Hot Topics in Kansas Water

Governor's Water Conference

November 14, 2018

David Barfield, Chief Engineer

Division of Water Resources
Kansas Department of Agriculture

Kansas
Department of Agriculture
Division of Water Resources

Kansas water hot topics

- Interstate compacts – conflicts and collaborations
- Wichita's requested changes to its Aquifer Storage and Recovery (ASR) Project
- Hays/Russell Pending Changes Applications and Proposed Water Transfer
- The Quivira National Wildlife Refuge impairment
- The Ogallala challenge: current directions to extend its life and benefits (LEMAs, WCAs, etc.)

Whiskey is for drinking…water is for fighting about

Discussing Water Rights, A Western Pastime

1901: Kansas first sues Colorado over the Arkansas River

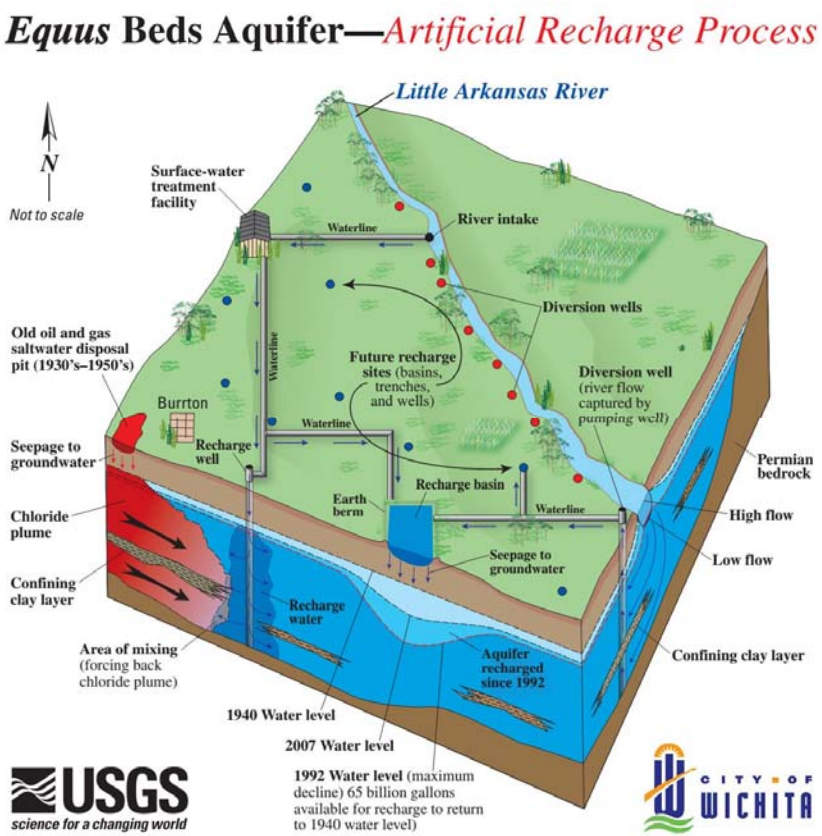
Kansas Interstate Water Compacts:

After multiple trips to the U.S. Supreme Court on the CO-KS Arkansas River and Republican River Compacts, and significant negotiations on implementing agreements, the Compacts are working.

Republican River Compact Long-term agreements

- Long-term agreements, adopted by the RRCA, summer 2016
- On August 1, 2018, Kansas and Colorado announced agreement on claims regarding Colorado's past use of water under the Compact (2003-13). Colorado to pay Kansas $2 million and to invest an additional $2 million in Colorado to reduce its use on the South Fork immediately above Kansas.
- October 2, 2018 we held a meeting in St Francis, KS, to discuss how to best invest $2 million in the basin and options for Bonny Reservoir.

Wichita's requested changes to its Aquifer Storage and Recovery Project



BURNS McDONNELL

ASR Permit Modification Proposal
Revised Minimum Index Levels & Aquifer Maintenance Credits

CITY OF WICHITA

City of Wichita, Kansas

Project No. 71395

3/12/2018

Wichita ASR Background

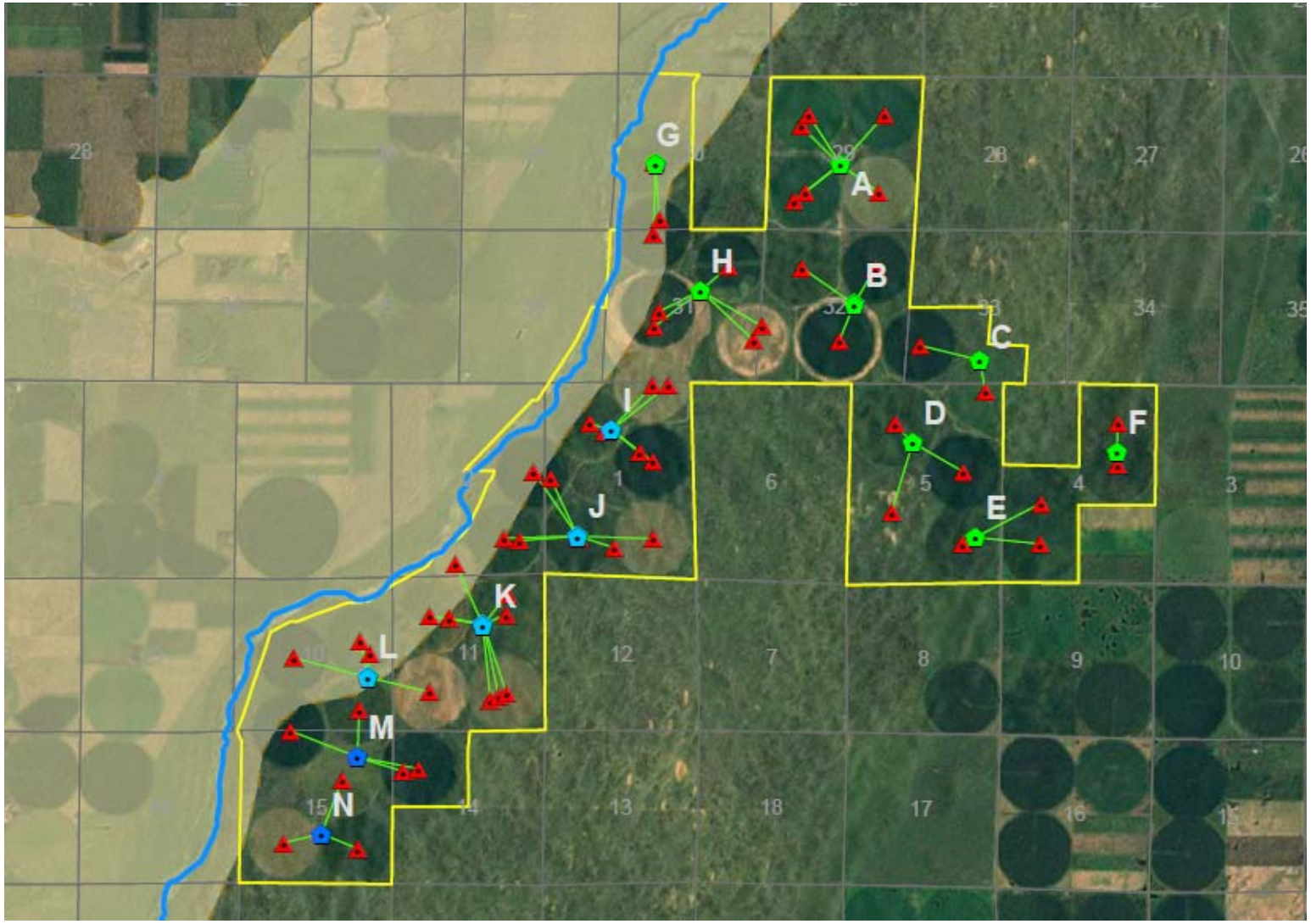
- Wichita's ASR was approved in phases: Phase I in 2005 (Burrton plume focus) and Phase II in 2009 & 2010.
- The City is two requested changes to its ASR permits.
- First, the City is requested that the bottoms of the basin storage area (BSA) be lowered.
  - This change is driven by the City re-purposing its ASR project to be a source of water during a protracted (1%) drought.
  - The current bottoms prevents the City from accessing some credits during drought.
  - The requested bottoms range between 72 - 86% full in the various index cells.
- Second, the City is requesting a new way to generate recharge credits.
  - Over the last two decades, the City's has moved 400,000 AF of its use from the Equus Beds Aquifer to Cheney Reservoir, contributing to the recovery of the aquifer to near-full conditions, making it difficult for the City to build the credits it needs in a protracted drought.

Wichita ASR: What are the proposed “Aquifer Maintenance Credits” (AMCs)

- The City is proposing AMCs to allow them to build ASR credits while keeping the Equus Beds Aquifer full.
- AMCs would allow the City to obtain recharge credits for:
  - water diverted and treated via its ASR infrastructure (diversion of Little Arkansas River flows)
  - when such water cannot be injected into the ground as the aquifer is near full and
  - when such water is taken to the City in lieu of Equus Beds water.
  - Additional terms and conditions proposed to protect the public interest and prevent impairment. Are they sufficient?
- A public hearing will be held on Dec. 11 for public comments. A second hearing will be held late January, principally for the formal parties.
- For more information: http://agriculture.ks.gov/WichitaASR

Hays/Russell Pending Changes Applications and Proposed Water Transfer

- Proposal to change 7,647 acre-feet (AF) from irrigation use on the R9 Ranch to municipal use for Hays/Russell
- 40 water right change applications
  58 points of diversion
- Two approvals required:
  1) contingent approval from KDA-DWR to change applications
  2) approval of the proposed water transfer via the Water Transfer Act process

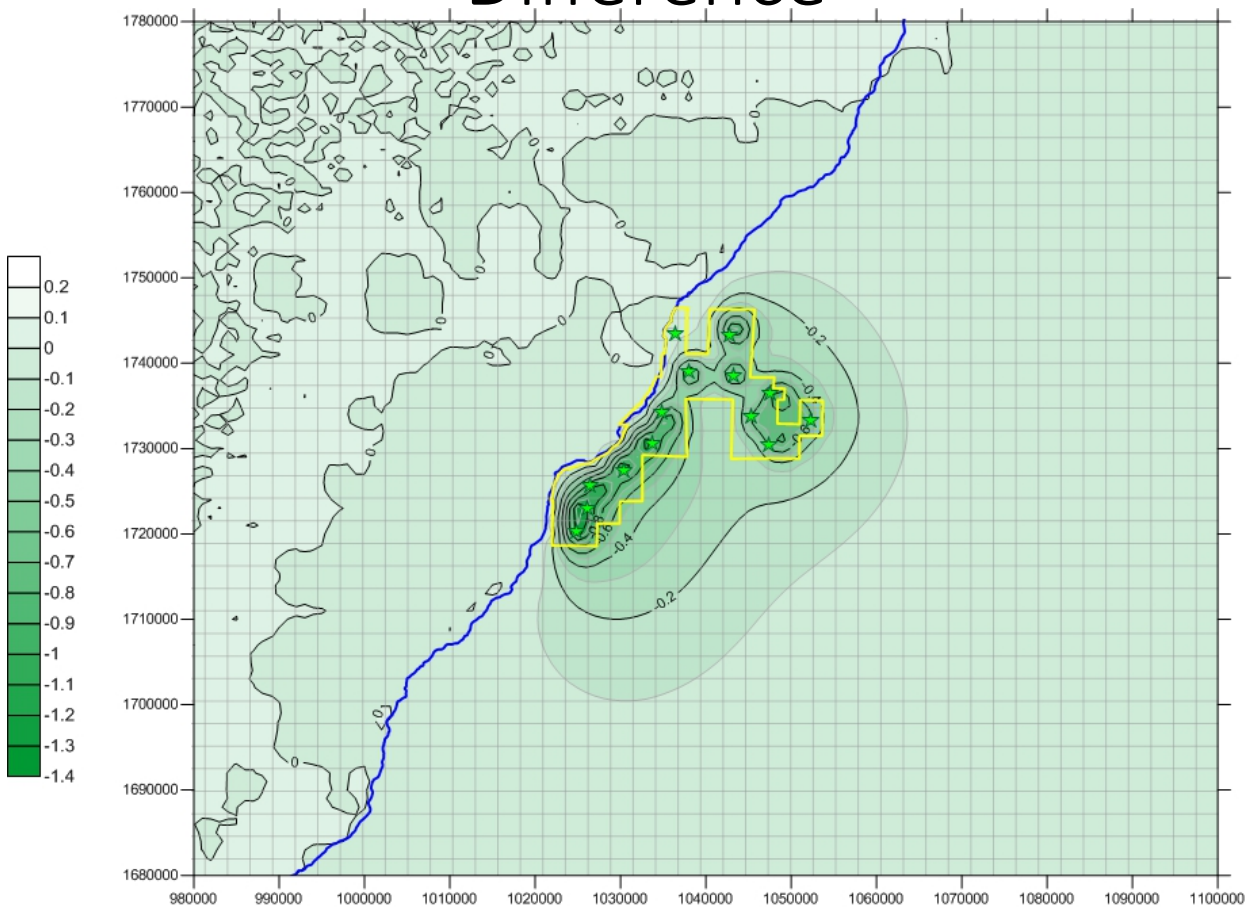


R9 Ranch well consolidation plan

Hays/Russell Changes – Draft approval provisions

- Consumptive use of 6,756 AF/year (annual limitation).
- 10-year limitation of 48,000 AF (an average of 4,800 AF/year) based on the demonstration of the long-term yield of the area from Cities' modeling analysis
- Ability to cancel the change approvals if the project cannot go forward
- Additional flexibility in locating their municipal wells (distance and time), including the ability "complete" some wells decades from now.

4800 AF Scenario Modeled Drawdown Difference



Difference between the baseline drawdown and drawdown from 1991 – 2007 with 14 municipal wells pumping a total of 4800 acre-ft per year 24/7.

Hays/Russell Changes - Process

- Significant work with Cities to develop proposed order
- A public educational meeting, June 21, 2018 followed by a significant public comment period.
- Currently evaluating input from GMD5, WaterPACK, others related to the change applications (challenging the consumptive use amount and modeling work).
- If changes contingently approved, initiate the Water Transfer proceeding (9-15 months to complete).

For more information: http://agriculture.ks.gov/HaysR9

Quivira National Wildlife Refuge impairment

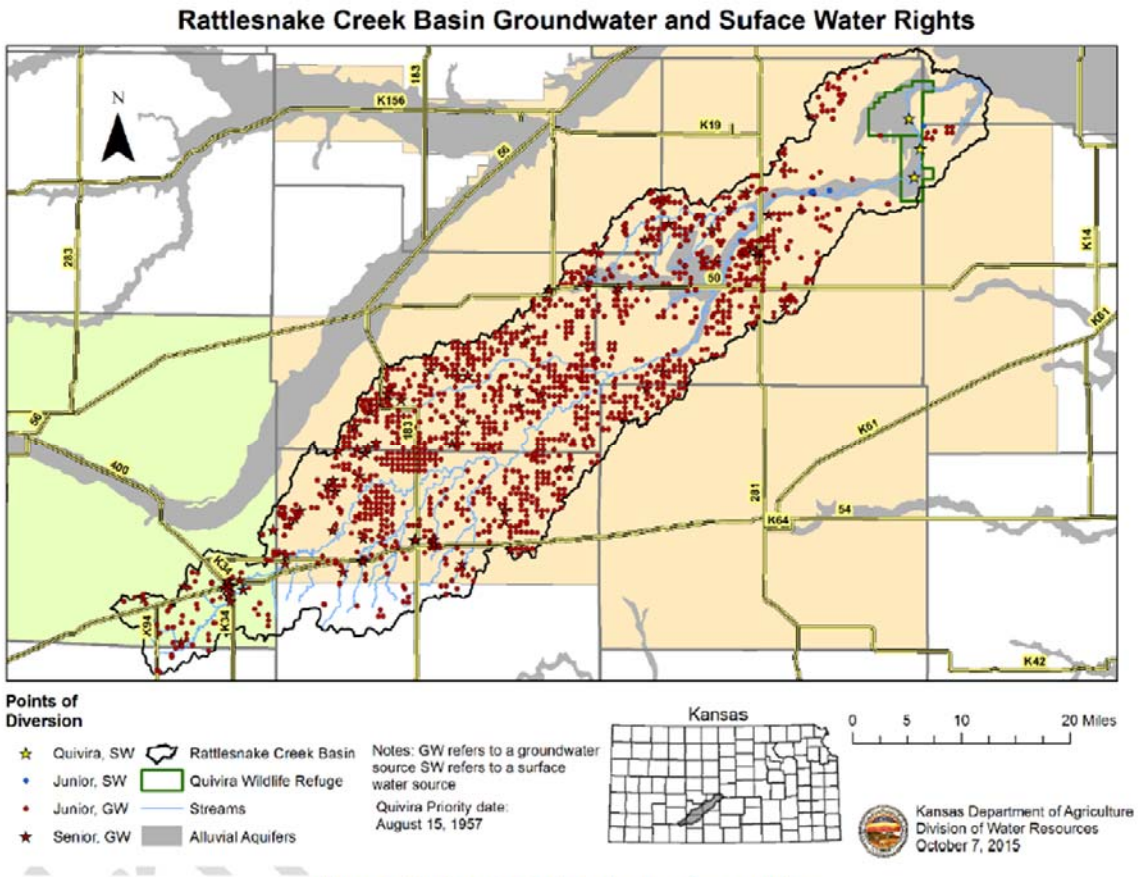
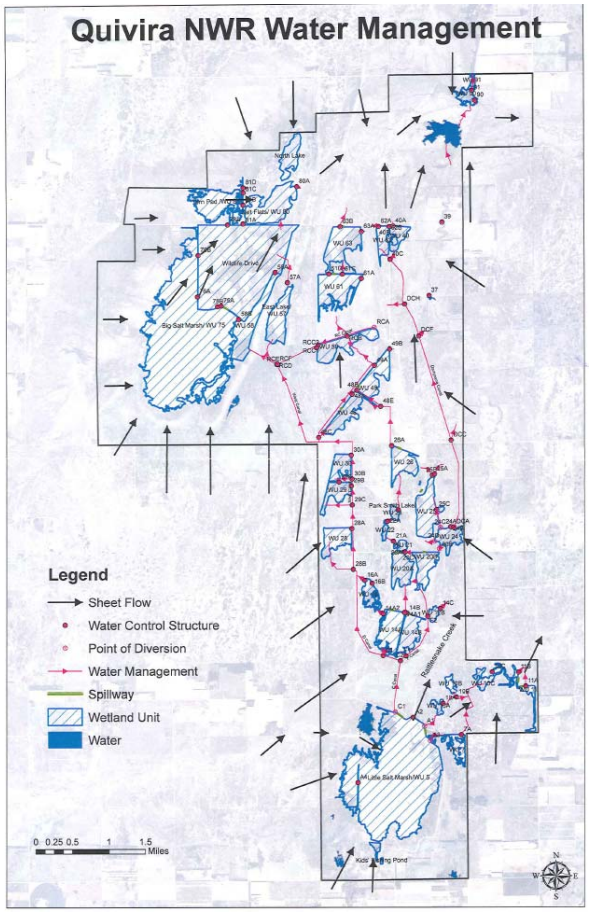


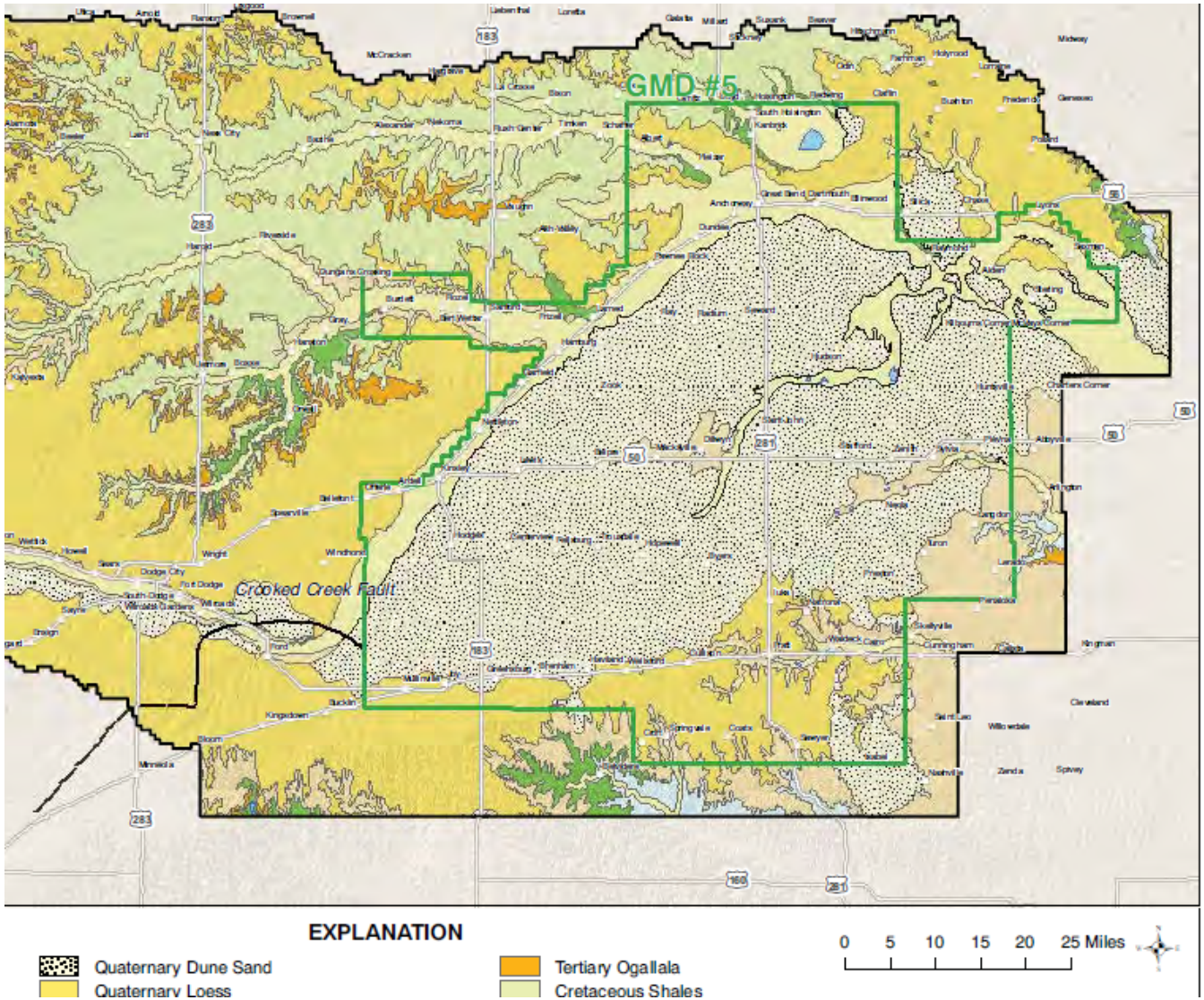
Figure 2 - Rattlesnake Creek Basin map of water rights



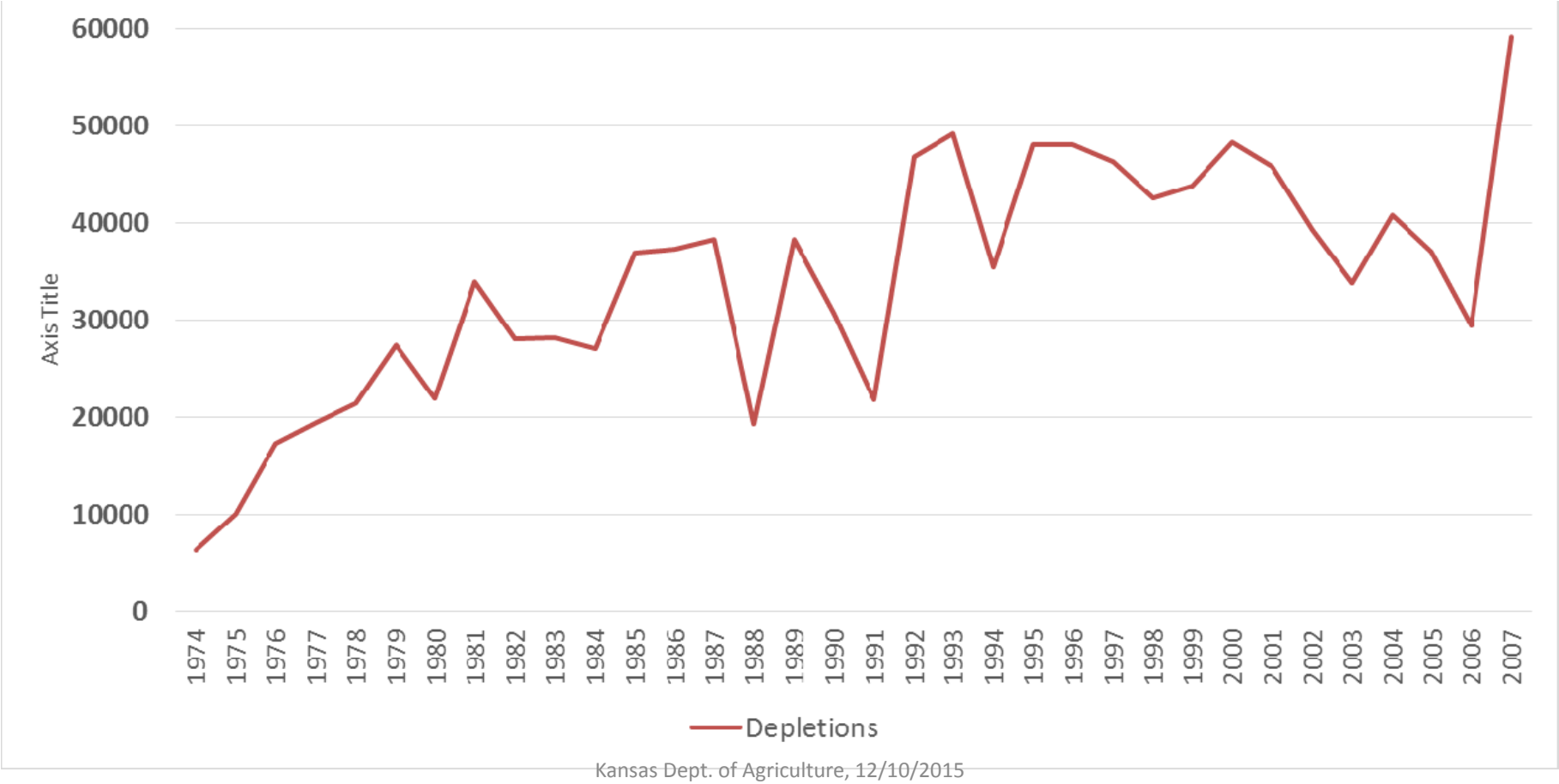
GMD 5:
Extensive area of sandy soils, shallow water tables

Pre-development condition: recharge destined to streams

Groundwater pumping intercepts water, deduces (depletes) streamflows



Historic depletions to Rattlesnake streamflows due to junior groundwater pumping. Model shows continuing to increase..



Kansas Dept. of Agriculture, 12/10/2015

Impairment quantity by year from final impairment report, 1974-2007

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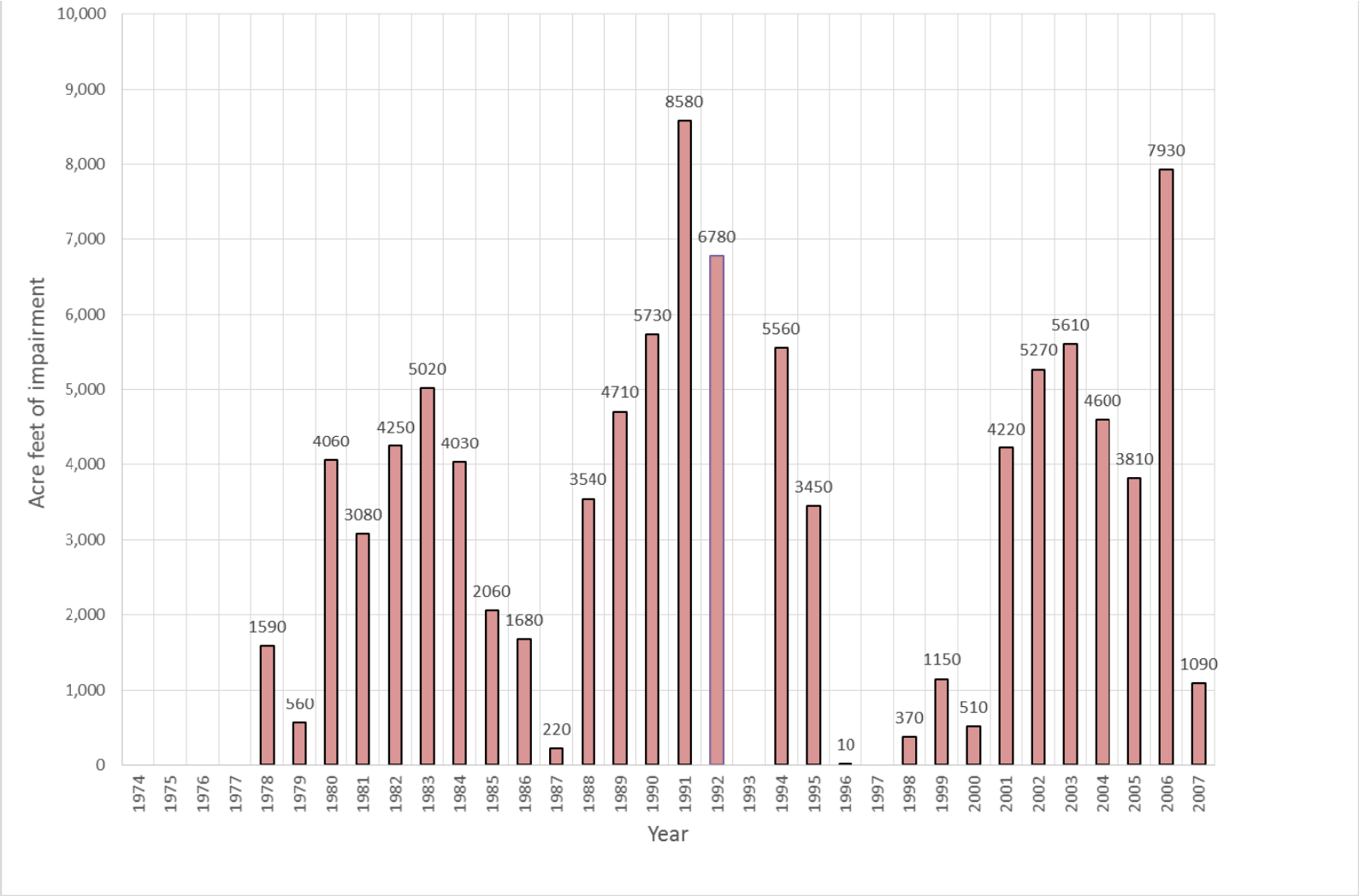
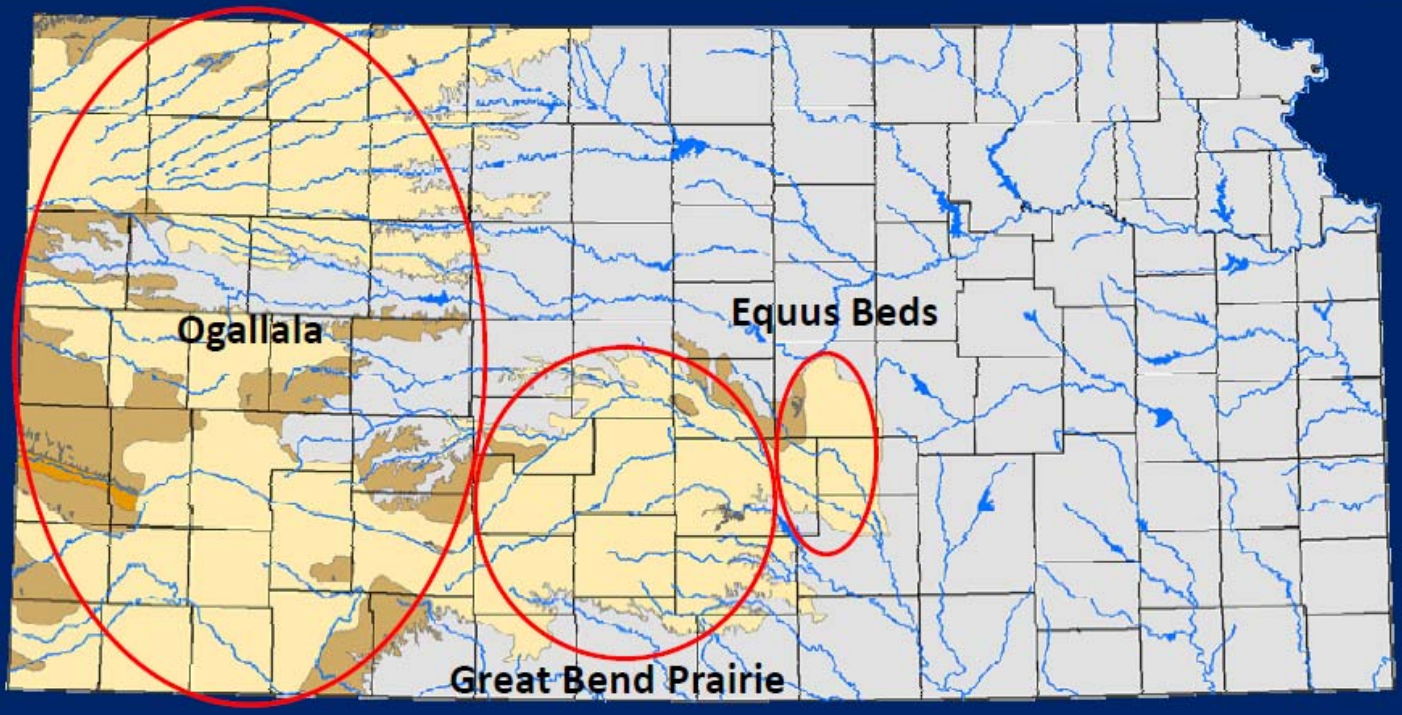


Seeking a remedy for the impairment

- Augmentation can be part of the remedy. It must be developed by the basin, led by GMD5.
- To slow further streamflow declines, a modest reduction (approx. 15%) in junior groundwater pumping is an essential part of the long-term remedy, in addition to augmentation.
- KDA and GMD5 have worked together to develop a LEMA that addresses the impairment. The GMD 5 board has decided to withdraw the LEMA concept and focus on the augmentation part of the solution.
- Given GMD's commitment to provide augmentation, KDA is assessing IGUCA proceedings, water right administration, and other options to reduce groundwater pumping to remedy the impairment long-term. KDA remains open to a LEMA proposal developed by local leaders.
- KDA will work with the basin on a solution that addresses the impairment, while providing as much flexibility in use as possible to protect the economy.
- For more information: http://agriculture.ks.gov/Quivira

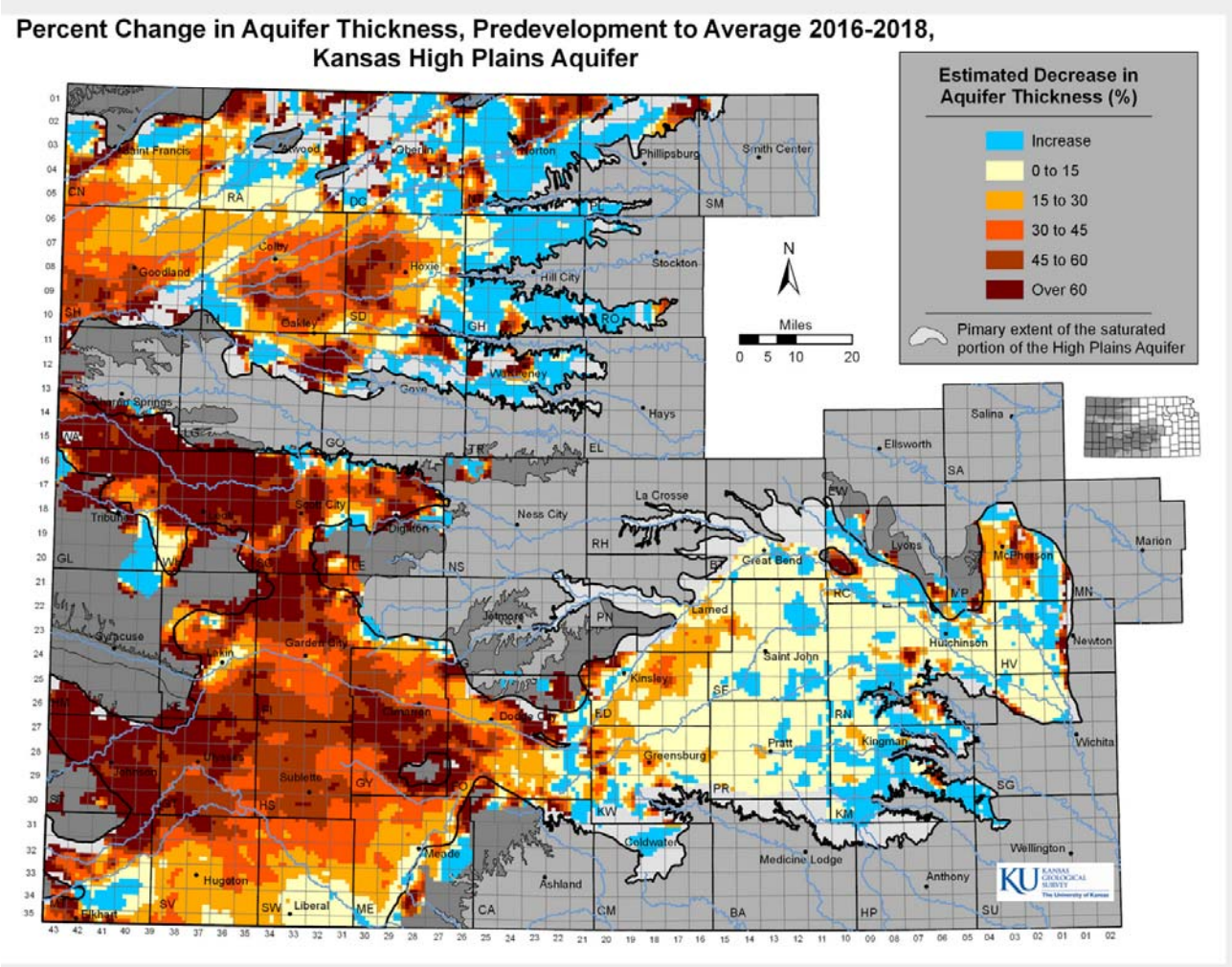
The Kansas High Plains Aquifer



In Kansas, The High Plains Aquifer is made up of several smaller sub-regional aquifers - the Ogallala, Great Bend Prairie and Equus Beds. On a national scale, many people and publications will refer to the High Plains aquifer as the Ogallala. In Kansas, we make a distinction.

The Great Bend Prairie and Equus Beds aquifers are generally closer to the land surface (not as deep) and are more responsive to recharge. They are managed as sustainable systems. The Ogallala is generally deeper with less annual precipitation and has little natural recharge. Recharge estimates are in the 0.5 to 1 inch range annually.

Percent Change in Saturated Thickness of High Plains Aquifer in Kansas



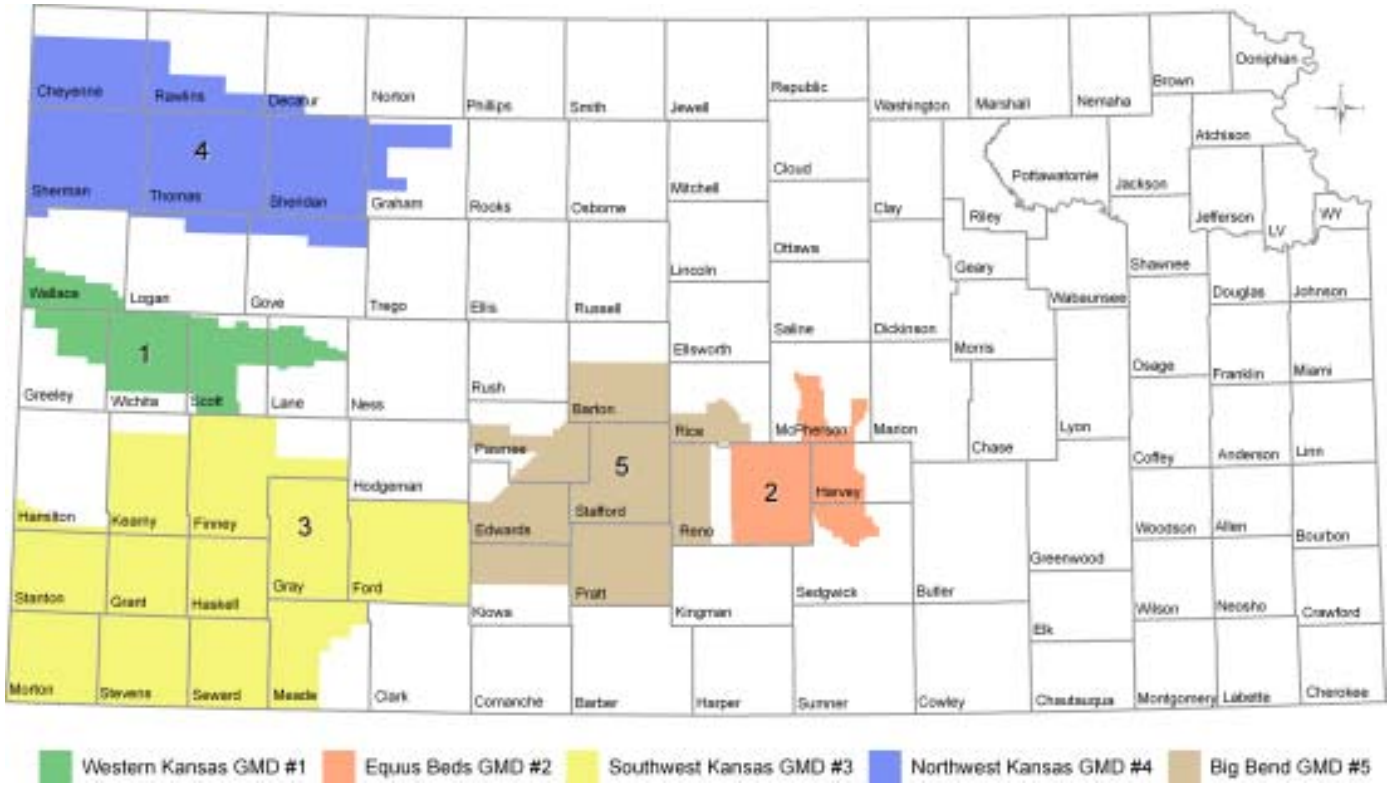
Legislative acts to encourage **groundwater conservation**

- 1972: GMD Act allow for the creation of **GMDs** to lead in local water conservation efforts
- 1978: GMD Act amended to allow for Intensive Groundwater Use Control Areas (**IGUCAs**).
- 2012: Local Enhanced Management Areas (**LEMA's**) allowed
- 2012: Eliminating abandonment of groundwater rights in closed areas
- 2015: Water Conservation Areas (**WCA's**) allowed
- 2015: Requirement for chief engineer to give due consideration of past voluntary conservation in all conservation programs

Kansas Groundwater Management Districts

GMD accomplishments:

- Closed districts to new appropriations, regulations related to change applications, metering, groundwater models, studies, incentive-based programs, more
- But little action to address over-appropriation in Ogallala (until 2012)

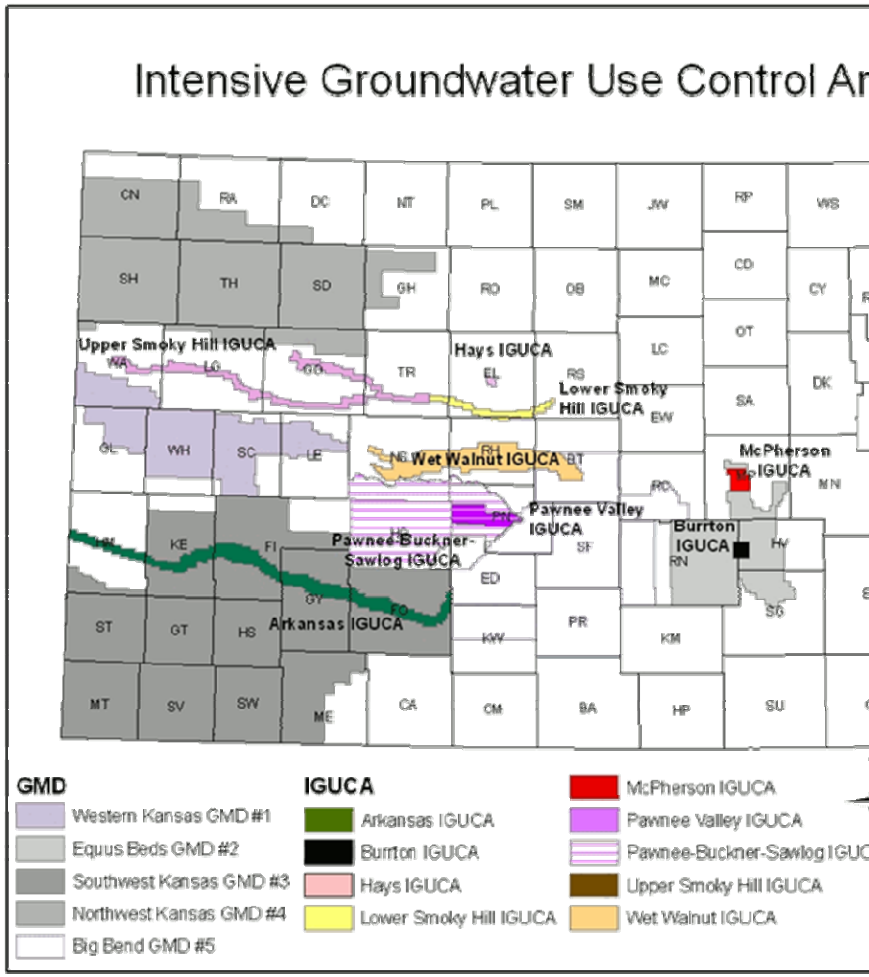


Intensive Groundwater Use Control Areas (IGUCAs), 1978

- Water management tool that works in conjunction with the Kansas Water Appropriation Act
- Allows for more flexible solutions, taking in to account the area and aquifer
- Provides alternatives to strict administration of water rights by priority
- Formal public hearings are held
- Decision by chief engineer based on hearing record

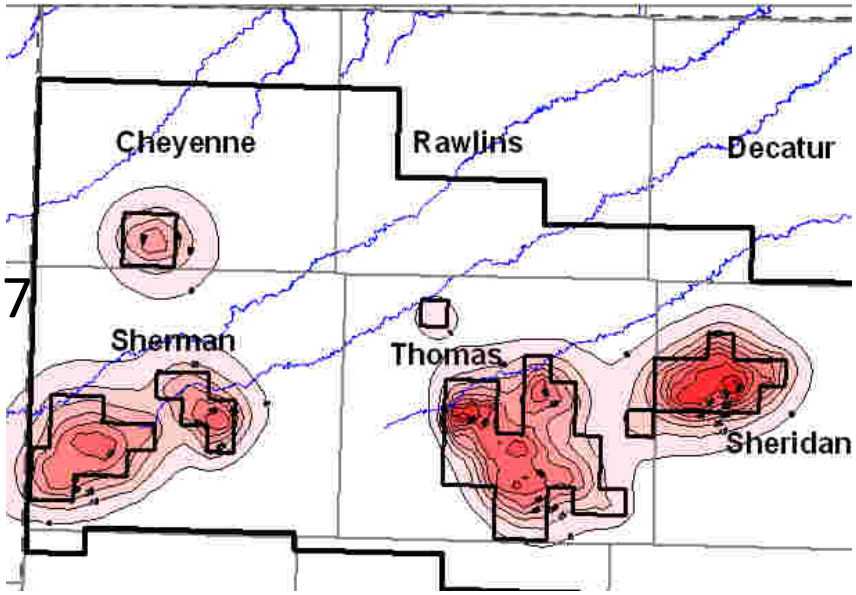
Intensive Groundwater Use Control Areas

- **McPherson County**, 1979, closed area, required meters
- **Pawnee Valley**, 1980, set safe yield criteria
- **Burrton**, 1982, water quality concern; criteria for review
- **Lower Smoky Hill River**, 1983, closed area, 15 inch allocation
- **Upper Smoky Hill River**, 1984, closed area
- **Arkansas River Valley**, 1984, closed area, restrict moves
- **Hays** and Immediate Area, 1985, restrict lawn watering by domestic wells
- **Walnut Creek**, 1990, 5-year allocations: senior set at 12-14 inches; junior set at 5.25-6.25 inches, flexibility to move allocations.



Northwest Kansas GMD 4 seeks Enhanced Management

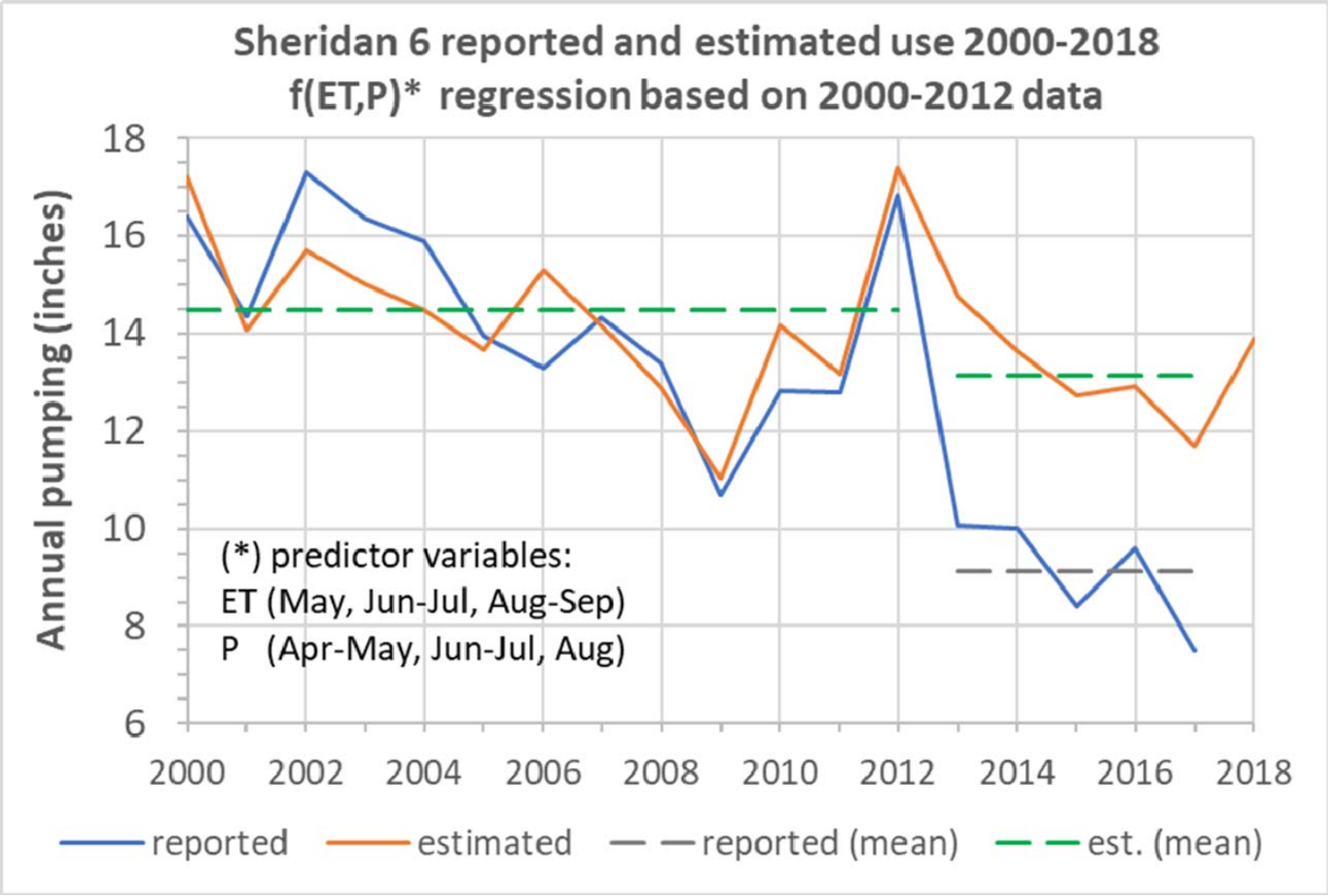
- "Sheridan 6" High Priority Area wanted to cut use by 20%, but not via priority administration, (2010-11)
- NW Kansas GMD No. 4 Board discusses and rejects IGUCA option
- Manager outlines new approach requiring new legislation
- Results in LEMA statute, 2012
- Sheridan 6 LEMA designated for 2013-17 and 2018-22, with the **goal of 20% reduction in use**



Local Enhanced Management Areas (LEMA), 2012

- Like IGUCAs, requires demonstrated groundwater problem
- Similar tools as IGUCAs.
- Like IGUCAs, due process required via hearings (as adjusting water rights)
- LEMA Plan to include conservation measures to address specific water resource problems.
- Hearings before the Chief Engineer to adopt, reject or return plan to the GMD
- Chief Engineer decision: is it consistent with state law; does it address the problem appropriately?

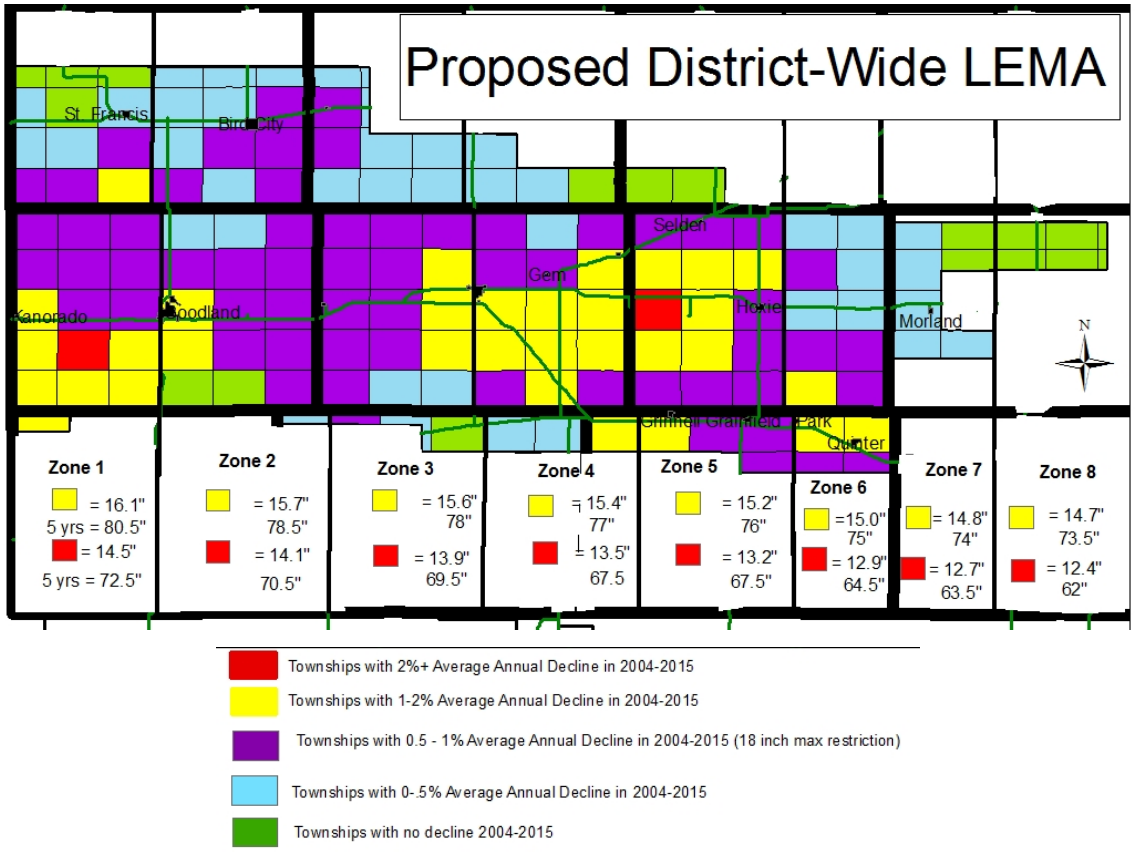
Sheridan 6 LEMA : Significantly reduced groundwater use



- Blue = reported use
- Orange = estimated use based on climate factors (2000-12)
- Actual use 2013-17 was 32% less than predicted by climate.
- 5-year values:
  - Historic average 149,100 AF
  - 2013-17 actual use 89,700 AF
  - 2013-17 **savings 59,100 AF or 39%**

GMD#4 District Wide LEMA

- GMD 4 determined rate of decline by township
- Sets 5-year allocations in inches/acre based principally on NIR for corn
  - Highest decline areas (red): 13-14 inches
  - Second highest decline (yellow): 15-16 inches
  - Purple township, 18 inches
  - Blue/Green: no restrictions
- No additional flexibilities, encourages WCAs



GMD 4 District-wide LEMA, Process

- Plan developed by GMD 4, working with members over 2015-17
- Initial hearing held August 23, 2017; positive decision
- Second hearing held November 14, 2017
  - a group of intervenors granted expanded “due process”
  - Significant public comment received
- On February 23, 2018, order of decision issued, returning it to District with recommended changes to improve plans administration.
- GMD accepted the recommended changes.
- On April 13, 2018, the Order of Designation issued.
- Currently under judicial review

2015 Legislation: Water Conservation Areas (WCAs)

K.S.A. 82a-745. Water conservation areas; establishment procedures; duties of chief engineer; notice; orders; consent agreement; review.

(a) Any water right owner *or a group of water right owners in a designated area may enter into a* ***consent agreement and order with the chief engineer*** *to* ***establish a water conservation area****. The water right owner or group of water right owners shall submit a management plan to the chief engineer.*

- A Water Conservation Area (WCA) is a designated area with an approved management plan developed by a water right owner(s) with the consent of the chief engineer to reduce water withdrawals while maintaining economic value via water right flexibility.
- Flexibilities can include multi-year allocations, exceeding annual authorized quantities, allowing for new uses of the water, when no impairment.
- No hearings; streamlined process
- WCAs do not make a permanent change in the water right

WCA's totals

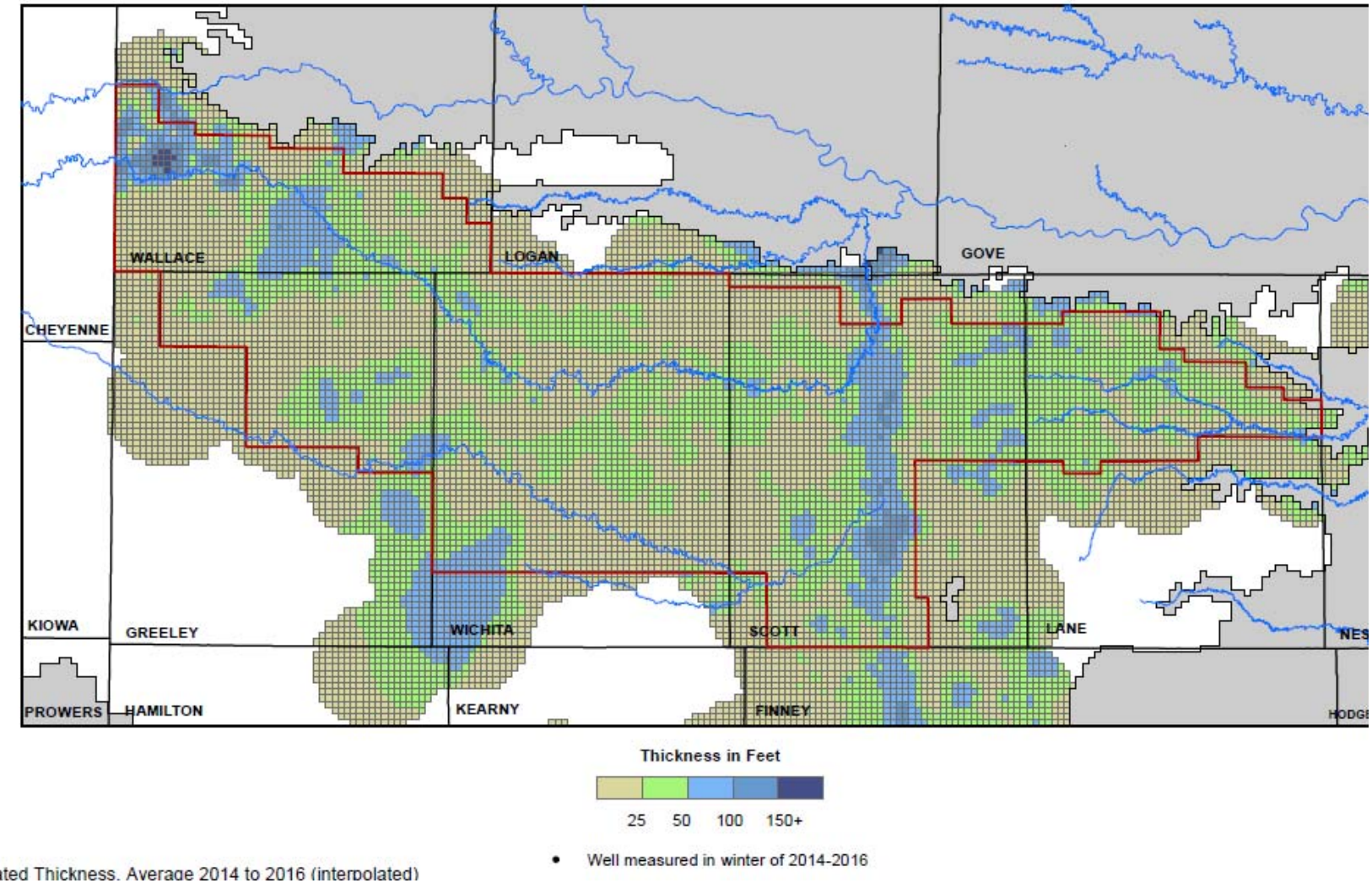
- Current status:
  - 22 plans approved as well as 25 Wichita County WCA consent agreements
  - 43,492 acres enrolled
  - 7,073 acre-feet of annual water savings
- Totals to expected by end of year:
  - 72,000+ acres enrolled
  - 10,500+ acre-feet of annual water savings

WCA Plans and Agreements

WCA Name	County	Plan	Consent Agreement & Order	Period	Acres Enrolled(Ac/Yr)	Water Savings (AF/Yr)	Date Approved
Powerline Dairy, LLC	GY	WCA Plan	Pending	2017-2021	2,893	435	Pending Approval
Midwest Feeders, INC	GY	WCA Plan	Pending	2018-2020	1,145	32	Pending Approval
Pillango Investments	SH	WCA Plan	Pending	2018-2020	1,432	--	Pending Approval
Bartlett Farms	FO	WCA Plan	Pending	2018-2022	333	49	Pending Approval
McCarty-Rexford	TH	WCA Plan	WCA CAO	2018-2022	1,417	108	07/31/18
Wheatland Electric Coop Inc.	FI	WCA Plan	WCA CAO	2018-2022	3,190	1,219	08/17/18
The Garden City Company	FI/KE	WCA Plan	WCA CAO	2017-2021	7,170	943	05/08/18
Ray Smith	GL/WA	WCA Plan	WCA CAO	2017-2026	1,479	87	04/06/18
Fansher Farms	FI	WCA Plan	WCA CAO	2017-2021	1,246	171	03/29/18
Larry Goss Farm	FI	WCA Plan	WCA CAO	2017-2021	432	89	02/19/18
Hayden Family Farms	SH	WCA Plan	WCA CAO	2018-2017	800	85	01/26/18
R&R Unruh Farms	FI/KE	WCA Plan	WCA CAO	2017-2021	1,613	248	01/26/18
Big D Farms	FI	WCA Plan	WCA CAO	2017-2021	2,790	253	09/05/17
Richmeier Farms	FI	WCA Plan	WCA CAO	2017-2021	597	129	08/25/17
Hatcher Land Co. LP	SW	WCA Plan	WCA CAO	2017-2019	252	19	07/31/17
Compton: Lane County Farm	LE	WCA Plan	WCA CAO	2017-2031	288	38	03/30/17
Wichita County	WH	WCA Plan	WCA CAO Amendment	-	10,673	2,226	03/07/17
Compton: Highway 4 Farm	SC	WCA Plan	WCA CAO	2017-2031	649	97	02/20/17
T&O Finney County (Willis)	FI	WCA Plan	WCA CAO	2016-2018	1274	PC*	07/25/16
Westside Dairy	ST	WCA Plan	WCA CAO	2016-2018	640	164	02/23/16
Franklin Family	SH	WCA Plan	WCA CAO	2016-2030	960	40	01/12/16

*WCA allocation held to historical average giving due consideration of past conservation per K.S.A. 82a-745.

Western Kansas GMD No 1, Remaining Saturated Thickness



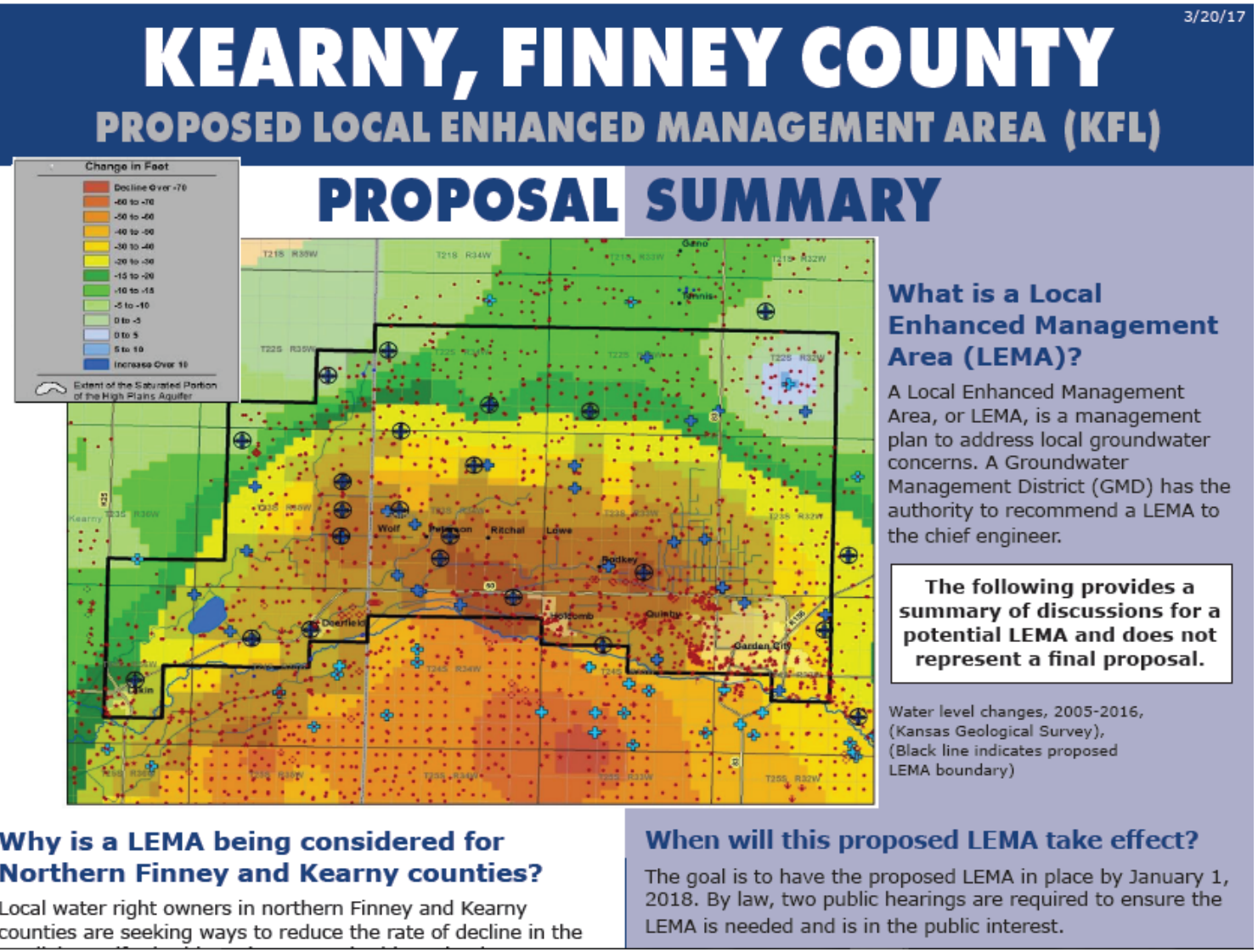
Saturated Thickness, Average 2014 to 2016 (interpolated)

Wichita County WCA proposal development

- 23 feet of average remaining saturated thickness, well rates dropping, less than 25 years of remaining life.
- Unique, county-wide WCA developed that producers can enroll in
- Extensive process to develop proposal, driven by a local committee, initiated August 2016
- Plan approved March 2017

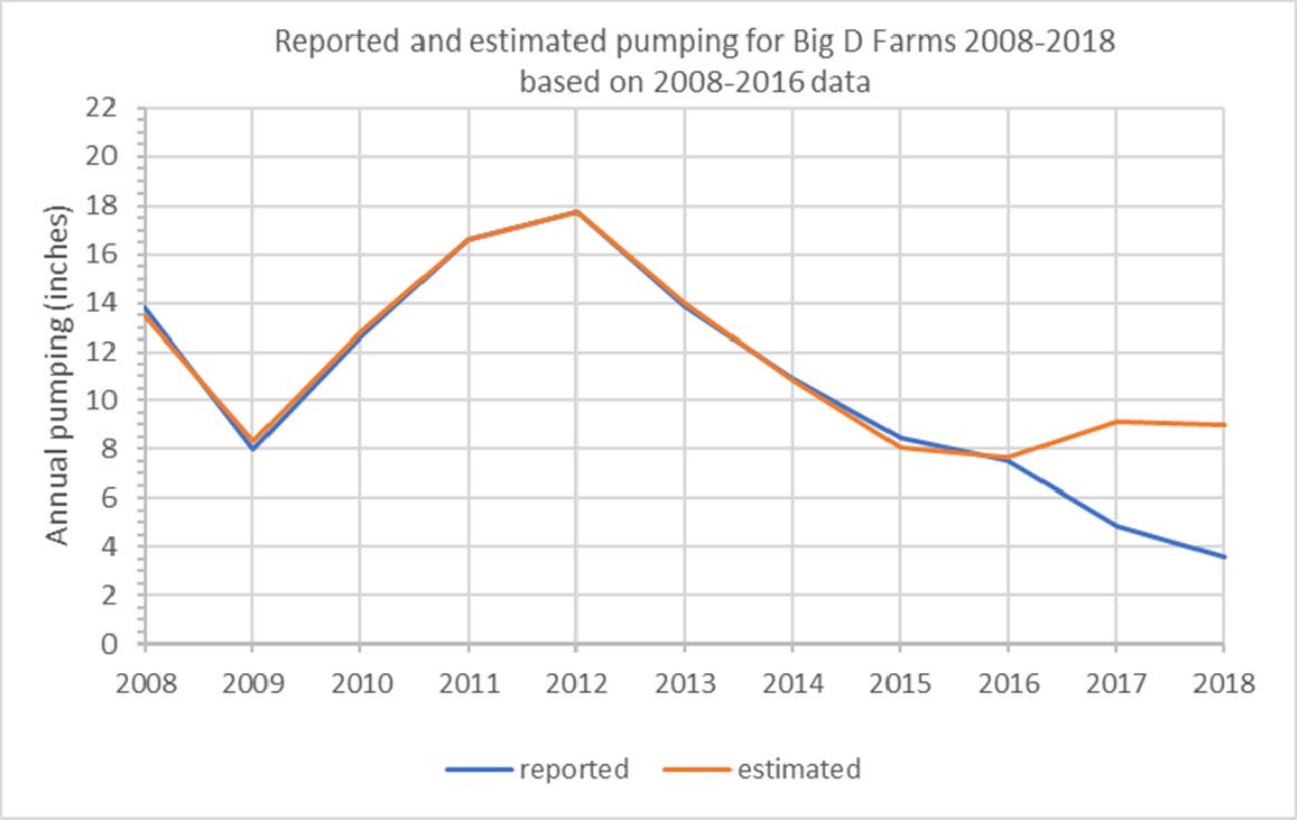
Wichita County WCA

- Four 7-year milestones beginning in 2017 and ending in 2045. Conservation factor from recent historic use, beginning at 29% and increasing to 50% by the last 7-year planning period
- Can use their allotment on any authorized land.
- Current status:
  - 25 consent agreements approved
  - 2,807 acre-feet of annual water savings (first 7 years; greater in subsequent periods)
  - 13,453 acres enrolled (almost 20% of irrigated acres in county)
- While a good start toward the goal of doubling the life of the aquifer, the WC committee is asking GMD to develop Wichita County LEMA.



- Discussions initiated among water users, fall 2016 as WCA
- Discussion moved to LEMA but stalled due to lack of consensus.
- 6 WCAs in the area: 13,848 acres, 1,832 AF/year of savings.
- 17,000 add'l acres to be added yet this year
- **Totals will the be: 30,000+ acres (39% of acres); 4000+ AF/year of savings**

Are WCAs saving water? A tool to evaluate



Big D WCA wateruse vs. climate-based estimates.

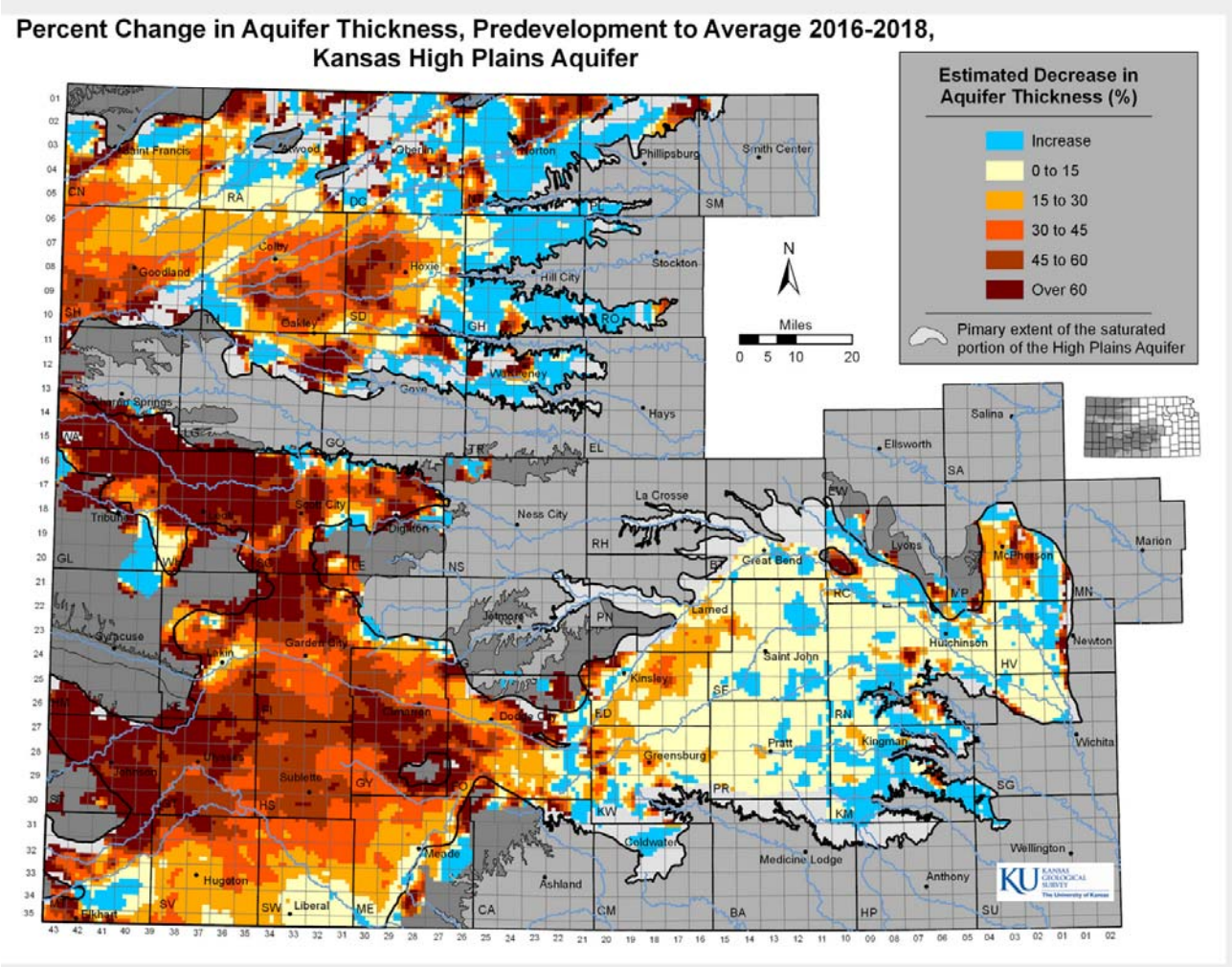
Demonstrates significant departure in 2017-2018 from previous use pattern, by 4.3 and 5.4* inches, respectively.

* hail effected some fields

Value of Water Conservation Areas

- Water savings (may be under estimated as water users reluctant to commit to more savings than they are comfortable with)
- Flexibilities allow water users to maintain profitability
- Demonstration to others of what can be achieved
- Discussions leading to consideration of additional LEMAs

Percent Change in Saturated Thickness of High Plains Aquifer in Kansas



Ogallala – next steps

- While these new tools (LEMA, WCAs) represent progress, esp. in areas like the Sheridan LEMA, Wichita County WCA, and the KFL area WCAs, **the benefits on local**.
- Declines continue through much of the Ogallala, resulting in declining pumping rates, increasing conflicts, limited future. Changes is needed.
- **Individual waterusers can take action** to extend the life of their water supply use via individual voluntary action, WCAs, etc.
- But **expanded joint action offers the best hope for extending the regional economies** depending on the declining Ogallala.
- Change is difficult. But we are seeing it is possible and benefits long-term, those who make those changes. Talk to DWR and your GMD about options for using these tools

For more information

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Division of Water Resources

http://www.agriculture.ks.gov/dwr

The Division of Water Resources administers 30 laws and responsibilities including the Kansas Water Appropriation Act which governs how water is allocated and used; statutes regulating the construction of dams, levees and other changes to streams; the state's four interstate river compacts; as well as coordinating the national flood insurance program in Kansas.

COMMON SEARCHES

- **Quivira:** Information about the investigation of the impairment complaint filed by the U.S. Fish and Wildlife Service on behalf of the Quivira National Wildlife Refuge.
- **Hays R9:** Information about the City of Hays' applications to KDA-DWR for water right changes and water transfer of the R9 Ranch.
- **Water Conservation Area (WCA):** Information about WCAs and active or pending WCA plans.
- **Local Enhanced Management Area (LEMA):** Information about LEMAs including the GMD No. 4 District-wide LEMA, the Sheridan County 6 LEMA and the proposed GMD No. 5 Rattlesnake/Quivira LEMA.
- **Wichita ASR:** Information about the City's request for changes to the conditions associated with the Phase II Aquifer Storage and Recovery Project.
- **Kickapoo Water Right:** Information on the Kickapoo Indian Reservation Water Right Settlement Agreement.
- **Republican River Compact:** Information on the latest resolutions and annual meetings between Kansas, Colorado and Nebraska on this compact.
- **Multi-Year Flex Accounts (MYFAs)**

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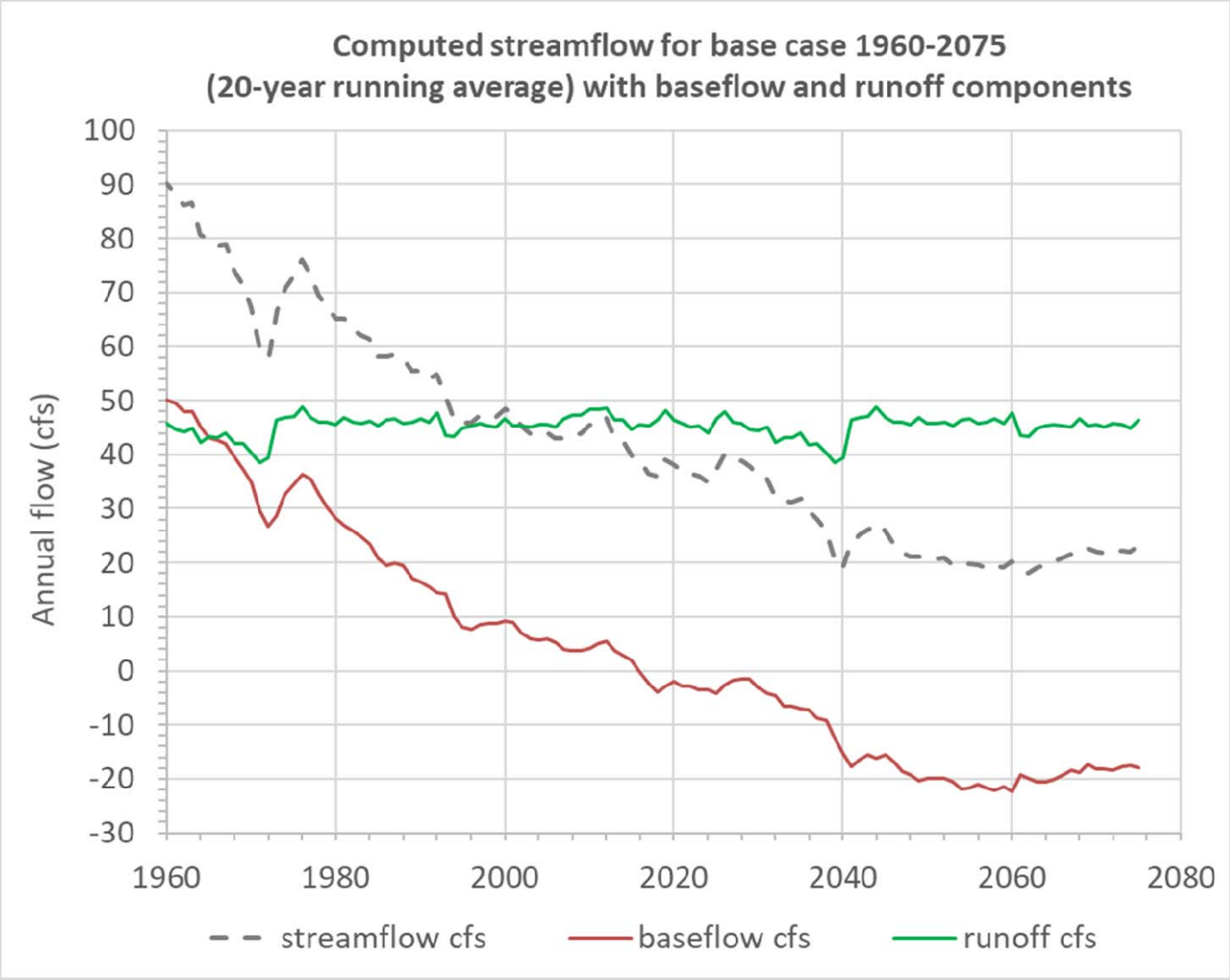
Slides that follow are for reference, Q & A



GMD 5's model shows that the current level of pumping will eliminate baseflows to Rattlesnake Creek over time and continue to reduce runoff, producing increasing frequency and magnitudes of impairment.

Orange/Red area have greatest effect on streamflows at the Refuge

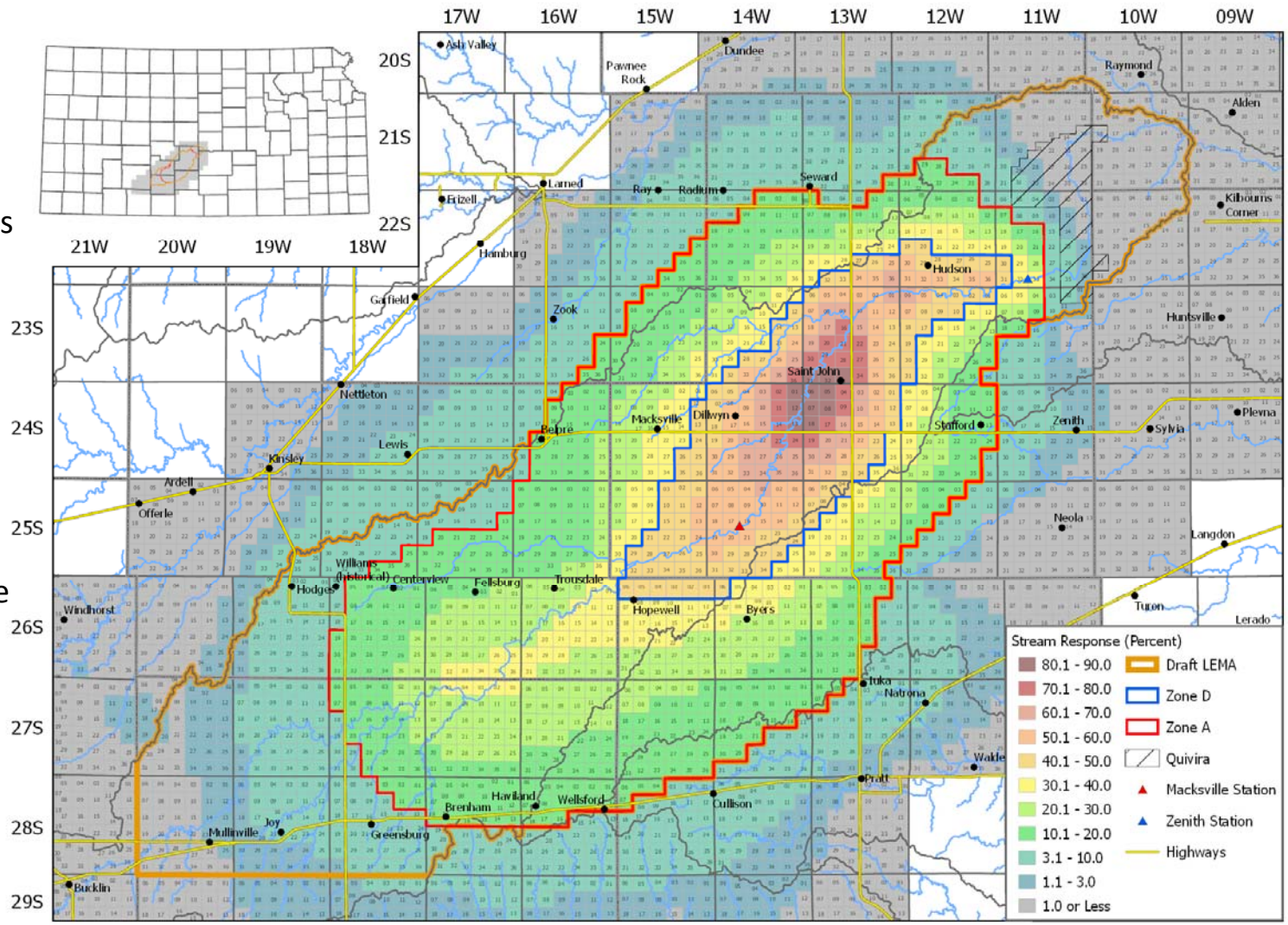
Green/yellow, lesser effects

Dark green and blue, very little effect

Significant impacts from some areas outside the Rattlesnake drainage

Rattlesnake Creek Streamflow Response Regions

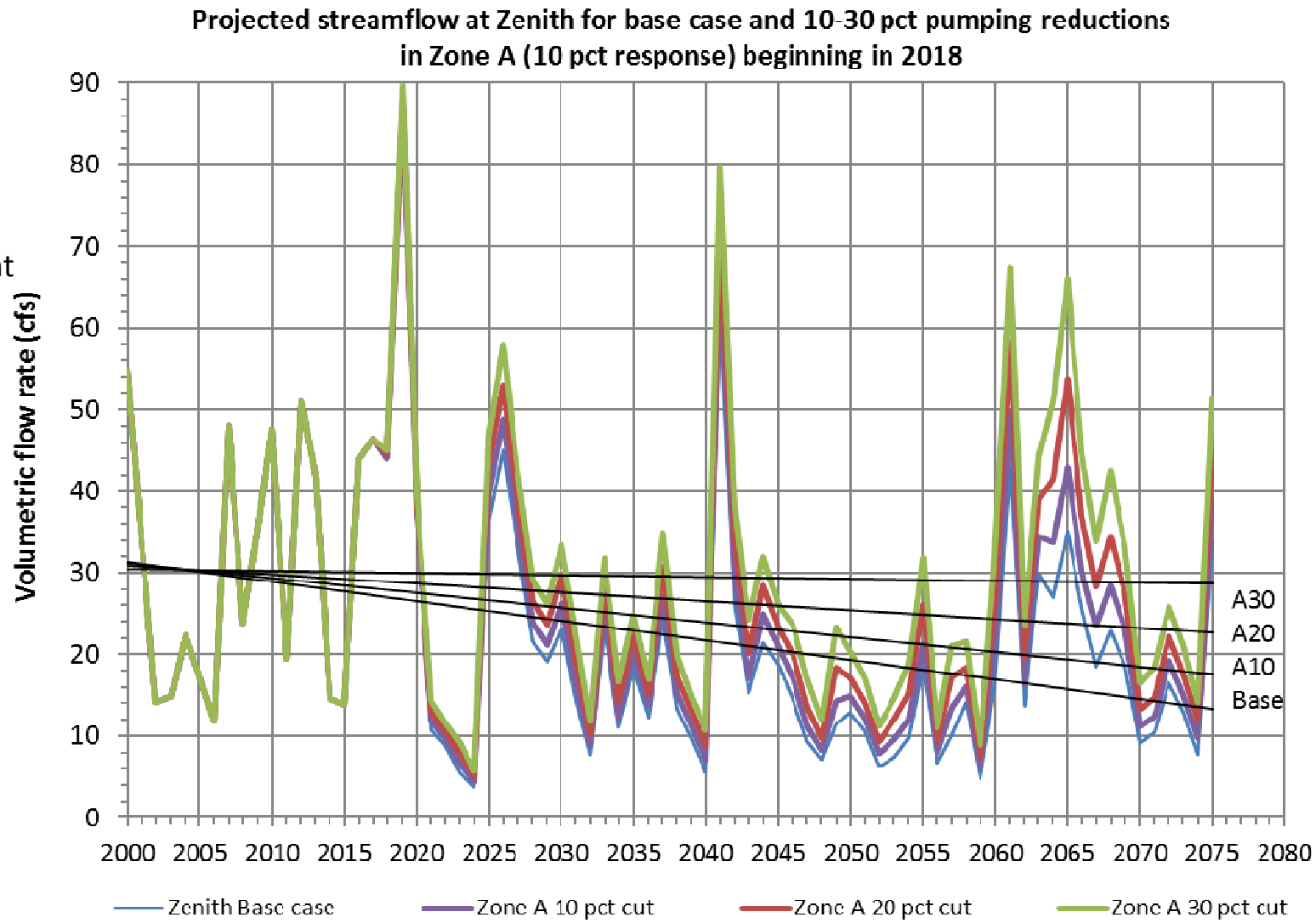
1998 - 2007 average streamflow response (pct) at Zenith gage as calculated using the GMD No. 5 model.



Groundwater model shows streamflow will
continue to decrease at current level of groundwater pumping (blue line at the bottom)

30% reductions in wateruse needed to stop streamflow declines

15% reductions in wateruse will halve the rate of decline

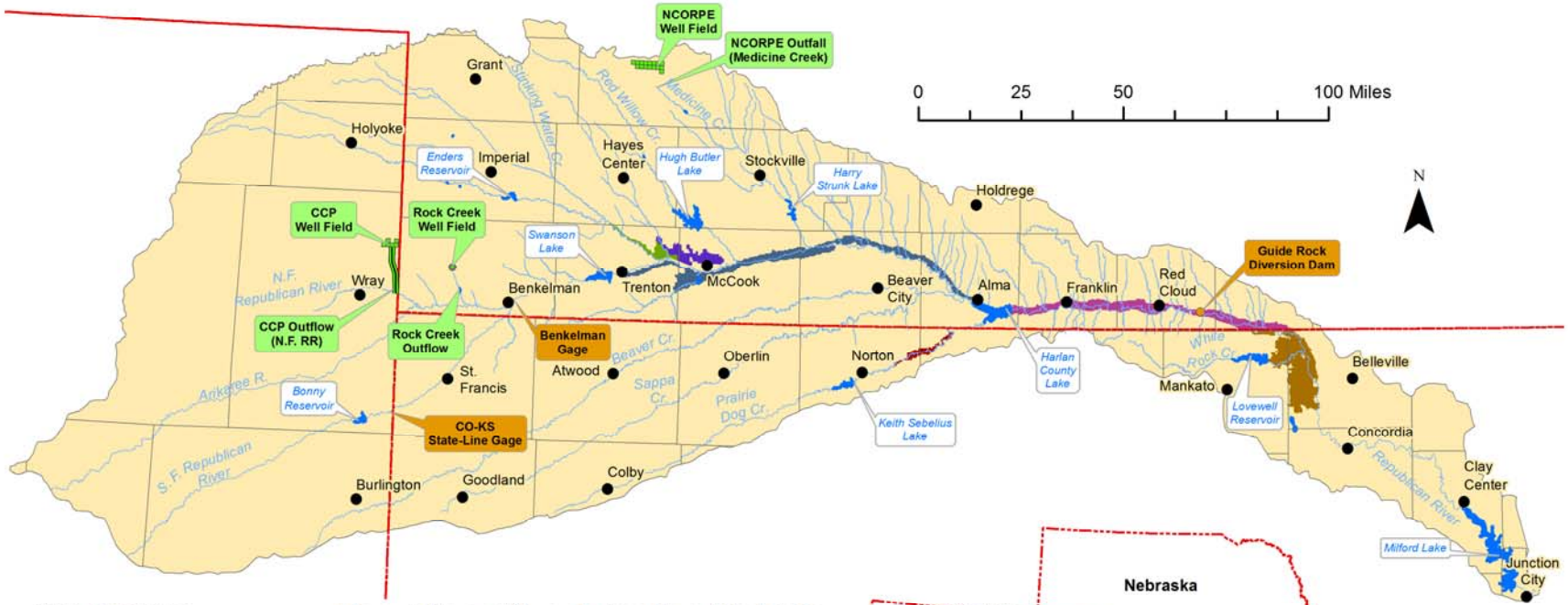


Kansas Interstate Water Compacts:

Note: not sure if I will have this or not. I might highlight.. not reporting on it as things going well,

After multiple trips to the U.S. Supreme Court on the CO-KS Arkansas River and Republican River Compacts, and significant negotiations on implementing agreements, the Compacts are working.

Republican River Compact Area
Current Issues



Map Features

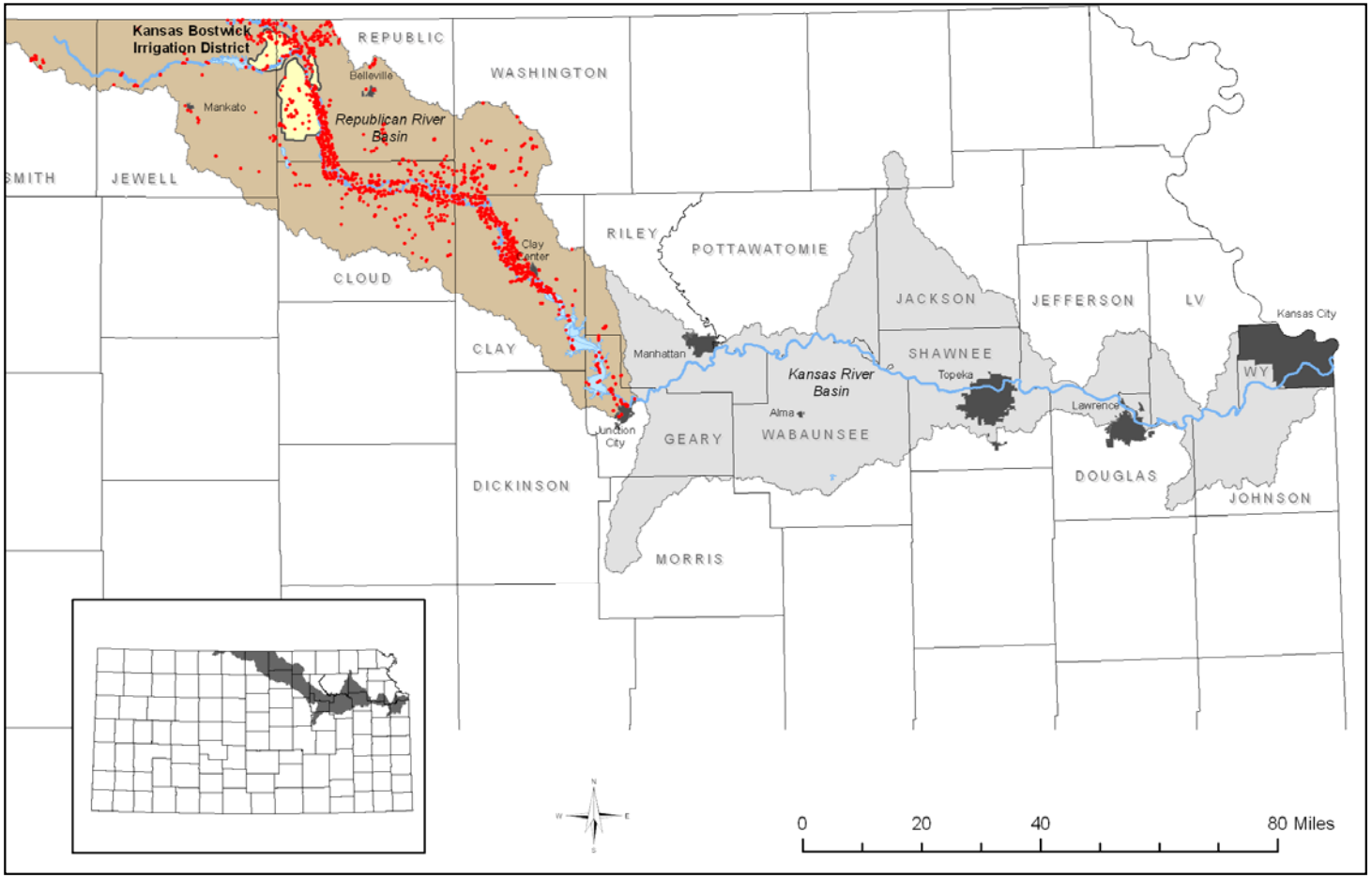
- Republican River Basin
- State Borders
- Counties
- County Seats
- Lakes
- Streams
- Augmentation Projects
- Gaging Stations
- Lakes and Reservoirs

Republican River Irrigation Districts

- Almena Irrigation District
- Frenchman Valley Irrigation District
- Frenchman-Cambridge Irrigation District
- Hitchcock and Red Willow Irrigation District
- Kansas-Bostwick Irrigation District
- Nebraska-Bostwick Irrigation District

Kansas Department of Agriculture
Division of Water Resources
December 30, 2016

Kansas' Interest in the Lower Basin



Republican River Compact Long-term agreements, 2016

- Resulting from 2+ years of monthly meetings. Based on experience from 2 years under temporary agreements.
- Separate agreements, adopted by the RRCA, one on Colorado issues; a second on NE issues.
- Colorado – Agreement on retiring an additional 25,000 acres of irrigation on the South Fork Republican River; augmentation credits for deliveries on the North Fork.
- Nebraska – Augmentation credits for water delivered to Harlan County for Kansas use.

Kansas-Colorado Arkansas River Compact

GMD 4 District-wide LEMA legal challenges

- In Gove County District Court (Friesen vs. Barfield), petition for judicial review filed, challenges the process to develop the LEMA order and the validity of K.S.A. 82a-1041 (the LEMA statutory provisions), particularly allowing allocations that do not consider priority.
- In Thomas County, a petition for judicial review filed seeking review of the LEMA order, esp. as related to GMD's authority to make final decisions on allocation appeals.

Kansas Water Appropriations Act - impairment provision

K.S.A. 82a-706: The Chief Engineer shall enforce and administer the laws of this state pertaining to the beneficial use of water and shall control, conserve, regulate, allot and aid in the distribution of the water resources of the state for the benefits and beneficial uses of all its inhabitants in accordance with the rights of priority of appropriation.

K.S.A. 82a-706b – "It shall be unlawful for any person to prevent, by diversion or otherwise, any waters of this state from moving to a person having a prior right to use the same…"

Groundwater Management District Act (1972)

- *"It is hereby recognized that a need exists for the creation of special districts for the proper management of the groundwater resources of the state;* ***for the conservation of groundwater resources; for the prevention of economic deterioration****; …"*
- Allows local people to "determine destiny" – within state laws and policies
- GMD's principal regulatory powers: recommend regulations for adoption by Chief Engineer; request IGUCA proceedings; propose LEMA.
- Many non-regulatory powers.
- Permit approval/regulatory authority remains with Chief Engineer
- GMD accomplishments:
  - Closed Districts to new appropriations, metering, groundwater models, studies, incentive-based programs, more
  - But little action to address over-appropriation in Ogallala (until 2012)