



Kansas River near Lecompton during 2012 drought. Photograph by Brian Loving, USGS.

## Science Programs in Kansas

The U.S. Geological Survey (USGS), an agency within the U.S. Department of the Interior, serves the Nation through its mission to collect and disseminate reliable, impartial, and timely information needed to understand the Nation's resources. USGS mission areas include: Climate and Land Use Change, Core Science Systems, Ecosystems, Energy, Minerals, and Environmental Health, Natural Hazards, and Water ([http://www.usgs.gov/start\\_with\\_science/](http://www.usgs.gov/start_with_science/)). This information sheet highlights selected Water Science Programs in Kansas.

### Water Programs in Kansas have a long history

The USGS began collection of hydrologic information in Kansas in 1895 with six streamflow gages funded through the first USGS Cooperative Water Program agreement with the Kansas Water Board. USGS collects various types of hydrologic data including stream stage and flow, reservoir stage and content, many water-quality parameters including suspended sediment, and groundwater level data. USGS scientists in Kansas conduct studies on national, regional, state, and local scales. The USGS in Kansas works cooperatively with 36 Federal, State, and local agencies, such as the Kansas Water Office, the U.S Army Corps of Engineers, and the City of Wichita.

### Where are we?

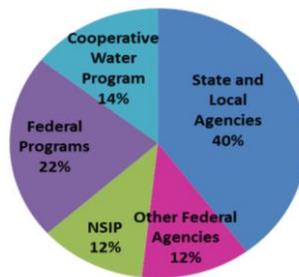
There are 75 USGS employees located in Kansas. The main water science center office and laboratory are in Lawrence and field offices are located in Hays and Wichita, Kansas.

### USGS Activities in Kansas

#### National Federal Programs

- Toxics program research into occurrence and movement of pesticides; antibiotics; algal toxins; and taste and odor compounds in the environment
- National Streamflow Information Program
- National Water Quality Assessment Program
- Applications of hydrologic modeling to USGS
- Streamflow and water-quality data visualization
- National evaluations of water use
- Stream and reservoir sediment research
- The USGS Earthquake Hazards Program monitors and reports earthquakes, assesses earthquake impacts and hazards, and researches the causes and effects of earthquakes in cooperation with the Kansas Geological Survey. For earthquake information in Kansas, contact the USGS National Earthquake Information Center at 303-273-8500, or visit the website at <http://earthquake.usgs.gov/>.
- The USGS Geospatial Liaison for Kansas develops partnerships and agreements that improve the data holdings and the products and services of *The National Map* and other initiatives that support USGS science. For more information, contact Ingrid Landgraf, Kansas Geospatial Liaison, [imlandgraf@usgs.gov](mailto:imlandgraf@usgs.gov), or visit the website at [http://nationalmap.gov/tnm\\_news.html](http://nationalmap.gov/tnm_news.html).

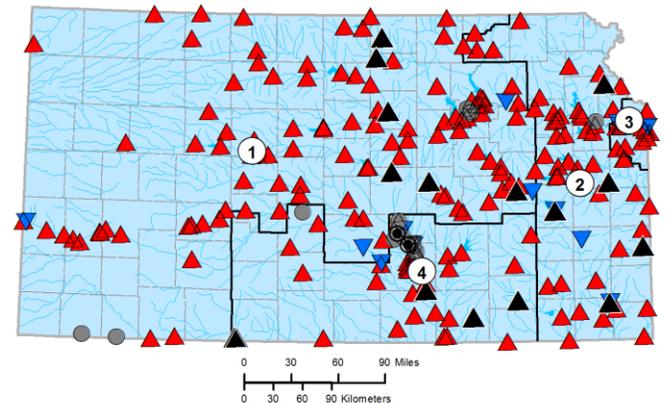
Funding Sources  
FY14 ~\$7.3 million



### Statewide Water Programs

- Streamflow monitoring at more than 200 locations for flood forecasting, reservoir operations, and other uses
- Monitoring of real-time water-quality conditions at about 25 locations
- Assessment of sedimentation in Kansas reservoirs
- Compilation of Kansas municipal and irrigation water-use data

### Streamflow Information



#### EXPLANATION

- Congressional District
- ▲ Newly funded by NSIP in 2014
- ▼ USGS Continuous water-quality monitoring station
- ▲ USGS Continuous streamflow or lake-level monitoring station
- ▼ USGS Continuous water-quality and streamflow or lake-level monitoring station
- USGS Continuous groundwater monitoring station
- USGS Continuous water-quality and groundwater monitoring station

Continuous real-time streamflow information is an important Kansas resource that can safeguard lives and property and ensure adequate water resources for a healthy State economy. The USGS operates about 200 streamflow-monitoring stations in Kansas and these stations are funded through the National Streamflow Information Program (NSIP) and the Cooperative Water Programs (CWP) in partnerships with local, Tribal, State, and other Federal agencies. Eleven new streamgages will be installed in 2014 and funding for three existing streamgages will now be provided by NSIP because of increased funding for NSIP. The real-time water-monitoring network provides the public long-term, accurate, and impartial information. This data has been particularly useful during the widespread drought that Kansas has experienced since 2011. <http://waterwatch.usgs.gov/>

### Uses of Continuous Real-time Streamflow Information

- State and local water-management and supply agencies—to plan, monitor, regulate, and adjust water withdrawals
- National Weather Service River Forecast Centers—to determine flood stages for various streams and to help forecast when and where streams will crest during floods
- U.S. Army Corps of Engineers—to most efficiently schedule reservoir releases
- Federal Emergency Management Agency—to delineate flood-prone areas, develop flood-insurance rates, and address emergency-response needs before, during, and after flooding
- Fishermen, swimmers, and boaters—to monitor water conditions for safe, optimal recreational use

## Sediment Science in Kansas

In Kansas and the rest of the United States, excessive sediment causes a variety of problems, including degraded water quality and aquatic habitats, increased water-treatment costs, decreased channel capacity and degradation, and loss of water-storage capacity in reservoirs. The USGS role in sediment science has been to determine reservoir storage-capacity and water quality trends, describe sediment transport to and from small impoundments, and to determine downstream effects of lake dredging on sediment concentration and loads in cooperation with federal, state, and local agencies. Sediment carries pesticides and nutrients (nitrogen and phosphorus), and can be a source of contaminants to water and the environment. Loss in reservoir water-storage capacity led the State of Kansas, through the Kansas Water Plan, to begin a Reservoir Sustainability Initiative to preserve water-supply storage in reservoirs for as long as possible. Sediment accumulation can lead to algal blooms and other water-quality issues.

<http://ks.water.usgs.gov/studies/sedsci/>

### Key findings:

- Some reservoirs are filling with sediment at rates faster than designed and decreasing storage for water supply;
- Streambanks are a substantial source of sediment to streams and downstream reservoirs;
- Larger sediment yields occur in watersheds with row crops and those with fewer small ponds;
- Smaller sediment yields occur in watersheds that are primarily grassland, or with tile drainage and riparian buffers;
- Nutrients are transported with sediment and in some instances concentrations have increased with time, potentially leading to increased frequency of algal blooms.

## City of Wichita Water Supply

In 1995, the city of Wichita determined the projected city water needs would not be met into the 21st century. To meet future water demands, the City began Aquifer Storage and Recovery (ASR) coupled with greater use of Cheney Reservoir—the city's existing surface water supply—to help Wichita provide water for more than 600,000 users by the year 2050. The *Equus* Beds ASR project will add up to 65 billion gallons of water to the aquifer and slow down the intrusion of saltwater into the groundwater supply. Phase 1 recharge facilities were completed in September 2006; Phase 2 in 2013. The USGS role in the ASR project includes monitoring water quantity and quality in surface and groundwater and measuring and modeling changes in the *Equus* Beds aquifer storage and quality.

<http://ks.water.usgs.gov/studies/equus/>

### Key findings:

- In July 2010, water storage in the *Equus* Beds aquifer recovered more than 63 percent of lost storage volume since January 1993 (historic record low). This recovery was due to decreased aquifer pumpage by Wichita, and increased reliance on Cheney Reservoir for the city of Wichita's water supply. As of July 2011, 71 percent of the recovered storage volume was lost due to drought conditions and increased irrigation pumpage.
- Results of preliminary modeling scenarios indicate that saltwater contamination from past oil and gas activities in the Burrton area and natural sources along the Arkansas River will continue moving toward municipal and irrigation production wells at a rate of about 500 feet per year, even if all pumping was discontinued. Increased pumping from within the Burrton area to remove the chloride; increased Phase 1 artificial recharge near Burrton; and decreased pumping along the Arkansas River will all slow or reverse the movement of chloride.

## Harmful Algal Blooms



Milford Lake algal bloom August 2011

Harmful algal blooms (HABs) can occur anytime water use is impaired because of excessive accumulations of algae. In freshwater, the majority of HABs are caused by cyanobacteria (blue-green algae). Understanding the environmental factors associated with the occurrence and concentration of taste-and-odor compounds and cyanotoxins is key to lake management and drinking water treatment decisions and minimization of human and environmental health risks. Taste-and-odor compounds and toxins are of particular concern in lakes, reservoirs, and rivers that are used for drinking water or recreation, and can result in increased treatment costs and loss of aquacultural and recreational revenue.

<http://ks.water.usgs.gov/studies/qw/cyanobacteria/>

### Key findings:

- A study in September–October 2011 showed that cyanobacteria and associated toxins and taste-and-odor compounds from upstream reservoirs were transported in the Kansas River.
- Biological, physicochemical, hydrological, and meteorological processes influence the occurrence of cyanobacteria and associated toxins and taste-and-odor compounds, as detected in a study during the early 1990's of Cheney Reservoir, a drinking water supply for the City of Wichita,.

<http://ks.water.usgs.gov/studies/chenev/>

## USGS Programs in Congressional Districts

### Congressional District 1

- Water-quality conditions in Cheney Reservoir and watershed
- Groundwater quality in the glacial till aquifer of NE Kansas
- Kansas River Algal Study
- Long-term monitoring of Cheney watershed and reservoir
- Monitoring of hydrologic conditions at Fort Riley

### Congressional District 2

- Groundwater quality in the glacial till aquifer of NE Kansas
- John Redmond Reservoir dredging sediment study
- Kansas River Algal Study
- Water quality monitoring at Kansas River at DeSoto through NAWQA national fixed site network program

### Congressional District 3

- Effects of wastewater treatment facilities on Indian Creek
- Kansas River Algal Study

### Congressional District 4

- Water-quality and quantity effects of *Equus* Beds ASR project
- Water quality monitoring near Sedgwick through NAWQA national fixed site network program
- National Hydrography Dataset (NHD) update for urban drainage infrastructure

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