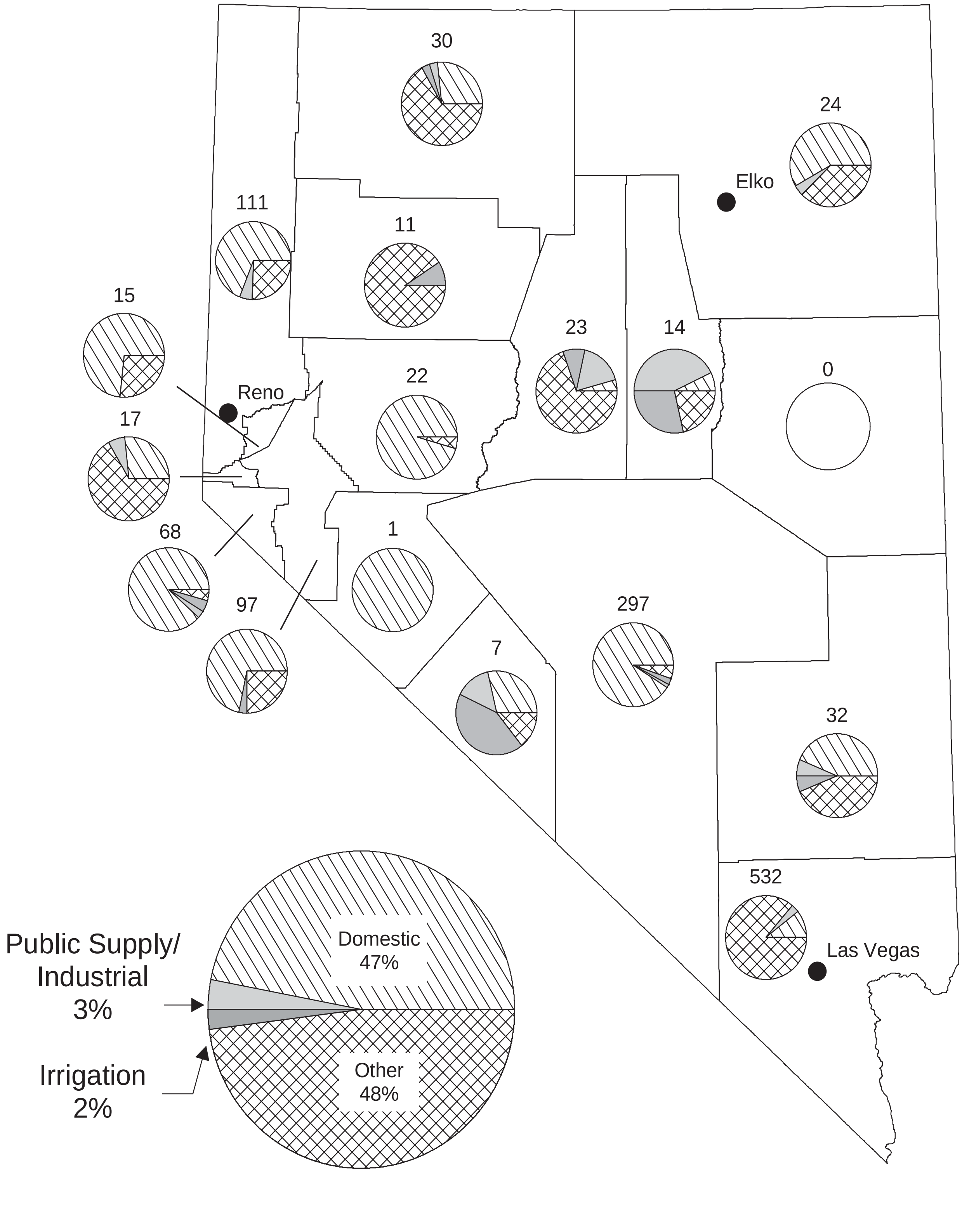


Figure 5. Distribution, by county, of the number of wells drilled during the water year 2002, on the basis of 1,301 logs submitted to the Nevada State Engineer's office. The category "other" includes mostly exploration wells. Above each county symbol is the number of logs submitted during 2002.

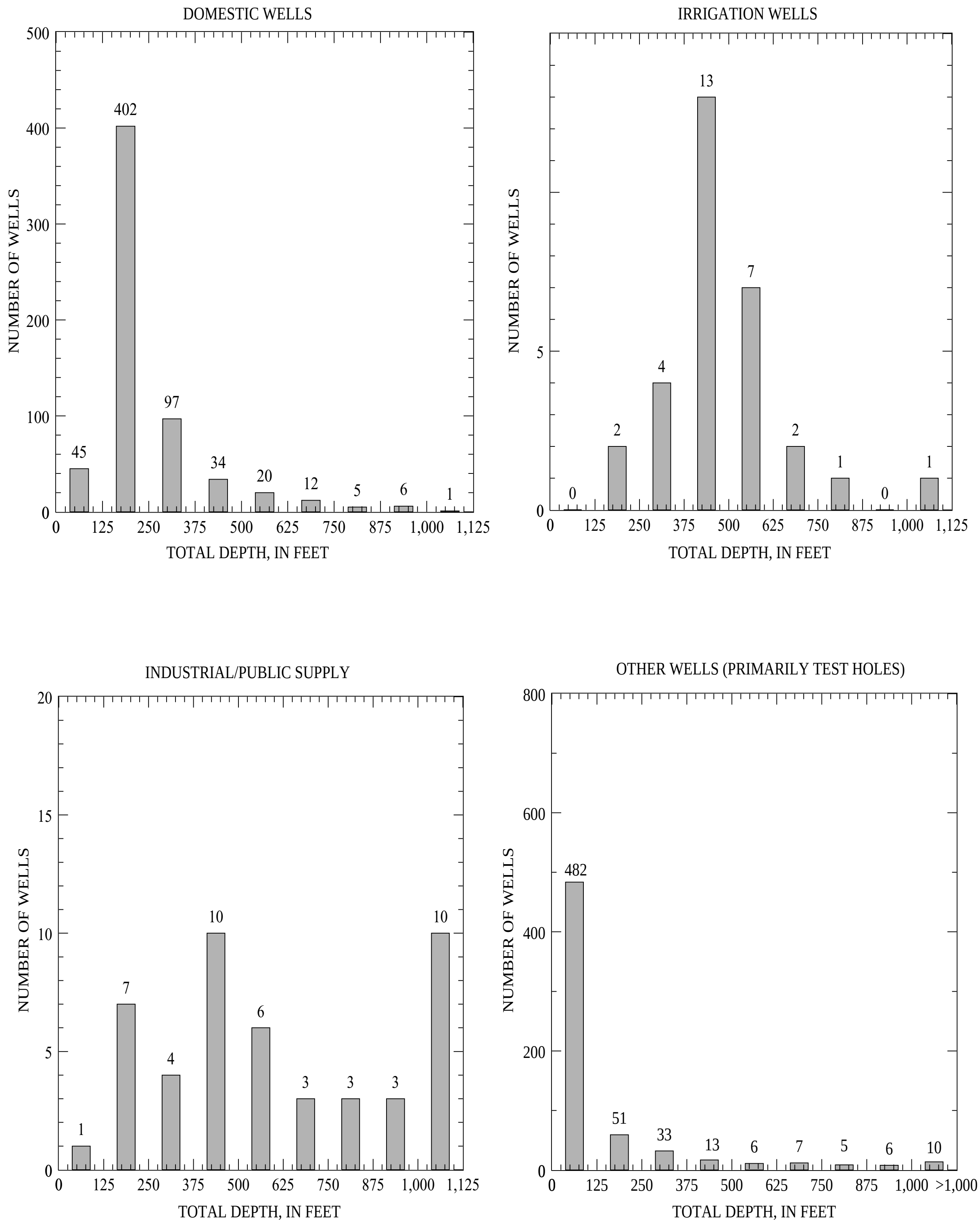


Figure 6. Depths of wells drilled during the 2002 water year for domestic, irrigation, public-supply and industrial, and other uses. The category 'other' does not include test holes drilled for geothermal exploration.

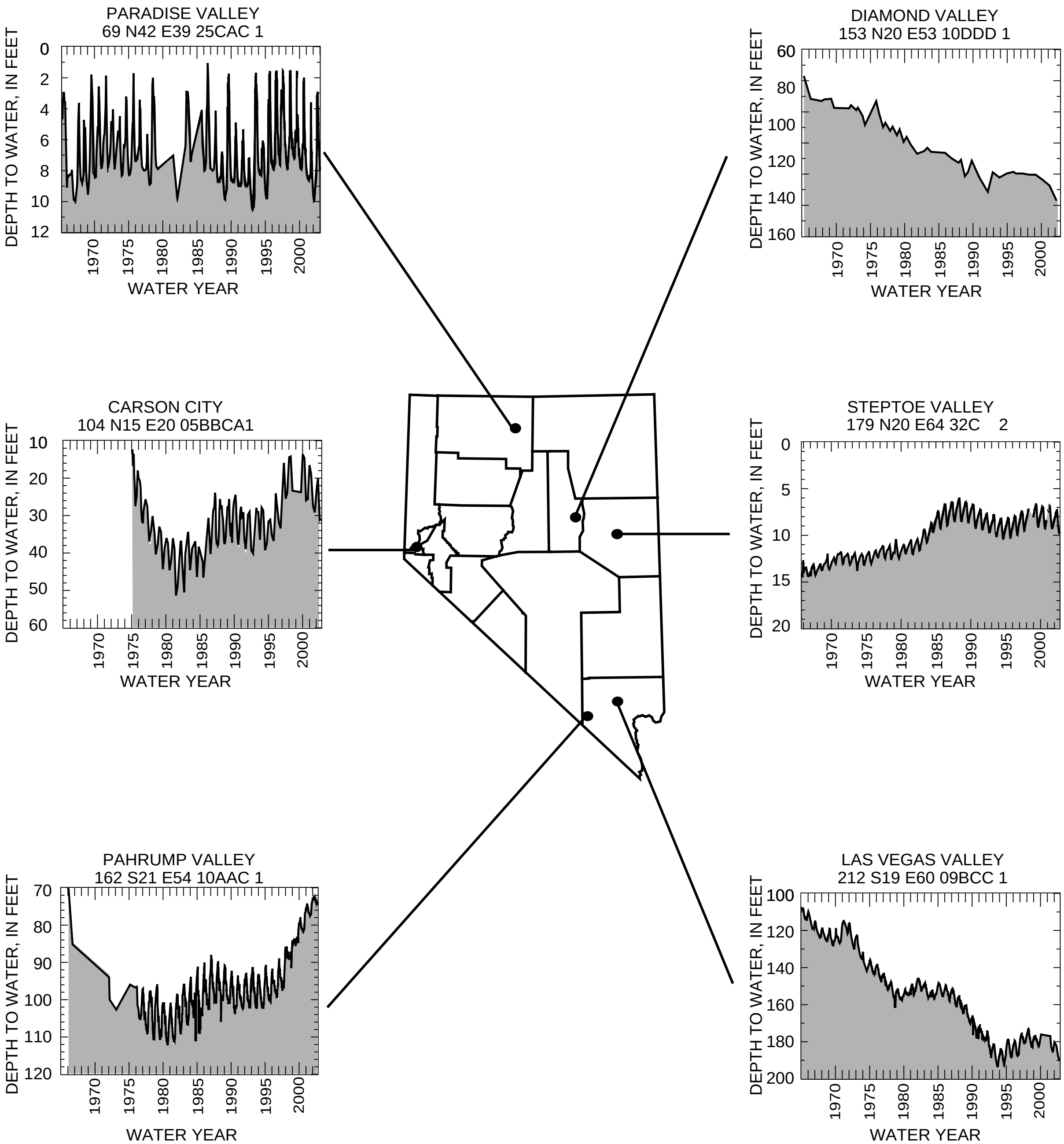


Figure 7. Long-term water-level depths below land surface in six selected observation wells.

Water Use

Since 1986, Nevada has been the nation’s fastest growing state (U.S. Bureau of the Census, 2002b). From April 1, 2000 to July 1, 2002, Nevada’s population has increased by 8.8 percent (U.S. Bureau of the Census, 2002a) and was estimated to be about 2,173,000 people (U.S. Bureau of Census, 2002a). In second place was Arizona with a 6.4 percent increase in population during this same period, and the United States population increased by 2.5 percent (U.S. Bureau of the Census, 2002a). The fastest growing U.S. city, in 1999, with a population greater than 10,000 people was Mesquite, Nevada, which grew by nearly 488 percent, from 1,873 people in 1990 to 11,012 people in 1999 (U.S. Bureau of the Census, 2000a).The fastest growing U.S. cities, in 1999, with populations over 100,000 were Henderson in first place, which grew by 155 percent between 1990 and 1999 to 166,399 people; and North Las Vegas in second place, which grew by 112 percent during the same 9 years to 101,841 people (U.S. Bureau of the Census, 2000b). The fastest growing metropolitan area in 1999, by rate of growth, was the Las Vegas area (Clark County, Nevada and Mohave County, Arizona), which grew by 62 percent between 1990 and 1999 to 1,381,086 people (U.S. Bureau of the Census, 2000c).

Statewide, Nevada’s annual precipitation averages about 9 inches--the lowest of any State in the Nation. Spatially, average precipitation ranges from 4 inches in some low-altitude valleys to about 16 inches in higher altitude areas; locally in the higher mountains, precipitation exceeds 30 inches.

Water year 2002 (October 1, 2001-September 30, 2002) was a below normal year for precipitation for Nevada. This was the third year in a row that snow pack conditions were below normal in western Nevada (National Weather Service, 2003a), and 2002 was the sixth driest year in Las Vegas, since record keeping began in 1932 (National Weather Service, 2003b). Precipitation at six selected sites in Nevada during water year 2002, as reported by the National Weather Service, ranged from 28 percent to 95 percent of the median value. The following table summarizes the data.

Precipitation

Weather station	Water year 2001 (inches)	Median water years 1962-92	Departure from median (inches)	Percentage of median
Elko	8.90	9.43	-0.53	94
Ely	4.69	9.83	-5.14	48
Las Vegas	1.13	4.07	-2.94	28
Reno	6.50	6.84	-0.34	95
Tonopah	1.70	5.62	-3.92	30
Winnemucca	6.26	8.15	-1.89	77

Irrigation is the largest use of water in Nevada. In a normal year, surface water is the source for about 60 percent of Nevada's water withdrawals. Some surface water right holders also have supplemental ground water rights, which can be used when surface water is not available for their use. In 2002, streamflows were below or near normal, in the major irrigation areas that rely on surface water.

Public supply is the second largest use of water in Nevada. The primary source of public-supply water for Las Vegas and Reno is surface water; for Carson City, it is ground water. The rate of increase in public-supply withdrawals nearly parallels the rapid growth in the State's population. In 1998, over 85 percent of Nevadans lived in urban areas (2,500 people or more). The three largest population centers in the State are the Las Vegas, Reno, and Carson City areas. In 2002, over 80 percent of the State's population lived in these three areas (Nevada State Demographer, 2002). The amount of water withdrawn by the principal public-supply utilities servicing each of these areas for the period from October 1992 (water year 1993) to September 2002 (water year 2002) is shown in figure 8. In 2000, these three areas accounted for about 80 percent of all the water withdrawn by public-supply utilities in the State. The small peak for the January billing period, seen on the plots for Reno and Carson City for some years, indicates, in part, increased water use by tourists during the Christmas and New Year's holidays. The lower spring and summer water use seen in the Reno and Carson City areas during the early 1990’s was due in large part to regional drought conditions and the heightened awareness and enforcement of water conservation.

In the Las Vegas area (which encompasses the cities of Las Vegas, North Las Vegas, Henderson and Nellis Air Force Base), the Colorado River is the principal source of public-supply water. The Las Vegas area is dependent on the Colorado River to meet its public-supply water needs. During 2002, Nevada used its entire 300,000 acre-feet allotment from the Colorado River, years before water officials expected that to happen (Reno Gazette-Journal, 2003). In 1974, surface- and ground-water withdrawals were about equal; in 2002, surface-water was the source for nearly 88 percent of the area's public-supply withdrawals (Southern Nevada Water Authority, 2003a). About 65 percent of the water used in Las Vegas is for residential use, and about 7 percent is used by hotels and motels (Southern Nevada Water Authority, 2003b). Of the total residential use, about 75 percent is used outdoor landscaping (Southern Nevada Water Authority, 2003b). Among the water-conservation measures taken in the Las Vegas area: No outside watering is permitted from Noon to 7 p.m., limits on the amount of turf, rebates for reducing the amount of turf (Las Vegas Valley Water District, 2003). Clark County now requires all new golf courses and nearby landscape areas to utilize reclaimed wastewater. Also some communities in the area prohibit man-made lakes, have placed restrictions on the size of outside decorative water displays at resort hotels, and have placed restrictions on the percentage of turf that can be used at commercial, industrial, and multifamily developments. In 2000, Las Vegas Valley Water District estimated that conservation measures saved 16.5 percent—29.5 billion gallons (Southern Nevada Water Authority, 2003b).

Two water purveyors in the Las Vegas area are doing artificial recharge. From 1987 through 2002, about 260,000 acre feet of treated Colorado River water has been injected into the Las Vegas Valley groundwater basin (Coache, 2003). Artificial recharge is being done for several reasons, two of these are: to help meet summer peak demands and to stabilize declining ground-water levels. About 4,000 acre-feet of the injected water has been recovered to meet water demands (Southern Nevada Water Authority, 2001).

In the Reno area (which encompasses the cities of Reno and Sparks), the Truckee River supplied about 82 percent of the community’s public-supply water in 2002. During years of high or surplus flows in Truckee River, the principal water purveyor follows a conjunctive use agreement to reduce its groundwater withdrawals, thus allowing groundwater storage to increase. Conservation measures enforced in the Reno area limit outside watering to twice a week; washing down hard surfaces is prohibited; and decorative water displays are turned off.

In 2002, ground water was the source for about 70 percent of Carson City's public-supply water, about 13 percent of the City’s water was from the Carson River and the remaining 17 percent was from other surface water sources. The amount of water that Carson City gets from surface water sources is increasing. City ordinance limits outside watering to every other day from June through September, with no watering between 10 a.m. and 7 p.m. This is done to reduce peak demand and not to limit water use. Wasting water and washing driveways is also prohibited.

The Nevada Test Site (NTS) is 60 miles northwest of Las Vegas. From 1950 until the ban on nuclear weapons testing in 1992, the NTS was the primary continental site for the testing of nuclear weapons. Ground water is the source of all water used at the NTS. With the ceasing of weapons testing and the related decline in personnel, water withdrawals have declined nearly 80 percent since 1989 (figure 9). Monthly pumpage for water year 2002 from the 14 production wells on the NTS is shown in figure 10.

Highlights of Nevada water news were on April 9, 2002, when the Nevada State Engineer did not extend temporary permits that allowed the Yucca Mountain Project to withdraw 140,000,000 gallons per year from 5 wells (Las Vegas Review-Journal, 2002a). President Bush has selected Yucca Mountain as the nation’s high-level nuclear waste repository (U.S. Department of Energy, 2003). On June 11, 2002, the U.S. District Court denied a Department of Justice request for an injunction aimed at forcing the State of Nevada to extend the temporary permits (Las Vegas Review-Journal, 2002 b).

All potable water was shut off to Carson High School from April 23 through April 29, when traces of antifreeze and other chemicals were discovered in the drinking supply due to a valve failure (Nevada Appeal, 2003).

Elko’s summer water conservation program limits outdoor watering to 3 days a week based on address number, this is the third year that Elko has used a mandatory watering plan (Elko Daily Free Press, 2002). Elko has a population of 16,690 people and its water needs are supplied by 18 wells.

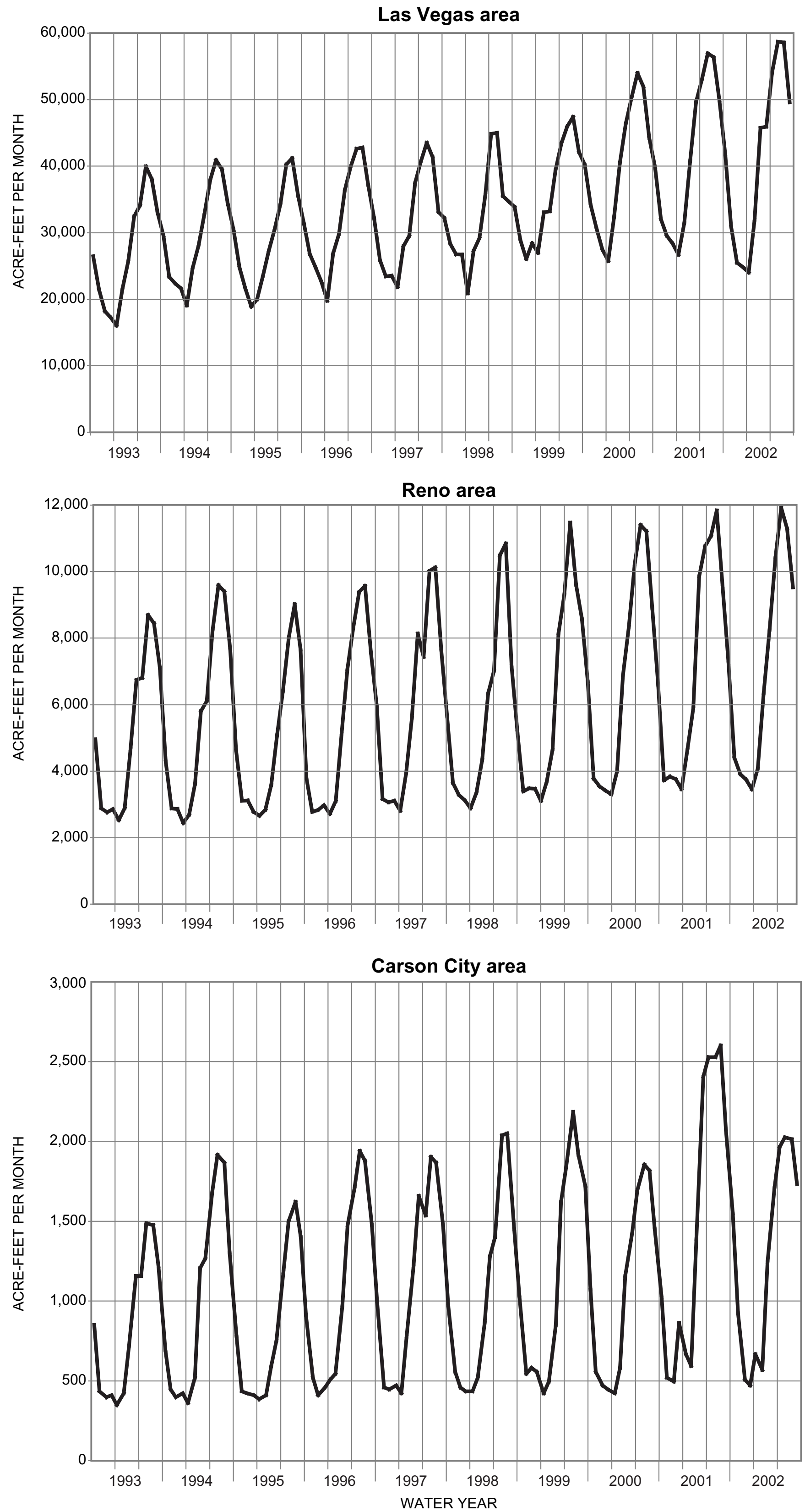


Figure 8. Monthly water withdrawals for public supply in the Las Vegas, Reno, and Carson City areas, water years 1993-2002. Source of data: Nevada Division of Water Resources.

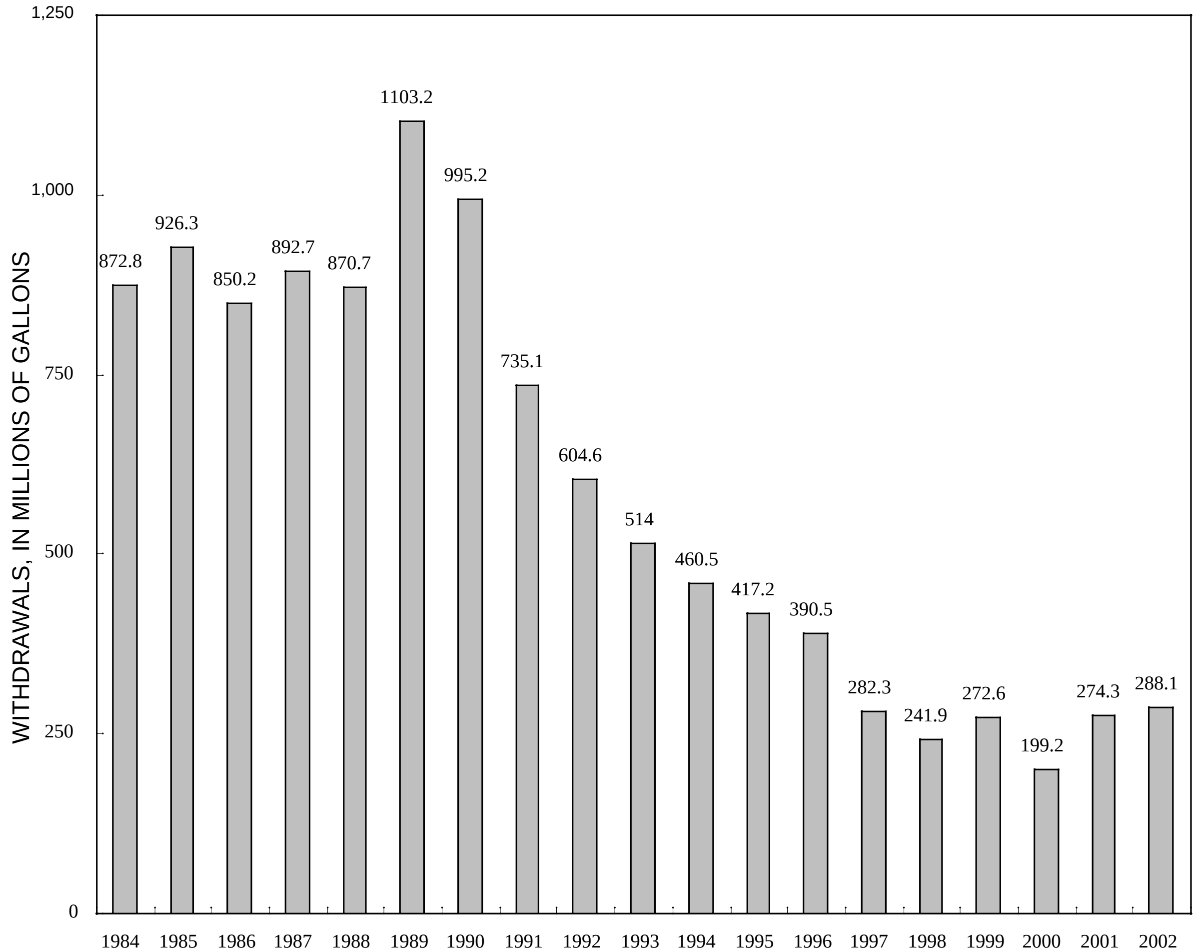


Figure 9. Total ground-water withdrawals from wells at the Nevada Test Site during water years 1984-2002.

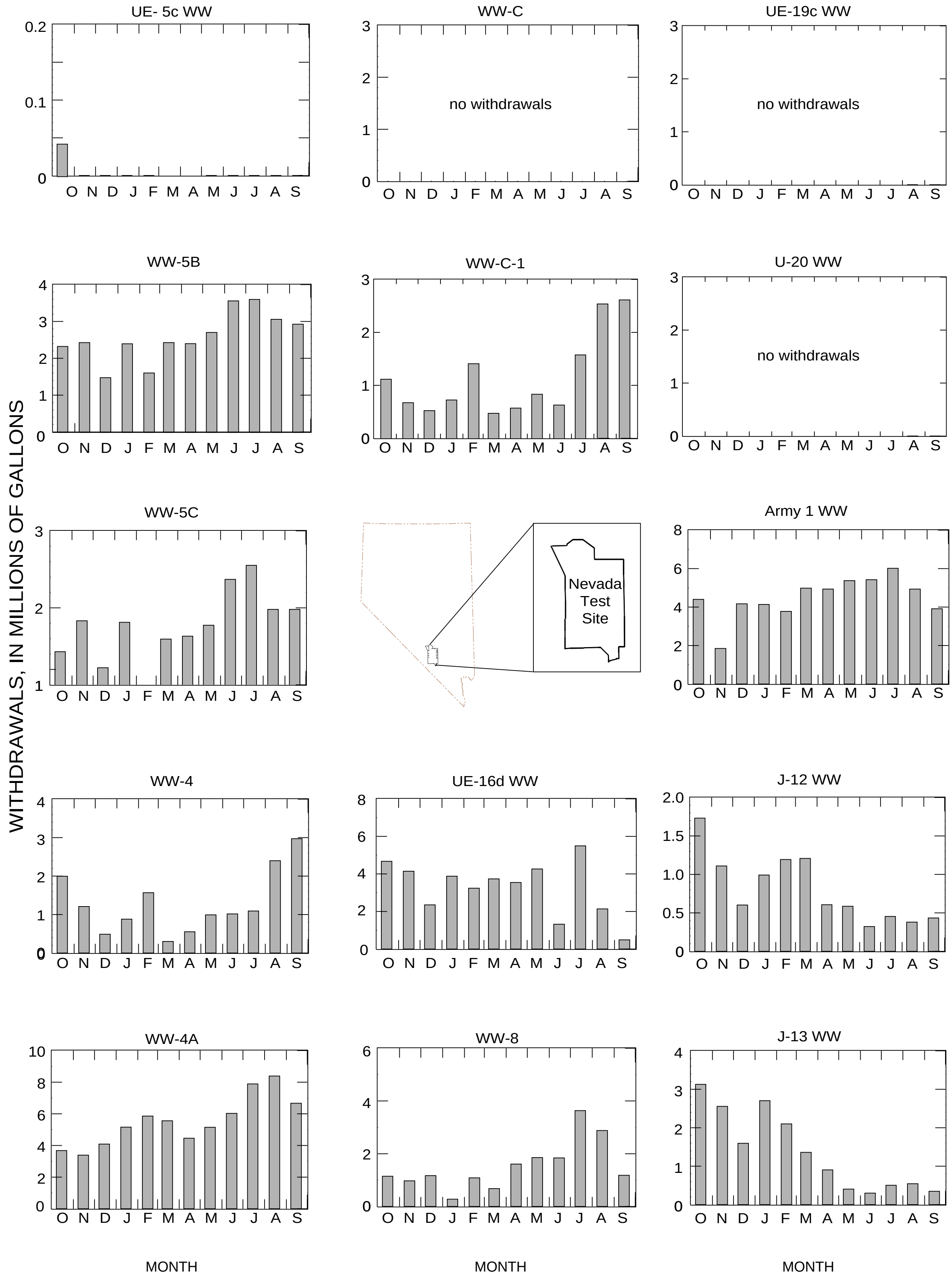


Figure 10. Total ground-water withdrawals from production wells at the Nevada Test Site during water year 2002.

SPECIAL NETWORKS AND PROJECTS

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 streamflow 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. At 10 of these sites, water-quality information is being gathered on major ions and nutrients, primarily to assess the affects of acid deposition on stream chemistry. Additional information on the Hydrologic Benchmark Program can be found at:

http://water.usgs.gov/hbn/

There are 2 sites in Nevada that are part of the hydrologic benchmark network, these are: Steptoe Creek near Ely, Nevada (10244950) and South Twin River near Round Mountain, Nevada (10249300).

National Stream-Quality Accounting Network (NASQAN) monitors the water quality of large rivers within the Nation's largest river basins. From 1995 through 1999, a network of approximately 40 stations were operated in the Mississippi, Columbia, Colorado, and Rio Grande. From 2000 through 2004, sampling was reduced to a few index stations on the Colorado and Columbia so that a network of 5 stations could be implemented on the Yukon River. 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. Additional information about the NASQAN Program can be found at:

http://water.usgs.gov/nasqan/

National Atmospheric Deposition Program/National Trends Network (NADP/NTN) provides continuous measurement and assessment of the chemical constituents in precipitation throughout the United States. As the lead federal agency, the USGS works together with over 100 organizations to provide a long-term, spatial and temporal record of atmospheric deposition generated from a network of 225 precipitation chemistry monitoring sites. This long-term, nationally consistent monitoring program, coupled with ecosystem research, provides critical information toward a national scorecard to evaluate the effectiveness of ongoing and future regulations intended to reduce atmospheric emissions and subsequent impacts to the Nation's land and water resources. Reports and other information on the NADP/NTN Program, as well as all data from the individual sites, can be found at:

http://bqs.usgs.gov/acidrain/

There are 3 active and 1 inactive NADP/NTN sites in Nevada.

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 59 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 can be found at

http://water.usgs.gov/nawqa/

The Nevada Basin and Range (NVBR) NAWQA, which includes the Las Vegas Valley area and the Carson and Truckee River basins, began in 1991. Data on physical, chemical, and biological properties of surface- and ground-water resources in the NVBR study unit will be combined with data from over 50 other river basins and aquifer systems to represent water-quality conditions in resources that provide more than 60 percent of the Nation's public supplies.Additional information about the NVBR NAWQA Program can be found at

http://nevada.usgs.gov/nawqa/

Amargosa Desert Study in Southern Nevada is a part of the USGS Toxics Program and consists of ground-water sites where data is collected to establish background information.

Aquifer Vulnerability Project will evaluate the susceptibility and vulnerability of ground water to anthropogenic contamination throughout Nevada. Existing water-quality data and information on variables that could be related to water quality (e.g. land use, depth to ground water) are being compiled from many sources and input to a database and geographic information system (GIS).

Carbonate Rock Study Area consists of recording wells, intermittent and quarterly measurements at wells, spring and fall discharge measurements at springs, and bulk precipitation readings at high-elevation sites.

Carson River Mercury Study consists of streamflow sites where depth/width integrated water samples for total and dissolved mercury, total and dissolved methylmercury, and suspended sediment are collected for determination of loads into and out of Lake Lahontan.

Cold Creek Monitoring Project consists of ground-water quality and ground-water level data collected in the Cold Creek watershed as part of a cooperative study with El Dorado County Department of Transportation and California Tahoe Conservancy. The purpose of the study is to assess effects of urban runoff into a detention basin adjacent to Cold Creek.

Dayton Valley consists of water-level measurements at wells, and bulk precipitation readings at sites.

Douglas County Network consists of sites for miscellaneous streamflow measurements, wells for water-level measurements, and ground water water-quality sites where data are routinely collected, principally in Carson Valley, western Nevada. The data will be used to establish background information to determine if changes in water quantity or quality occurs.

Fallon Basalt Aquifer Monitoring consists of groundwater sites where water-quality samples are taken from municipal supply wells to detect long term chloride and arsenic concentrations of pumped ground-water, and streamflow sites where samples are collected to determine changes in stable-isotope composition.

Humboldt River Basin Study consists of stream-gaging stations, and additional streamflow sites where samples were collected for inorganic chemical analyses.

Lake Tahoe Interagency Monitoring Program is a network of surface-water sites where streamflow and water-quality data are routinely collected around Lake Tahoe and ground-water sites monitored for nutrients. The surface-water data will be used to provide a long-term data base of streamflow and of sediment and nutrient loadings from major tributaries to Lake Tahoe

Lake Tahoe Basin Organics Study in Lake Tahoe and other Lower Echo Lake (Nevada and California) consists of lake sites where water samples were taken and analyzed for MTBE and other gasoline components. The data will be used to determine the effectiveness of the prohibition of carbureted 2-stroke engines in the Lake Tahoe Basin.

Nevada Test Site and Adjacent Areas Monitoring Project collects and compiles hydrogeologic data to aid in characterizing local and regional ground-water flow systems underlying the Nevada Test Site and vicinity. This work is done in cooperation with the U.S. Department of Energy as part of their Environmental Restoration and Hydrologic Resources Management Programs. Specific activities include the collection of water-level, water-use, evapotranspiration, and discharge data. Periodic and continuous water-level measurements are collected from wells and test holes at and adjacent to the Nevada Test Site. Measurements provide information defining short- and long-term water-level fluctuations. Water-use data are compiled for most water-supply wells at the Nevada Test Site. Continuous water-use data are collected at selected well sites. Evapotranspiration and discharge data are collected at Ash Meadows National Wildlife Refuge and Oasis Valley.

Newlands Shallow Aquifer Monitoring Project consists of wells for water-level measurements and ground water water-quality sites in Churchill County, Nevada where data are collected to monitor changes in water levels and water quality caused by changes in land use.

Ruby Valley study is a six-year project to develop an annual water budget for the Ruby Valley Hydrographic Area. The study is planned to take place in 2 phases with each phase lasting 3 years. Phase 1 (1999-2001) is designed to provide information on annual evapotranspiration from the most biologically important habitats within the Ruby Lake Wildlife Refuge. During Phase 2 (2002-2004), an annual water budget will be developed that incorporates all estimates of inflow and outflow to the basin-fill aquifer system on an annual basis.

Trout Creek Watershed Project consists of water-level data collected in the Trout Creek watershed as part of a cooperative study with the Tahoe Regional Planning Agency. The purpose of the study is to provide data on interactions between surface water and ground water along Trout Creek.

Virgin River Basin Project in Southern Nevada consists of streamflow sites to characterize the hydraulics and water quality of the basin. The data will be used to provide a long-term data base of chemical loading to Lake Mead.

Yucca Mountain Ground-Water Monitoring Project includes periodic measurements made throughout the Yucca Mountain Area to support environmental and regulatory aspects of the Yucca Mountain Project. Discharge and water-level measurements are made at selected springs and wells. Data presented do not include data collected as part of the Site-Characterization Program nor continual records developed from pressure-sensor data. The data included have been reviewed according to quality-assurance requirements specific to the Yucca Mountain Project.

EXPLANATION OF THE RECORDS

The surface-water and ground-water records published in this report are for the 2002 water year that began October 1, 2001, and ended September 30, 2002. A calendar of the water year is provided on the inside of the front cover. The records contain streamflow data, stage and content data for lakes and reservoirs, water-quality data for surface and ground water, and ground-water-level data. The locations of the stations and wells where the data were collected are shown in figures 11-37. The following sections of the introductory text are presented to provide users with a more detailed explanation of how the hydrologic data published in this report were collected, analyzed, computed, and arranged for presentation.

Station Identification Numbers

Each data station, whether stream site or well, in this report is assigned a unique identification number. This number is unique in that it applies specifically to a given station and to no other. The number usually is assigned when a station is first established and is retained for that station indefinitely. The systems used by the U.S. Geological Survey to assign identification numbers for surface-water stations and for ground-water well sites differ, but both are based on geographic location. The "downstream order" system is used for regular surface-water stations and the "latitude-longitude" system is used for wells and, in Nevada, for surface-water stations where only miscellaneous measurements are made.

Downstream Order System

Since October 1, 1950, the order of listing hydrologic-station records in Survey reports has been in a downstream direction along the main stream. All stations on a tributary entering from a mainstream station are listed before that station. A station on a tributary that enters between two mainstream stations is listed between them. 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 the list of gaging stations. Each indention represents one rank. This downstream order and system of indention show (1) which stations are on tributaries between any two stations and (2) 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 numbers, 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 left in the series of numbers to allow for new stations that may be established; hence the numbers are not consecutive. The complete number for each station, such as 10351700, which appears just to the left of the station name, includes the 2-digit part number (10) plus the 6-8-digit downstream-order number (351700). In this report, the records are listed in downstream order by parts. The part number refers to an area the boundaries of which coincide with certain natural drainage lines. Records in this report are for sites in Part 9 (Colorado River basin), Part 10 (The Great Basin), and Part 13 (Snake River basin). All records for a drainage basin encompassing more than one State can be arranged in downstream order by assembling pages from the various State reports by station number.

Latitude-Longitude System

The identification numbers for wells and miscellaneous surface-water sites are assigned according to the grid system of latitude and longitude. The number consists of 15 digits. The first six digits denote the degrees, minutes, and seconds of latitude, the next seven digits denote degrees, minutes, and seconds of longitude, and the last two digits (assigned sequentially) identify the wells or other sites within a 1-second grid. This site-identification number, once assigned, is a pure number and has no locational significance. In the rare instance where the initial determination of latitude and longitude are found to be in error, the station will retain its initial identification number; however, its true latitude and longitude will be listed in the LOCATION paragraph of the station description.

Local Site Numbers

Local site numbers used in Nevada locate ground-water data sites (wells or springs) by hydrographic areas and by the official rectangular subdivision of the public lands with reference to the Mt. Diablo base line and meridian. Nevada has been divided into 14 hydrographic regions or major basins and 256 individual hydrographic areas or valleys. The classification is used to compile information pertaining to water resources in Nevada. The local site number uses as many as 19 digits to locate the site by hydrographic area, township, range, section, and section subdivision.

The first segment of the local site number specifies the hydrographic area as defined by Rush (1968). The remainder of the number specifies the township north or south of the Mt. Diablo base line, the range east of the Mt. Diablo meridian, the section, and the subdivision of the section. Sections are divided into quadrants labeled counterclockwise from upper right as A, B, C, and D. Each quadrant is then similarly subdivided up to as many as three times, depending on the accuracy of available maps; thus each section of about 640 acres may be subdivided into tracts approximately 330 ft on a side containing about 2.5 acres. Lettered quadrants are read from left to right, with the largest subdivision on the left. Sites within the smallest subdivision used are numbered sequentially with 1 digit. As an example, a well in Fallon (Carson Desert, hydrographic area 101) located within the SE$^1/_4$NE$^1/_4$NW$^1/_4$SW$^1/_4$ section 6, Township 19 North, Range 28 East, would have the number 101 N19 E28 6CBAD1. A second well within the same 2.5-acre tract would be numbered 101 N19 E28 6CBAD2.

Prior to January 1976, local site numbers in Nevada were published according to the following general format: 19/28-36aabc1. The first number was the township north of the base line (if the township was south of the base line, the first number was followed by an “S”). The second number was the range east of the meridian, the third number was the section, and the following letter or letters and number indicated the quarter sections and sequence as defined above.

Records of Stage and Water Discharge

Records of stage and water discharge may be complete or partial. Complete records of discharge are those obtained using a continuous stage-recording device through which either instantaneous or mean daily discharges may be computed for any time, or any period of time, during the period of record. Complete records of lake or reservoir content, similarly, are those for which stage or content may be computed or estimated with reasonable accuracy for any time, or period of time. They may be obtained using a continuous stage-recording device, but need not be. Because daily mean discharges and end-of-day contents commonly are published for such stations, they are referred to as “daily stations.”

By contrast, partial records are obtained through discrete measurements without using a continuous stage-recording device and pertain only to a few flow characteristics, or perhaps only one. The nature of the partial record is indicated by table titles such as “Crest-stage partial records,” or “Low-flow partial records.” Records of miscellaneous discharge measurements or of measurements from special studies, such as low-flow seepage studies, may be considered as partial records, but they are presented separately in this report.

Data Collection and Computation

The data obtained at a complete-record gaging station on a stream or canal consist of a continuous record of stage, individual measurements of discharge throughout a range of stages, and notations regarding factors that may affect the relations between stage and discharge. These data, together with supplemental information, such as weather records, are used to compute daily discharges. The data obtained at a complete-record gaging station on a lake or reservoir consist of a record of stage and of notations regarding factors that may affect the relation between stage and lake content. These data are used with stage-area and stage-capacity curves or tables to compute water-surface areas and lake storage.

Continuous records of stage are obtained with digital recorders, data collection platforms, or data loggers that sample stage values at selected time intervals. Measurements of discharge are made with current meters using methods adopted by the Geological Survey as a result of experience accumulated since 1880. These methods are described in standard textbooks, in Water-Supply Paper 2175, and in U.S. Geological Survey Techniques of Water-Resources Investigations, 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).

In computing discharge records, results of individual measurements are plotted against the corresponding stages, and stage-discharge relation curves are then constructed. From these curves, rating tables indicating the approximate discharge for any stage within the range of the measurements are prepared. If it is necessary to define extremes of discharge outside the range of the current-meter measurements, the curves are extended using: (1) logarithmic plotting; (2) velocity-area studies; (3) results of indirect measurements of peak discharge, such as slope-area or contracted-opening measurements, and computations of flow over dams or weirs; or (4) step-backwater techniques.

Daily mean discharges are computed by applying the daily mean stages (gage heights) to the stage-discharge curves or tables. 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 determined by the shifting-control method, in which correction factors based on the individual discharge measurements and notes of the personnel making the measurements are applied to the gage heights before the discharges are determined from the curves or tables. This shifting-control method also is used if the stage-discharge relation is changed temporarily because of aquatic growth or debris on the control. For some stations, formation of ice in the winter may so obscure the stage-discharge relations that daily mean discharges must be estimated from other information such as temperature and precipitation records, notes of observations, and records for other stations in the same or nearby basins for comparable periods.

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 the 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.

In computing records of lake or reservoir contents, it is necessary to have available from surveys, curves or tables defining the relation of stage and content. The application of stage to the stage-content curves or tables gives the contents from which daily, monthly, or yearly changes then are determined. If the stage-content relation changes because of deposition of sediment in a lake or reservoir, periodic resurveys may be necessary to redefine the relation. Even when this is done, the contents computed may become increasingly in error as the lapsed time since the last survey increases. Discharges over lake or reservoir spillways are computed from stage-discharge relations much as other stream discharges are computed.

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 other reasons. For such periods, the daily discharges are estimated from the recorded range in stage, previous or following record, discharge measurements, weather records, and comparison with other station records from the same or nearby basins. Likewise, daily contents may be estimated from operator's logs, previous or following record, inflow-outflow studies, and other information. Information explaining how estimated daily-discharge values are identified in station records is included in the next two sections, “Data Presentation” (REMARKS paragraph) and “Identifying Estimated Daily Discharge.”

Data Presentation

Streamflow data in this report are presented in a format that is 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 several headings, 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 different headings of the station description.

LOCATION.--Information on locations is obtained from the most accurate maps available. The location of the gage 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.

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

PERIOD OF RECORD.--This indicates the period for which there are published records 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 records from it can reasonably be considered equivalent with records from the present station.

REVISED RECORDS.--Published records, because of new information, occasionally are found to be incorrect, and revisions are printed in later reports. Listed under this heading are all the reports in which revisions have been published for the station and the water years to which the revisions apply. If a revision did not include daily, monthly, or annual figures of discharge, that fact is noted after the year dates as follows: “(M)” means that only the instantaneous maximum discharge was revised; “(m)” that only the instantaneous minimum was revised; and “(P)” that only peak discharges were revised. If the drainage area has been revised, the report in which the most recently revised figure was first published is given.

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 record 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 statement is used to identify estimated record, the paragraph will begin with this information presented as the first entry. The paragraph also is used to present information relative to the accuracy of the records, to special methods of computation, to conditions that affect natural flow at the station 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 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.

EXTREMES FOR CURRENT YEAR.--Extremes given here are similar to those for the period of record, except the peak discharge listing may include secondary peaks. For stations meeting certain criteria, all peak discharges and stages occurring during the water year and greater than a selected base discharge are presented under this heading. The peaks greater than the base discharge, excluding the highest one, are referred to as secondary peaks. Peak discharges are not published for canals, ditches, drains, or streams for which the peaks are subject to substantial control by humans. The time of occurrence for peaks is expressed in 24-hour local standard time. For example, 12:30 a.m. is 0030, and 1:30 p.m. is 1330. The minimum for the current water year appears below the table of peak data.

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 offices whose addresses are 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 were obtained by computer retrieval, the data would be current and there would be no need to check because any published revision of data are 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.

Data table of daily mean values

The daily table for stream-gaging stations gives mean discharge for each day and is followed by monthly and yearly summaries. In the monthly summary below the daily table, the line headed “TOTAL” gives the sum of the daily figures. The line headed “MEAN” gives the average flow in cubic feet per second during the month. The lines headed “MAX” and “MIN” give the maximum and minimum daily discharges, respectively, for the 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 are omitted if there is extensive regulation or diversion or if the drainage area includes large noncontributing areas. In the yearly summary below the monthly summary, the figures shown are the appropriate discharges for the calendar and water years. At some stations monthly and (or) yearly observed discharges are adjusted for reservoir storage or diversion, or diversions 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 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 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 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. Reported 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 given also. 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 different 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 of 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.)

MAXIMUM PEAK FLOW.-- The maximum instantaneous peak discharge occurring for the water year or designated period. Occasionally the maximum flow for a year may occur at midnight at the beginning or end of the year, on a recession from or rise toward a higher peak in the adjoining year. In this case, the maximum peak flow is given in the table and the maximum flow may be reported in a footnote or in the REMARKS paragraph in the manuscript.

MAXIMUM PEAK STAGE.-- The maximum instantaneous peak stage occurringfor the water year or designated period. Occasionally the maximum stage for a year may occur at midnight at the beginning or end of the year, on a recession from or rise toward a higher peak in the adjoining year. In this case, the maximum peak stage is given in the table and the maximum stage may be reported in the REMARKS paragraph in the manuscript or in a footnote. If the dates of occurrence of the maximum peak stage and maximum peak flow are different, the REMARKS paragraph in the manuscript or 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 equal to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.

Cubic feet per second per square mile (CFSM) is the average number of cubic feet of water flowing per second from each square mile 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 the runoff for a given time period were uniformly distributed on it.

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

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

90 PERCENT EXCEEDS.--The discharge 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 a table of annual maximum stage and discharge at crest-stage stations. The table of crest-stage stations is 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.

Identifying Estimated Daily Discharge

Estimated daily-discharge values published in the water-discharge tables of annual State data reports are identified either by flagging individual daily values with the letter symbol “e” and printing a table footnote, “e Estimated,” or by listing the dates of the estimated record in the REMARKS paragraph of the station description.

Accuracy of the Records

The accuracy of streamflow records 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 measurements of stage, measurements of discharge, and interpretation of records.

The accuracy attributed to the records is indicated under “REMARKS.” “Excellent” means that about 95 percent of the daily discharges are within 5 percent of their true values; “good,” within 10 percent; and “fair,” within 15 percent. Records that do not meet the criteria mentioned are rated “poor.” Different accuracies may be attributed to different parts of a given record.

Daily mean discharges in this report are given to the nearest hundredth of a cubic foot per second for values less than 1 ft^3/s; to the nearest tenth between 1.0 and 10 ft^3/s; to whole numbers between 10 and 1,000 ft^3/s; and to three significant figures for more than 1,000 ft^3/s. The number of significant figures used is based solely on the magnitude of the discharge value. The same rounding rules apply to discharges listed for partial-record stations and miscellaneous sites.

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 Records Available

Information used in the preparation of the records in this publication—such as discharge-measurement notes, gage-height records, temperature measurements, and rating tables—is on file in the Nevada District Office. Also, most of the daily mean discharges are in computer-readable form and have been analyzed statistically. Information on the availability of the unpublished information or on the results of statistical analyses of the published records may be obtained from the offices whose addresses are given on the back of the title page of this report.

Records of Surface-Water Quality

Records of surface-water quality ordinarily are obtained at or near stream-gaging stations because interpretation of records of surface-water quality nearly always requires corresponding discharge data. Records of surface-water quality in this report may involve a variety of types of data and measurement frequencies.

Classification of Records

Water-quality data for surface-water sites are grouped into one of three classifications. A continuing-record station is a site where data are collected on a regularly scheduled basis. Frequency may be once or more times daily, weekly, monthly, or quarterly. A partial-record station is a site where limited water-quality data are collected systematically over a period of years. Frequency of sampling is usually less than quarterly. A miscellaneous sampling site is a location other than a continuing or partial-record station where random samples are collected to give better areal coverage to define water-quality conditions in the river basin.

A careful distinction needs to be made between “continuing records,” as used in this report, and “continuous recordings,” which refers to a continuous graph or a series of discrete values punched at short intervals on a paper tape. Some records of water quality, such as temperature and specific conductance, may be obtained through continuous recordings; however, because of costs, most data are obtained only monthly or less frequently. Locations of stations for which records on the quality of surface water appear in this report are shown in figures 17, 18, 24, 29 and 33.

Arrangement of Records

Water-quality records collected at a surface-water daily record station are published immediately following that record, regardless of the frequency of sample collection. Station number and name are the same for both records. Where a surface-water daily record station is not available or where the location of the water quality site differs significantly from that at the nearby surface-water station, the continuing water-quality record is published with its own station number and name in the regular downstream-order sequence. Water-quality data for partial-record stations and for miscellaneous sampling sites appear in a table following the tables of discharge measurements at miscellaneous sites.

On-Site Measurements and Sample Collection

In obtaining water-quality data, a major concern is assuring that the data obtained represent the in-situ quality of the water. To assure this, certain measurements, such as water temperature, pH, and dissolved oxygen, need to be made on site when the samples are taken. To assure that measurements made in the laboratory also represent the in-situ water, carefully prescribed procedures need to be followed in collecting the samples, in treating the samples to prevent changes in quality pending analysis, and in shipping the samples to the laboratory. 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. C2; Book 5, Chap. A1, A3, and A4. All these references are listed under “TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS OF THE U.S. GEOLOGICAL SURVEY” that appears at the end of the introductory text. These methods are consistent with ASTM standards and generally follow ISO standards. Detailed information on collecting, treating, and shipping samples may be obtained from the Nevada District Office.

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 through several vertical sections to obtain a representative sample needed for an accurate mean concentration and for use in calculating load. All samples obtained for the National Stream Quality Accounting Network (see definitions) are obtained from at least several verticals. Whether samples are obtained from the centroid of flow or from several verticals depends on flow conditions and other factors which must be evaluated by the collector.

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.

Specific Conductance

For chemical-quality stations equipped with digital monitors or data loggers, the records consist of daily maximum, minimum, and mean specific conductance values measured and are based upon hourly or more frequent punches beginning at 0015 hours and ending at 2400 hours for the day of record.

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 or twice daily, the water temperatures are taken at about the same time each day. Large streams normally have a small diurnal 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, minimum, and mean temperatures for each day are published. Water temperatures measured at the time of water-discharge measurements are on file in the Nevada District Office.

Laboratory Measurements

Samples for biochemical-oxygen demand (BOD), samples for indicator bacteria, and samples for specific conductance are analyzed locally. All other samples are analyzed in the Geological Survey laboratory in Lakewood, Colo. Methods used in analyzing sediment samples and computing sediment records are given in TWRI, Book 5, Chap. C1. Methods used by the Geological Survey laboratory are given in TWRI, Book 1, Chap. D2; Book 3, Chap. C2; and Book 5, Chap A1, A3, and A4. These methods are consistent with ASTM standards and generally follow ISO standards.

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MBAS determinations made from January 1, 1970, through August 29, 1993, at the National Water-Quality Laboratory in Denver (Analyzing Agency Code 80020) are positively biased. These data can be corrected on the basis of the following equation, if concentrations of dissolved nitrate plus nitrite, as nitrogen, and dissolved chloride, determined concurrently with the MBAS data, are applied:

MBASCOR = M - 0.0088N - 0.00019C

where:

MBASCOR = corrected MBAS concentration, in mg/L;

M = reported MBAS concentration, in mg/L;

N = dissolved nitrate plus nitrite, as nitrogen, concentration, in mg/L; and

C = dissolved chloride concentration, in mg/L.

The detection limit of the new method is 0.02 mg/L, whereas the detection limit for the old method was 0.01 mg/L. A detection limit of 0.02 mg/L should be used with corrected MBAS data from January 1, 1970, through August 29, 1993.

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Long-Term Method Detection Levels and Laboratory Reporting Levels

The USGS National Water Quality Laboratory collects quality-control data on a continuing basis to evaluate selected analytical methods to determine long-term method detection levels (LT-MDL's) and laboratory reporting levels (LRL's). These values are re-evaluated each year on the basis of the most recent quality-control data and, consequently, may change from year to year.

This reporting procedure limits the occurrence of false positive error. The chance of falsely reporting a concentration greater than the LT-MDL for a sample in which the analyte is not present is 1 percent or less. Application of the LRL limits the occurrence of false negative error. The chance of falsely reporting a non-detection for a sample in which the analyte is present at a concentration equal to or greater than the LRL is 1 percent of less.

Accordingly, concentrations are reported as <LRL for samples in which the analyte was either not detected or did not pass identification. Analytes that are detected at concentrations between the LT-MDL and LRL and that pass identification criteria are estimated. Estimated concentrations will be noted with a remark code of "E". These data should be used with the understanding that their uncertainty is greater than that of data reported without the "E" remark code.

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 or, in some instances, hourly). 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 0.0027, 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 discharges 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 samples 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 and in predicting long-term sediment-discharge characteristics of the stream.

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

Data Presentation

For continuing-record stations, information pertinent to the history of station operation is provided in descriptive headings preceding the tabular data. These descriptive headings give details regarding location, drainage area, period of record, type of data available, instrumentation, general remarks, cooperation, and extremes for parameters currently measured daily. Tables of chemical, physical, biological, radiochemical data, and so forth, obtained at a frequency less than daily are presented first. Tables of "daily values" of specific conductance, pH, water temperature, dissolved oxygen, and suspended sediment then follow in sequence.

In the descriptive headings, if the location is identical to that of the discharge gaging station, neither the LOCATION nor the DRAINAGE AREA statements are repeated. The following information, as appropriate, is provided with each continuous-record station. Comments that follow clarify information presented under the different headings of the station description.

LOCATION.--See Data Presentation under "Records of Stage and Water Discharge;" same comments apply.

DRAINAGE AREA.--See Data Presentation under "Records of Stage and Water Discharge;" same comments apply.

PERIOD OF RECORD.--This indicates the periods for which there are published water-quality records for the station.

INSTRUMENTATION.--Information on instrumentation is given only if a water-quality monitor temperature record, sediment pumping sampler, or other sampling device is in operation at a station.

REMARKS.--Remarks provide added information pertinent to the collection, analysis, or computation of the records.

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

EXTREMES.--Maximums and minimums are given only for parameters measured daily or more frequently. Extremes, when given, are provided for both the period of record and for the current water year.

REVISIONS.--If errors in published water-quality records are discovered after publication, appropriate updates are made to the Water-Quality File in the U.S. Geological Survey's computerized data system, WATSTORE. 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 the appropriate computer file to ensure the most recent updates.

The surface-water-quality records for partial-record stations and miscellaneous sampling sites are published in a table following the table of discharge measurements at miscellaneous sites. No descriptive statements are given for these records. Each station is published with its own station number and name in the regular downstream-order sequence.

Remark Codes

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

PRINTED OUTPUT	REMARK
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)
&	Biological organism estimated as dominant

Samples where the dissolved concentration of a constituent (which is theoretically less than or equal to the total concentration) exceeds the respective total, may be due to unavoidable errors associated with subsampling and sample processing, or limitations on precision and accuracy of the analytical procedure.

Records of Ground-Water Levels

Data from the basic Statewide network of primary and secondary observation wells are published herein. Each well is identified by means of (1) a 15-digit number that is based on latitude and longitude and (2) a local well number. (See the section titled "Station Identification Numbers.")

Data Collection and Computation

Measurements of water levels are made in many types of wells under varying conditions, but the methods of measurement are standardized to the extent possible. The equipment and measuring techniques used at each observation well ensure that measurements at each well are of consistent accuracy and reliability.

Tables of water-level data are presented by hydrographic area arranged in ascending order. The prime identification number for a given well is the 15-digit number that appears in the upper left corner of the table. The secondary identification number is the local well number, an alphanumeric number, derived from the township-range location of the well.

Water-level records are obtained from direct measurements with a steel or electric tape; or from continuos records of stage using digital recorders, data collection platforms, or data loggers. The 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 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 are reported to as many significant figures as can be justified by the local conditions. For example, in a measurement of a depth to water of several hundred feet, the error of 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 to a tenth of a foot or a larger unit.

Data Presentation

Each well record consists of two parts, the station description and the data table of water levels observed during the water year. The description of the well is presented first through use of descriptive headings preceding the tabular data. The comments to follow clarify information presented under the different headings.

WELL NUMBER.--This entry reports the 15-digit site identification number and the local well number previously mentioned and explained more completely in the section entitled, “Station Identification Numbers” under the headings, “Latitude-Longitude system” and “Local Site Numbers”.

LOCATION.--This paragraph follows the well-identification number and reports the latitude and longitude (given in degrees, minutes, and seconds); a landline location designation; the hydrologic-unit number; the distance and direction from a geographic point of reference; and the owner's name.

AQUIFER.--This entry designates by name (if a name exists) and geologic age the aquifer(s) open to the well.

INSTRUMENTATION.--This paragraph provides information on the frequency of measurement and the collection method used, allowing the user to better evaluate the reported water-level extremes by knowing whether they are based on weekly, monthly, or some other frequency of measurement.

DATUM.--This entry describes the measuring point and the land-surface elevation at the well. The measuring point is described physically (such as top of collar, notch in top of casing, plug in pump base and so on), and in relation to land surface (such as 1.3 ft above land-surface datum). The elevation of the land-surface datum is described in feet above (or below) sea level; it is reported with a precision depending on the method of determination.

REMARKS.--This entry describes factors that may influence the water level in a well or the measurement of the water level. It should identify wells that also are water-quality observation wells, and may be used to acknowledge the assistance of local (non-Survey) observers.

PERIOD OF RECORD.--This entry indicates the period for which there are published records for the well. It reports the month and year of the start of publication of water-level records by the U.S. Geological Survey and the words “to current year” if the records are to be continued into the following year. Periods for which water-level records are available, but are not published by the Geological Survey, may be noted.

EXTREMES FOR PERIOD OF RECORD.--This entry contains the highest and lowest water levels of the period of published record, with respect to land-surface datum, and the dates of their occurrence.

A table of water levels follows the station description for each well. Water levels are reported in feet below land-surface datum and all taped measurements of water level are listed. The highest and lowest water levels of the water year and their dates of occurrence are shown on a line below the abbreviated table. Because all values are not published for wells with recorders, the extremes may be values that are not listed in the table. Missing records are indicated by dashes in place of the water level. A hydrograph for a selected period of record may follow the water-level table.

Records of Ground-Water Quality

Records of ground-water quality in this report differ from other types of records in that, for most sampling sites, they consist of only one set of measurements for the water year. The quality of ground water ordinarily changes only slowly; therefore, for most general purposes, one annual sampling, or only a few samples taken at infrequent intervals during the year, is sufficient. Frequent measurement of the same constituents is not necessary unless one is concerned with a particular problem, such as monitoring for trends in nitrate concentration. In the special cases where the quality of ground water may change more rapidly, more frequent measurements are made to identify the nature of the changes.

Data Collection and Computation

The records of ground-water quality in this report were obtained mostly as a part of special studies in specific areas. Consequently, a number of chemical analyses are presented for some counties but none are presented for others. As a result, the records for this year, by themselves, do not provide a balanced view of ground-water quality Statewide. Such a view can be attained only by considering records for this year in context with similar records obtained for these and other counties in earlier years.

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" section 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. 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.

Data Presentation

The records of ground-water quality are published with projects and any corresponding ground-water-level records. Data for quality of ground water are listed numerically by hydrographic basin and are identified by well number. The prime identification number for wells sampled is the 15-digit number derived from the latitude-longitude locations. No descriptive statements are given for ground-water-quality records; however, the well number, depth of well, date of sampling, and other pertinent data are given in the table containing the chemical analyses of the ground water. The REMARK codes listed for surface-water-quality records are also applicable to ground-water-quality records.

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 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.

Canister blank - blank water placed into a storage canister for VOC sampler and subsequently placed into sample container; operations are preformed in a clean environment.

Source Solution blank - blank water placed directly in the sample container, but in a clean environment.

Ambient blank - blank water placed directly in the sample container in the same environment as the 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.

Concurrent sample - taken at same time as environmental sample.

Grab-D - grab sample, dipped at centroid of flow.

Grab-I - vertically integrated sample at center of channel.

Spike Samples

Spike samples are 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.

ACCESS TO USGS WATER 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 gage stations through the world wide web (WWW). These data may be accessed at

http://water.usgs.gov/nv/nwis/nwis

In addition, data can be provided in various machine-readable formats on compact discs, electronic files, or 3-1/2 inch floppy disk. Information about the availability of specific types of data or products, and user charges, can be obtained locally from the Water Resources Division District Office (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, 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 on the inside of the back cover.

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).

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.

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 is purposely 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 the 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.

Bedload is material in transport that is supported primarily by the streambed. In this report, bedload is considered to consist of particles in transit from the bed to an elevation equal to the top of the bedload sampler nozzle (ranging from 0.25 to 0.5 foot) that 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”)

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

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 is also called the Autotrophic Index.

Blue-green algae (*Cyanophyta*) are a group of phytoplankton organisms having a blue pigment, in addition to the green pigment called chlorophyll. Blue-green algae often cause nuisance conditions in water. Concentrations are expressed as a number of cells per milliliter (cells/mL) of sample. (See also "Phytoplankton")

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 lithology and porosity of the rock.

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 are generally reported as cells or units per milliliter (mL) or liter (L).

Cells volume (biovolume) determination is one of several common methods used to estimate biomass of algae in aquatic systems. Cell members of algae are frequently used 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 pr3 cone 1/3 pr2h cylinder pr2h.
pi (p) is the ratio of the circumference to the diameter of a circle; pi = 3.14159….

From cell volume, total algal biomass expressed as biovolume (mm3/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.

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 warmblooded animals. Clostridial spores are being used experimentally as an indicator of past fecal contamination and 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 are numerically 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 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 periodic sample or 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 are usually 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 UTM coordinates. (See also "Gage datum," "Land-surface datum," "National Geodetic Vertical Datum of 1929," and "North American Vertical Datum of 1988")

Diatoms are the unicellular or colonial algae having a siliceous shell. Their concentrations are expressed as number of cells per milliliter (cells/mL) of sample. (See also "Phytoplankton")

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, etc., 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:

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

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 are commonly 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 are generally 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) concentration value 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 qualitatively identified 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 (<).

Euglenoids (*Euglenophyta*) are a group of algae that are usually 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 itself is not an actual physical object, the datum usually is 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 have chlorophyll pigments similar in color to those of higher green plants. Some forms produce algae mats or floating "moss" in lakes. Their concentrations are expressed as number of cells per milliliter (cells/mL) of sample. (See also "Phytoplankton")

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 are typically 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.), 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 uniformly distributed on it. (See also “Annual runoff”)

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

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) is generally 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. [Note: In several previous NWQL documents (NWQL Technical Memorandum 98.07, 1998), the LRL was called the nondetection value or NDV—a term that is no longer used.]

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.

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.

Methylene blue active substances (MBAS) are apparent detergents. 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 of 1929) is a fixed reference adopted as a standard geodetic datum for elevations determined by leveling. It was formerly 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 Vertical Datum of 1988 (NAVD 1988) 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 utilizes 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 are usually 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 pre-cipitation.

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 (<2mm, 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.

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, 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”)

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.

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:	Arthropoda
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 tons 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 due to 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 U.S. EPA 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 pathlength 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 are often 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.”

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”)

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TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS OF THE U.S. GEOLOGICAL SURVEY

The USGS publishes a series of manuals titled the “Techniques of Water-Resources Investigations” that describe procedures for planning and conducting specialized work in water-resources investigations. The material in these manuals 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. Each chapter then is limited to a narrow field of the section subject matter. This publication format permits flexibility when revision or printing is required.

Manuals in the Techniques of Water-Resources Investigations series, which are listed below, are available online at http://water.usgs.gov/pubs/twri/. Printed copies are available for sale from the USGS, Information Services, Box 25286, Federal Center, Denver, Colorado 80225 (an authorized agent of the Superintendent of Documents, Government Printing Office). Please telephone “1-888-ASK-USGS” for current prices, and refer to the title, book number, section number, chapter number, and mention the “U.S. Geological Survey Techniques of Water-Resources Investigations.” Other products can be viewed online at http://www.usgs.gov/sales.html, or ordered by telephone or by FAX to (303)236-4693. Order forms for FAX requests are 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.

Section E. Subsurface Geophysical Methods

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.

2–E2. *Borehole geophysics applied to ground-water investigations,* by W.S. Keys: USGS–TWRI book 2, chap. E2. 1990. 150 p.

Section F. Drilling and Sampling Methods

2–F1. *Application of drilling, coring, and sampling techniques to test holes and wells*, by Eugene Shuter and W.E. Teasdale: USGS–TWRI book 2, chap. F1. 1989. 97 p.

Book 3. Applications of Hydraulics

Section A. Surface-Water Techniques

3–A1. *General field and office procedures for indirect discharge measurements,* by M.A. Benson and Tate Dalrymple: USGS–TWRI book 3, chap. A1. 1967. 30 p.

3–A2. *Measurement of peak discharge by the slope-area method,* by Tate Dalrymple and M.A. Benson: USGS–TWRI book 3, chap. A2. 1967. 12 p.

3–A3. *Measurement of peak discharge at culverts by indirect methods,* by G.L. Bodhaine: USGS–TWRI book 3, chap. A3. 1968. 60 p.

3–A4. *Measurement of peak discharge at width contractions by indirect methods,* by H.F. Matthai: USGS-TWRI book 3, chap. A4. 1967. 44 p.

3–A5. *Measurement of peak discharge at dams by indirect methods,* by Harry Hulsing: USGS–TWRI book 3, chap. A5. 1967. 29 p.

3–A6. *General procedure for gaging streams,* by R.W. Carter and Jacob Davidian: USGS–TWRI book 3, chap. A6. 1968. 13 p.

3–A7. *Stage measurement at gaging stations,* by T.J. Buchanan and W.P. Somers: USGS–TWRI book 3, chap. A7. 1968. 28 p.

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