

# **WHERE DID ALL THE IRRIGATORS GO? TRENDS IN IRRIGATION AND DEMOGRAPHICS IN KANSAS**

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## **Abstract**

The 2000 United States Census indicated that Kansas had grown by 8.51 percent in population since 1990, compared to the national average growth rate of 13.15 percent. Only nine (9) of 105 counties in Kansas experienced growth equal to or greater than the national average growth rate. From 2000-2004 only 8 counties grew at or above the national average growth rate. In 1990, Kansans were 1.00 percent of the U.S. population, in 2004 only 0.94% of the population. The 2004 population estimates had 56 of 105 counties in Kansas declining in population since 2000. Of the 54 counties overlying the High Plains aquifer, only three (3) counties had equal or greater growth than the national average. In addition the census also indicated a cultural transition as many counties experienced domestic out-migration and foreign immigration.

Agricultural Census data document a 5.26 percent decrease in the total market value of agricultural products from 1997 to 2002, while the total number of farms increased 4.58 percent in Kansas during the same period. The number of irrigated farms decreased by 3.58 percent with total irrigated acres declining by only 1.07 percent to 2.678 million acres over the same five year period. Total acreage in crop production declined 1.59 percent, while the market value of crops sold decreasing 24.9% from \$3.22 billion in 1997 to \$2.42 billion in 2002.

Since 1990, irrigation technology has dramatically changed to more efficient low pressure pivot and SDI (subsurface drip irrigation) systems. With more efficient water use, irrigators have been able to grow significantly more corn and other water intensive crops. Given the 3.5 percent decrease in the number of irrigated farms since 1997, the resulting 1.08 percent decline in irrigated acres indicates increased acreage efficiency by remaining irrigators.

This presentation intends to demonstrate spatial and temporal trends in irrigation and demographics for Kansas, with focus on the 54 counties overlying the High Plains Aquifer.

## Population Change in Kansas Contrasted with the US

In the 20<sup>th</sup> century, the population of Kansas increased from 1.5 to about 2.7 million people, growing approximately 8 percent per decade. In the latest decade (1990 to 2000), the US Census indicated Kansas growth at 8.51 percent, compared to the national average of 13.15 percent. Historically, when comparing two decennial census, Kansas has experienced 5-10 percent less growth than the nation. During the last decade, 9 of 105 Kansas counties (indicated with blue outline) experienced growth equal to or greater than the national average growth rate as illustrated in the Population Ratio 1990:2000 map.

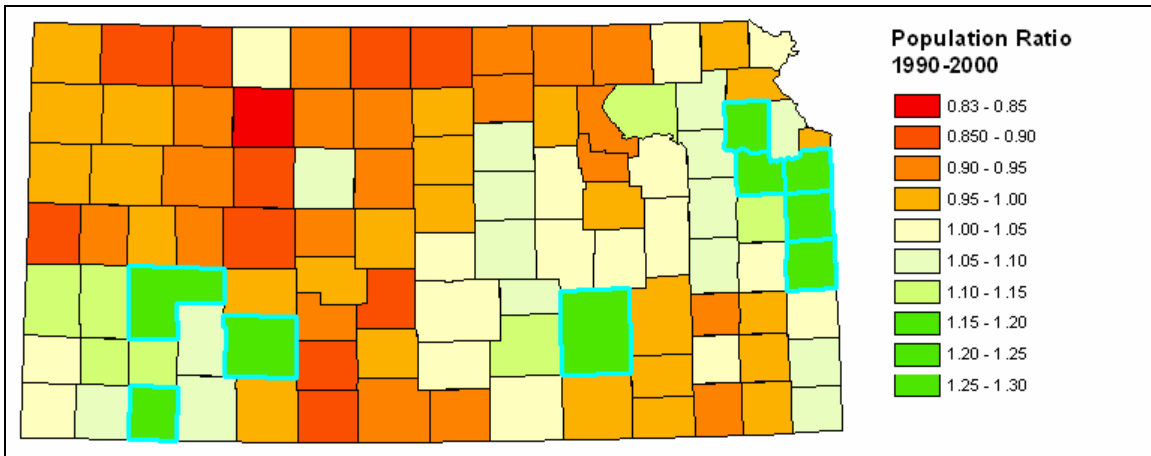


Figure 1. Kansas Population Ratio 1990-2000

Comparing the latest population estimate (2004) with 2000, only 8 counties grew at or above the national average growth rate. In 1990, Kansas totaled 1.00 percent of the U.S. population, in 2004 only 0.94% of the population. The 2004 population estimates had 56 of 105 counties in Kansas declining in population since 2000. Of the 54 counties overlying the High Plains aquifer, only three (3) counties had equal or greater growth than the national average. In the last century (1900-2000) census data indicate that county population peaked in 1939 on average across the state as illustrated in Figure 2 and Table 1.

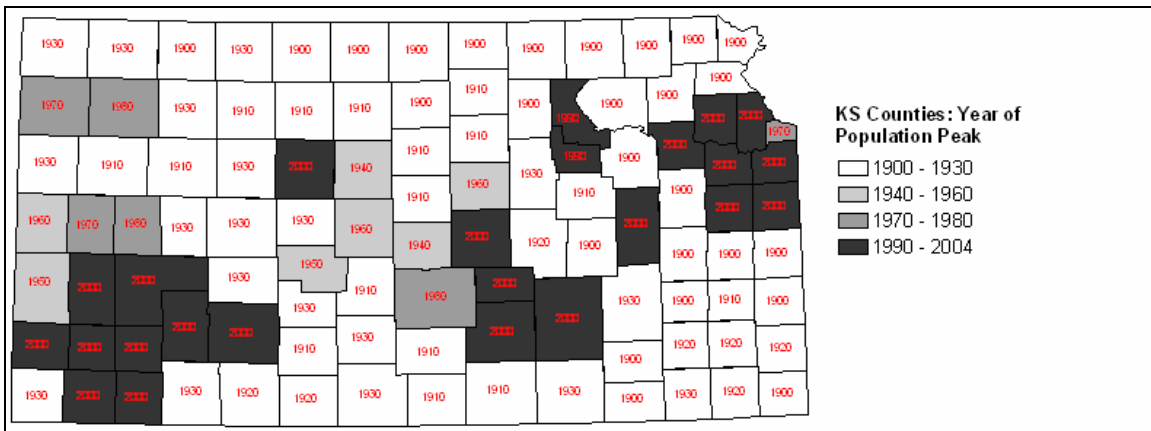


Figure 2. Kansas Counties Year of Population Peak

Figures 1 and 2 indicate growth of counties having larger communities or metropolitan areas. Both US, and Kansas population growth has been mainly concentrated in metropolitan areas throughout the last hundred years as illustrated in the following maps comparing the population distribution by county in 1900 and 2004. In Figure 3 note that in 1900 a more even statewide distribution of population existed than 2004.

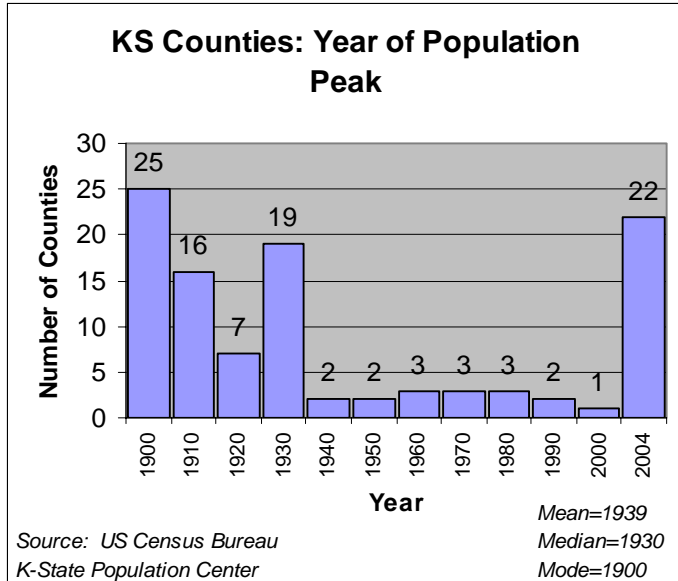


Table 1. Kansas Counties Year of Population Peak

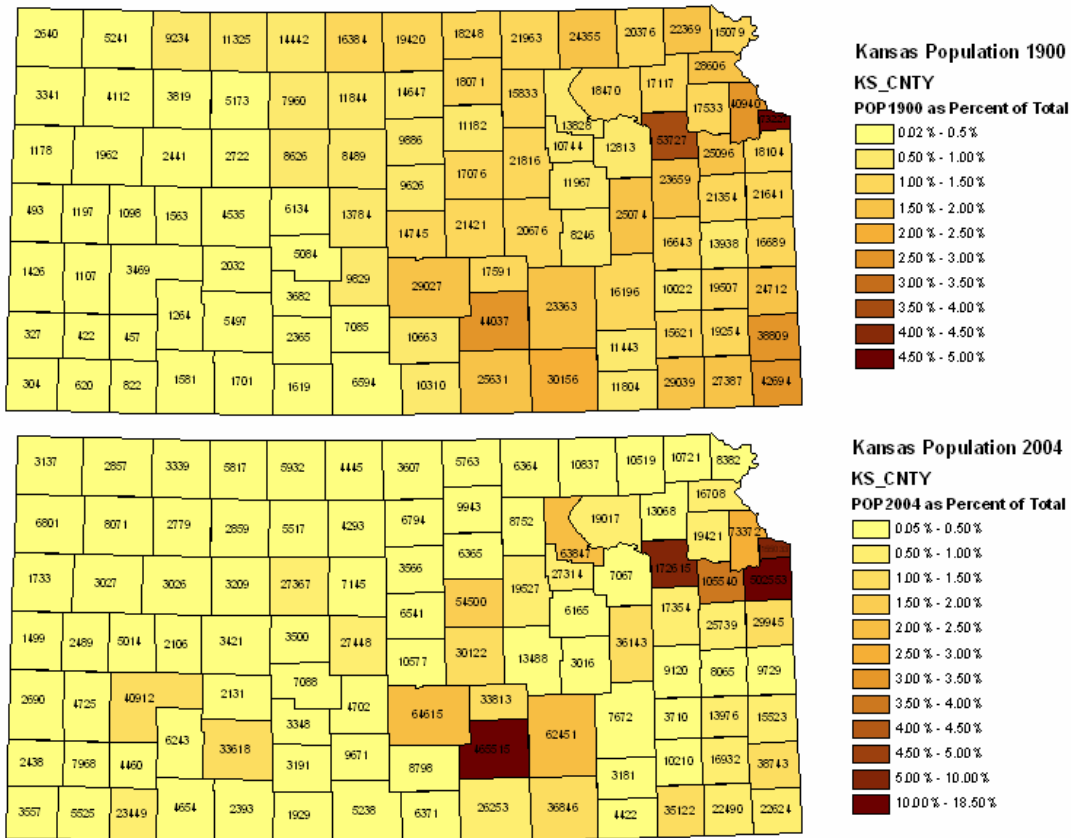


Figure 3. Kansas County Population 1900 and 2004 as a Percent of State Population

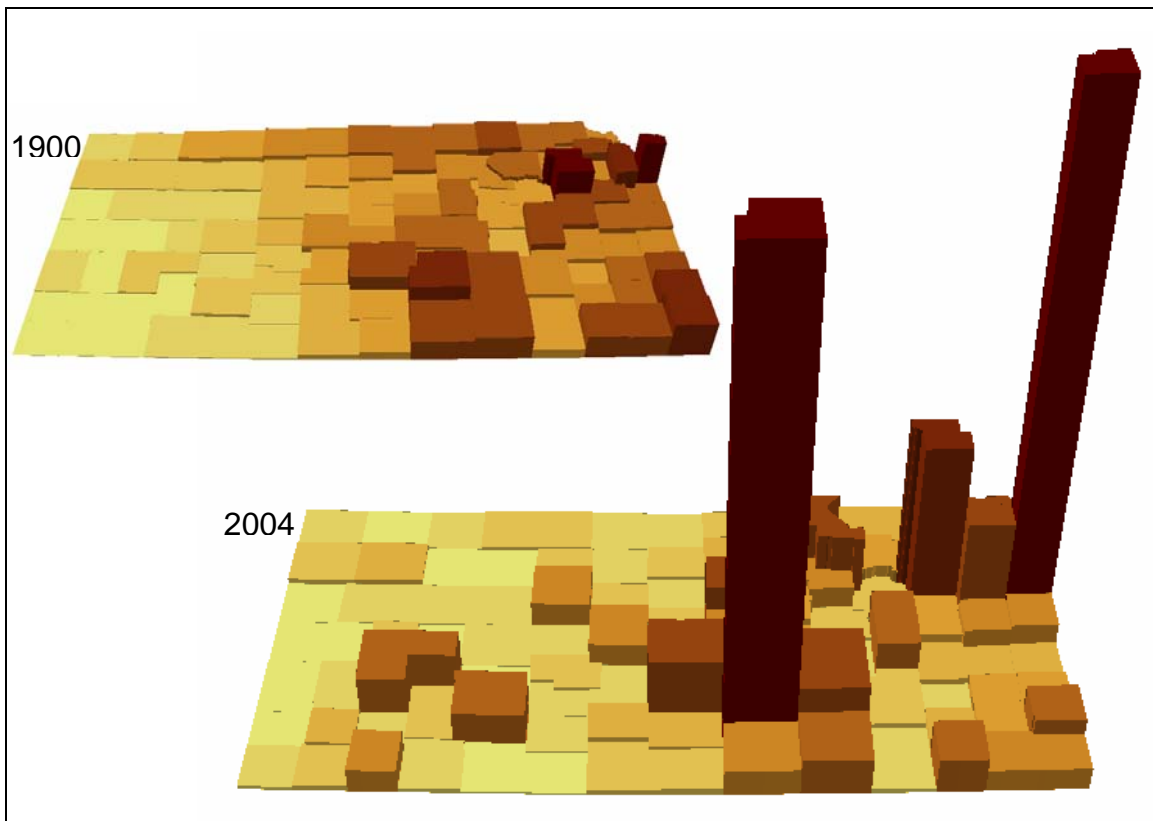


Figure 4. Kansas County Population 1900 and 2004 Extruded by Population

The three-dimensional maps of Kansas emphasize a drastic change in population distribution from 1900-2004, as well as the trend toward metropolitan growth which parallels the US. Kansas counties near the metropolitan areas of Kansas City and Wichita, and along the Interstate 70 and 35 corridors from Kansas City to Topeka and Wichita experienced the greatest growth. In contrast, there were counties in Western Kansas that lost more than 10 percent of their population between 1990 and 2000—Graham, Ness, Greeley and Comanche.

Population projections by US Census Bureau and the Kansas Water Office indicate a steady and similar trend for Kansas as seen in the past century. Between 2000 and 2030 the population of Kansas is projected to increase approximately 9 percent, again well below the projected 29 percent increase in the US. The projected growth disparity between Kansas and the US creates both economic and political challenges. More challenging however, is the compositional aspect of the population change. Of the predicted increase between 2000 and 2030, approximately 237,000 of 252,000 people, will be in the 65+ age category. As illustrated in Figure 5 for Sheridan County, which is representative of many counties in western Kansas, there is an erosion of the base population age cohort of 0-4, and drastic thinning of the 20-34 age cohorts which normally replace the base age cohort.

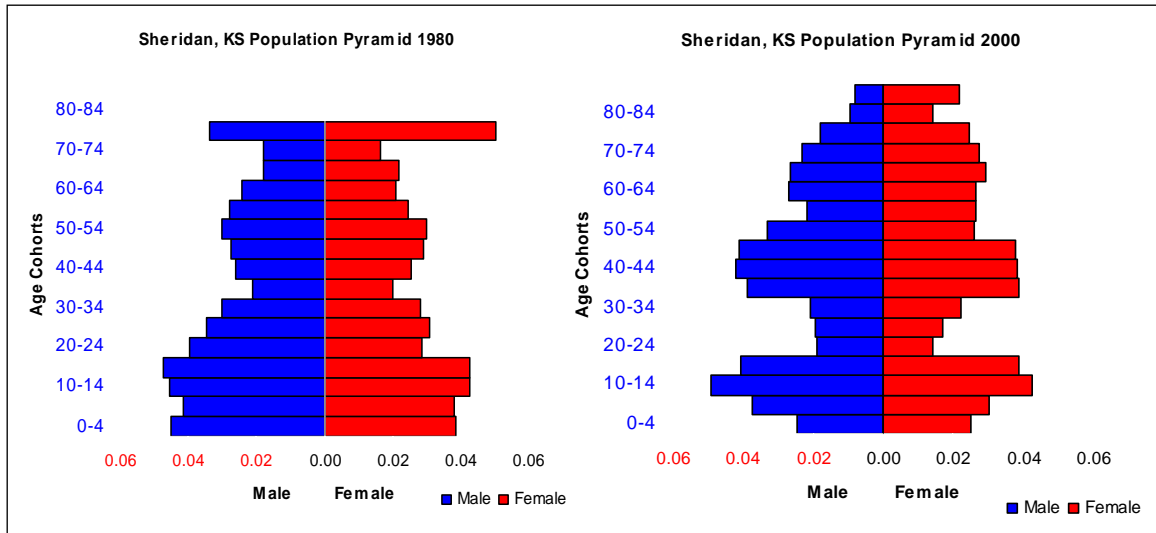


Figure 5. Sheridan County Kansas Population Pyramids for 1980 and 2000

Therefore the bulk of the predicted population increase will be the transition of the baby boomers into higher age cohorts above 60. Since Kansas does not have significant retirement migration destinations, the population will be aging in place, further perpetuating economic and social challenges for particular communities, especially those in Western Kansas.

Aging will not be the only compositional change in Kansas. Southwestern counties experienced a rapid influx of international migrants in recent history. This corresponds with the dominant economic activities in animal and meat production, a pattern that likely will not change. The spread of the Hispanic population across the rural Midwest is a relatively new phenomenon facing policy makers and community professionals. The Hispanic population in 1990 comprised 4 percent of the total population of Kansas, and in 2000 increased to 7% of the state population. In High Plains Aquifer Counties, Hispanics in 2000 accounted for 9 percent of the population and the total White percentage fell to 76%, while Kansas as a whole went from 86% to 80% in the same period.

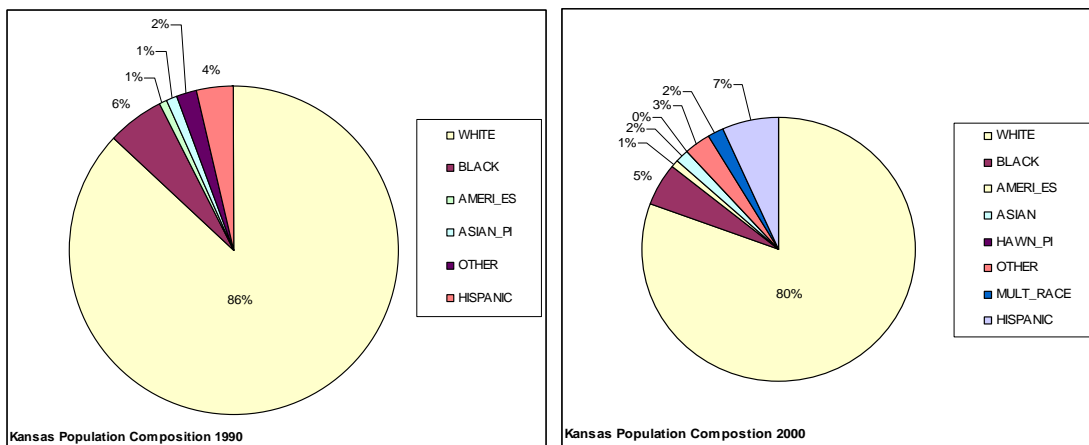


Figure 6. Kansas Population Composition 1990-2000

## Agricultural Changes in Kansas

Kansas Agricultural Census data for 1997 and 2002 document a 5.26 percent decrease in the total market value of agricultural products, while the total number of farms increased 4.58 percent in Kansas during the same period. The number of Irrigated farms decreased by 3.58 percent with total irrigated acres declining by 1.07 percent to 2.678 million acres over the same five year period. Total acreage in crop production declined 1.59 percent, while the market value of crops sold decreasing 24.9% from \$3.22 billion in 1997 to \$2.42 billion in 2002.

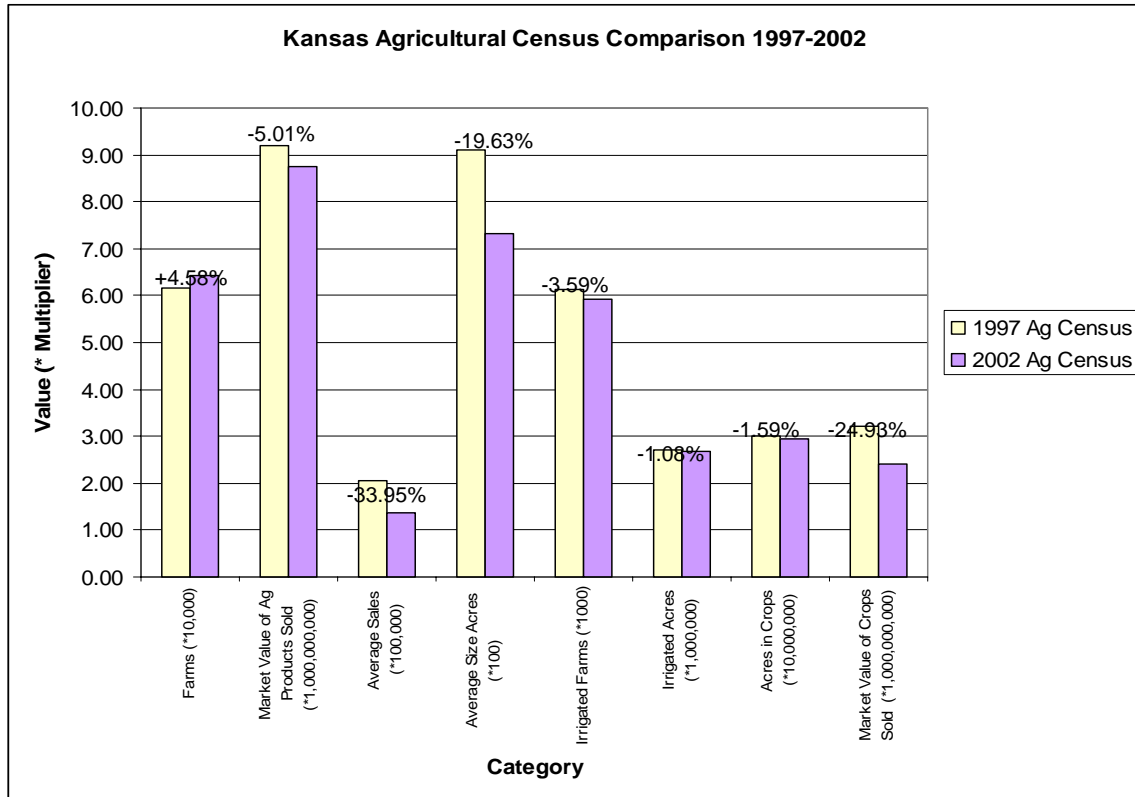


Table 2. Kansas Agricultural Census Comparison 1997-2002

Comparing the 1997 and 2002 Agricultural Census data for Kansas by county reveals that 31 of 105 counties lost total numbers of farms with six counties losing 10% or more farms. See Figure 7. The Average size of farms decreased in 54 of the 105 counties with the greatest decrease in average size per farm being 37%, and the greatest increase being 36% in Marshall County. Nine counties experienced a 10% or greater increase in average farm size. See Figure 8. Total crop acres decreased in 67 counties and increased in the remaining 38, with the greatest increase in crop acres being 16% in Barber County. See Figure 9. Average Farm Sales declined in 83 of the 105 counties. Of the 22 counties that had increased average farm sales between 1997 and 2002, Decatur and Sheridan counties experienced the largest increases at 80.6% and 95.3% respectively. On average Kansas counties Average Farm Sales were 89.95% of the 1997 values. See Figure 10.

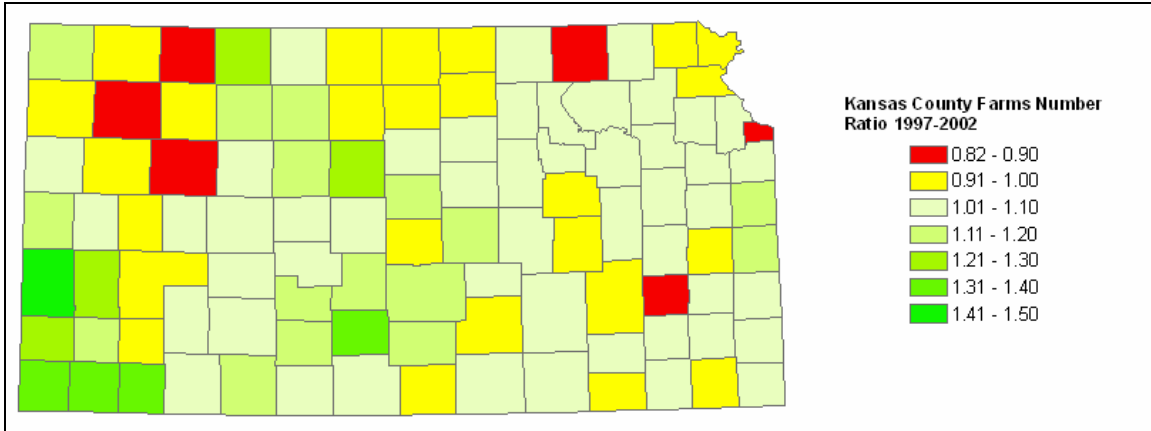


Figure 7. Kansas County Farms (Number) Ratio 1997-2002

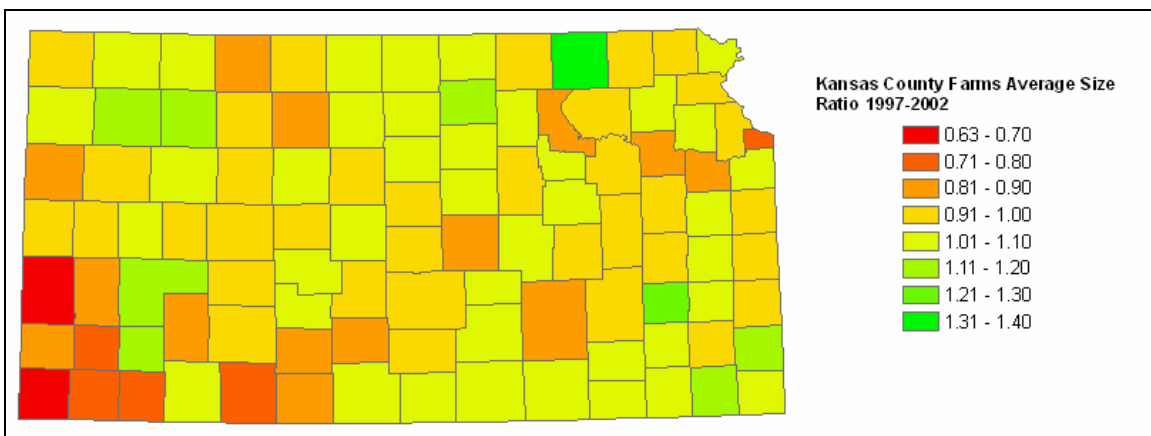


Figure 8. Kansas County Farms Average Size Ratio 1997-2002

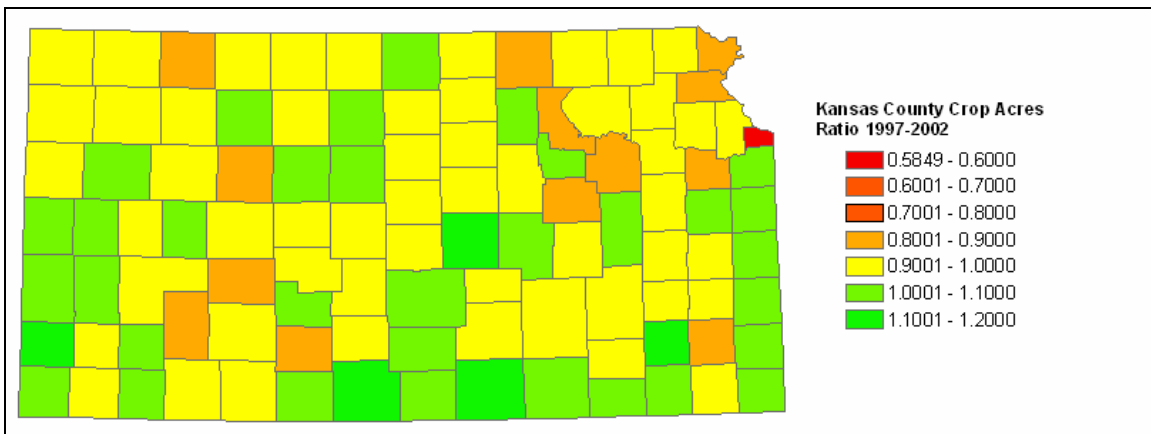


Figure 9. Kansas County Crop Acres Ratio 1997-2002

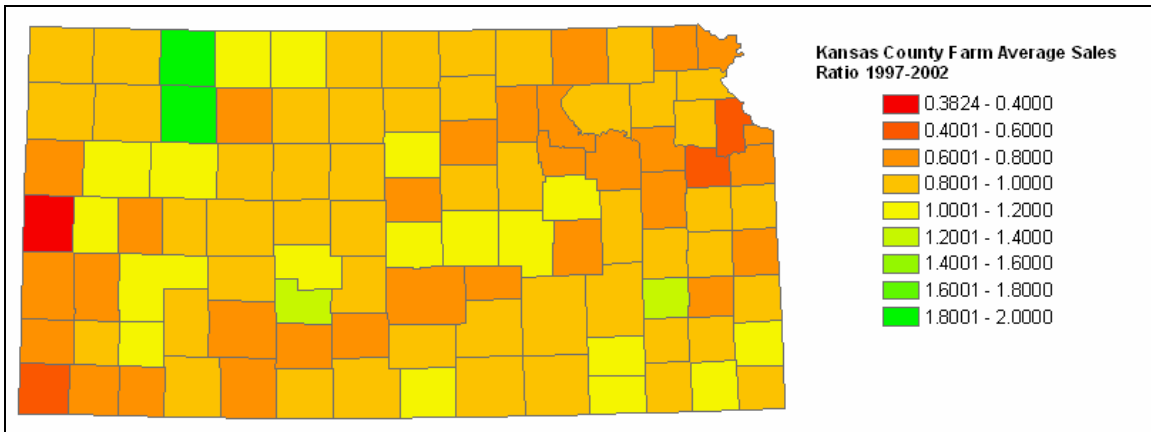


Figure 10. Kansas County Average Farm Sales Ratio 1997-2002

Since 1990, irrigation technology has dramatically changed to more efficient low pressure pivot and SDI (subsurface drip irrigation) systems. With more efficient water use, irrigators have been able to grow significantly more corn and other water intensive crops. Given the 3.5 percent decrease in the number of irrigated farms since 1997, the resulting 1.08 percent decline in irrigated acres indicates increased acreage efficiency by remaining irrigators. Figure 11 illustrates changes in irrigated acres, sprinkler and SDI acreage in Kansas (Source D.H. Rogers).

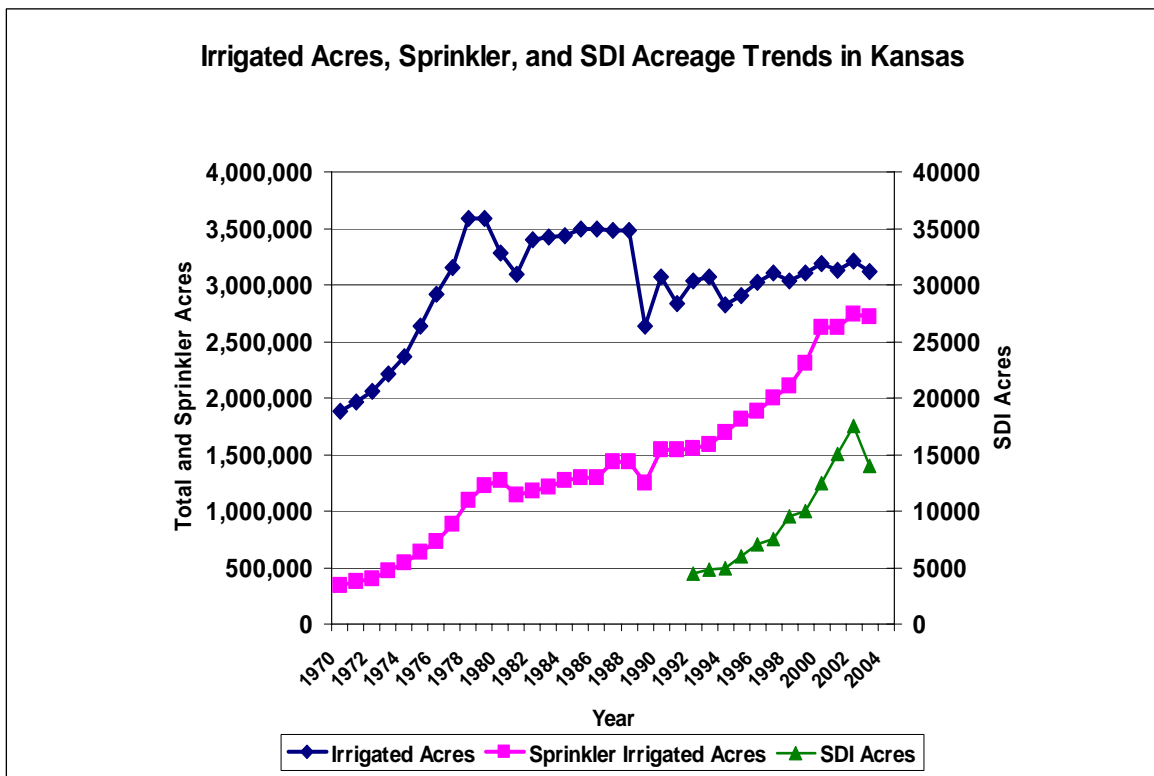


Figure 11. Kansas Irrigated Acres, Sprinkler, and SDI Acreage Trends (Source D.H. Rogers)



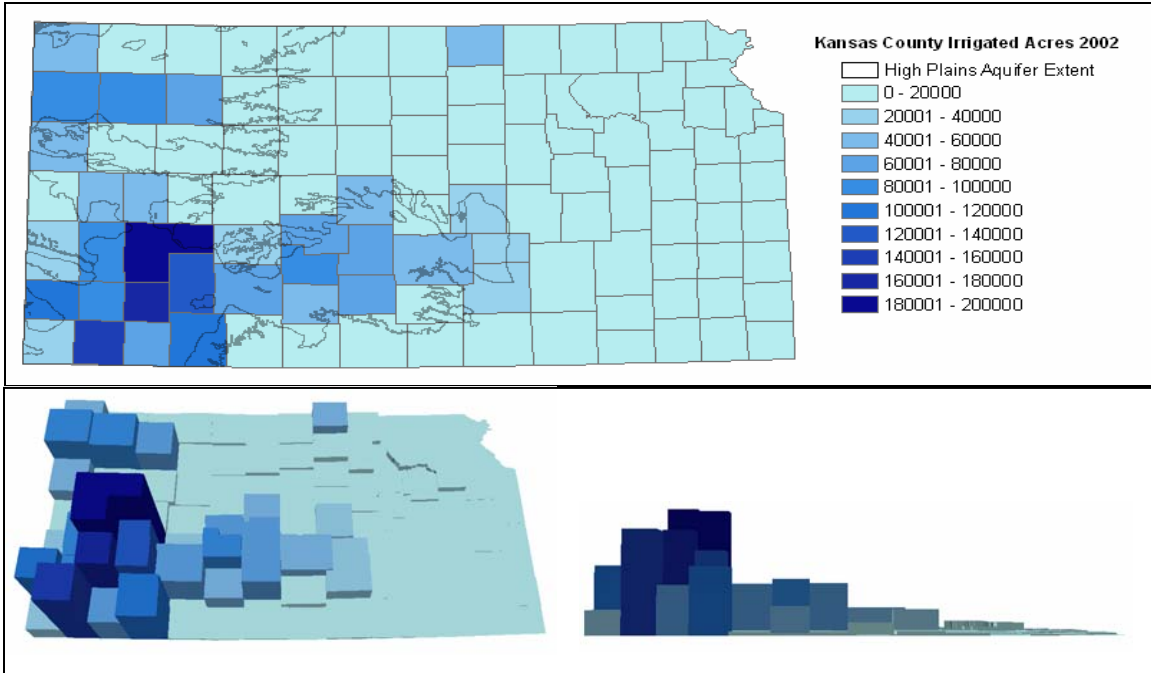


Figure 12. Kansas County Irrigated Acres 2002.

Kansas County irrigated acres in 2002 (shown above in map and 3D and section formats) indicate only one county outside the extent of the High Plains Aquifer with greater than 20,000 irrigated acres. Total irrigated acres in 2002 for the 54 counties overlying the High Plains Aquifer were 2,452,734. The Kansas Geological Survey estimated lifetime of High Plains Aquifer water resources indicates a dire situation for counties that have not grown in the past decade and a bleak outlook for parts of most counties that had experience growth since 1990.

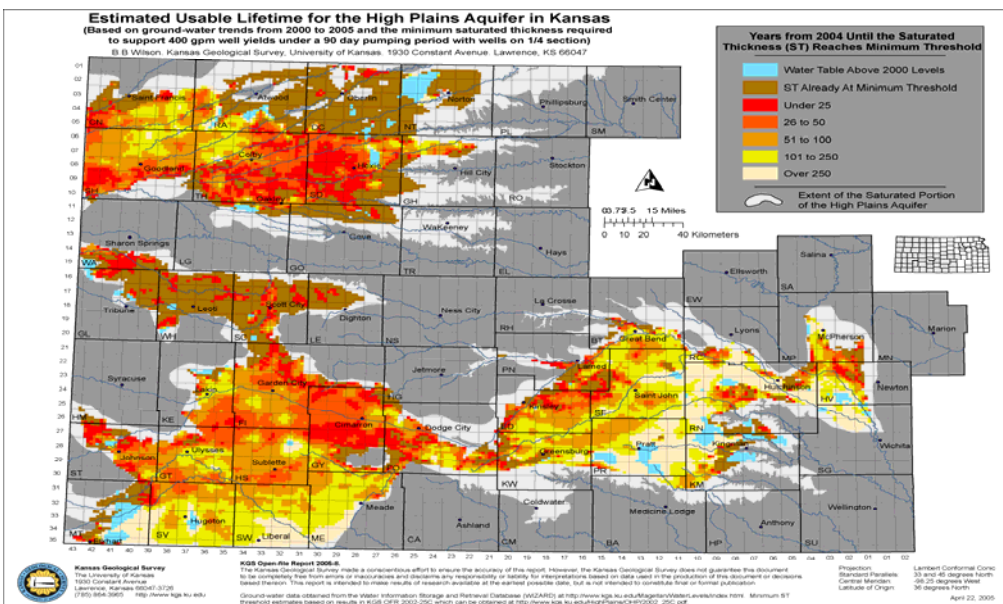


Figure 13. Estimated Useable Lifetime (Source: KGS OFR 2005-8)

## Conclusions

Research questions regarding the drivers of socio-economic, agriculture and irrigation change are just beginning to be formulated and researched, however one apparent connection between population growth and irrigation has been identified in this study. When Population Ratio 1990-2000 colors are placed on 3D County Irrigated Acres, counties in the southwest corner of the state that irrigate the largest number of acres are also those that have shown growth in the last decade. Given the KGS estimated useable lifetime of the aquifer, the same southwestern counties are likely the only counties in the western half of the state with potential to grow into the future based on the continuation of existing agricultural practices and estimated useable lifetime of the aquifer. Many important questions remain, however one very large issue for southwestern counties will be the age cohort projections and potential impact on agriculture production due to workforce aging.

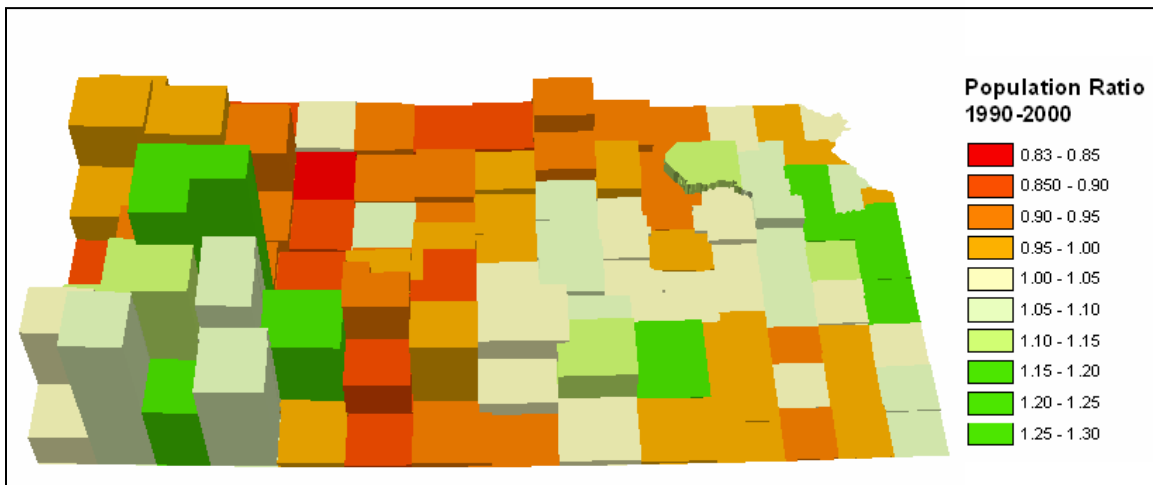


Figure 14. Kansas County Population Ratio 1990-2000 and Irrigated Acres Extruded

## Sources

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