

The general economy of the basin is diversified with farming throughout the area and industrial activity most heavily concentrated in the Wichita-Newton-Hutchinson vicinity. [Corn](#), [wheat](#) and [livestock](#) are the principal agricultural products.⁽³⁾

Many kinds of industries are represented in the basin, with the aircraft and oil and gas industries being of major importance. The salt mines of the state are located largely in this basin. There is a sizable gypsum production facility west of Medicine Lodge. There is one oil refinery located in the basin in McPherson.



Salt Mine near Lyons, Rice County.
Photo courtesy Kansas Geological Survey.

Wichita State University, and the Hutchinson and Pratt County Community Colleges offer opportunities for higher education.

Recreation is an increasingly significant part of the economics of the basin, as is industry. The state parks and associated recreation and wildlife areas draw hunters to the area. There is one multipurpose small lake, Wellington Lake in Sumner County, located in the basin.

The growing industrial contribution to the basin economy is primarily related to energy production, including ethanol. As of November 2008, three ethanol plants are located in the basin in Pratt (now idle), Sedgwick and Rice counties. An additional ethanol plant is under construction in Sedgwick County. Two biodiesel plants have been permitted for construction in Stafford and Kiowa Counties, and one is under construction in Sedgwick County.

Physical Characteristics

Geology and Soils

The subsurface formations within the Lower Arkansas basin include three major systems; from oldest to youngest: Permian, Cretaceous, and Quaternary. The formations in the Permian system are relatively poor sources of ground water in terms of quantity and quality. The same is true of the formations in the Cretaceous system, except in the northern part of the Lower Arkansas River valley where the Dakota Formation is a principal source of water supplies.



Permian-Cretaceous Contact, McPherson County.
Photo courtesy Kansas Geological Survey.

The sands and gravels of the Quaternary system are a good source of ground water in the basin.

The topography in the basin varies from flat, undulating plains of slight relief to rolling uplands and, in places, steep bluffs and hills. Elevation ranges from about 1700 feet to about 1100 feet. Sandy soils and sand dunes are prevalent, mostly in the river valleys, but fine textured soils, tight clays and many other soil types are also represented.

Land Use/Land Cover

[Land use](#) in the basin typically is dominated by cropland (55.8%) or grassland (32.5%) and Conservation Reserve Program land (5.5%). The remaining land cover is forest or woody (2.4%) and industrial use, municipal use, open water and barren ground.

The Lower Arkansas basin contains 49,108 stream bank miles. Within a 100-foot corridor along each bank, about 36% of the land is pasture/grassland followed by crop/tree mix (35%), cropland (34%), pasture/tree mix (13%) and forest land (11%). While comprising less than 1% of the bank miles, the Lower Arkansas basin has the most urban land stream bank area of the Kansas basins.⁽⁴⁾



Chikaskia River, Harper County.

Climate

The climate of the Lower Arkansas basin is classified as subhumid with moderate [precipitation](#). The average annual temperature for the basin is about 57 degrees Fahrenheit, but temperatures fluctuate considerably within a year. The weather in this part of the state is subject to frequent and abrupt change.

Temperatures tend to increase mildly from west to east across the basin in response to declining elevations. At Greensburg, the average annual temperature is 54.3° F while at Wichita it is 56.4° F. Precipitation and the frost free period shows a similar west-to-east pattern (See table below).

Location	Average Annual ¹		Freeze Dates (32 F.) ²		
	Precipitation (inches)	Temperature (F)	Last	First	Days Between
Greensburg	25.49	54.3	Apr. 17	Oct. 19	185
Wichita	30.38	56.4	Apr. 14	Oct. 25	194

¹Source: National Climatic Data Center (1971-2000 data)

²Source: KSU Weather Data Library (1961-1990 data)

Wildlife and Habitat

The Lower Arkansas River basin is comprised primarily of four physiographic regions: High Plains, Red Hills, Arkansas River Lowlands and Wellington-McPherson Lowlands. Native vegetation in these regions ranges from

mixed grass and sand sage prairie grasses to floodplain woodlands species such as cottonwood and black willow.

Numerous threatened and endangered species occur in the Lower Arkansas basin. Of these, ten are birds, two are mammals, three are reptiles, one is an amphibian and six are fish.

Water Resources

Ground water, which is very shallow in some places, i.e. the Equus Beds aquifer, is the source for 92 percent of supply for all reported uses in 2006. Irrigation accounted for nearly 75% of [all reported water pumped](#) or diverted. Municipal use accounted for 15% of water used in the basin; industry for five percent; and recreation, stockwater and other uses combined equal about five percent (2006).⁽⁵⁾

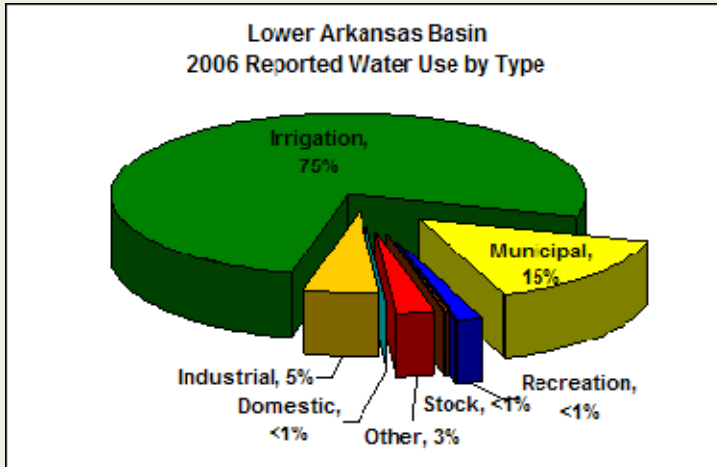
The Lower Arkansas basin contains 20,974 miles of intermittent and 2,592 miles of perennial streams for a total of 23,566 stream miles. The basin has a density of 2.1 stream miles per square mile.

Streamflows in the Lower Arkansas basin are highly variable within the year, and from one year to another. The major sources of [surface water](#) are Cheney Reservoir on the North Fork of the Ninnescah River in Reno County, and Wellington Lake in Sumner County, which drains into the Chikaskia River.

Water Management

There are two [Groundwater Management Districts](#) (GMDs) in the Lower Arkansas basin which cover most of the area. The Equus Beds GMD2 was formed in 1975 and operates under a "safe yield concept" in which appropriations are managed so that the quantity of ground water withdrawn from a given area is approximately equal to the average annual recharge to the same area. Big Bend GMD #5, in the northwestern part of the basin, was formed in 1976 and also operates under a safe yield policy.

There are two Intensive Ground Water Use Control Areas (IGUCAs) within GMD2: the McPherson Area IGUCA, and a 36 square mile area surrounding the town of Burrton in Harvey County. Each IGUCA is managed with programs and activities for the particular needs of that area. There are two IGUCAs in GMD5: the eastern portion of the Wet Walnut IGUCA, and the Pawnee IGUCA in Pawnee County.



Seven [watershed districts](#) are included in the Lower Arkansas basin: Upper Little Arkansas, Sand Creek, Mount Hope, Andale, Goose Creek, Spring Creek and Clear Creek.

The county conservation district is the primary local unit of government responsible for the conservation of soil, water and related natural resources within the county boundary. Each county within the Lower Arkansas River basin has a county conservation district. Three Resource Conservation and Development (RC&D) districts serve the counties of the Lower Arkansas basin: the Sunflower RC&D, Flint Hills RC&D and Central Prairie RC&D. The RC&Ds are designed to help community leaders develop rural economies by improving and conserving local natural, human and economic resources.⁽⁶⁾

Resources

1. US Census data, 2000
2. Kansas Division of Budget 2007. County population estimates.
3. USDA, Kansas 2006-2007 County Farm Facts, Agricultural Statistics and Ranking.
4. Wilson, Brownie, State of Kansas, 2003. [Assessment of Riparian Areas Inventory](#).
5. Water Right Information System (WRIS) database, Division of Water Resources, December 13, 2007.
6. USDA Natural Resources Conservation Services, Resource Conservation and Development Information. <http://www.ks.nrcs.usda.gov/partnerships/rcd/>
7. Kansas Water Office, Kansas Water Authority, Lower Arkansas Basin Water Quality Management Cate-

gory, *Kansas Water Plan*.

8. Kansas Water Resources Board Water Plan Studies Lower Arkansas Unit June 1962.



Braided Arkansas River south of Wichita.
Photo courtesy Kansas Geological Survey.

Cheyenne Bottoms/Quivira National Wildlife Refuge

Cheyenne Bottoms is a wetland of international importance located north of Great Bend in Barton County. It was designated as such by the Ramsar Convention in 2000. The wetland encompasses approximately 41,000 acres that includes 19,857 acres as a wildlife area. This wildlife area is recognized as an important migration point for shorebirds in North America. Past studies reflect almost half of the North America shorebirds migrate through the Bottoms. It is designated critical habitat for endangered species such as the Whooping Crane, Least Tern, Peregrine Falcon and numerous others. The Cheyenne Bottoms is owned by the State of Kansas and is managed by the Department of Wildlife and Parks.

Formed thousands of years ago, the wetland's natural depression has a drainage area of approximately 254 square miles including drainage from Blood and Deception Creeks. Availability of water plays a major role in productivity at the wetland.

The wildlife refuge also receives surface water from the Arkansas River through a canal system. Through the years, the availability of surface water in the Arkansas River has been reduced due to human activities in the upper reaches of the river above the wetland's diversion point.

Cheyenne Bottoms Wildlife Area receives, on average, more than 50,000 visitors each year. Estimated total number of visitors and hunters on opening day of the regular duck season increased steadily from 1996 to 2001.

Numbers were down during the drought of 2002-2003; however, 2004 had a rebound in hunters. Crane and duck presence at the Bottoms has been constant to slightly increasing since 1986. Geese populations have increased significantly with the largest peak occurring in 2002.

Quivira National Wildlife Refuge, 20 miles from Cheyenne Bottoms, is also recognized as a wetland of international importance recognized by the Ramsar Convention in 2001. Quivira contains 22,135 acres of prairie grass, salt water marshes, sand dunes, canals, dikes and timber. During spring migration, Quivira is a staging area for over 500,000 birds. Quivira and Cheyenne Bottoms are joined by a National Scenic Byway, also known as the Wetland and Wildlife Scenic Byway.



Migrating pelicans at Cheyenne Bottoms, Barton County. Photo courtesy Kansas Geological Survey.