

Prepared in cooperation with the Arizona Department of Environmental Quality

Monitoring Surface-Water Quality in Arizona— The Fixed-Station Network

Introduction

Arizona is an arid State in which economic development is influenced largely by the quantity and quality of water and the location of adequate water supplies. In 1995, surface water supplied about 58 percent of total withdrawals in Arizona. Of the total amount of surface water used in 1995, about 89 percent was for agriculture, 10 percent for public supply, and 1 percent for industrial supply (including mining and thermoelectric; Solley and others, 1998). As a result of rapid population growth in Arizona, historic agricultural lands in the Phoenix (Maricopa County) and Tucson (Pima County) areas are now being developed for residential and commercial use; thus, the amount of water used for public supply is increasing.

The Clean Water Act was established by U.S. Congress (1972) in response to public concern about water-pollution control. The act defines a process by which the United States Congress and the citizens are informed of the Nation's progress in restoring and maintaining the quality of our waters. The Arizona Department of Environmental Quality (ADEQ) is the State-designated agency for this process and, as a result, has developed a monitoring program to assess water quality in Arizona. The ADEQ is required to submit a water-quality assessment report to the United States Environmental Protection Agency (USEPA) every 2 years. The USEPA summarizes the reports from each State and submits a report to the Congress characterizing water quality in the United

States. These reports serve to inform Congress and the public of the Nation's progress toward the restoration and maintenance of water quality in the United States (Arizona Department of Environmental Quality, 1998).

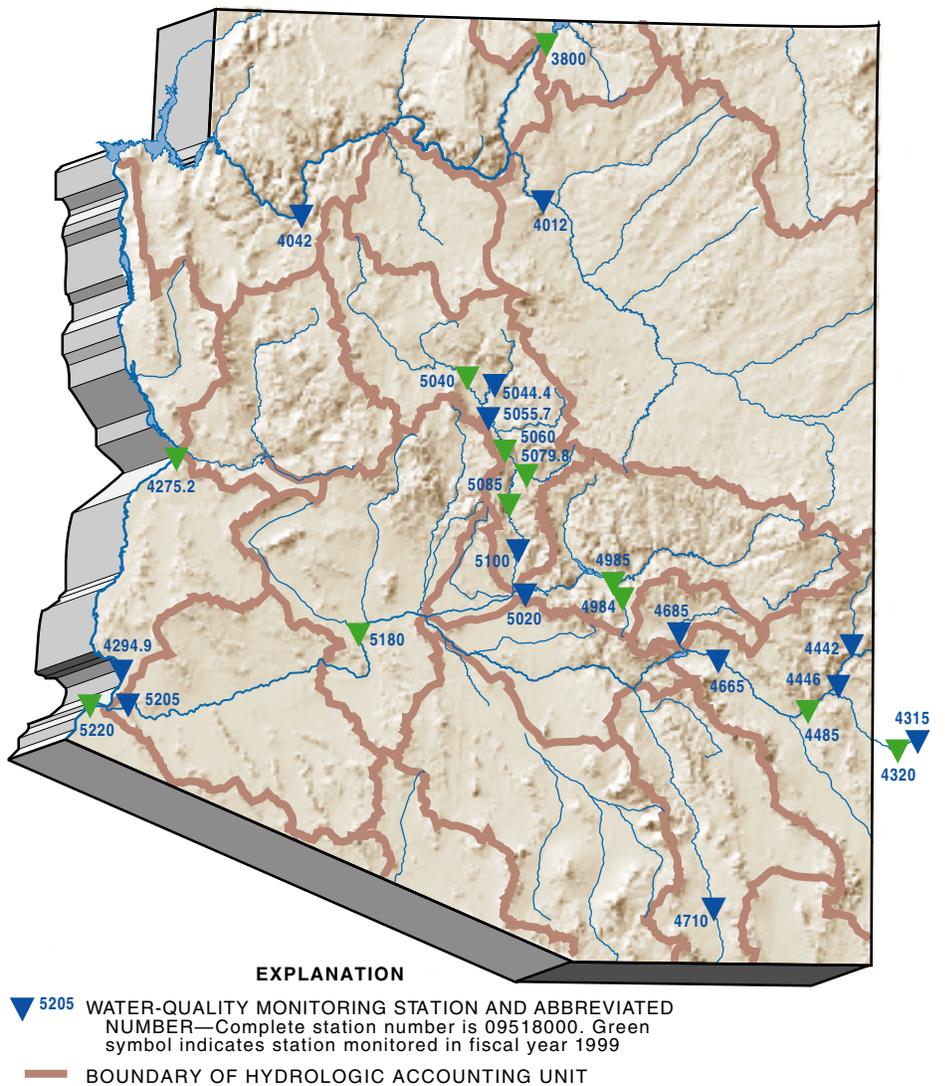


Figure 1. Surface-water quality monitoring stations in the fixed-station network during 1987–99 and hydrologic accounting units in Arizona.

HISTORY

The fixed-station network (fig. 1) was established by the ADEQ in 1987 to provide information on the quality of surface water in Arizona. The purpose of the network is to collect water-quality data to:

1. Evaluate long-term water-quality trends.
2. Provide warnings of detriments to protected uses (particularly to public health), both immediate and chronic.
3. Identify water-quality effects resulting from beneficial uses (municipal, industrial, agricultural, recreational, mineral production, and others) of water, both from point and nonpoint sources.
4. Identify natural sources of pollution.

In 1987, the ADEQ entered into a cooperative agreement with the U.S. Geological Survey (USGS) to sample and analyze surface water at nine of the USGS's streamflow-gaging stations in Arizona and California. Since 1987, samples have been collected at 9 to 13 stations every year. The USGS has collected and analyzed water samples from a total of 26 surface-water monitoring stations either bimonthly or quarterly from 1987 to 1999 as part of the fixed-station network (table 1). These 26 stations are in the upper Colorado River Basin, lower Colorado River Basin, Verde River Basin, Salt River Basin, upper Gila River Basin, Lower Gila River Basin, and San Pedro River Basin (fig. 1). The fixed-station network consisted of 12 water-quality monitoring stations in fiscal year 1999 (October 1, 1998, to September 30, 1999).

Sample Collection and Analysis

Surface-water samples are analyzed for concentrations of major ions, nutrients, dissolved trace elements, and bacteria. On-site measurements of pH, specific conductance, dissolved-oxygen concentration, alkalinity, air temperature, and water temperature are made as samples are collected. The samples are analyzed at the USGS laboratory in Ocala, Florida. Duplicate samples are



Verde River near Camp Verde, Arizona.

collected and analyzed to provide data that are used to verify the precision of results from the sample-processing and analytical procedures. Field blanks are collected and analyzed to provide data on potential contamination of samples from sample collection, processing, and preservation, and laboratory handling. The duplicates and field

blanks are analyzed for the same constituents and are subjected to the same procedures of sample collection, field processing, preservation, and laboratory handling as the environmental samples.

The data from the monitoring program can be used to estimate the total maximum daily loads of constituents at stations where both water-quality data and continuous-streamflow data are collected. Also, water-



View looking upstream from streamflow-gaging station, Gila River at Calva, Arizona

Table 1. Surface-water quality monitoring stations that were part of the fixed-station network, 1987–99

Station name	Station number
Colorado River at Lees Ferry, Arizona.....	09380000
Little Colorado River at Cameron, Arizona	09401200
Colorado River above Diamond Creek, near Peach Springs, Arizona	09404200
Colorado River below Parker Dam, Arizona-California	09427520
Colorado River above Imperial Dam, Arizona-California	09429490
Gila River near Red Rock, New Mexico.....	09431500
Gila River below Blue Creek, near Virden, New Mexico	09432000
Blue River near Clifton, Arizona.....	09444200
San Francisco River near Clifton, Arizona.....	09444600
Gila River at head of Safford Valley, near Solomon, Arizona.....	09448500
Gila River at Calva, Arizona	09466500
San Carlos River near Peridot, Arizona.....	09468500
San Pedro River at Charleston, Arizona.....	09471000
Pinal Creek at Inspiration Dam, near Globe, Arizona.....	09498400
Salt River near Roosevelt, Arizona	09498500
Salt River below Stewart Mountain Dam, Arizona	09502000
Verde River near Clarkdale, Arizona.....	09504000
Oak Creek at Red Rock Crossing, near Sedona, Arizona	09504440
Verde River above West Clear Creek, near Camp Verde, Arizona	09505570
Verde River near Camp Verde, Arizona.....	09506000
East Verde River near Childs, Arizona	09507980
Verde River below Tangle Creek, above Horseshoe Dam, Arizona	09508500
Verde River below Bartlett Dam, Arizona.....	09510000
Gila River above diversions, at Gillespie Dam, Arizona.....	09518000
Gila River near Dome, Arizona.....	09520500
Colorado River at northerly international boundary, above Morelos Dam, near Andrade, California	09522000

quality data from several stations in the same basin can be used to measure changing conditions in the basin, such as the effects of land-use changes on water quality. The data also can be used to determine the suitability of water for municipal, industrial, and agricultural uses and suitability to support aquatic life.

Reporting

Field measurements and laboratory analyses are stored in the USGS water-quality data base, and the data are published in the USGS annual water-resources data report for Arizona and are available from the U.S. Department of Commerce, National Technical Service, Springfield, Virginia 22161.

Selected References

Arizona Department of Environmental Quality, 1998, Arizona water quality assessment, volume I—Assessment process and analysis: Arizona Department of Environmental Quality, 159 p.



Measuring pH, conductivity, and alkalinity of water samples from the Colorado River at Lees Ferry and preparing samples for laboratory analysis in vehicle outfitted for field sampling.

Hooper, R.P., Goolsby, D.A., Rickert, D.A., and Stuart, W.C., 1997, NASQAN—A program to monitor the water quality of the nation's large rivers: U.S. Geological Survey Fact Sheet FS-055-97, 6 p.

Longworth, M.K., 1997, Five year strategy for water-quality monitoring in Arizona, 1997-2002: Arizona Department of Environmental Quality, 40 p.

Solley, W.B., Pierce, R.R., and Perlman, H.A., 1998, Estimated use of water in the

United States in 1995: U.S. Geological Survey Circular 1200, 71 p.

U.S. Congress, 1972, Federal Water Pollution Control Act, May 1, 1972—Public Law 92-240, March 1, 1972: U.S. Congress, 92nd, 2nd session, U.S. Statutes at Large, v. 86, p. 47.

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Verde River near Clarkdale, Arizona. Streamflow-gaging station is right of center at base of cliff.