

General Description

The Marais des Cygnes River rises near Eskridge in Wabauunsee County, Kansas and flows east and south to join the Little Osage River in Bates County, Missouri. The [basin](#) covers 4,304 square miles of east-central and southeast Kansas and includes all or parts of 13 counties. Dragoon Creek, Bull Creek, Pottawatomie Creek and Sugar Creek are major tributaries in Kansas. The Marmaton and Little Osage Rivers originate in Kansas and join in Missouri just above their confluence with the Marais des Cygnes to become the Osage River. The Marais des Cygnes basin includes four [Hydrologic Unit Code](#) (HUC) Subbasins: 10290101, 10290102, 10290103 and 10290104.

Major federal reservoirs in the basin are Melvern, Pomona and Hillsdale. Other significant lakes include the La Cygne Power Station Lake and impoundments within the Marais des Cygnes Wildlife Management Area and Refuge. Ground water [aquifers](#) underlying the watershed include portions of the Ozark and Glacial Aquifer and alluvial aquifers of the Marais des Cygnes River and its tributaries.

Population and Economy

There were an estimated 125,000 residents in the basin in the year 2000 (KWO estimate). The 13 counties either partly or wholly located within the basin had a combined [population](#) of 761,561 in 2000 (U.S. Census) and projected population of 1,076,146 in 2040.⁽¹⁾

Miami County, in the northern part of the basin, is poised for growth as urbanization of the Kansas City metropolitan area moves south. Miami County, with a population of 28,499 in 2000, has a projected population of 41,917 in 2040. By contrast, Linn County had a population in 2000 of 9,606 and a projected 2040 population of 8,679.

Despite the continuing urban growth, the Marais des Cygnes watershed maintains a robust agricultural industry comprised of feed grain operations, grazing lands and confined animal feeding operations. Wheat and sorghum are the primary crops. The value of [crops](#) grown in the 13 counties either partly or wholly within the basin exceeded \$318 million while [livestock](#) and dairy production topped \$192 million in 2006. Two large retail distribution centers have been developed near Ottawa in Franklin County.

Water-based recreation is an important component of the basin economy with recreational development associated with the three federal reservoirs in the basin, four state fishing lakes, and 20 community lakes attracting boaters, anglers, hunters and campers. State Parks and commercial marinas are located at each federal reservoir in the basin. Waterfowl hunting on private, state, and federal lands is a major activity, particularly in the lower basin.

Physical Characteristics

Geology and Soils

The Marais des Cygnes basin slopes gently west to east from a surface elevation of 1,472 feet above sea level at the headwaters in Wabaunsee County to about 742 feet at the state line. The Marais des Cygnes basin lies predominantly within the Osage Cuestas physiographic region with the extreme southeast corner located in the Cherokee Lowlands. This area is characterized by many east-facing escarpments which trend irregularly north to south across the basin. Major cities in the basin include Osage City, Ottawa, Garnett, Paola, Louisburg and Fort Scott.

Most of the surface [geology](#) in the basin is Pennsylvanian in age with Permian age rock in the headwater counties. Strata consist primarily of alternating thin beds of limestone and shale with some local sandstone deposits in the Lawrence shale and Stranger formations. Between the ridges are flat or gently rolling plains formed by softer rocks in the region.

The consolidated sediments derived from the Permian and Pennsylvanian rocks lie in widespread and nearly parallel layers dipping gently toward the north and west. Unconsolidated rock of Tertiary and Quaternary age is present locally in uplands as gravel or chert deposits and as gravel, silt and clay deposits in alluvium.

There are 11 soil series represented in the basin and vary from easily-worked, productive soils to compacted clay. Soils may be divided into three major associations: upland, terrace and bottomland. Upland soils tend to be moderately deep and dark-colored with a clay subsoil and occupy approximately 87% of the basin. Bottomland soils, which are mostly undifferentiated, deep and well-drained, occupy about 11% of the basin. Terrace soils along the edges of stream channels

occupy less than two percent of the basin and tend to be deep soils with a clay subsoil.

Land Use/Land Cover

The predominant land features in the basin are grasslands (55%) followed by cropland (23%) and woodlands (16%). In 2006, there were 10,780 farms comprised of 4.1 million acres, that lie in the 13 counties. Average farm size is 383 acres.

The basin contains many important highways. Interstates 35 and 135 cross the basin from northeast to southwest. U.S. Highways 75, 59, 169 and 69 cross the basin from north to south while U.S. 54 and 56 cross from east to west.

The Marais des Cygnes basin contains the largest percentage of riparian acreage of the twelve major river basins in Kansas. Within the 100-foot corridor along each bank of streams in the basin, 40% of the land is forested followed by cropland (17%) and pasture/grassland (15%).

Climate

The climate of the basin is classified as humid continental with cold winters and hot summers. Normal mean temperature generally increases from northwest to southeast across the basin. The average mean temperature of the basin is 54° F. Most of the [precipitation](#) falls in the summer and spring. June is typically the wettest month. Flood events and the drought experienced from 1952-1956, underscore the variability in precipitation.



Osage Cuestas - Photo courtesy Kansas Geological Survey

Table 1.

Location	Average Annual ¹		Freeze Dates (32 F.) ²		
	Precipitation (inches)	Temperature (F)	Last	First	Days Between
Eskridge	35.31	52.8	Apr. 15	Oct. 20	190
Fort Scott	44.14	56.1	Apr. 16	Oct. 23	195

¹Source: National Climatic Data Center (1971-2000 data)
²Source: KSU Weather Data Library (1961-1990 data)

Wildlife and Habitat

The Marais des Cygnes basin encompasses a wide array of habitat types that support rich and diverse wildlife populations. Habitat ranges from tallgrass prairie in the western portion of the watershed to riparian forests in the east. Some bottomland along major streams has been cultivated for row crops. Twenty-five state or federally listed threatened or endangered species share a probable or historic range or critical habitat within the basin including seven birds, four reptiles, three amphibians, two fish, two mammals and six mollusks including one snail species.

Significant wildlife habitat includes extensive wetlands in the lower basin. The Marais des Cygnes State Wildlife Area and adjacent U.S. Fish and Wildlife Service refuge, along with numerous private duck clubs hold recreational water rights on the Marais des Cygnes River. Water is pumped from the river to flood marshes and attracts large numbers of waterfowl during migration.



Water fowl on Marais des Cygnes River

Water Resources

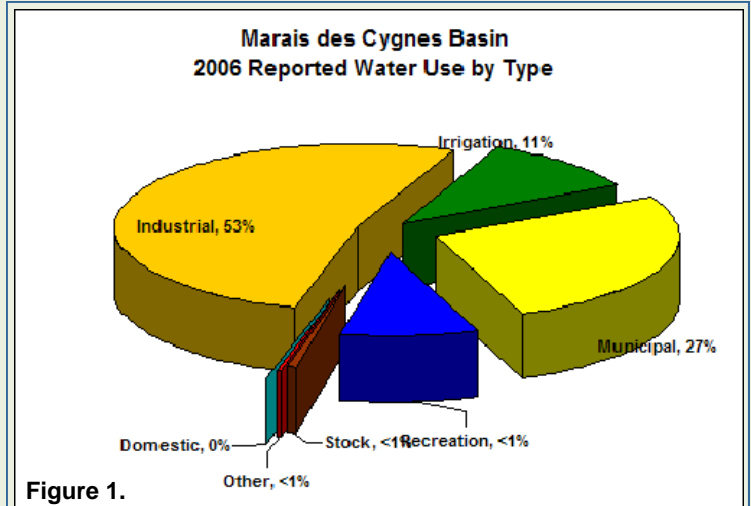
The Marais des Cygnes basin contains 8,821 miles of intermittent and 2,011 miles of perennial streams for a total of 10,832 stream miles. The density of 2.5 stream miles per square mile is typical among basins located in the eastern third of the state.

U.S. Army Corps of Engineers (Corps) operates three reservoirs in the Marais des Cygnes basin: Pomona, Melvern and Hillsdale. Four State Multipurpose Small Lakes have been constructed in the basin including

Bone Creek, Xenia, Cedar Creek and Little Sugar Creek.

Ground water resources in the basin are associated with alluvial and terrace deposits along the larger stream valleys. Ground water deposits in the Flint Hills in the upper basin are characterized by thin saturated zones and high levels of dissolved solids and hardness.

Surface water is the principal source of supply in the basin, accounting for over 97% of the use in 2006. Alluvial deposits along streams provide a minor source of ground water in the basin. As shown in Figure 1, most water use withdrawals are made for municipal (27%) and industrial (53%) supply.⁽⁴⁾ The primary industrial water user in the basin is the La Cygne electrical generating station where Kansas City Power and Light maintains a 2,600 acre cooling lake.



Water Management

The Corps manages pool elevations in their three reservoirs according to specific operating rules. Flood flows are stored until downstream conditions allow their release. A conservation pool is maintained with a fluctuating pool plan to maximize fish and wildlife production and recreational use. Each federal lake contains storage to maintain downstream water quality.

Water storage in Melvern, Pomona and Hillsdale lakes is maintained under the state Water Marketing Program. The 40 public water suppliers in the basin rely predominantly on surface water. The Marais des Cygnes Water Assurance District No. 2 was organized in 1990 and became operational in 1995. Seven municipal and industrial water right holders on the river are members. State-owned water assurance storage is located in Melvern and Pomona Lakes.

Gages to monitor minimum desirable streamflow (MDS) are located on the Marais des Cygnes River at Ottawa in Franklin County (15 to 25 cubic feet per second) and La Cygne in Linn County (20 to 25 cubic feet per second).

There are eight organized [watershed districts](#) in the basin. Watershed districts may be formed to construct, operate and maintain works of improvement needed to provide for water management. The primary function is to develop a comprehensive general plan for a watershed that will provide flood protection for the residents and landowners.

Each county in the basin also has a Conservation District dedicated to reducing soil erosion, improving water quality and conserving natural resources. The basin is primarily covered by the federal Big Lakes Resource Conservation and Development (RC&D) Program, with three southeastern counties in the See-Kan RC&D.

Watershed Restoration and Protection Strategies (WRAPS) are local stakeholder-driven watershed management programs designed to address multiple water resource issues. WRAPS projects have been established above the three federal reservoirs in the basin which provide public water supply along with projects in the lower Marais des Cygnes and Marmaton watersheds.⁽⁶⁾

Resources

1. U.S. Census Data, 2000
2. USDA, *Kansas 2006-2007 Farm Facts, Agricultural Statistics and Ranking*
3. Wilson, Brownie. 2003. Assessment of Riparian Areas Inventory, State of Kansas.
4. Kansas Department of Agriculture-Division of Water Resources. 2007 Water Rights Information System (WRIS).
5. Natural Resources conservation Service. Accessed January 2009. Resource Conservation and Development Information. www.ks.nrcs.usda.gov/partnership/rcd/index.html
6. Kansas Department of Health and Environment. Accessed January 2009. Watershed Restoration and Protection Strategies (WRAPS) www.kswraps.org



La Cygne Generating Station.
Photo courtesy Kansas Geological Survey

Bi-State EPA Grant Holds Promise for Water Quality Improvement

Kansas and Missouri received a \$900,000 Targeted Watershed Grant for the Lower Marais des Cygnes River Basin from the Environmental Protection Agency on December 3, 2007. The funding will be devoted to watershed restoration and protection practices, cost shared with landowners and communities. The Kansas Department of Health and Environment developed and will administer the bi-state grant that was supported by Kansas Governor Kathleen Sebelius and Missouri Governor Matt Blunt. The project will supplement existing Watershed Restoration and Protection Strategies (WRAPS) in the Marais des Cygnes basin.

The bi-state initiative has five objectives: improve the health of riparian areas and the adjacent streams, reduce adverse water quality impacts (pollution) from livestock operations, reduce pollution from on-site wastewater systems, reduce the adverse affects of urbanization and study the aquatic insects, fish, and plant life of a stream or river to help assess their health.

A variety of educational programs targeted to specific audiences are planned including pasture management and grazing systems for livestock operations. For crop farmers, there will be clinics on stream bank stabilization and, riparian area restoration practices. For the general public, there will be training modeled after the Kansas Environmental Leadership Program (KELP) on basin water resource issues.

The problems in the bi-state Marais des Cygnes basin are well documented. Earlier scientific evaluation has determined which streams or sections of streams do not meet water quality standards for their intended designated uses including recreation activities such as fishing and swimming. The key causes of the pollution: excess nutrients, fecal coliform bacteria, and limited dissolved oxygen, also have been identified. The unknown, however, is the exact source of the pollutant. Given the difficulty in pointing to a specific source, as with a discharge pipe from industry or a municipality, this form of water contamination is known as nonpoint source pollution.

Once the possible water quality impairment are identified, best management practices will be determined. Through computer modeling, twelve such practices will be compared, ranked and promoted to landowners for their adoption. All of these activities are made possible, in whole or in part, by this bi-state grant.

