

# Water-Quality Study of the Cheney Reservoir Watershed, South-Central Kansas

U.S. Department of the Interior—U.S. Geological Survey

A water-quality study of the 933-square-mile Cheney Reservoir watershed in south-central Kansas was begun in 1996 to evaluate potential degradation of Cheney Reservoir from constituents such as nutrients (compounds of nitrogen and phosphorus), pesticides, and suspended sediment. These constituents, among others, will be evaluated in a 4-year study conducted by the U.S. Geological Survey. This fact sheet describes the perceived problem and impetus for this study and provides some details of the study's organizational and operational characteristics.

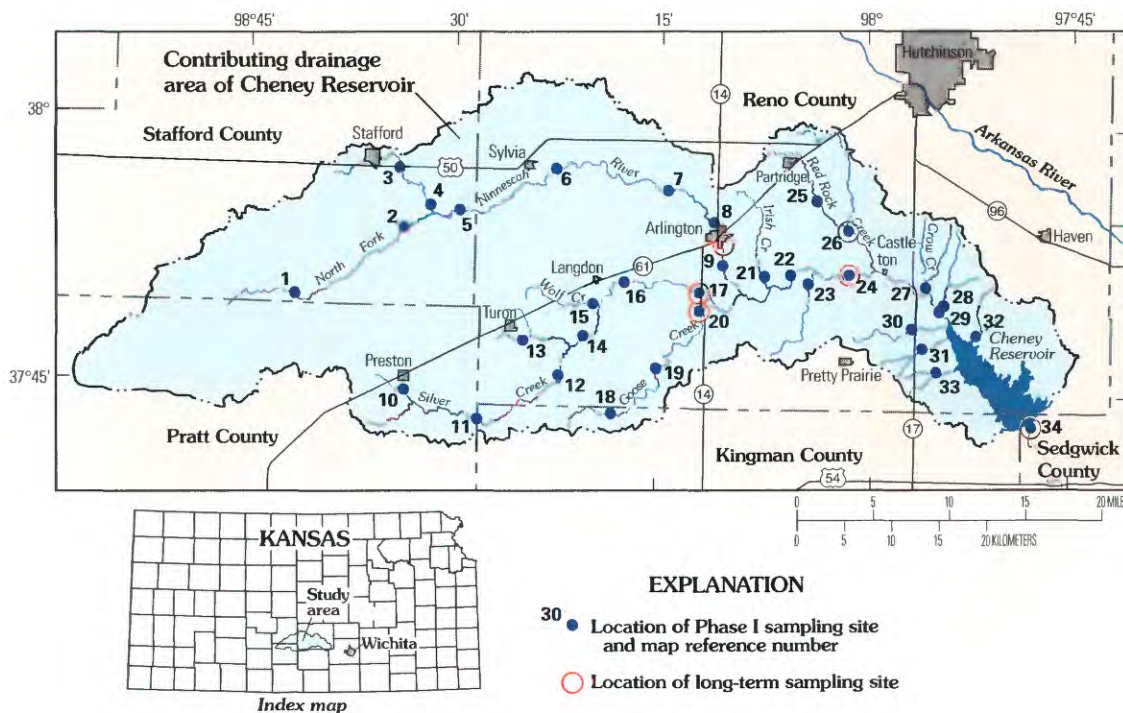
Maintaining suitable surface-water quality in the Cheney Reservoir watershed is important because the reservoir is a principal source of water for domestic and public supplies, recreation, irrigation, and livestock in south-central Kansas. Additionally, proper maintenance of surface-water

resources is necessary to help prevent detrimental concentrations of water-quality constituents that could affect aquatic organisms, disrupt fish populations, or interfere with the natural life cycles of plants and animals relying on surface water as fundamental to their reproduction and growth.

Cheney Reservoir was constructed by the Bureau of Reclamation, U.S. Department of the Interior, between 1962 and 1965 to serve as a water-supply source, to provide for downstream flood control, to allow recreational activities such as boating and fishing, and to provide wildlife benefits. The reservoir has a conservation-pool storage of 151,800 acre-feet, with an additional flood-control-pool capacity of 80,860 acre-feet. The city of Wichita, Kansas, a major metropolitan area, acquires much of its daily water supply from Cheney Reservoir.

Cheney Reservoir has a contributing drainage area of about 933 square miles in five south-central Kansas counties (see map). The contributing drainage area includes the North Fork Ninescaw River and associated tributaries. Land use is predominately agricultural and consists mainly of pasture and cropland. Crops produced in the watershed include corn, grain sorghum, soybeans, and wheat.

Algal blooms in Cheney Reservoir have occurred frequently during the summer months for the past several years. These blooms have caused taste and odor problems in water withdrawn from the reservoir by the city of Wichita for use as public supply. It is believed that excessive nutrient concentrations may be causing these blooms. Historical water-quality data also indicate that sedimentation and occurrence of pesticides (herbicides and insecticides) may be



Contributing drainage area of Cheney Reservoir and location of sampling sites.





North Fork of Ninnescah River near Arlington, Kansas.

additional water-quality problems associated with Cheney Reservoir.

As a step toward maintaining suitable surface-water quality, the Cheney Reservoir Task Force was formed in 1992 to prepare a plan to manage documented or potential contamination within the watershed through the implementation of watershed-management practices. This task force was comprised of members from the city of Wichita; Reno and Sedgwick Counties; Kansas Department of Health and Environment; U.S. Environmental Protection Agency; Natural Resources Conservation Service, U.S. Department of Agriculture; and a committee of landowners (Citizen's Management Committee) from within the watershed. Recommendations from this partnership of private and governmental entities included the establishment of long-term water-quality monitoring within the watershed.

In 1996, the U.S. Geological Survey began a water-quality study of the Cheney Reservoir watershed in participation with the city of Wichita and the Bureau of Reclamation. The objectives of the study are to: (1) describe differences in concentrations and transport of selected water-quality constituents within the Cheney Reservoir watershed; (2) evaluate, specifically, the annual transport of selected water-quality constituents into and out

of Cheney Reservoir; and (3) evaluate long-term changes in the chemical quality of reservoir sediment to serve as a surrogate for historical changes in water quality.

The study consists of two general phases. Phase I components included a short-term, preliminary evaluation of the watershed to document spatial variability in water-quality constituents and to assist in selection of long-term monitoring sites. Thirty-four sampling sites (see map) were monitored during Phase I, which was conducted from June through September 1996. These sites were sampled during periods of sustained low flow, which is streamflow originating primarily as springflow, ground-water seepage, irrigation return flow, or as point-source discharges such as from wastewater treatment plants.

Results of the Phase I evaluation identified dissolved solids and nutrients as potential water-quality concerns during low flow and led to the establishment of six long-term sampling sites during Phase II. Phase II consists of a 3-year data-collection effort to quantify water-quality constituent concentrations and loading characteristics in selected subbasins within the watershed and into and out of Cheney Reservoir. Phase II will include an evaluation of both low-flow and runoff periods. Water and sediment samples also will be



Streamflow-gaging/water-quality sampling equipment typical of Phase II sampling sites.

collected from several locations within the reservoir.

Information collected during Phases I and II will be used by the Citizen's Management Committee to evaluate the effectiveness of implemented watershed management practices in decreasing movement of selected water-quality constituents such as nutrients, pesticides, and suspended sediment into the reservoir. Also, the information and monitoring techniques developed during this study may be transferable to other watersheds in Kansas and the Nation with similar hydrologic and land-use characteristics.

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