REFERENCE MATERIAL - GMD3 MANAGEMENT PROGRAM

Kansas water law and planning legislation history notes.

Selected from work by **John Peck** who provides a water rights and planning history outline in his writing on drought concern and Kansas water law: ***Legal Responses to Drought in Kansas,*** Kansas Law Review, Vol. 62, No. 1141, 2014, University of Kansas - School of Law.

Legislation

A. Pre-1945 water statutes: Drought not mentioned specifically, but perhaps can be inferred as one of the background reasons for some legislation:

1. 1866 (irrigation companies empowered to construct canals)
2. 1886 (stream water may be used for irrigation by appropriation, and first in time is first in right)
3. 1889 (ditch and canal companies empowered to condemn water rights)
4. 1891 (waters west of 99th meridian to be devoted first to irrigation use, subject to domestic, 2nd to industrial use; irrigation districts may be created)
5. 1899 (irrigation companies empowered to condemn to aid in establishing reservoirs, lakes, or ponds for water storage)
6. 1917 (Kansas Water Commission established to investigate problems of, *inter alia*, domestic water supply and irrigation; to establish river gaging stations; to make general plan for development of river basins; repealed 1927)
7. 1919 (Division of Irrigation created in State Board of Agriculture (BOA), under control of commissioner of irrigation; duties of commissioner included gathering data, visiting sites, and making quarterly reports to BOA)
8. 1927 (legislature abolished Water Commission and Division of Irrigation; Division of Water Resources (DWR) created to take over duties) [chief engineer position created]
9. 1933 (Chief Engineer made head of DWR)

B. The 1945 Water Appropriation Act: Activity related to and resulting from 1930s drought: Richard Pfister, WATER RESOURCES AND IRRIGATION, PART IV OF ECONOMIC DEVELOPMENT IN SOUTHWESTERN KANSAS, KU School of Business (March 1955)

1. 1940 (Governor appointed committee and held conference to study problems and make recommendations; committee report recognized need for a state plan to control the water resources)
2. 1941 (legislature repeals part of 1886 Act and established administrative procedures for handling applications for water appropriations)
3. 1944 (*State ex rel. Peterson v. Kansas State Board of Agriculture*, 158 Kan. 603, 149 P.2d 604 (1944) (affirmed common law doctrine of absolute ownership for groundwater; concluded that the chief engineer had been given no power over groundwater allocation))
4. 1944 (Governor appoints committee to study state water law, which produces "The Appropriation of Water for Beneficial Purposes: A Report to the Governor" (Dec. 1944) recommending adoption of Doctrine of Prior Appropriation)
5. 1945 (legislation adopts the Water Appropriation Act (WAA)) [Now all Kansas water rights to follow one doctrine and unused water is dedicated to the people of the state subject to beneficial appropriation as provided in WAA]

6. 1956 (clarify water rights as changeable real property that must tolerate reasonable economic effects between users)
7. 1972 GMD Act (legislature dedicates local groundwater management rights)
8. 1978 (legislature restrict all non-domestic use without first obtaining state permission and adds Intensive Groundwater Use Control Area provision in GMD Act)
9. 1986 (mandated annual water use reports by March 1st each year subject to fines)
[10. Water right management tools developed since then.]
[2012: Local Enhanced Management Areas (LEMA's) allowed]
[2012: Eliminating forfeiture of groundwater rights for non-use in closed areas]
[2015: Water Conservation Areas (WCA's) allowed]
[2015: Requirement for chief engineer to give due consideration of past management and voluntary conservation in new conservation programs.]

Kansas Water Planning Acts

1. 1917 (Kansas Water Commission established to investigate problems of, *inter alia*, domestic water supply and irrigation; to establish river gaging stations; to make general plan for development of river basins; repealed 1927)
2. 1955 (Kansas Water Resources Board and executive director established)
a. Charged with working on and working out a state water plan of water resources development.
b. Background: "The State of Kansas had no sooner recovered from the spectacular floods of 1951 when it plunged into one of the most severe droughts in Kansas history from 1952 through 1956. This sequence of disasters led to legislative creation of the Kansas Water Resources Board in 1955 as a move to try to do something to avert or at least alleviate future crises through aggressive planning.

3. 1963 (State Water Plan Act, 82a-901 *et seq.)*
4. 1981 (Kansas Water Resources Board replaced by the Kansas Water Authority, the Kansas Water Office, and the director of the Kansas Water Office)
5. 1984 (State Water Resource Planning Act: major amendments to K.S.A. 82a-901a, *et seq.*)
6. 1985 (K.S.A. 82a-906 amended to provide dynamic planning process, under which KWO presents annual water plan and recommendations to the legislature)

End of Legislation History notes.

Maps and groundwater model information

The following maps provide map that inform management program activity.

The High Plains Aquifer Atlas can be found at:
http://www.kgs.ku.edu/HighPlains/HPA_Atlas/Water%20Rights%20and%20Water%20Use/index.html

The most recent GMD3 groundwater model information can be found at the following urls:

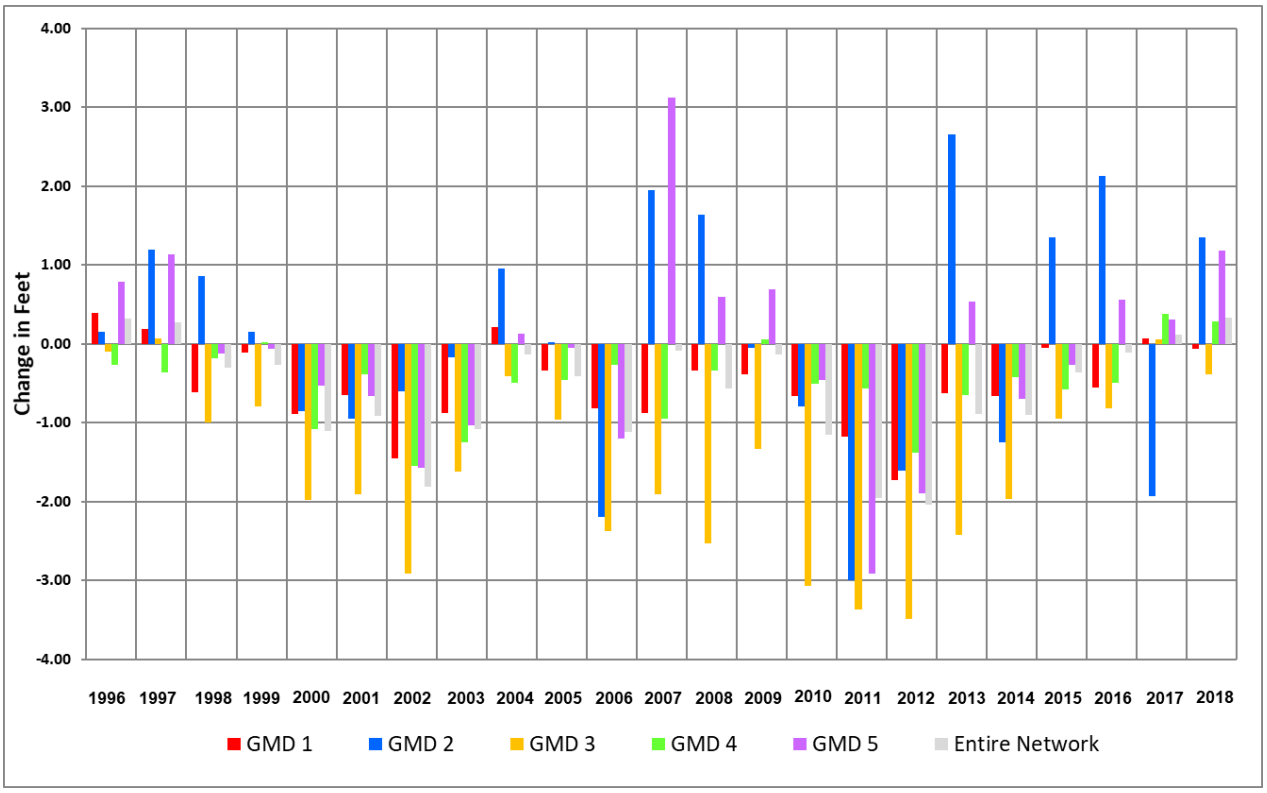
GMD3 Ground-Water Model: http://www.kgs.ku.edu/Hydro/Publications/2010/OFR10_18/

GMD3 Model Future Scenarios: http://www.kgs.ku.edu/Hydro/Publications/2012/OFR12_3/

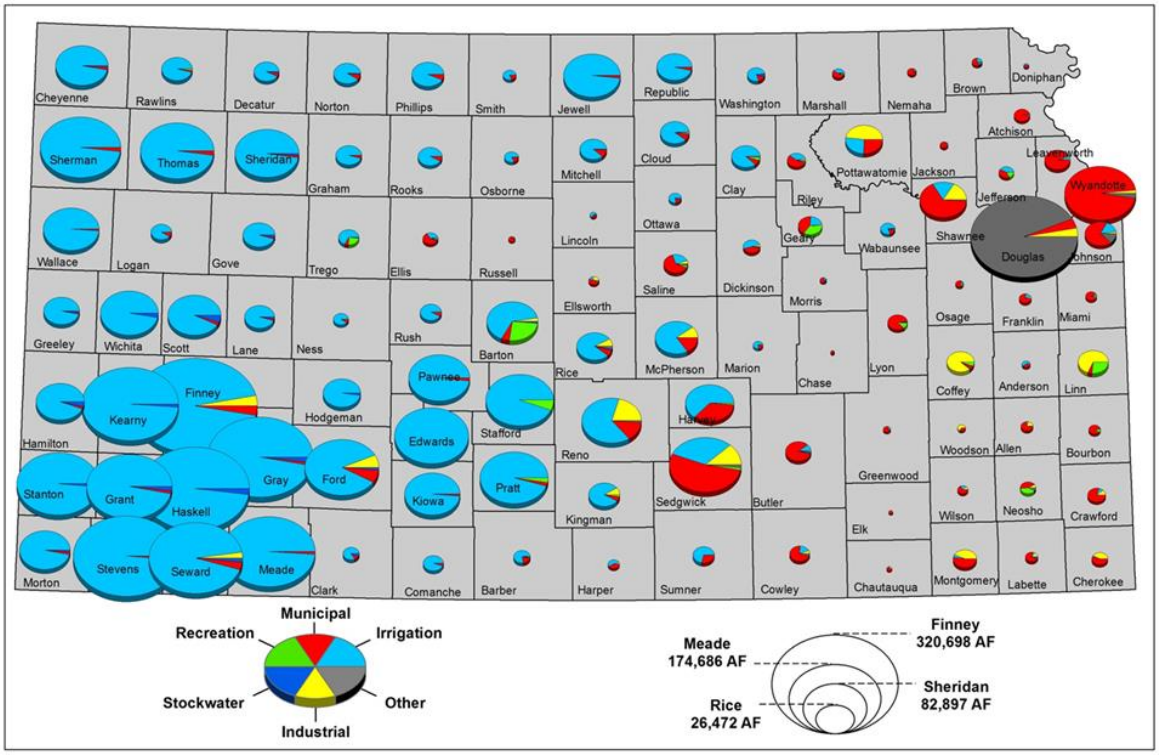
Potential economic impacts of water-use changes in Southwest Kansas:
http://www.tandfonline.com/doi/abs/10.1080/19390459.2013.811855

Section level percent decline in storage (since 1950) of the OHP Aquifer in GMD3.
Source: KGS, http://www.kgs.ku.edu/Publications/pic18/index.html

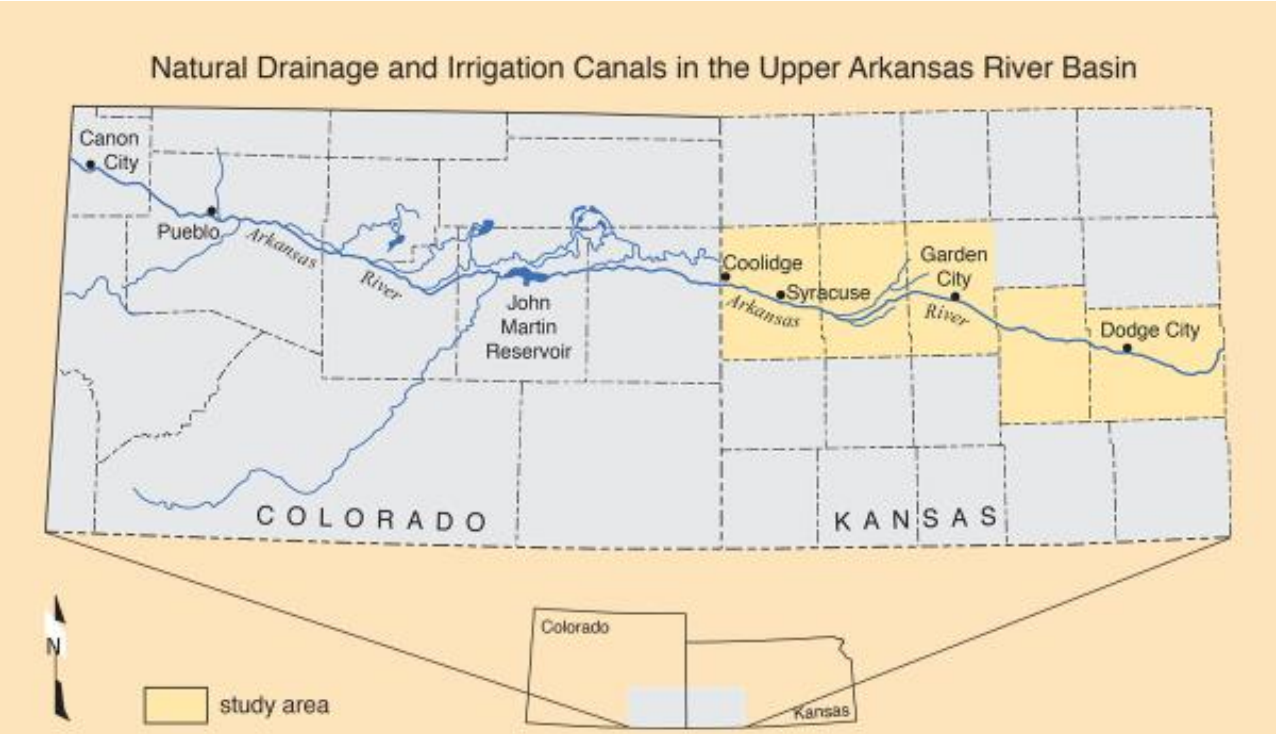
Saturated Thickness of the Ogallala/High Plains Aquifer, 2015.Source: KGS, http://www.kgs.ku.edu/Publications/pic18/index.html



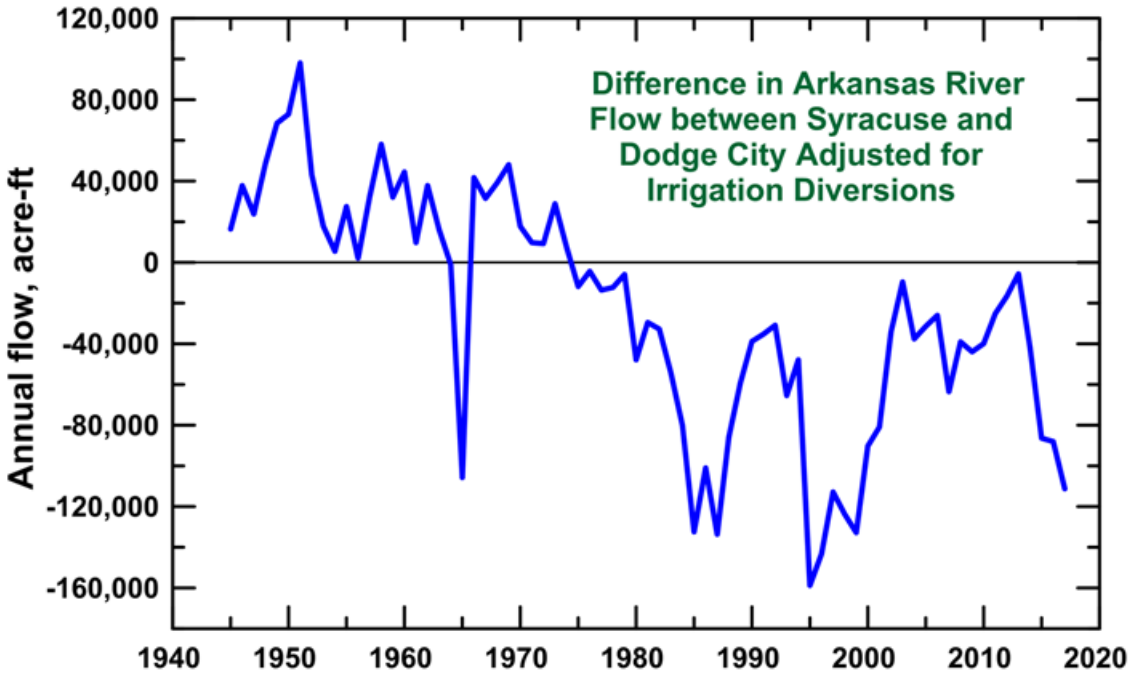
Average change results above are based only on the cooperative network (KGS and KDA-DWR) and do not include sub-regional networks from the KDA-DWR, KGS, or local GMDs. 2019 water levels are provisional data.



Average annual reported water uses 1995 to 2014 are influenced by precipitation patterns and available groundwater. “Other” use is primarily flow through hydropower. Source: KGS.

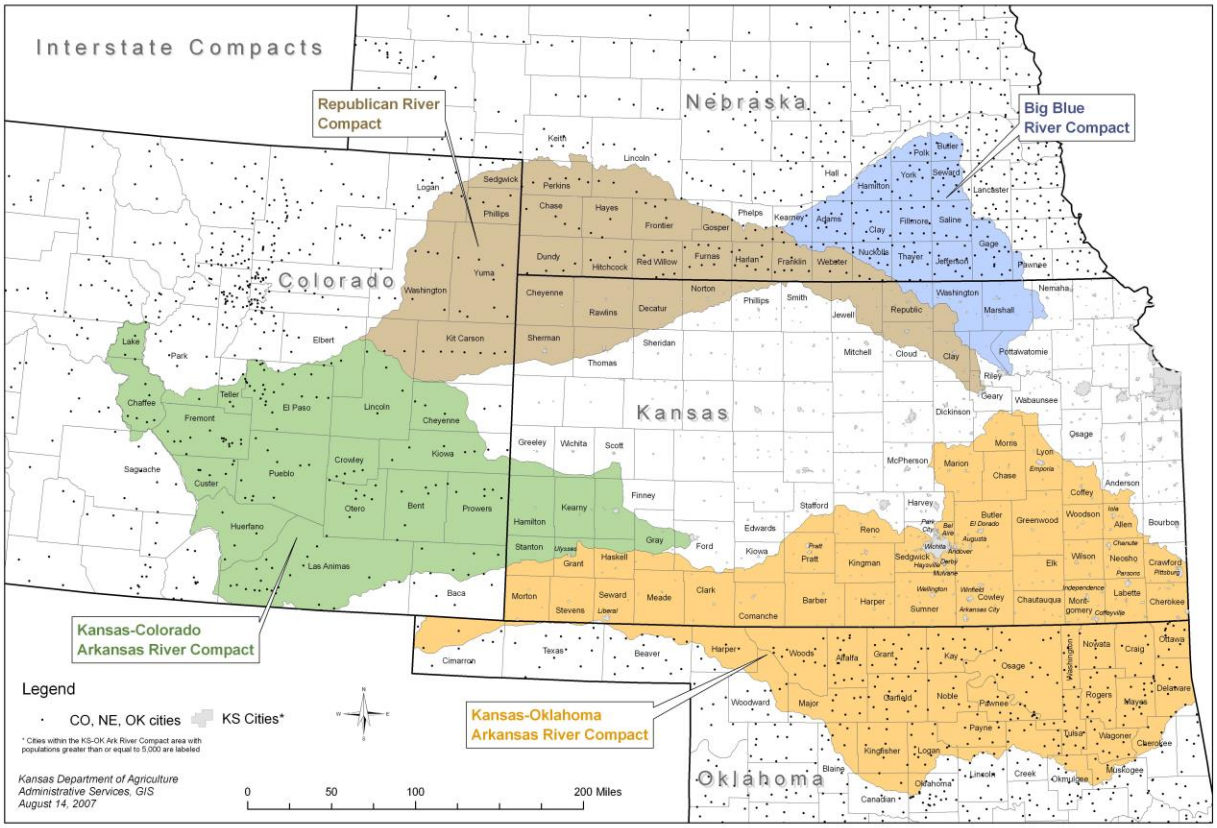


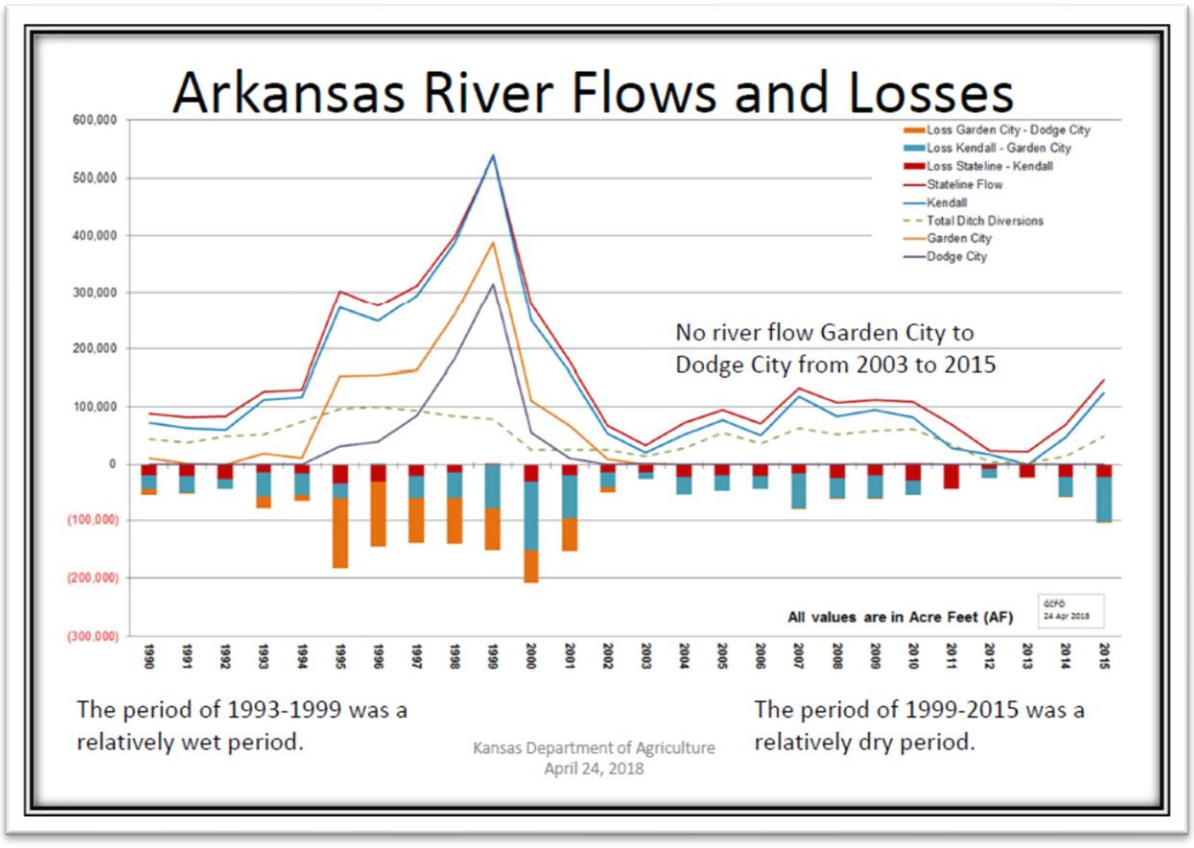
Evapotranspiration in the area of irrigation diversions and reservoirs in eastern Colorado substantially decreases the river flow before it enters Kansas. A smaller extent of irrigation ditches also divert river water in the GMD3 area.



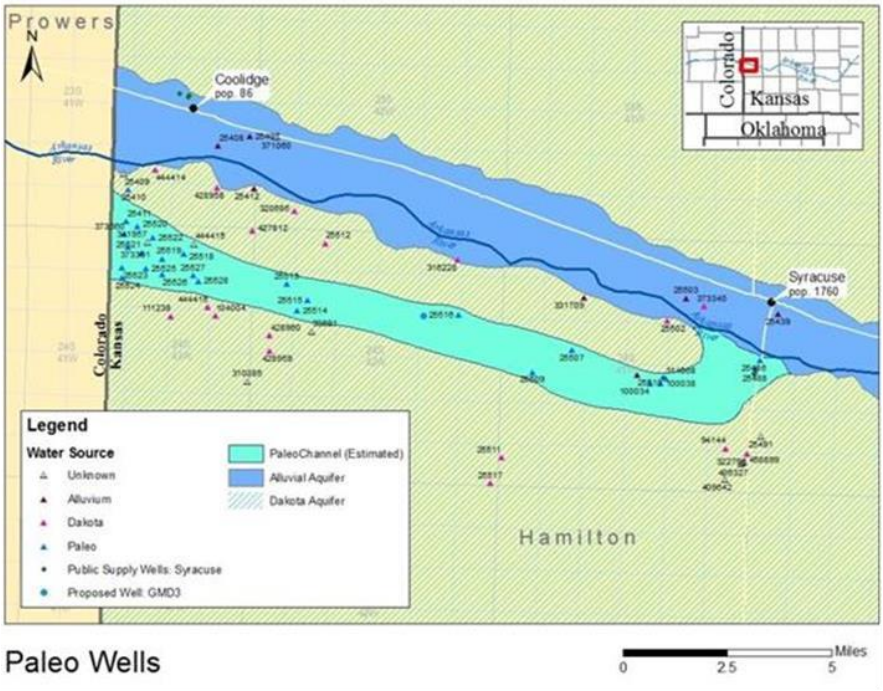
Before the mid-1970s, the Arkansas River nearly always gained flow (represented by positive values on the graph) between the area of ditch diversions and Dodge City. Now the river

recharges the HPA, with recharge exceeding 100,000 acre-ft during years of higher flows. We've created a closed basin (KGS 2018). GMD3 has identified this hydrology setting to be surface water natural storage into available groundwater reservoir space.





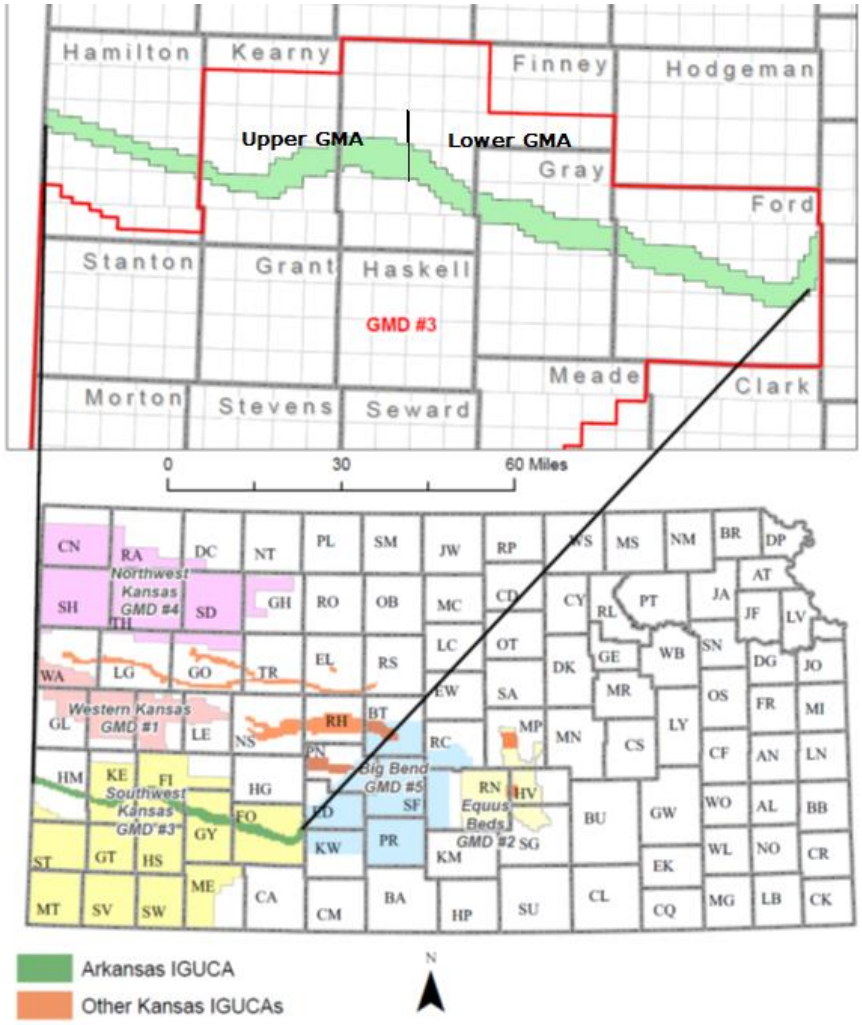
Arkansas River flow/loss chart. Source: DWR



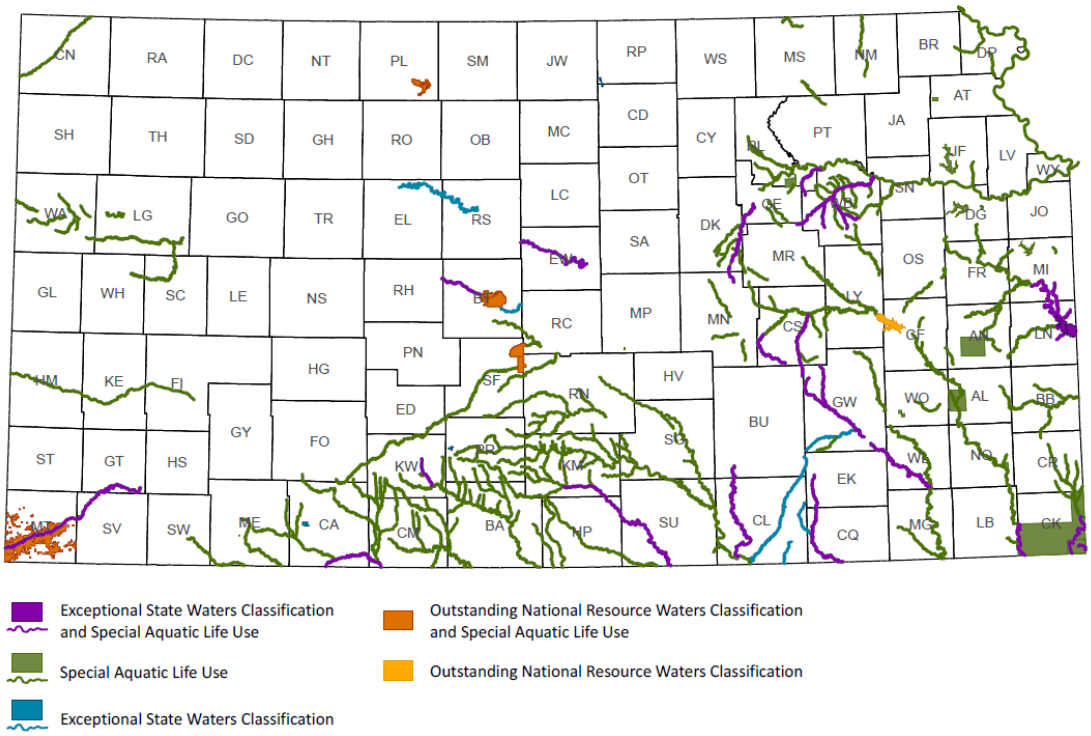
Paleo Wells

Hamilton County palio-river channel freshwater aquifer source of drinking water and river water quality mitigation to be managed.

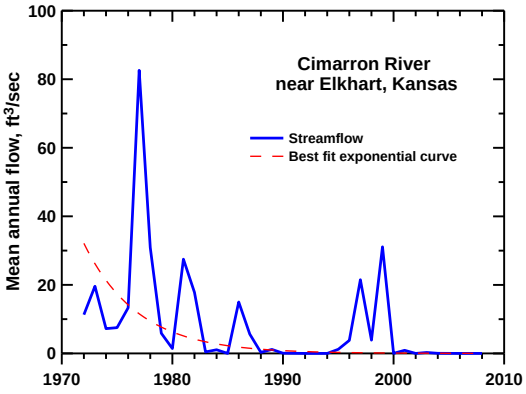
Ark River IGUCA



High Value Surface Water Designations within Kansas



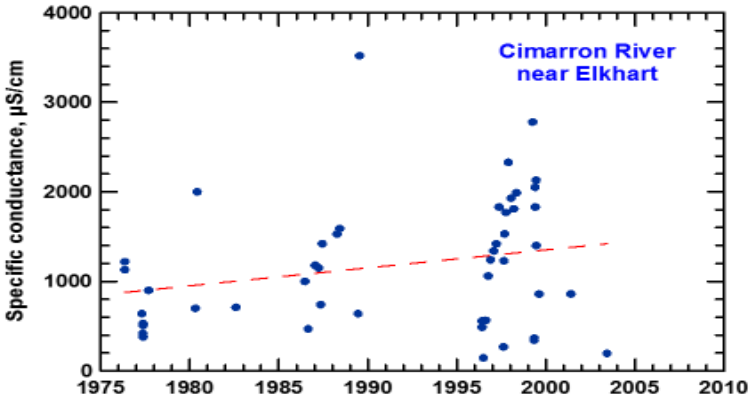
Map showing Exceptional State Waters and Outstanding National Resource Waters of the Cimarron River and National Grassland. Source: KDHE, 2010



Cimarron River entering Kansas in Morton County

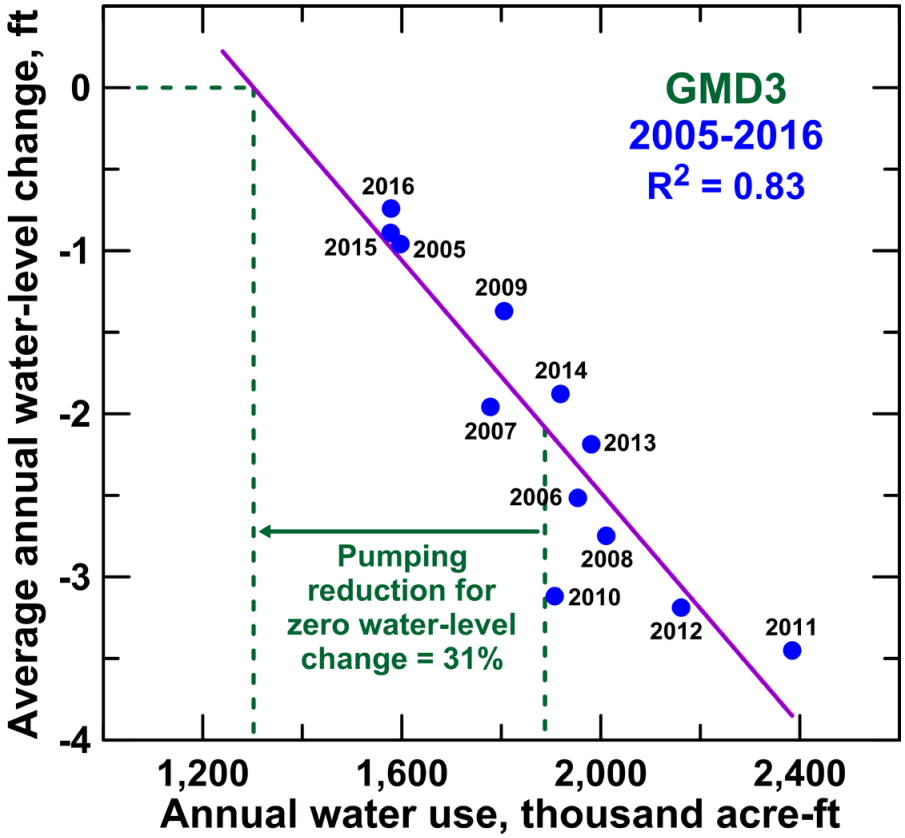
Water use in the Cimarron River valley upstream of the Kansas Stateline has decreased flow and increased salinity of the river system entering Kansas. The river no longer flows except occasionally.

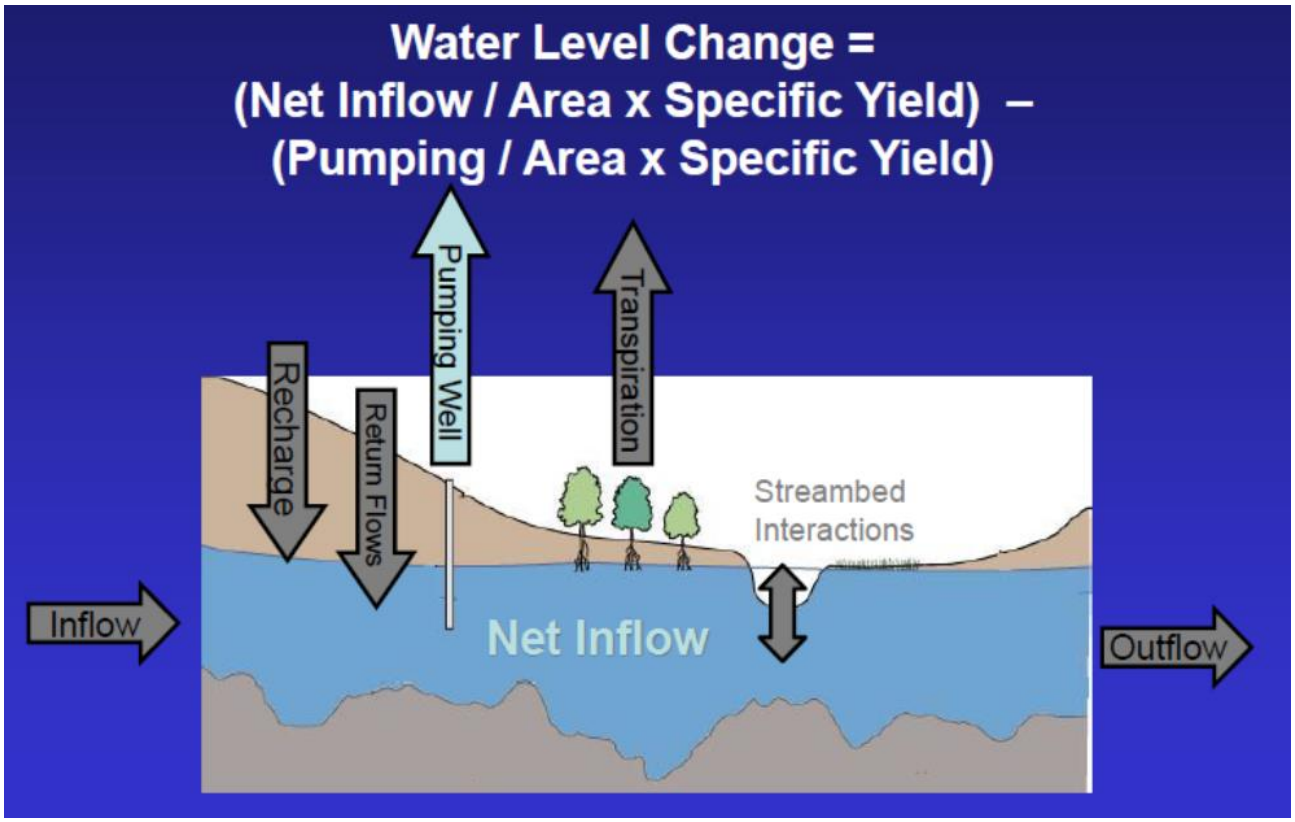
From Kansas Geological Survey Open File Report 2005-27



From Kansas Geological Survey Open File Report 2005-27

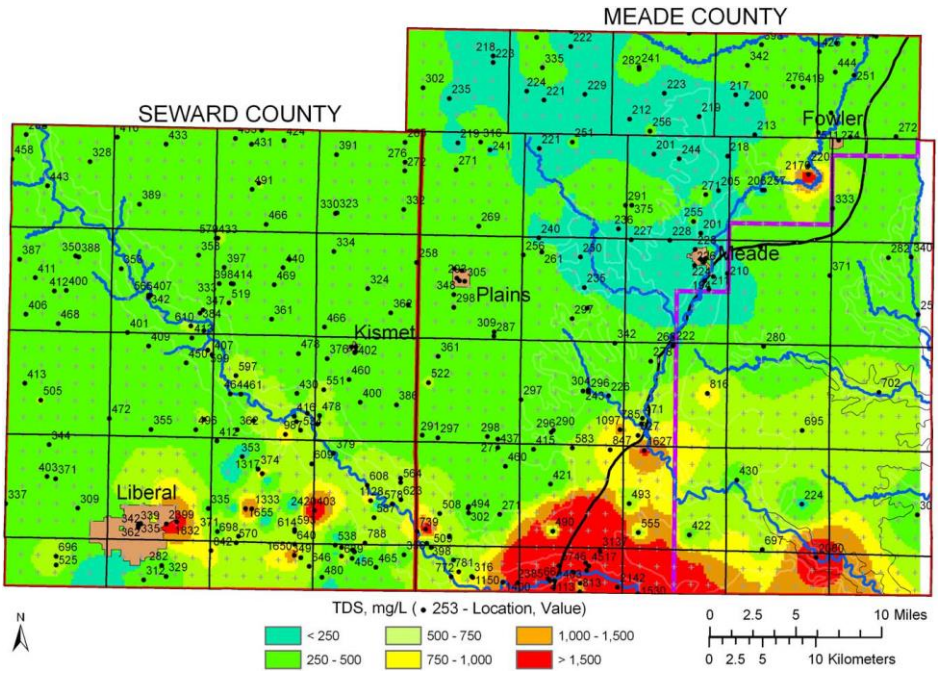
How close to sustainable? Average annual water-level change versus annual water use for GMD3 for 2005–2016. Water-level data are for KGS-DWR cooperative network wells measured each winter during the period. The solid line is the best-fit straight line to the plot. The pumping reduction from the average water use for 2005–2016 to that needed to achieve a zero water-level change is shown by the vertical dashed green lines. From *Status of the High Plains Aquifer in Kansas* | Whittemore, Butler, & Wilson, KGS Technical series 22, 2018. 31% = about 776,000 acre-feet.



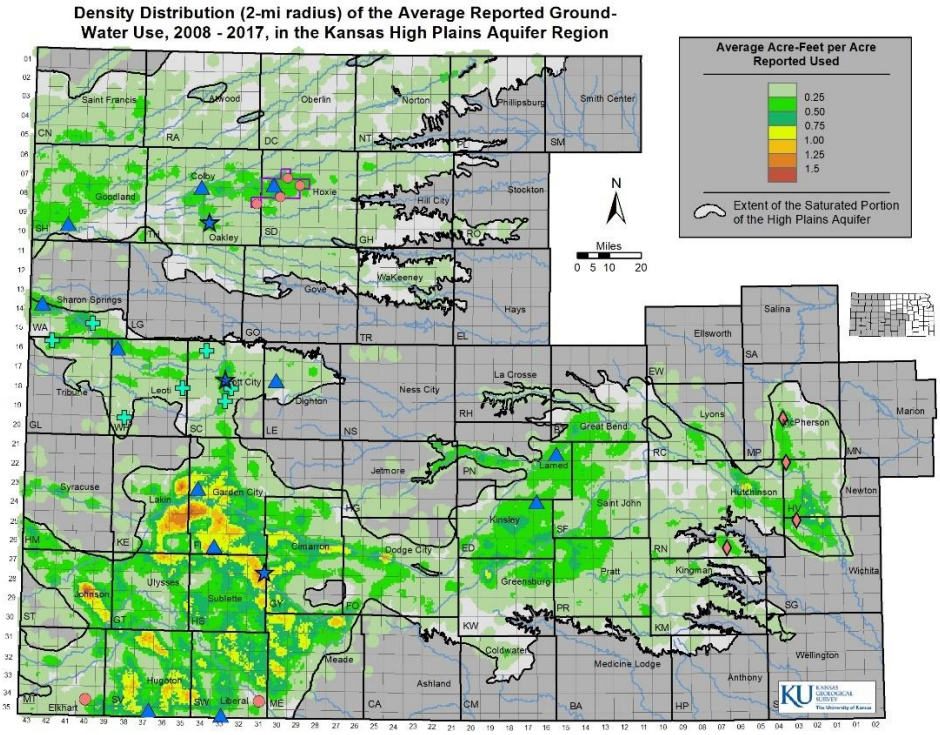


Source: Kansas Geological Survey

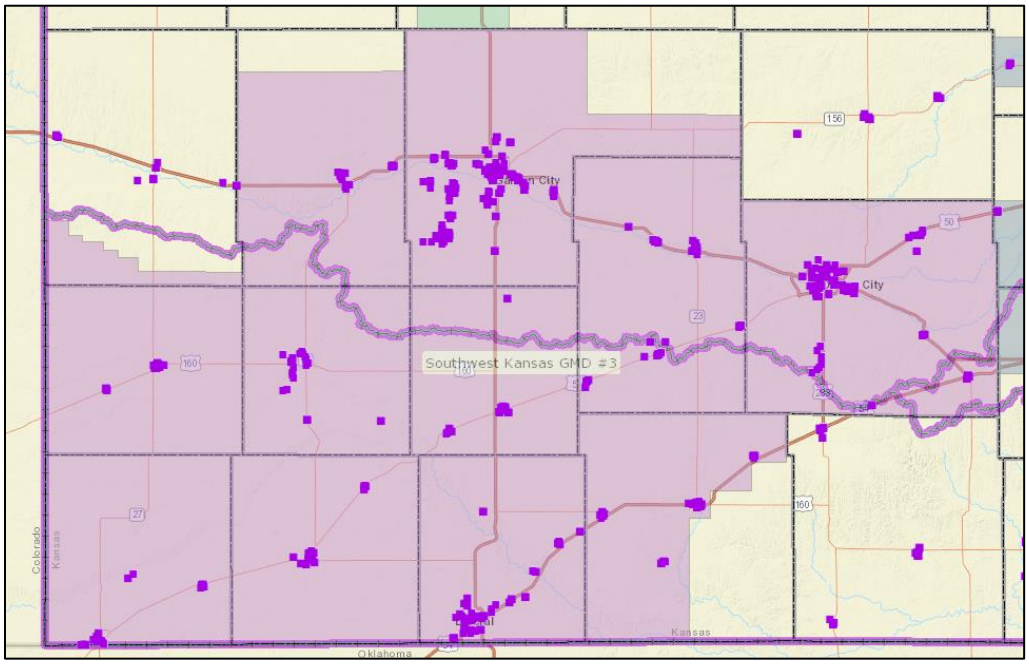
GMD3 Special Rule GMA (Water Quality Control Area)



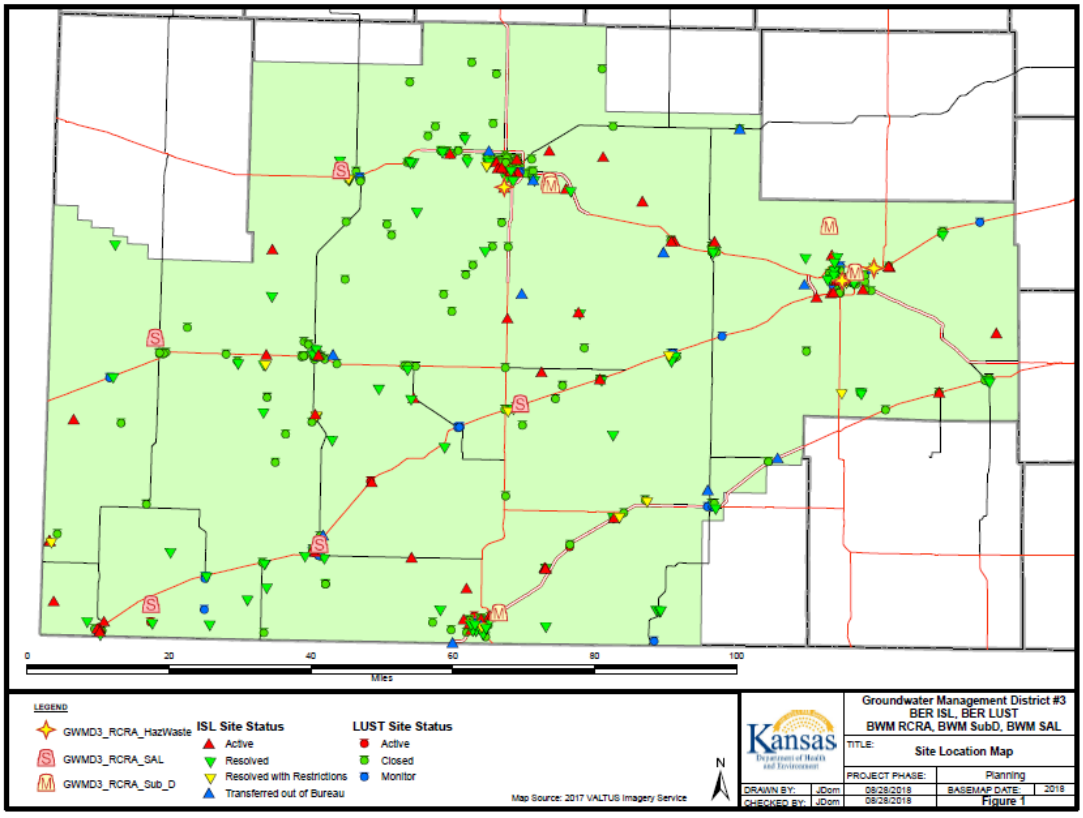
Distribution of chloride concentration in groundwater in groundwater reservoirs in Seward and Meade counties. The blue line extending from northwest to southeast Seward County and through southwest Meade County is the Cimarron River. Most of the blue lines in northern, central, and southeast Meade County are streams that are part of the Crooked Creek drainage basin. The vertical red line is the boundary between Seward and Meade counties. The purple line within Meade County is part of the eastern boundary of GMD3. The black line extending from southwest to northeast Meade County represents the eastern extent of the saturated part of the High Plains Aquifer in the figure. From KGS Open File Report 2005-27.



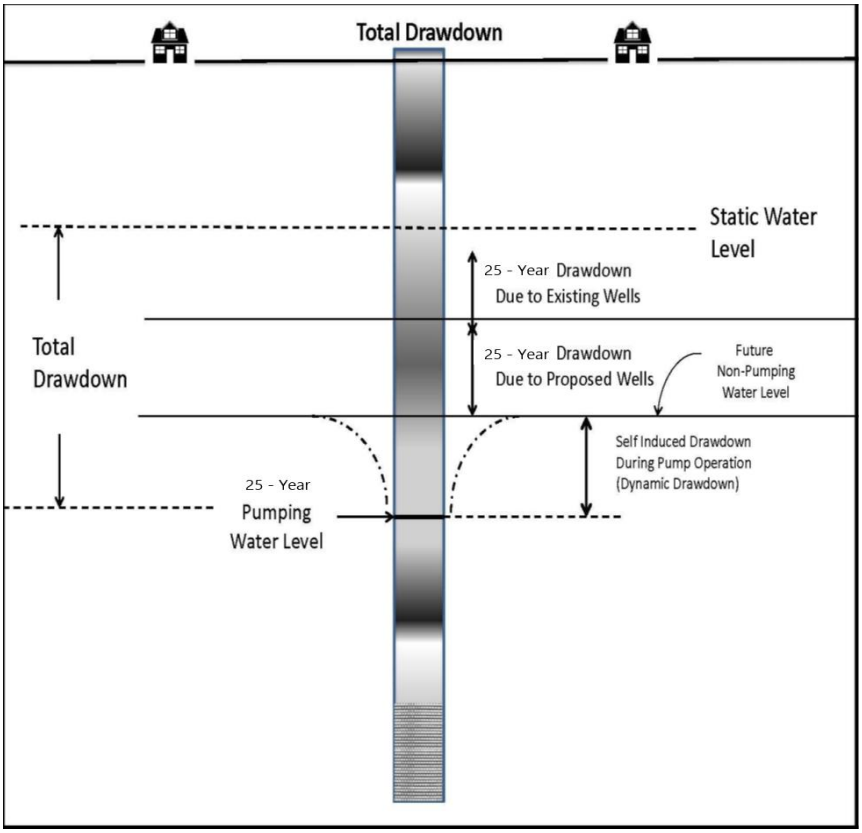
Kansas High Plains Groundwater reservoir detailed pumping density and location of KGS index wells in 2019.



2018 KDHE map of the 67 public water system infrastructure locations within or near GMD3. Map includes the boundary through the district between the Upper Ark and the Cimarron basins. Southeast Ford County includes the upper Rattlesnake Creek basin.



KDHE 2018 map of contaminated sites documented in the Identified Site List (ISL) and Leaking Underground Storage Tanks (LUST). A subset of these are “orphaned sites” with no identified responsible entity for site cleanup, including groundwater remediation.



Illistration (A), Total Drawdown Calculation

(A) is adapted from *Guidelines for the Assessment of Drawdown Estimates for Water Right Application Processing* (New Mexico Office of the State Engineer Hydrology Bureau Report 05-17, May 10, 2017, by Tom Morrison, et. al.). GMD3 may use a 25-year period of pumping to be consistent with GMD3 Board policy on maximum allowable rate of groundwater reservoir depletion.

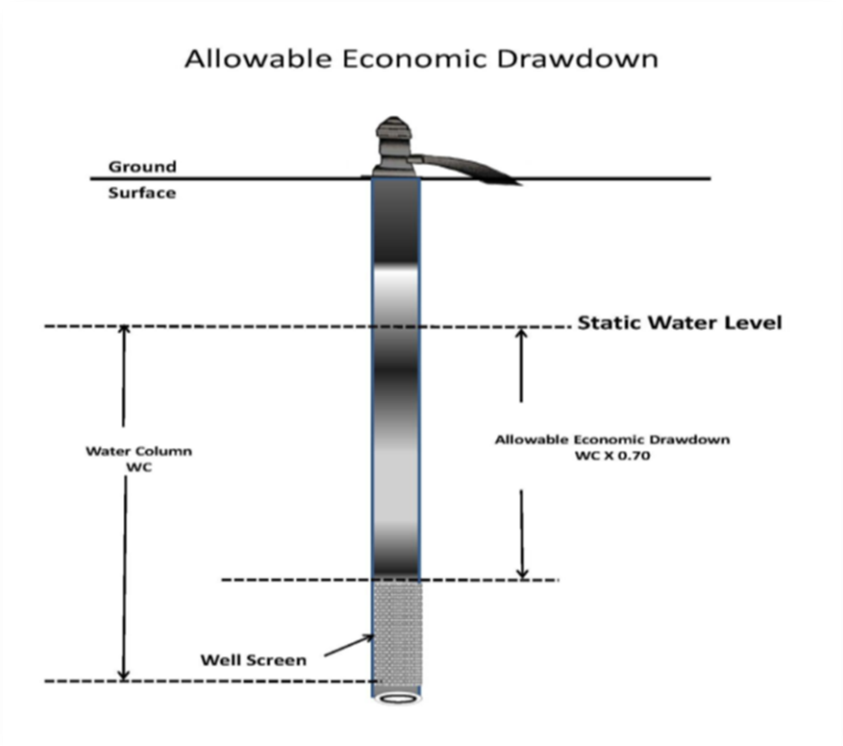


Illustration (B), Allowable Economic Drawdown

(B) is addapted from: *Guidelines for the Assessment of Drawdown Estimates for Water Right Application Processing* (New Mexico Office of the State Engineer Hydrology Bureau Report 05-17, May 10, 2017, by Tom Morrison, et. al.).

- The Theis equation estimates drawdown in the aquifer but not inside of the well casing.
- Dynamic drawdown represents drawdown inside of casing, including well inefficiencies.
- Dynamic drawdown represents fluctuating drawdown as pumps are cycled on and off.

See: http://www.gmd3.org/wp-content/uploads/2019/04/DRAWDOWN-ASSESSMENT-GUIDELINES-for-GMD3-2019.docx