Kansas Report
Association of Western State Engineers
August 2017

David Barfield, Chief Engineer
Division of Water Resources
Kansas Department of Agriculture

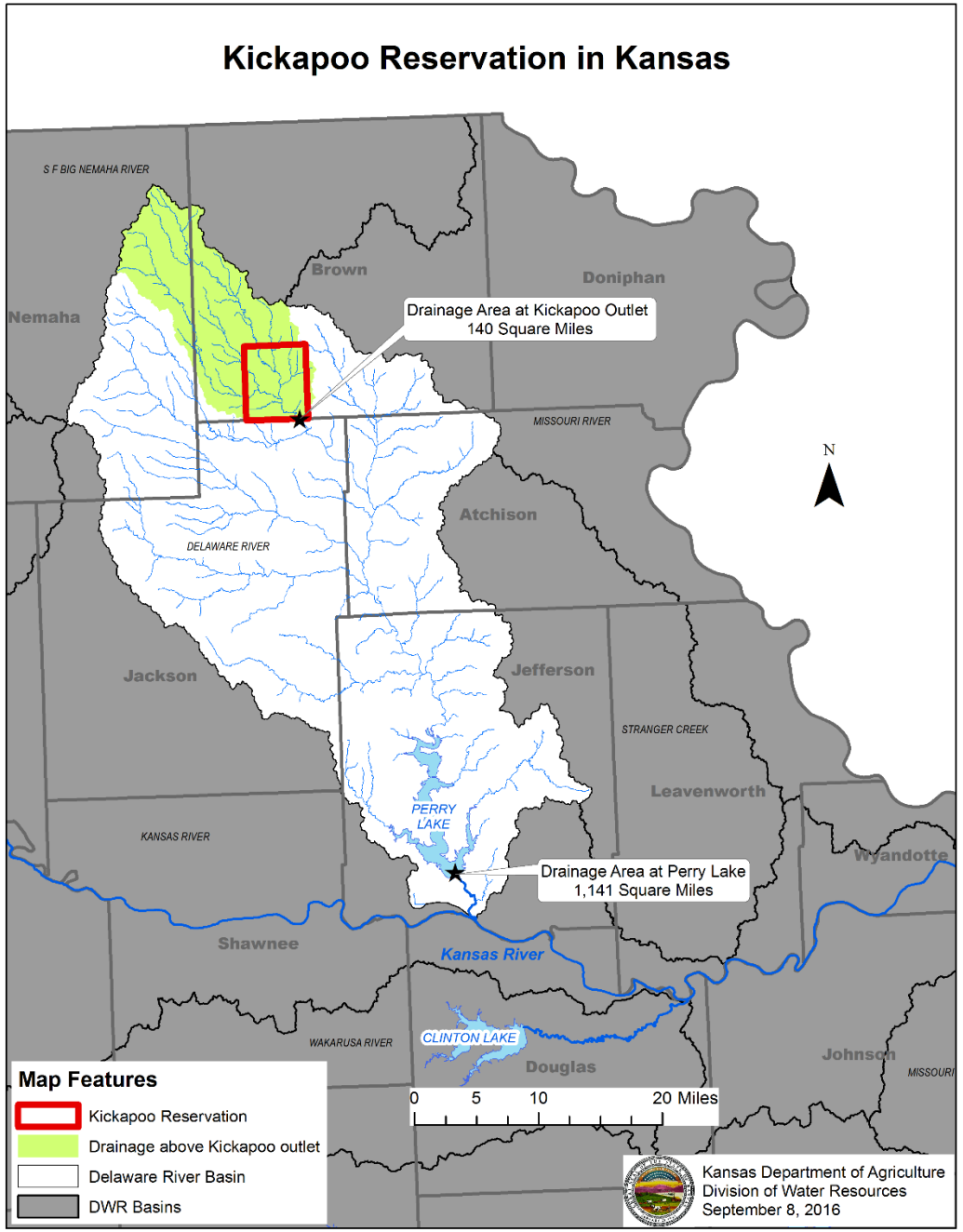
Kansas Interstate Water Compacts:

Republican River Compact Long-term agreements

- 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 additional actions to get to compliance on South Fork Republican River; augmentation credits for deliveries on the North Fork.
- Nebraska – Augmentation credits for water delivered to Harlan County for Kansas use. Working with irrigation districts and Bureau to implement MOA.

Kickapoo settlement and water right quantification

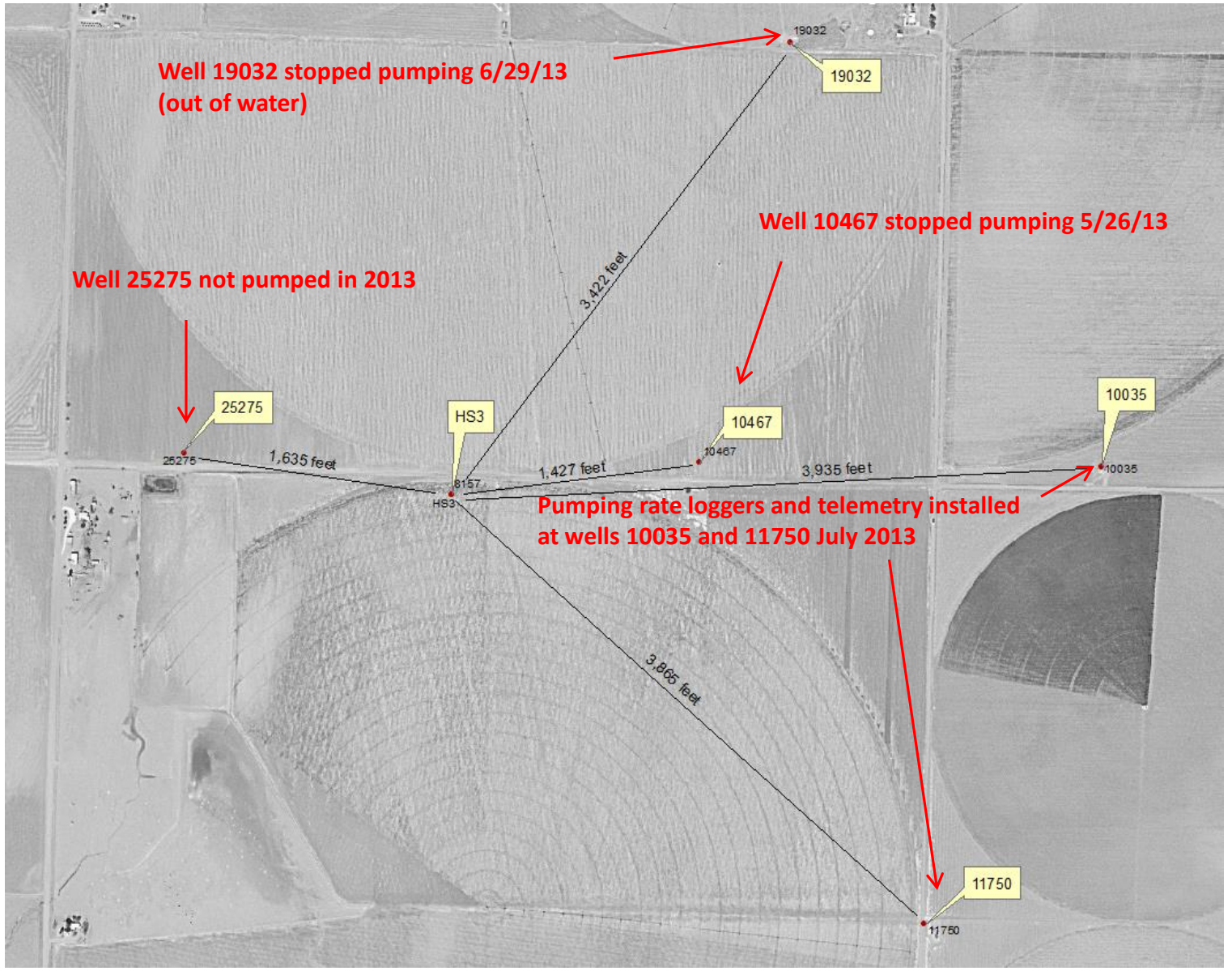
- 30 sq miles.
- 4700 AF for direct use based on municipal build-out concept consistent with state rules.
- MOA between Tribe and chief engineer
  - establishes procedures for communication, monitoring and protection of the Tribal Water Right,
  - annual reviews to insure it remains current, especially as the Tribe develops storage.



Groundwater impairment complaints / actions

- 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…”
- With water level declines, increasing complaints between groundwater users
- Complex, time-consuming investigations

Wells that interfere with HS3



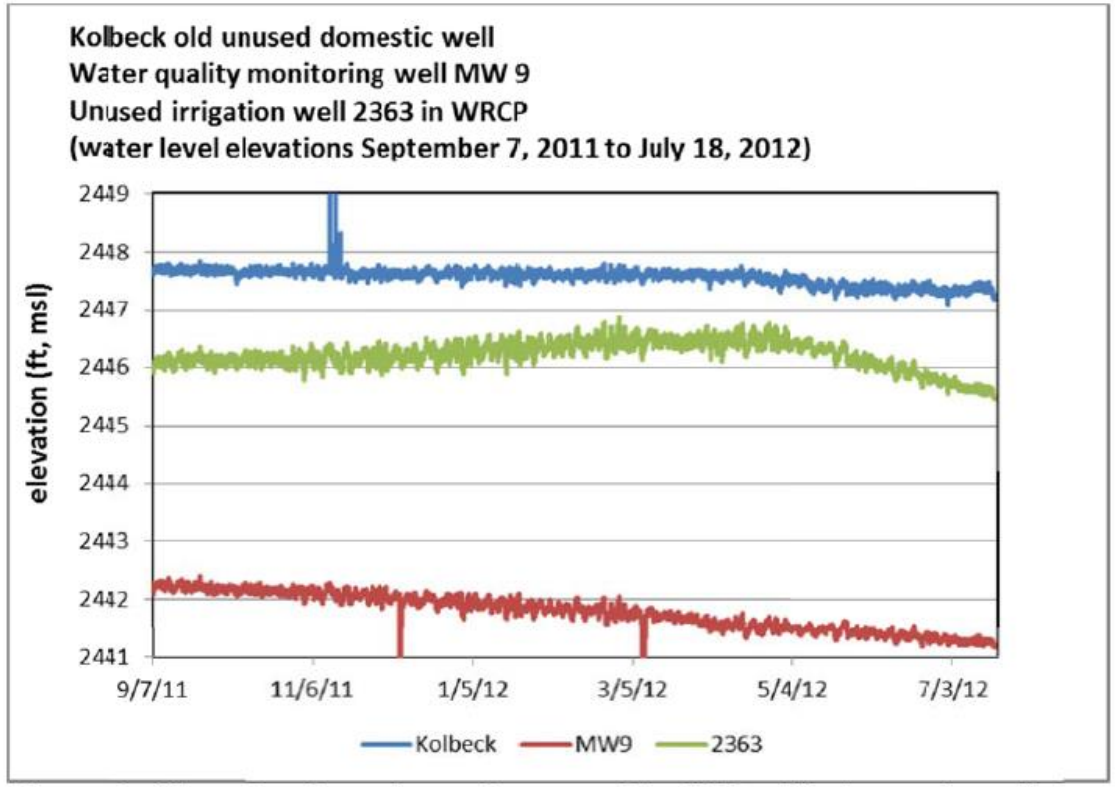
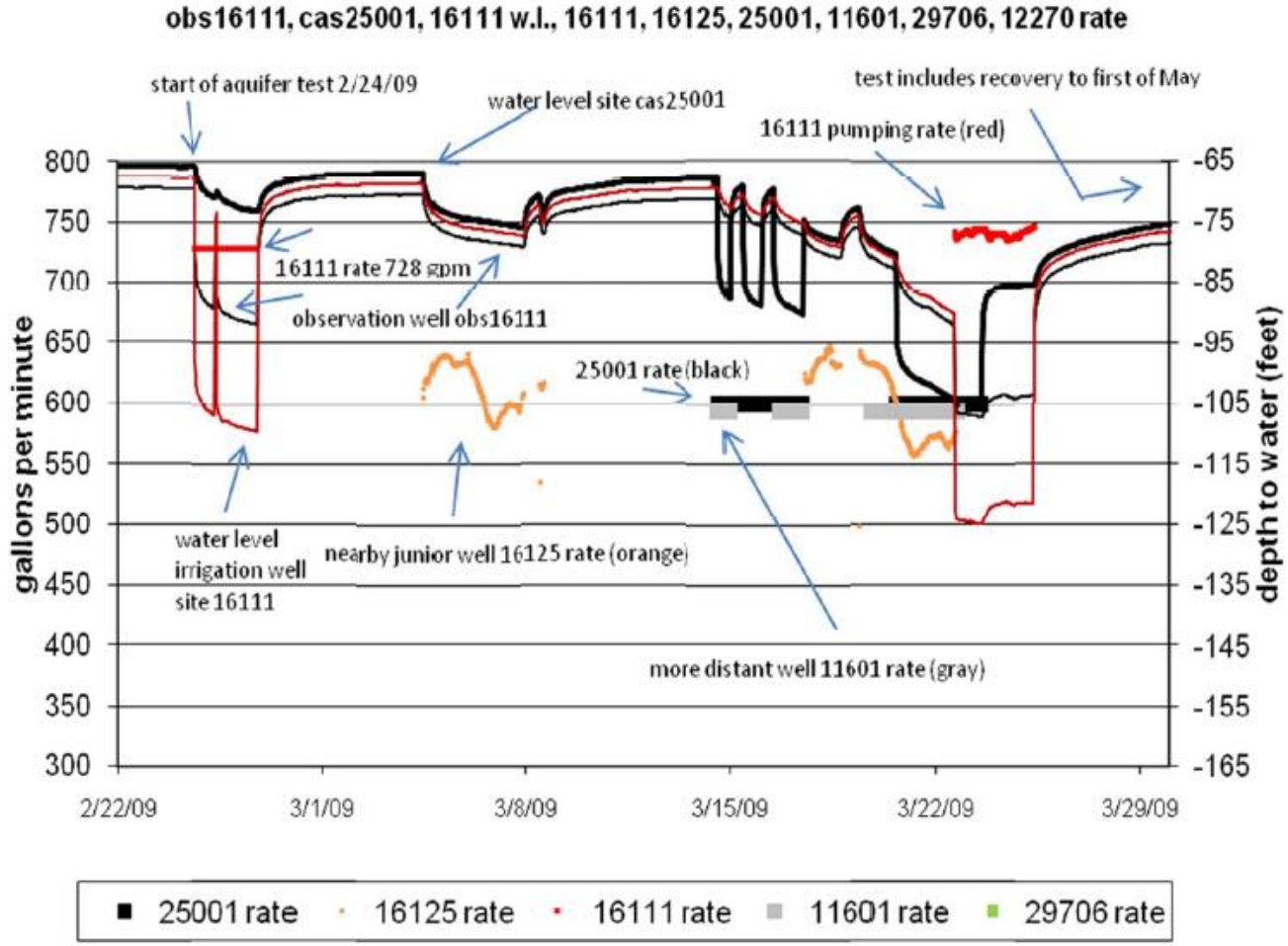
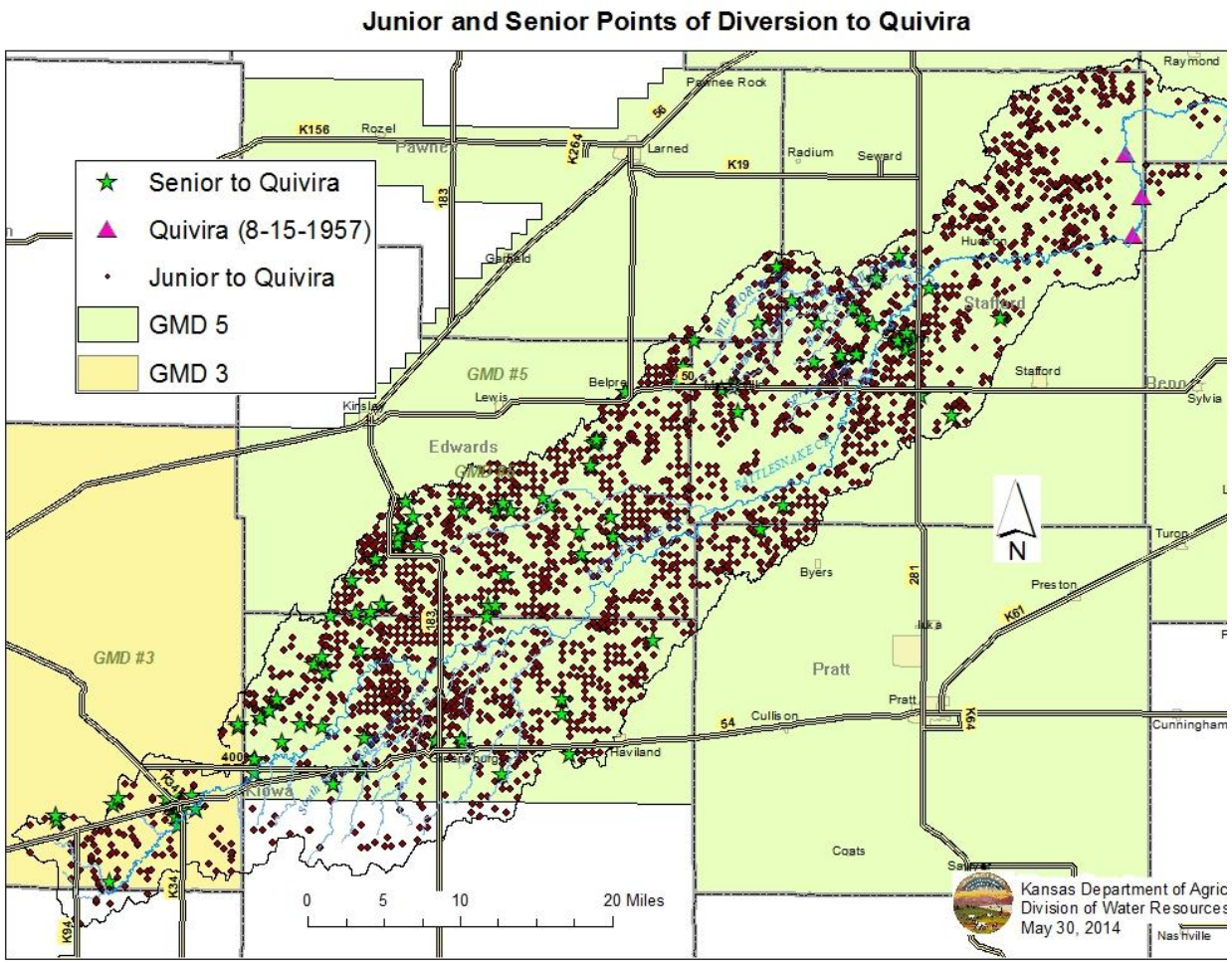
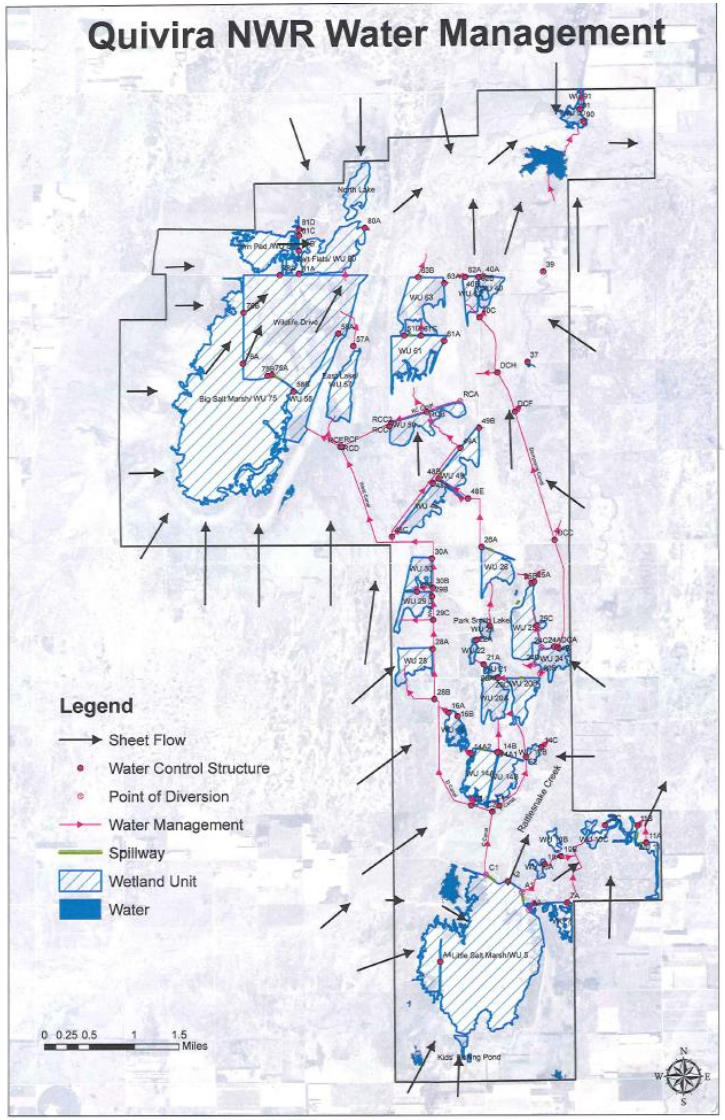


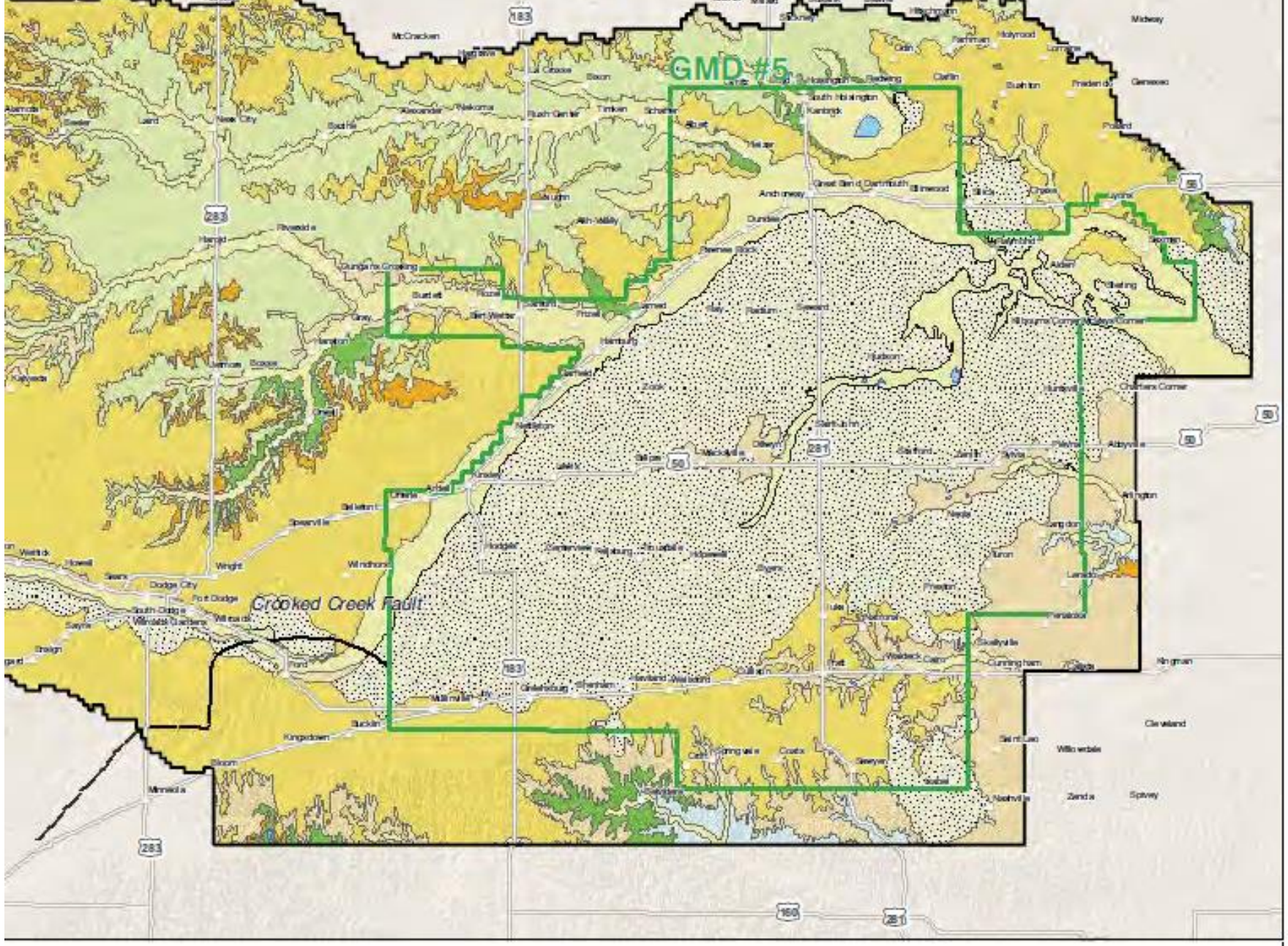
Figure 2 –Water levels at three sites near Mr. Kolbeck's domestic wells.



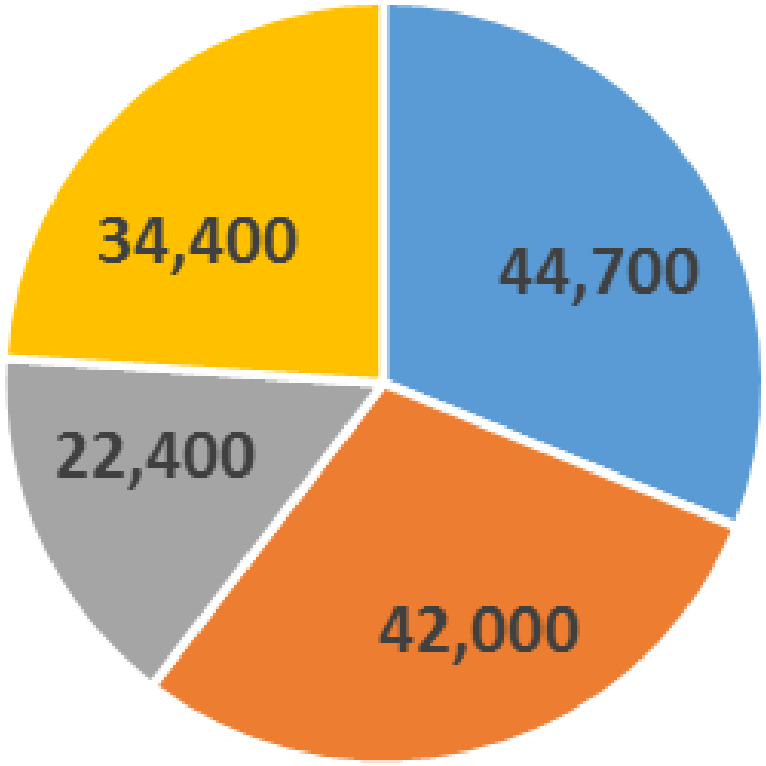
Quivira National Wildlife Refuge impairment investigation





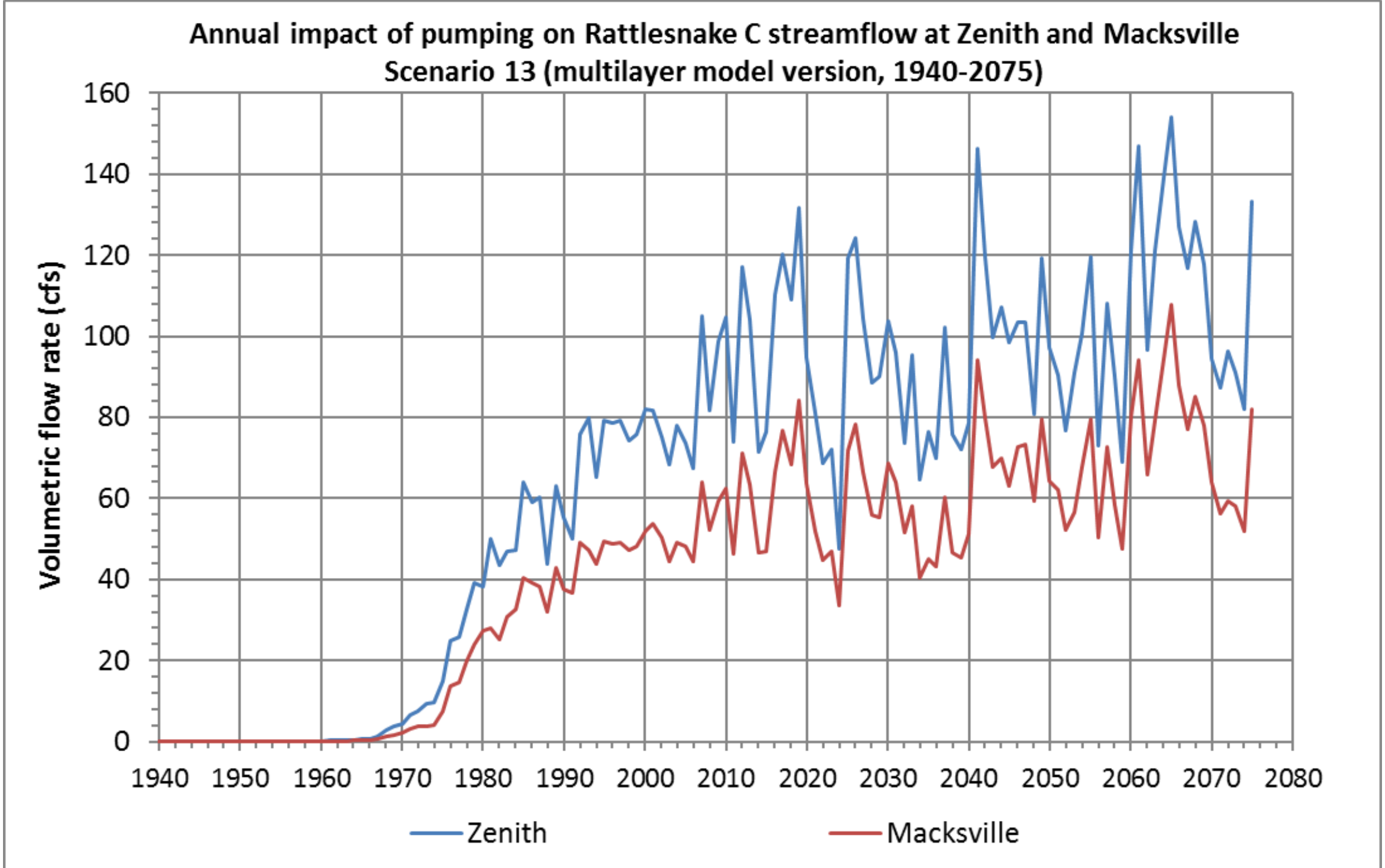

GMD #5
Crooked Creek Fault
EXPLANATION
Quaternary Dune Sand
Quaternary Loess
Tertiary Ogallala
Cretaceous Shales
0 5 10 15 20 25 Miles

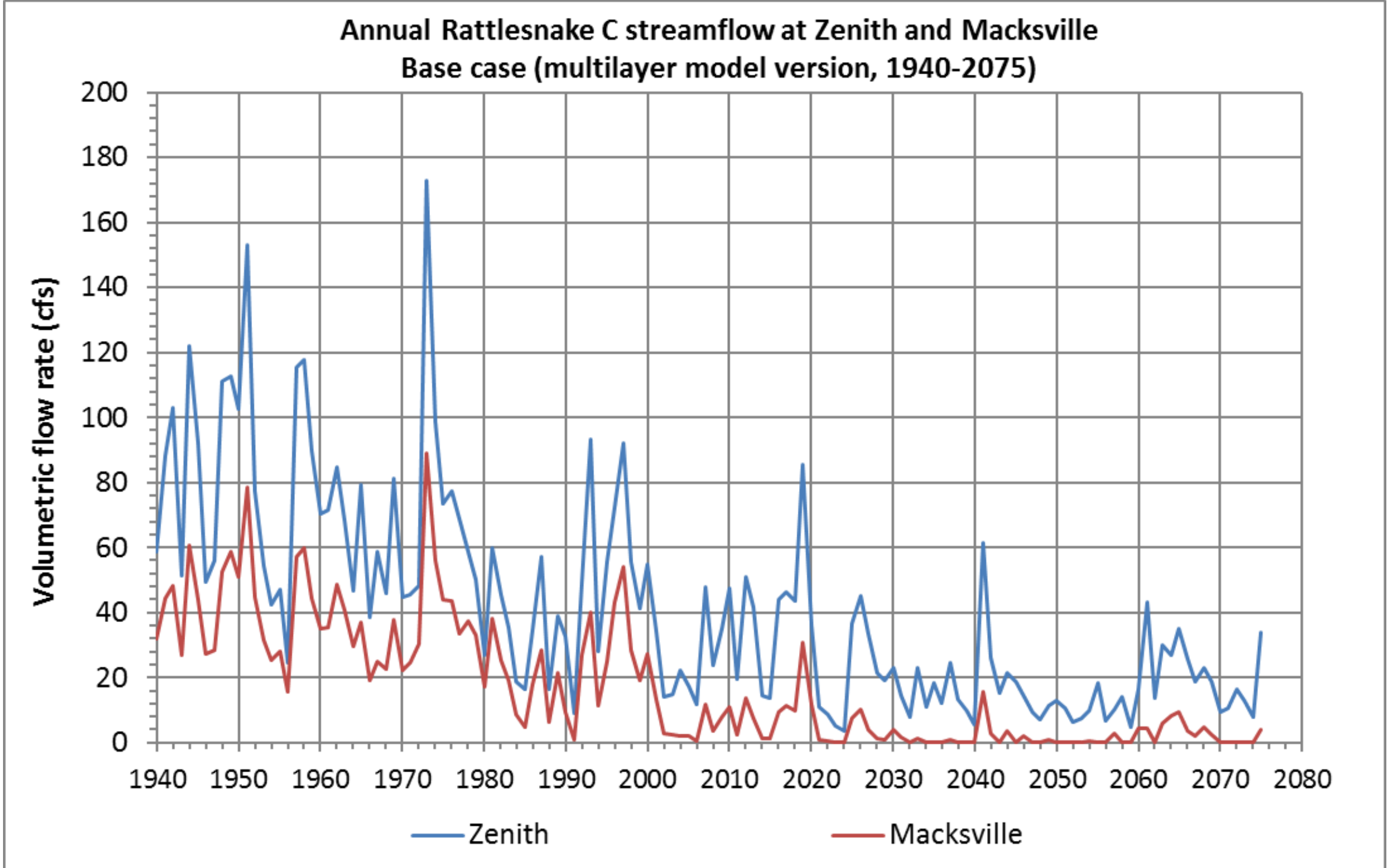
Impacts of 143,500 AF of junior groundwater pumping

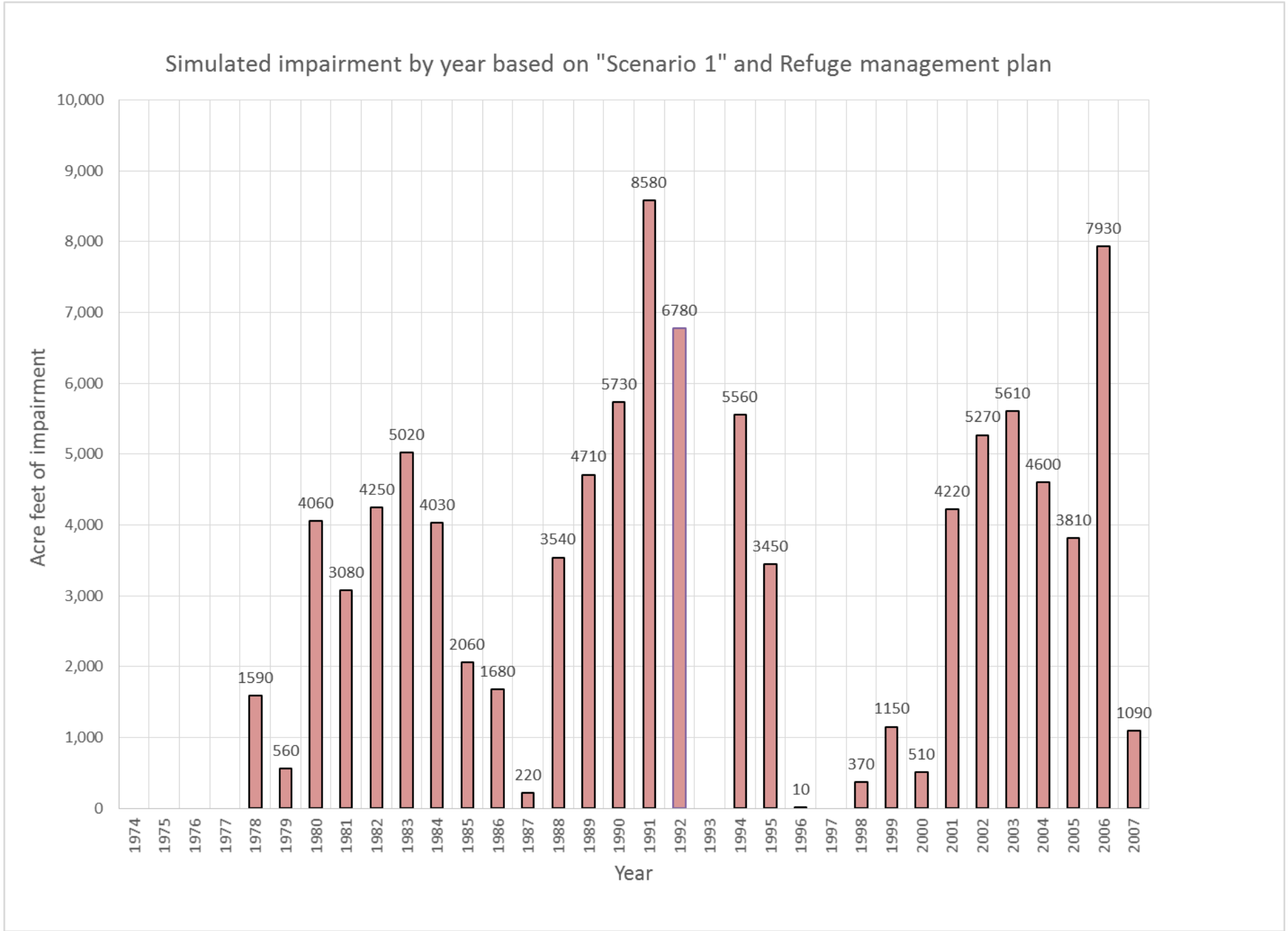


- Reduction in groundwater storage
- Reduction in streamflow
- Reduction in phreatophtye ET
- Inflows from neighboring basins

Kansas Dept. of Agriculture, 12/10/2015


Annual impact of pumping on Rattlesnake C streamflow at Zenith and Macksville
Scenario 13 (multilayer model version, 1940-2075)
Volumetric flow rate (cfs)
0
20
40
60
80
100
120
140
160
1940
1950
1960
1970
1980
1990
2000
2010
2020
2030
2040
2050
2060
2070
2080
Zenith
Macksville


Annual Rattlesnake C streamflow at Zenith and Macksville
Base case (multilayer model version, 1940-2075)
Volumetric flow rate (cfs)
200
180
160
140
120
100
80
60
40
20
0
1940
1950
1960
1970
1980
1990
2000
2010
2020
2030
2040
2050
2060
2070
2080
Zenith
Macksville

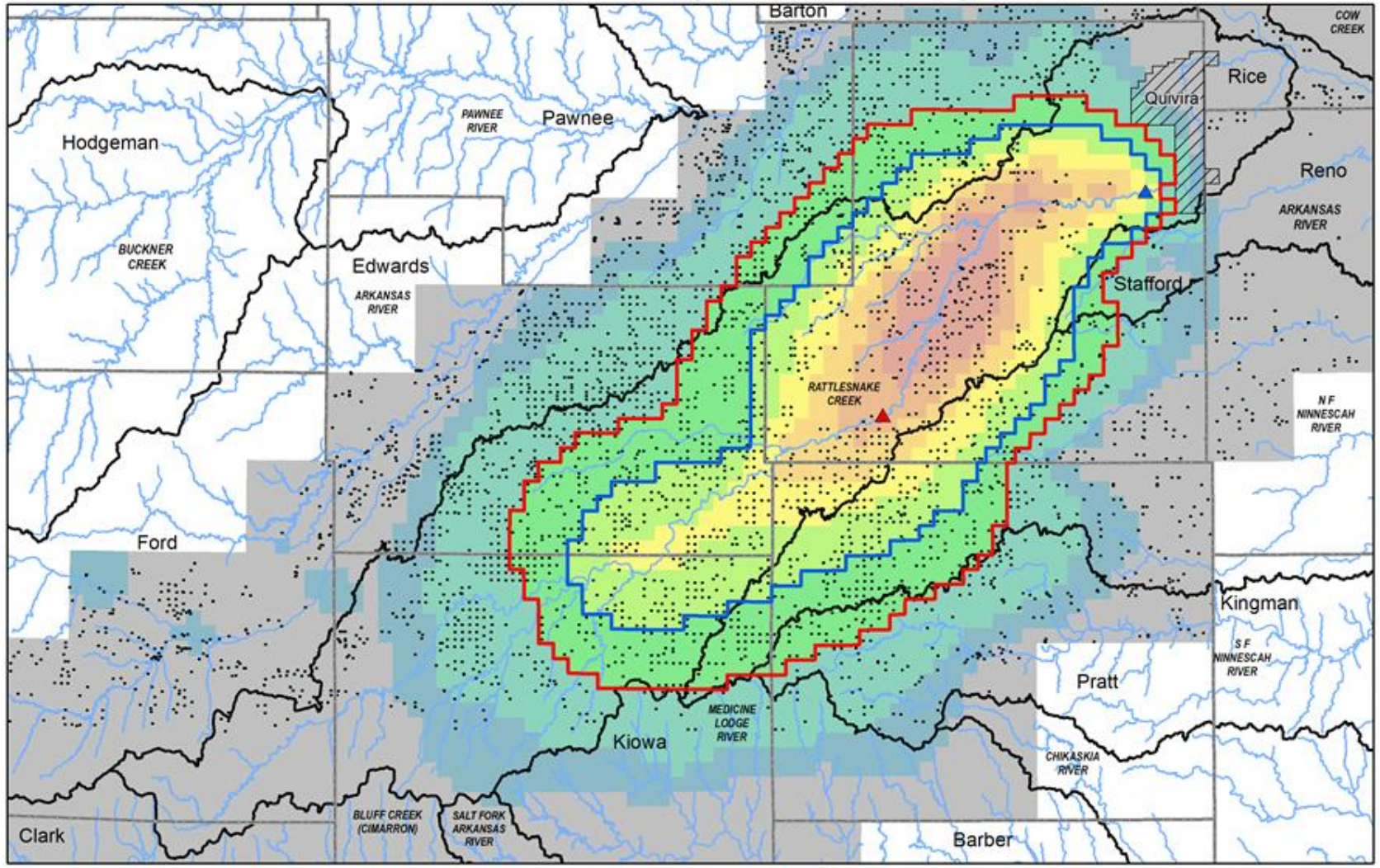

Simulated impairment by year based on "Scenario 1" and Refuge management plan
Acre feet of impairment
Year
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007
1590
560
4060
3080
4250
5020
4030
2060
1680
220
3540
4710
5730
8580
6780
5560
3450
10
370
1150
510
4220
5270
5610
4600
3810
7930
1090

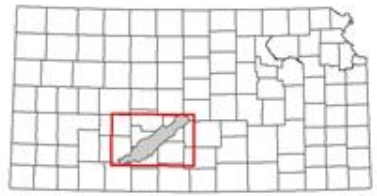
Quivira: current status

- Impairment investigation found junior, upstream groundwater pumping is regularly interfering with the U.S. Fish and Wildlife Service's senior use.
  - Regularly 3,000 – 5,000 acre-feet per year
- Working with water users to develop a workable solution
  - No water administration in 2016 and 2017 to allow negotiation / determination of solution
  - Two rounds of offers by GMD dominated by augmentation; the latest, up to 5,000 AF.
  - Negotiating on level of pumping cuts to stabilize the level depletions to make augmentation a long-term solution.

Rattlesnake Creek Streamflow Response Regions (Version 3, DRAFT)

1998 - 2007 average streamflow response (pct) at Zenith gage evaluated in 110 townships and 483 sections and kriged to 3,960 sections in and near Rattlesnake Creek basin and groundwater points of diversion junior to Quivira





Stream Response (Percent)

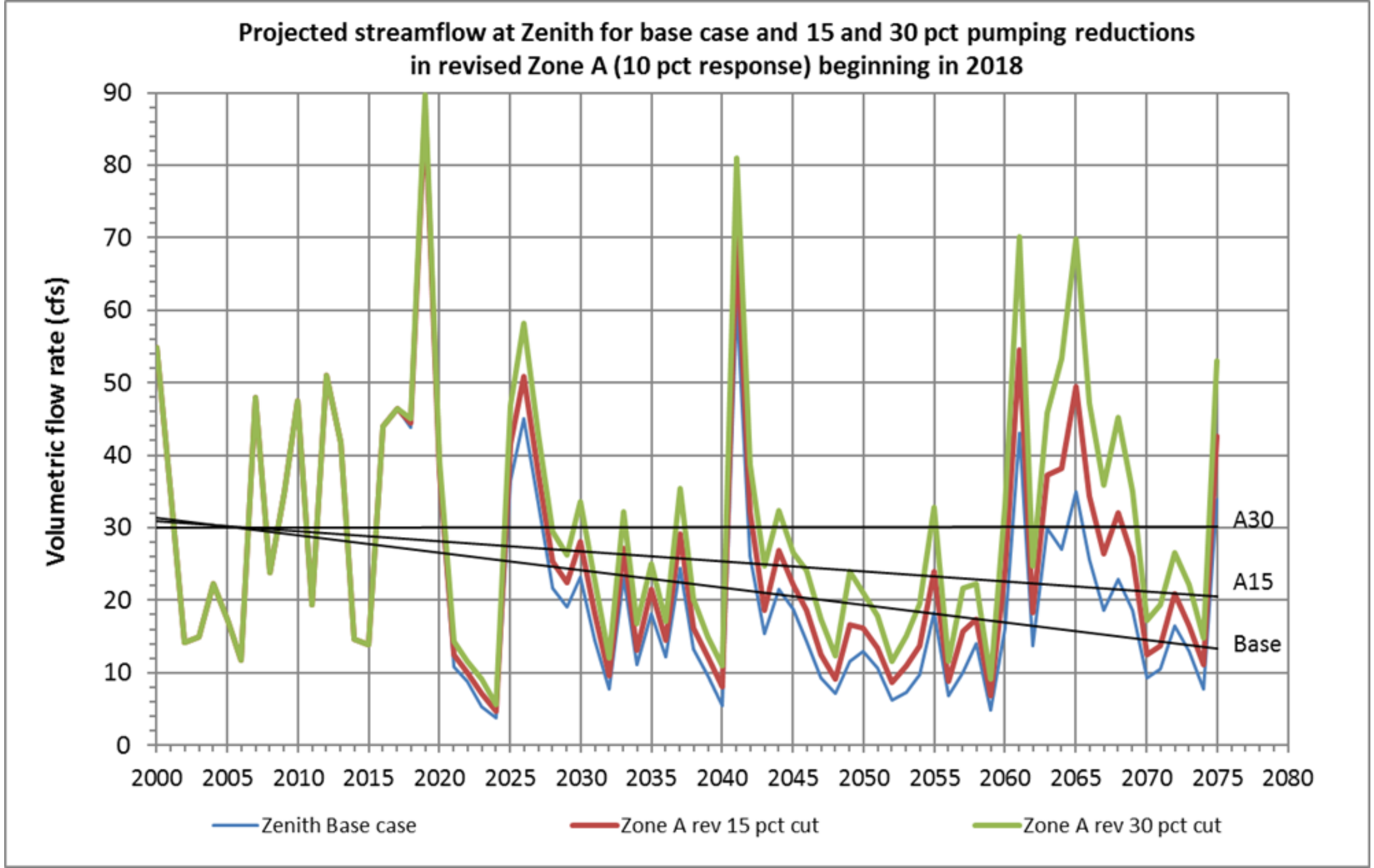
- 60.1 - 90.0
- 50.1 - 60.0
- 40.1 - 50.0
- 30.1 - 40.0
- 20.1 - 30.0
- 10.1 - 20.0
- 3.1 - 10.0
- 1.1 - 3.0
- 1.0 or Less

- Zone A - Version 3
- Zone B - Version 3
- Zenith Station
- Macksville Station
- Point of Diversion

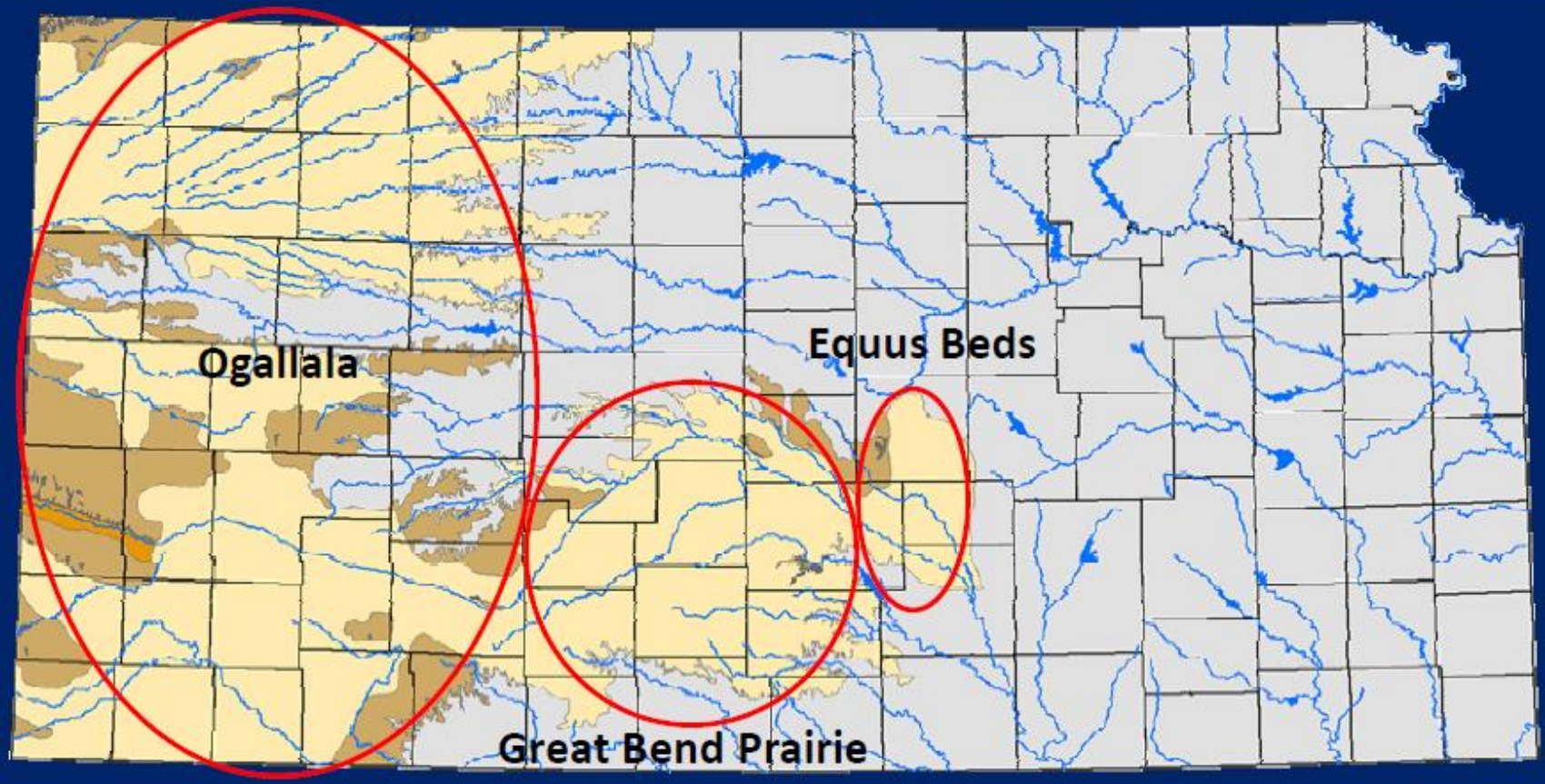
N

0 5 10 15 20 Miles

Kansas Department of Agriculture
Division of Water Resources
July 21, 2017


Projected streamflow at Zenith for base case and 15 and 30 pct pumping reductions
in revised Zone A (10 pct response) beginning in 2018
Volumetric flow rate (cfs)
0
10
20
30
40
50
60
70
80
90
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
A30
A15
Base
Zenith Base case
Zone A rev 15 pct cut
Zone A rev 30 pct cut

The Kansas High Plains Aquifer



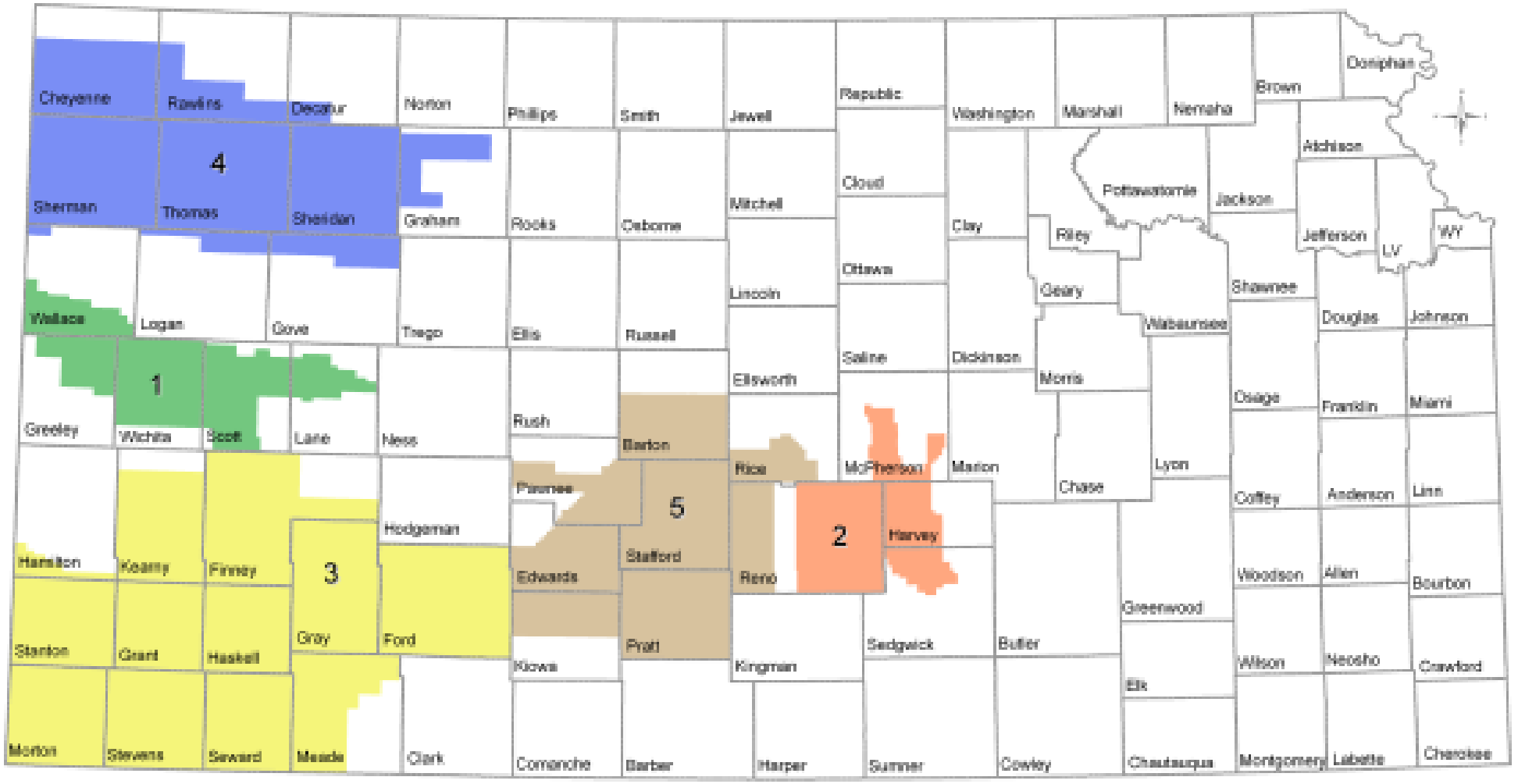
In Kansas, The High Plains Aquifer is made up of several smaller sub-regional aquifers - the Ogallala, Great Bend Prairie and Equus Beds. On a national scale, many people and publications will refer to the High Plains aquifer as the Ogallala. In Kansas, we make a distinction.

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.

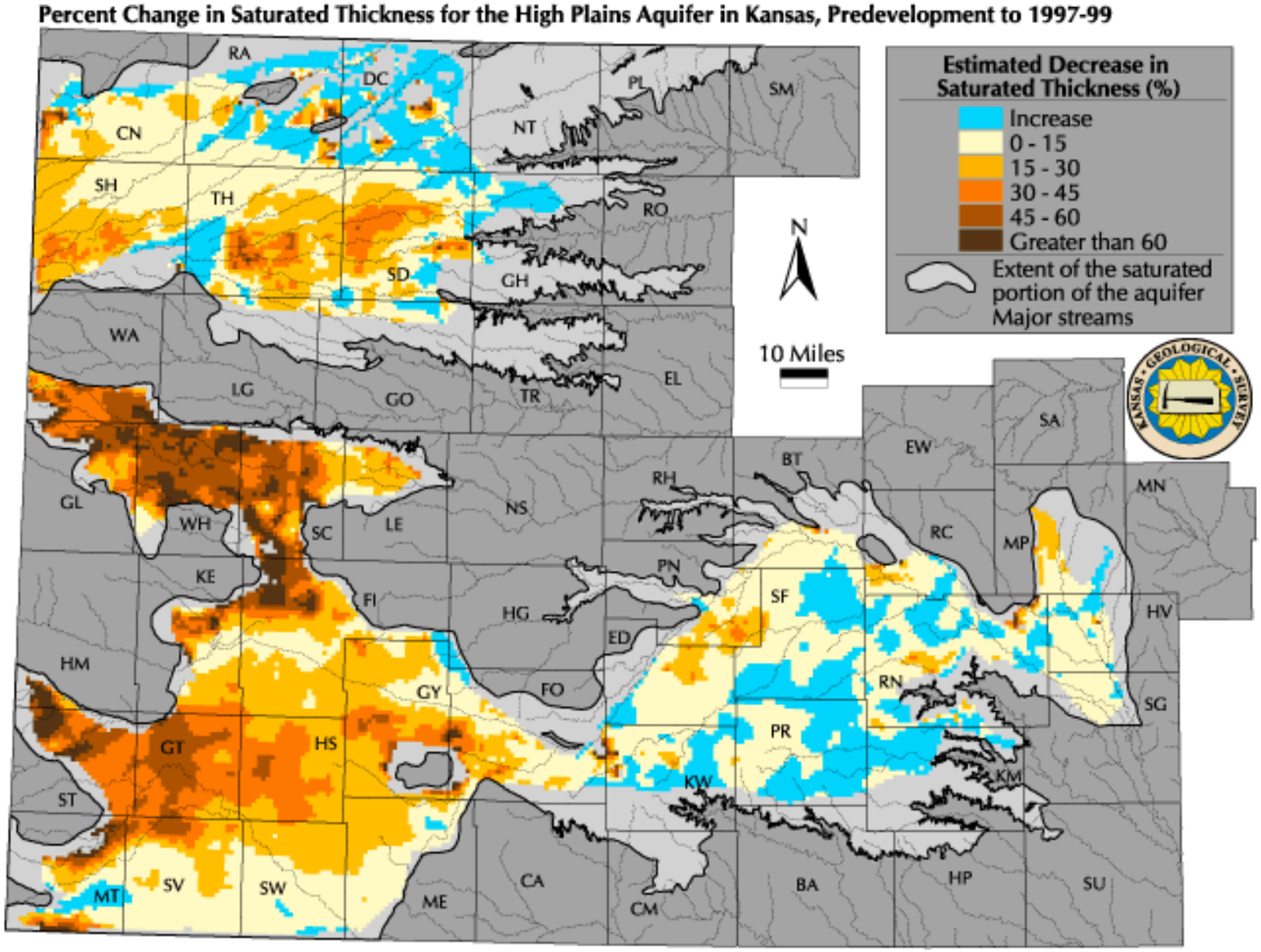
Kansas Water Appropriation Act, 1945

- **All water** within the state of Kansas is hereby **dedicated to the use of the people of the state**, subject to the control and regulation of the state in the manner herein prescribed.
- Based on prior appropriation (first in time, first in right)
- Groundwater and surface water in single priority system
- Charges chief engineer to oversee:
  - **Allocation** of water supply, allowing for orderly development of the state's water resources
  - **Regulation** of in times of shortage.

Kansas Groundwater Management Districts (GMDs)



Percent Change in Saturated Thickness of High Plains Aquifer in Kansas



Renewed efforts to extend the life of Ogallala Aquifer

- Reducing the barriers to conservation, esp. eliminating “Use it or Loss It”:
  - 2012: No abandonment in closed areas;
  - 2015: Voluntary conservation must be considered in all programs and regulatory actions (LEMA, IGUCA, WCA, etc.).
- Good science, esp. the development of groundwater models
- Providing new management tools (next slide)
- Demonstrating technologies that work in the field
- Incentive-based: CREP, EQIP
- Increased education

Tools for over-appropriated areas

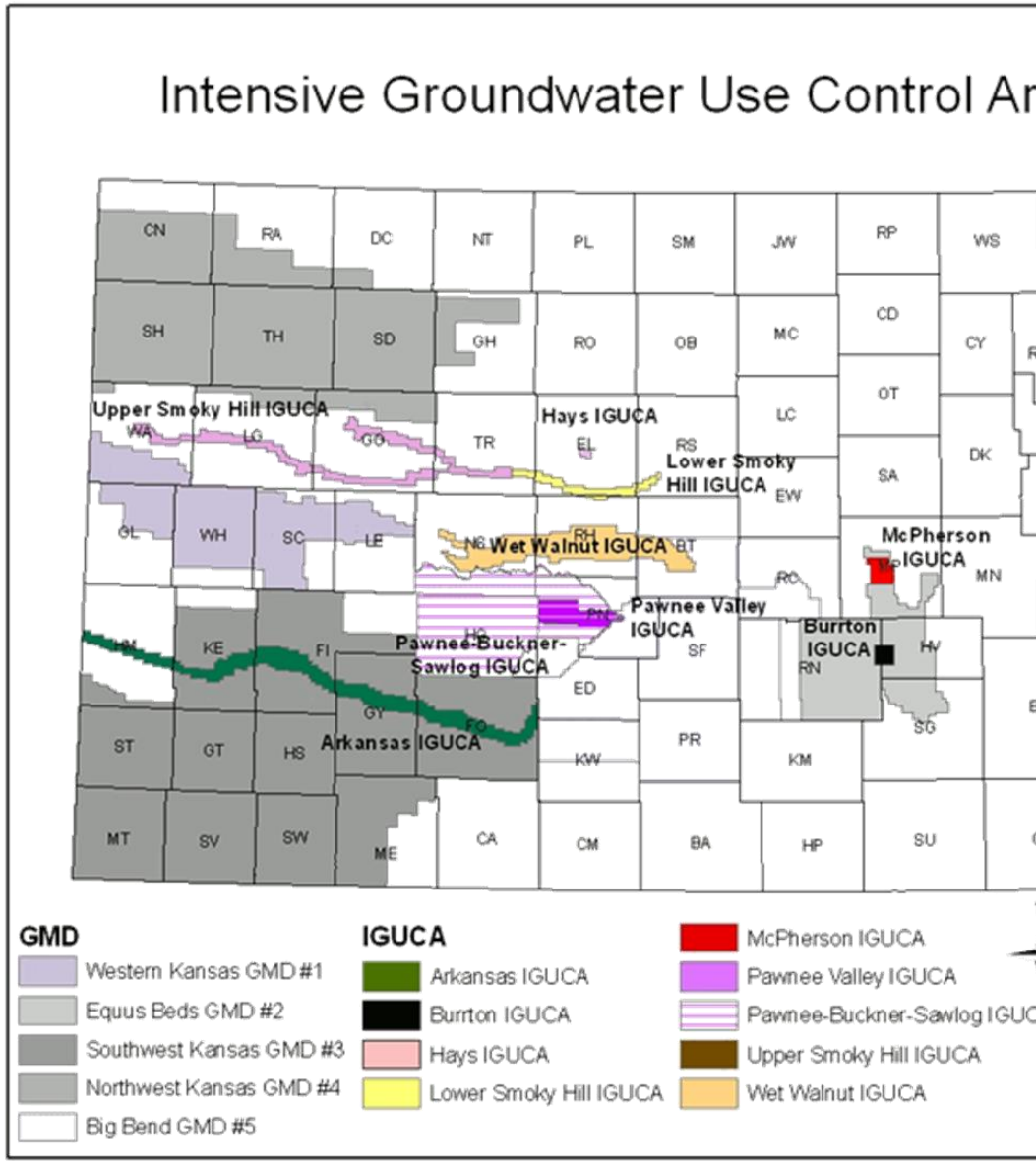
- Regulatory:
  - Intensive Groundwater Use Control Areas, IGUCAs (1978):
  - Local Enhanced Management Areas, LEMAs (2012)
- Voluntary
  - Water Conservation Areas, WCAs (2015)

Intensive Groundwater Use Control Areas (IGUCA), 1978

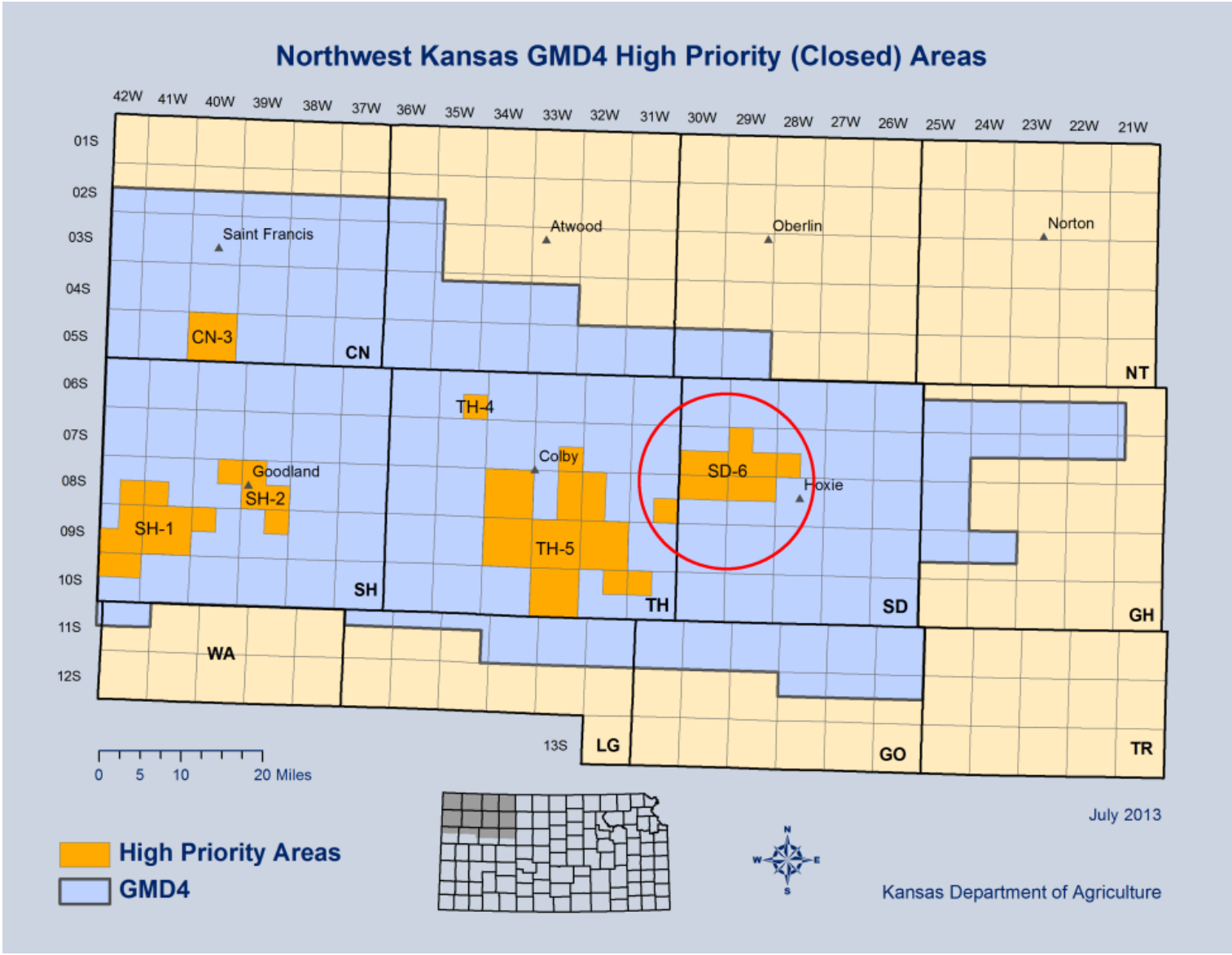
- Water management tool that works in conjunction with the Kansas Water Appropriation Act
- Allows for more flexible solutions, taking in to account the area and aquifer
- Provides alternatives to strict administration of water rights by priority
- Formal public hearings are held
- Decision by chief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

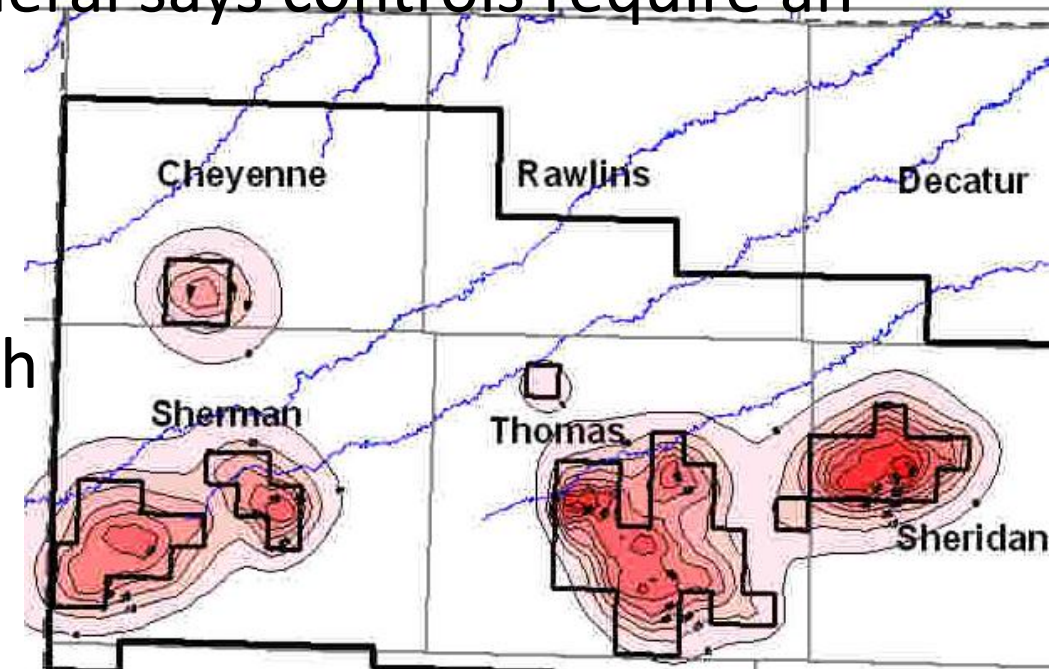


Northwest KS GMD 4 High Priority Area



GMD 4 Seeks Enhanced Management

- Groundwater model demonstrates benefits of pumping cuts stay put
- “Sheridan 6” High Priority Area wants to cut use by 20%, but not via priority administration
- Tried regulations; Attorney General says controls require an IGUCA
- GMD Board discusses and rejects IGUCA option
- Manager outlines new approach requiring new legislation



Senate Bill 310 (2012): Local Enhanced Management Areas (LEMA)

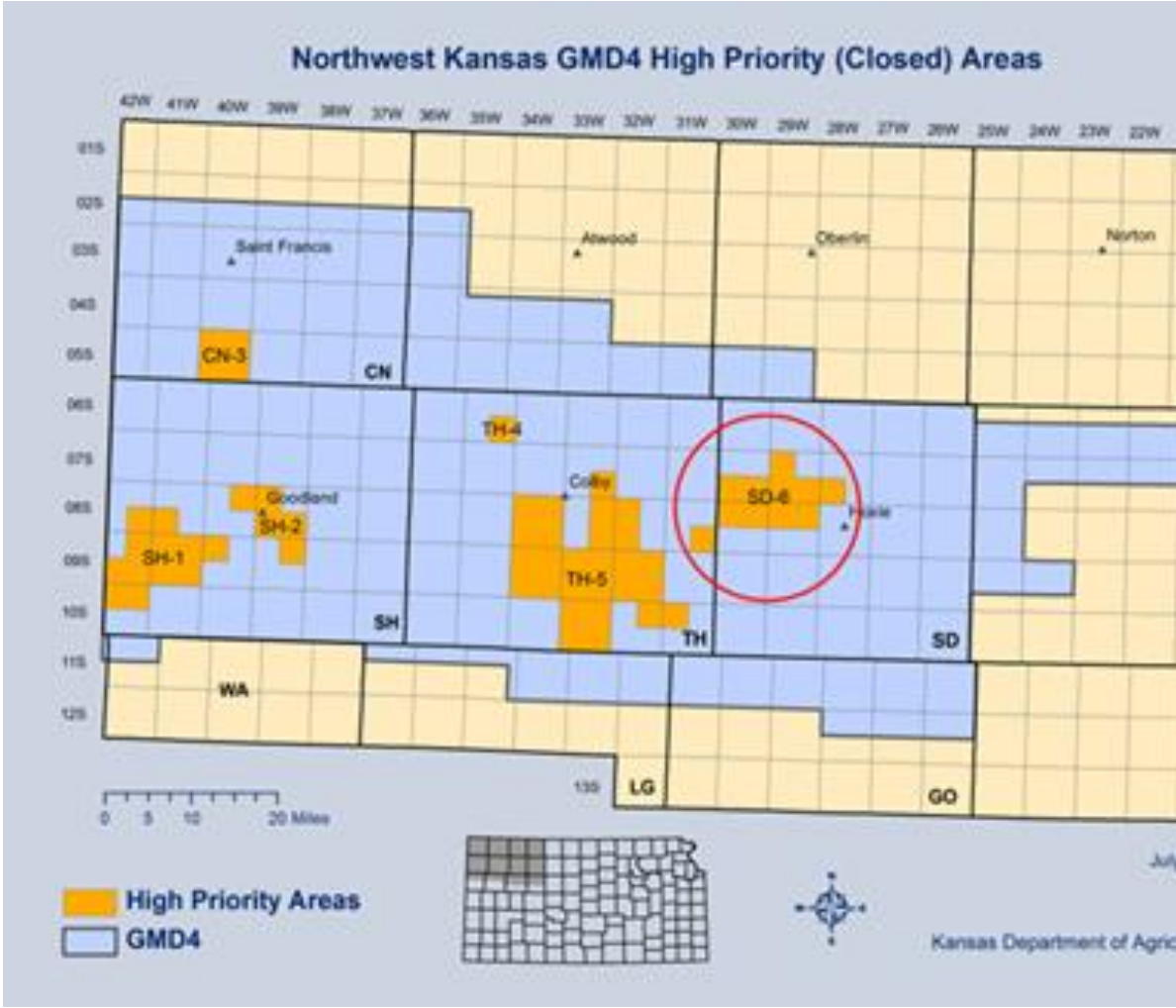
- Like IGUCAs, requires demonstrated problem: groundwater declines, dropping rates, etc.
- Similar tools as IGUCAs: allocations, rotation of use, etc.
- Like IGUCAs, due process required via hearings (as adjusting water rights)
- LEMA Plan to include conservation measures to address specific water resource 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

- Goal: Restrict use to 114,000 acre-feet total from 2013-2017
- LEMA allocation of 55 inches (11 inches x 5 years)
- Flexibility to move allocations
- GMD initiated proceedings, June 2012
- Public hearings, Sept. & Nov. 2012
- Order of decision, Dec 2012
- Order of designation, April 2013

  Size: 99 Sections

  Wells: 195 wells; 61,164 authorized acre-feet, 24,803 acres irrigated.

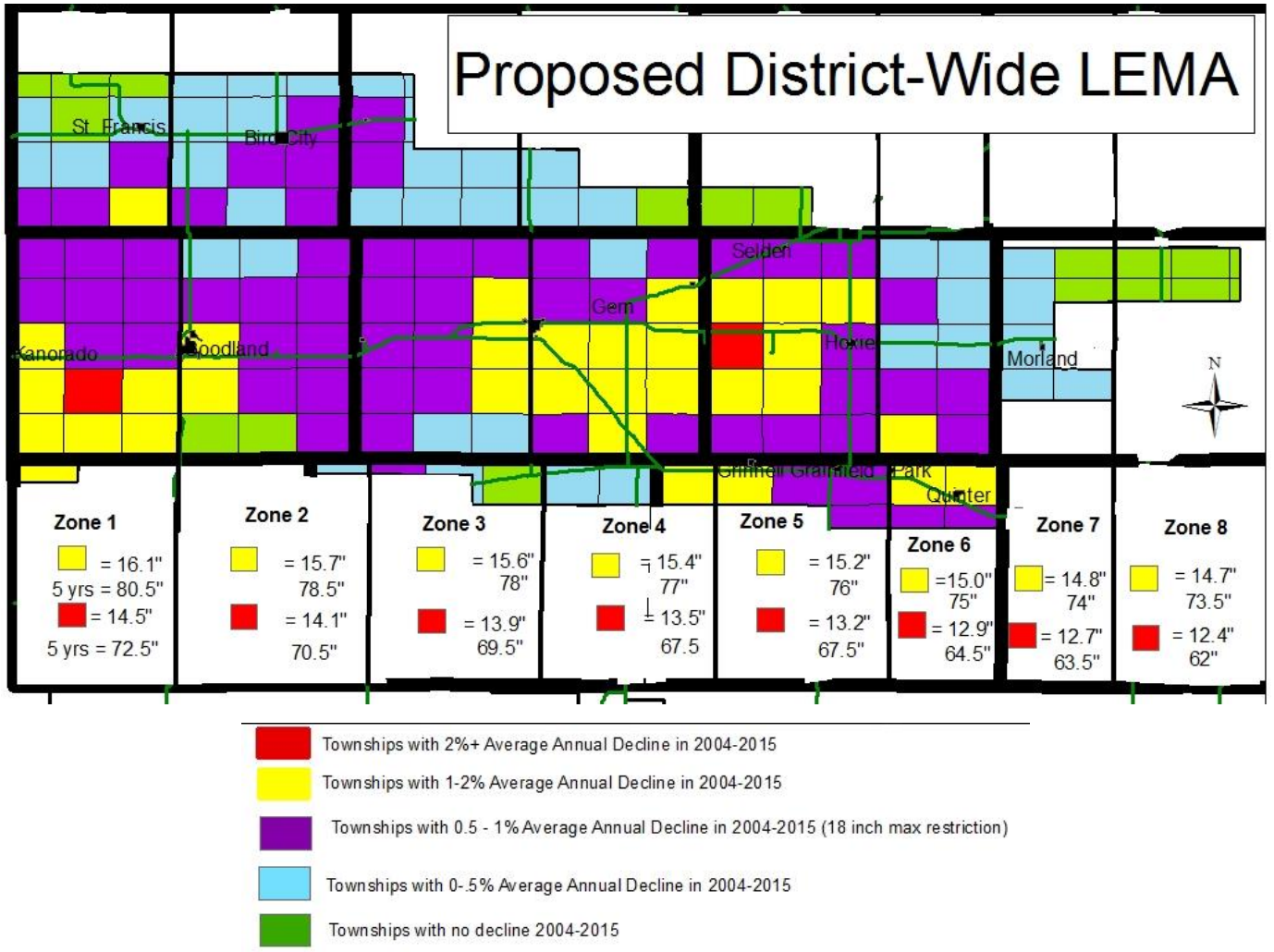


Sheridan 6 LEMA, 2018-2022

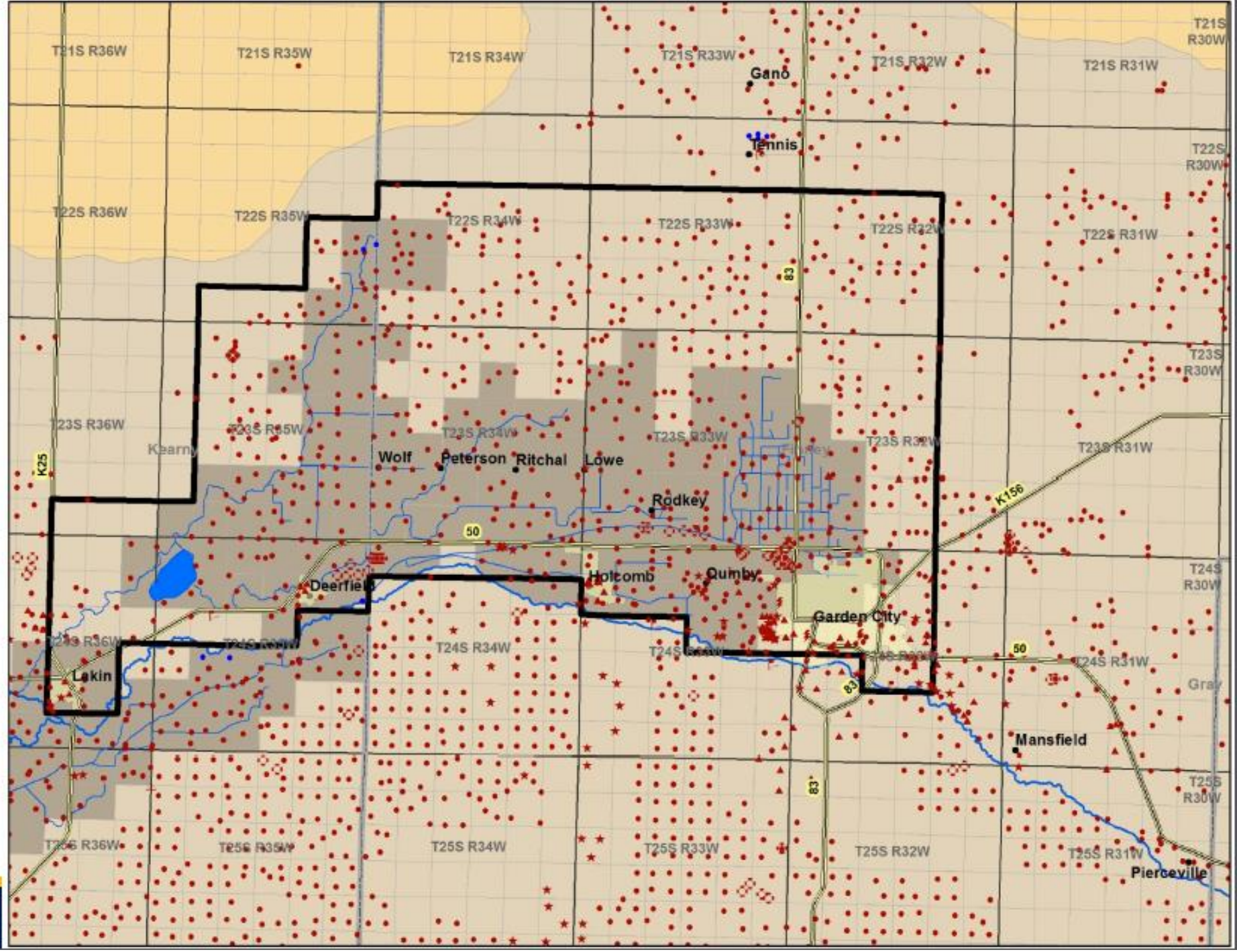
- Requested by GMD 4 on February 17, 2017
- Same terms as initial LEMA except to allow up to 5 inches of unused allocation from the first 5 years.
- Hearing: May 31, 2017 in Hoxie
- Order of Decision approving on August 24, 2017. Order of designation coming soon.

GMD#4 District Wide LEMA

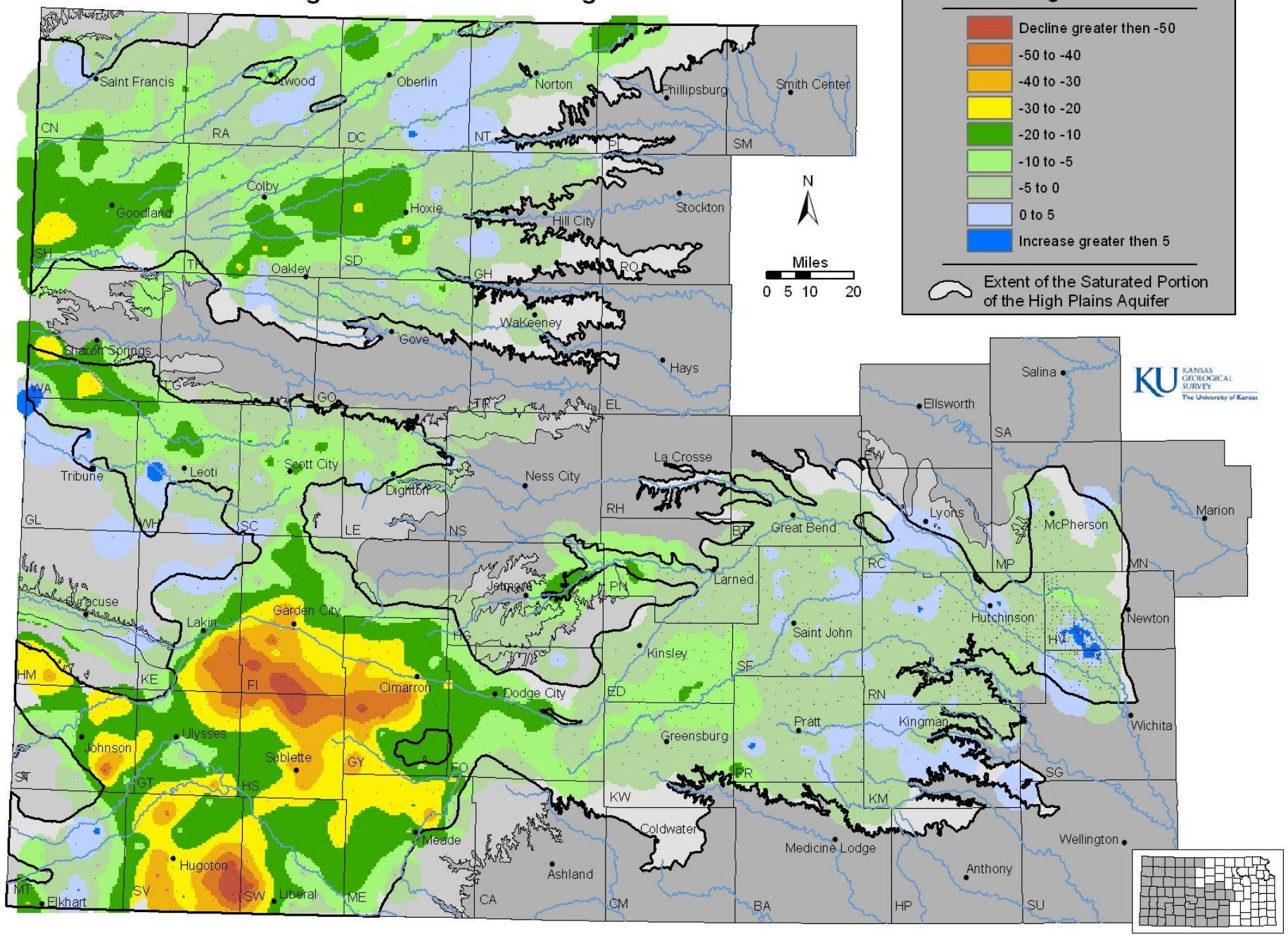
- Based on rate of decline
- Conservation factor related to 50% or 80% NIR
- Zones factor in variability in precipitation from west to east
- 5-year LEMA allocation
- No additional flexibilities, encourages WCAs
- Initial hearing: Aug 23, 2017



KFL Boundary and Water Right Development



Interpolated Water Level Change in the High Plains Aquifer from Average 1997-1999 to Average 2007-2009



2015 Legislation: Water Conservation Areas (SB 156, S. 1)

New Section 1. (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.

What is a WCA?

- A Water Conservation Area (WCA) is a designated area with an approved management plan developed by a water right owner or group of water right owners with the consent of the chief engineer to reduce water withdrawals while maintaining economic value via water right flexibility.
- Benefits:
  - Extending the usable lifetime of the local aquifer
  - Flexibilities such as multi-year allocations, movement of allocations, and allowing for new uses of the water
  - No hearings; streamlined process
- WCAs do not make a permanent change in the water right
- Can be limited in duration to allow water right owners to try out control

WCA Plans and Agreements

WCA Name	County	WCA Plan	WCA Consent Agreement/Order	Date Approved
Big D Farms	Finney	Big D Farms WCA Plan		Pending Approval
Richmeier Farms	Finney	Richmeier Farms WCA Plan		Pending Approval
Hatcher Land Co. LP	Seward	Hatcher Land Co. LP Plan		Pending Approval
Compton: Lane County Farm	Lane	Compton Lane County WCA Plan	Compton Lane County WCA Consent Agreement/Order	03/30/2017
Wichita County	Wichita	Wichita County WCA Plan	Order establishing the Wichita County WCA	03/07/2017
Compton: Highway 4 Farm	Scott	Compton HWY 4 WCA Plan	Compton HWY 4 Consent Agreement/Order	02/20/2017
T&O Finney County (Willis)	Finney	T&O Finney County (Willis) WCA Plan	T&O LLC Consent Agreement/Order	07/25/2016
Westside Dairy	Stanton	Westside Dairy WCA Plan	Westside Dairy Consent Agreement/Order	02/23/2016
Franklin Family	Sherman	Franklin Family WCA Plan	Franklin Family Consent Agreement/Order	01/12/2016

Technology

Water Technology Farms

Cost share for technology adoption

State funding where they are in a LEMA or WCA (i.e. water savings go to saving water not growing more corn)