# The Kansas Surface Water Database

## Final Report

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# Credits

The Kansas Surface Water Database (KSWD) 2003 was created at the Kansas Applied Remote Sensing (KARS) Program of the Kansas Biological Survey.  The database is an extension of a project sponsored by the Kansas Department of Agriculture, Division of Water Resources to map water impoundments in Kansas.

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# Introduction

The Kansas Surface Water Database is an outgrowth of a project sponsored by the Kansas Department of Agriculture, Division of Water Resources to map water impoundments in Kansas.  The Surface Water Database includes impounded and standing water bodies such as lakes, reservoirs, playas, cooling and settling ponds.  The water bodies in the database are not categorized by type (e.g. reservoir, playa, etc.) and therefore all water bodies are labeled with the same attribute value.  The minimum size threshold for water bodies in the database is 1.5 acres.  The data are available by counties in UTM projection/NAD 83 datum and as a statewide map in Lambert Conformal Conic projection/NAD 83 datum.  All database (county and state) are in ArcGIS grid format.

# Purpose

The Kansas Surface water database was created primarily to serve as a cartographic element in map design.  It may also be used to assist the compilation of other water databases, such as 24k NHD, by identifying water bodies that are more recent than the source material used for the compilation.  It was derived from 2000-2001 Landsat Thematic Mapper satellite imagery from the Kansas Satellite Image Archive (KSID) at the Kansas Data Access and Support Center (DASC) of the Kansas Geological Survey.

# Methods

*Data Acquisition*

Landsat Thematic Mapper (TM) and Enhanced Thematic Mapper (ETM+) county scenes from the 2000 - 2001 Kansas Satellite Image Database (KSID) were used. Summer scenes were chosen because they occur during or right after the highest rainfalls when water bodies should be at their fullest. These data are in Universal Transverse Mercator (UTM) NAD 83 projection.

*Processing*

An unsupervised classification was applied to the six-band multispectral summer image of each county to create 100 spectral clusters (Figure 1a). Each cluster was identified as either water or non-water based on visual inspection and with reference to ancillary data (e.g., 1991 DOQQs, DRGs). The 100 clusters were then recoded to a two-class map with classes representing either water or non-water pixels. A post-classification elimination technique was used to remove water bodies smaller than 1.5 acres. The 1.5 acre threshold size was determined to be the smallest water body size that could be accurately extracted. After further visual inspection, hand digitizing was employed to remove obvious non-water areas still visible on the map (Figure 1b).
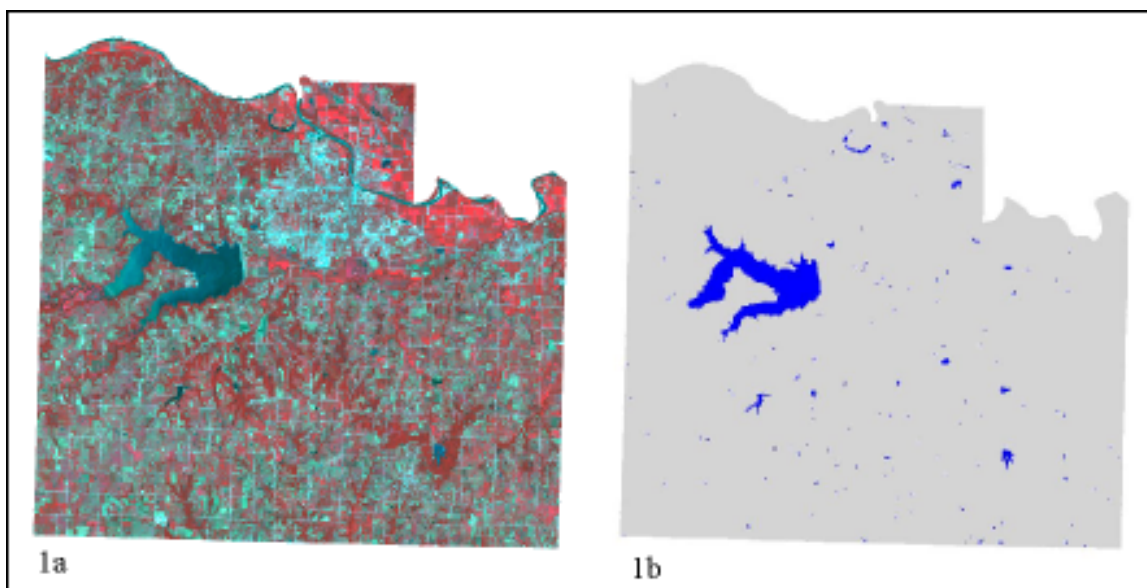


1a          1b

Figure 1: The surface water database of Douglas County. To create the surface water database, an unsupervised classification was applied to each Landsat multispectral summer image (a), creating 100 clusters that were assigned to either a water or non-water class to create the two class water map (b).

As we moved further west, the unsupervised classification process was unsuccessful for many counties primarily because in many counties in western Kansas there are not enough water bodies to be distinguished statistically from irrigated cropland. A hybrid classification technique was created to address this problem. First an

unsupervised classification was run generating 100 clusters.  Then between five and ten water pixel training sites were collected and combined to represent water. These training sites were used to find statistically similar pixels throughout the county.  This hybrid approach was applied to the following counties: Grant, Gray, Kingman, Clark, Comanche, Cheyenne, Decatur, Edwards, Greeley, Gove, Hodgeman, Harper, Haskell, Kearney, Kiowa, Logan, Lane, Meade, Morton, Ness, Pawnee, Pratt, Rawlins, Rice, Rush, Scott, Sheridan, Stevens, Stanton, Thomas, Wallace, and Wichita.

*Product Generation*

The surface water database includes impounded and standing water bodies such as lakes, reservoirs, playas cooling and settling ponds.  The water bodies in the database are not categorized by type and therefore all water bodies are labeled with the same attribute value.

The data is available in two formats: as county grids in UTM NAD 83 and as a statewide grid in Lambert Conformal Conic Projection NAD 83.  The statewide grid was created by mosaicking all county grids together and reprojecting to Lambert (Figure 2).
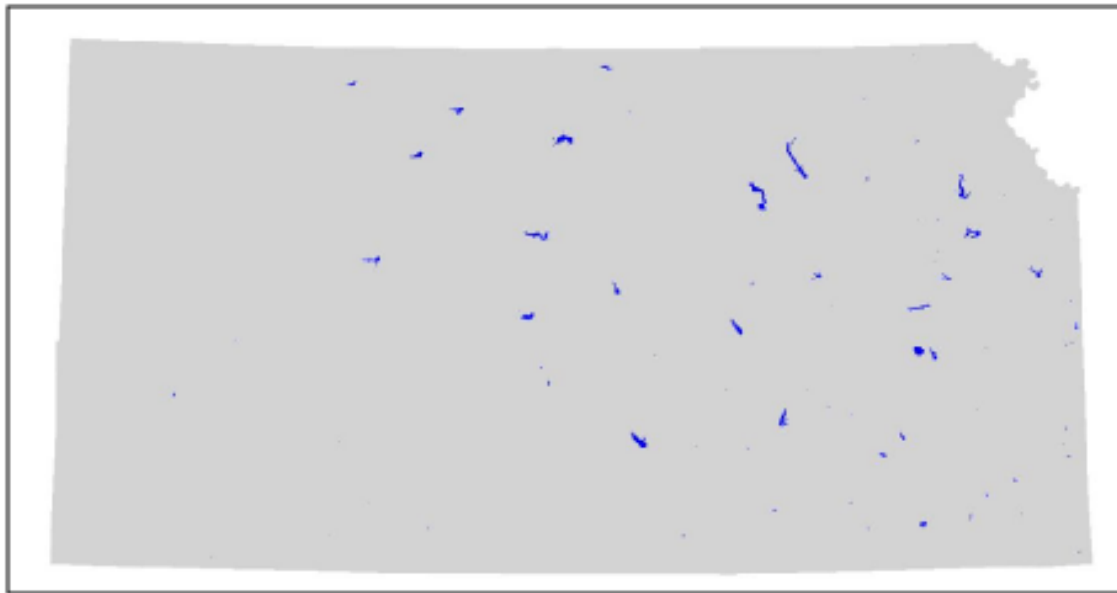


Figure 2.  The statewide Kansas Surface Water Database.

# References

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