

# Quivira Impairment Remedy Requirements

GMD 5 annual meeting  
February 15, 2018

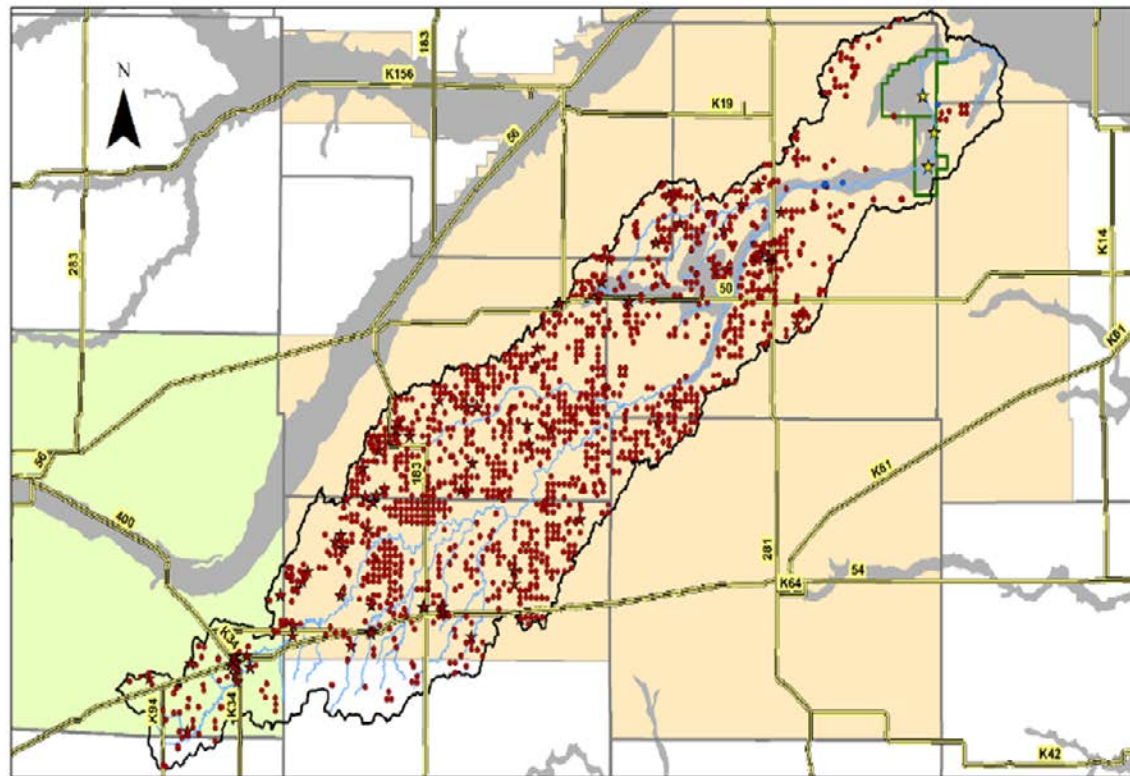
David Barfield, Chief Engineer

Division of Water Resources  
Kansas Department of Agriculture



# Rattlesnake Basin and Quivira National Wildlife Refuge

Rattlesnake Creek Basin Groundwater and Surface Water Rights



## Points of Diversion

- ★ Quivira, SW
- Junior, SW
- Junior, GW
- ★ Senior, GW
- Rattlesnake Creek Basin
- Quivira Wildlife Refuge
- Streams
- Alluvial Aquifers

Notes: GW refers to a groundwater source SW refers to a surface water source

Quivira Priority date: August 15, 1957



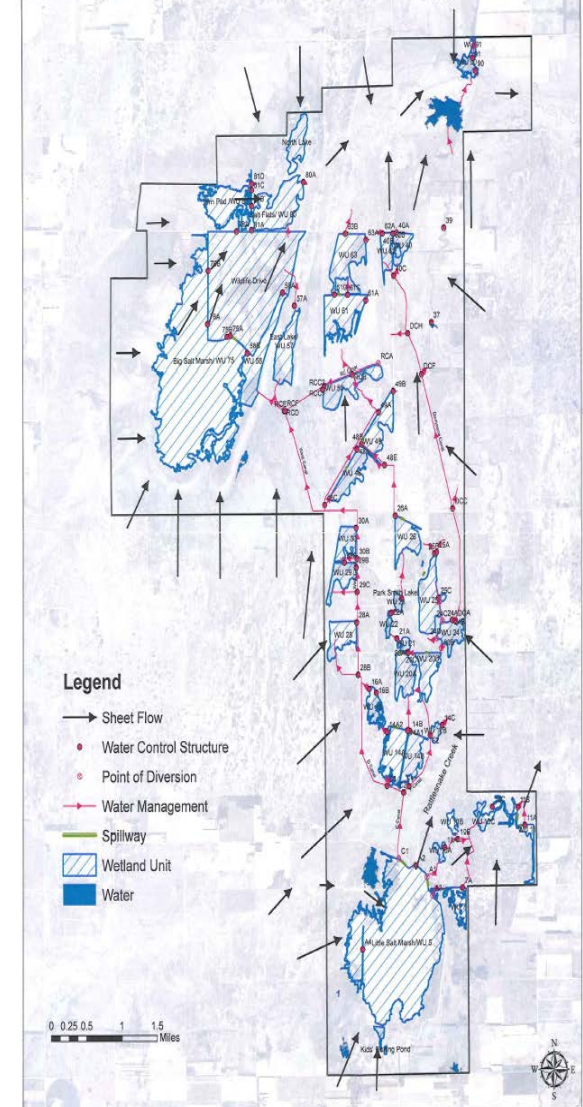
0 5 10 20 Miles



Kansas Department of Agriculture  
Division of Water Resources  
October 7, 2015

Figure 2 - Rattlesnake Creek Basin map of water rights

Quivira NWR Water Management







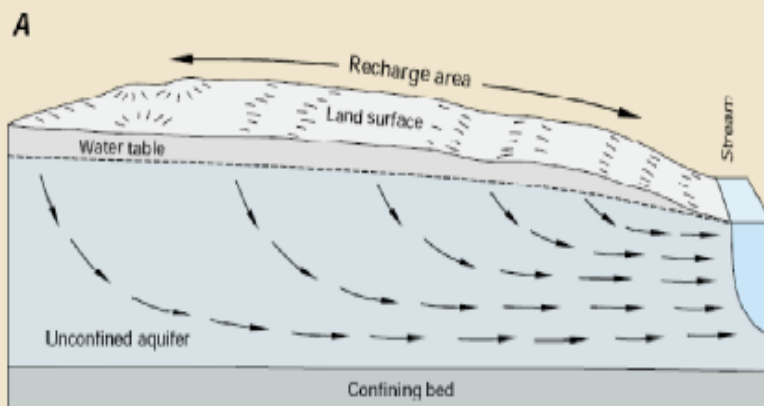
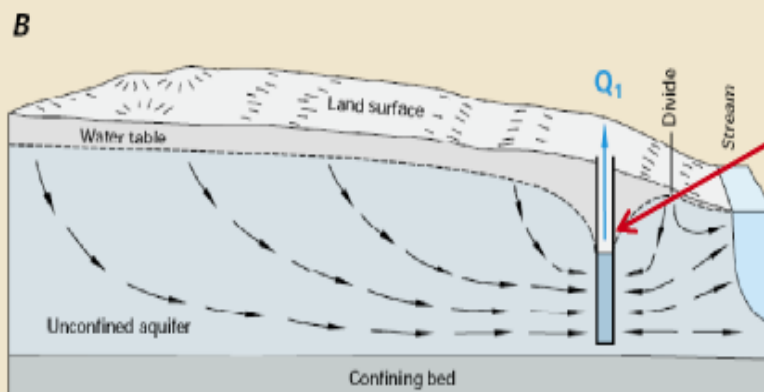
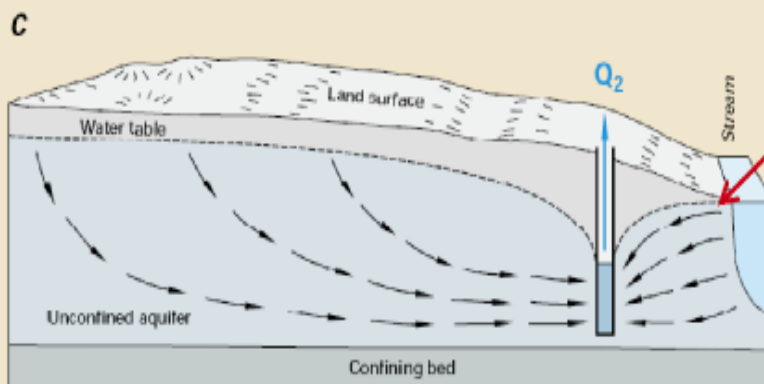


Figure C-1. In a schematic hydrologic setting where ground water discharges to a stream under natural conditions (A), placement of a well pumping at a rate ( $Q_1$ ) near the stream will intercept part of the ground water that would have discharged to the stream (B). If the well is pumped at an even greater rate ( $Q_2$ ), it can intercept additional water that would have discharged to the stream in the vicinity of the well and can draw water from the stream to the well (C).

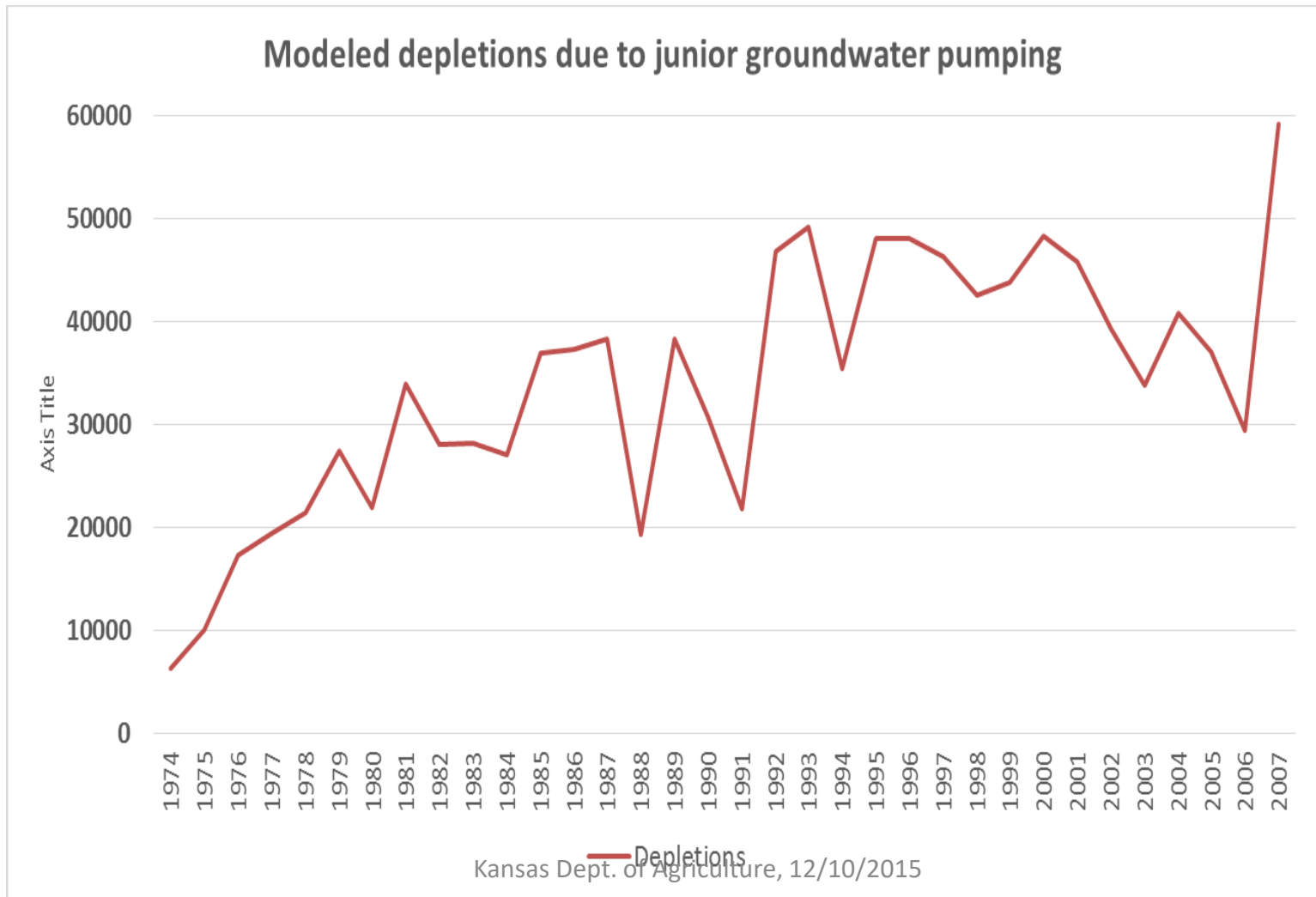


Cone of Depression



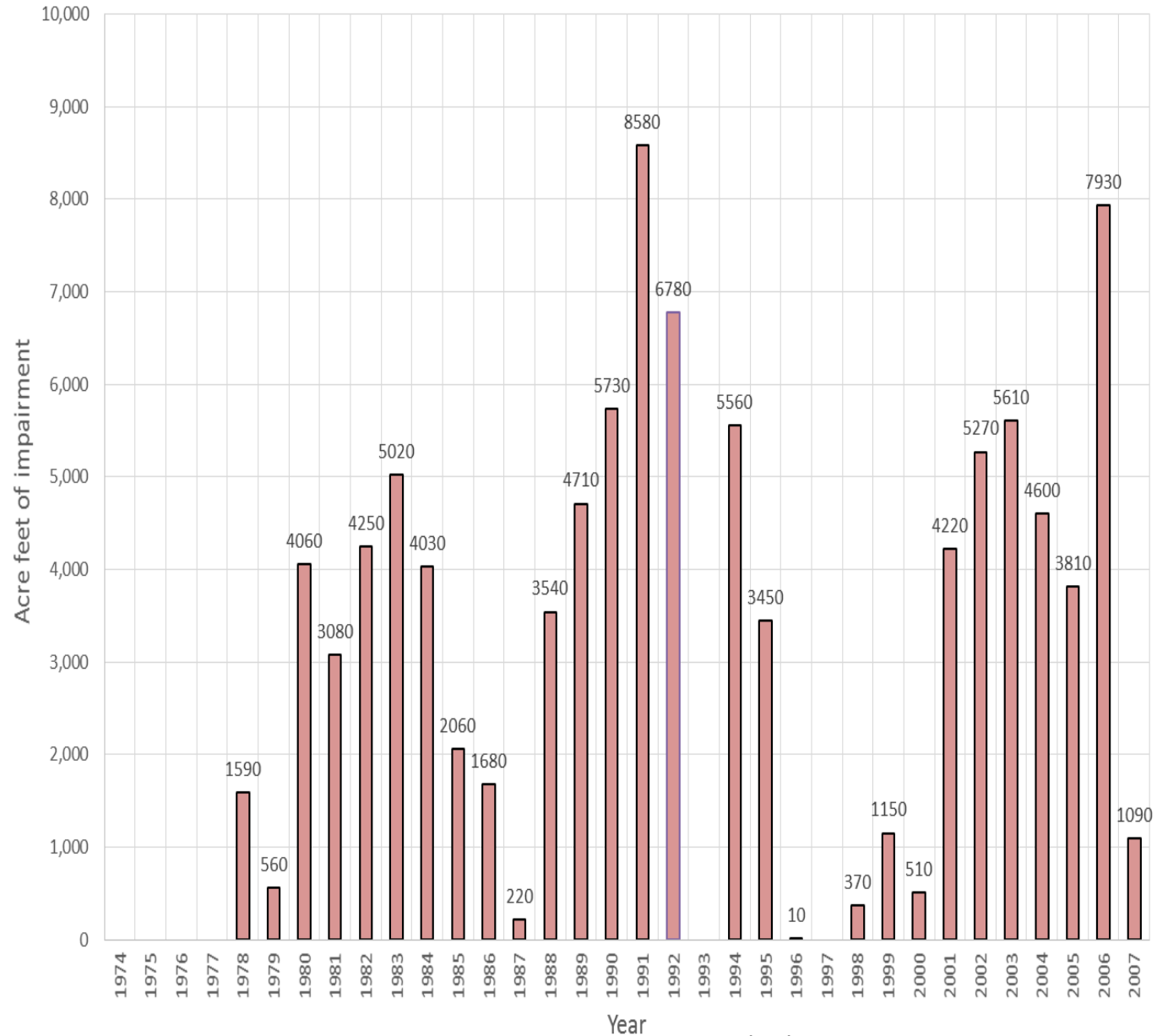
Intersection of stream by the cone of depression, resulting in diminishing streamflow.

# Groundwater depletions to streamflow as determined using the GMD 5 groundwater model





Simulated impairment by year based on "Scenario 1" and Refuge management plan







# Tools to remedy impairment

- Augmentation. This cannot be ordered, the Basin must bring it.
- Long-term pumping reductions. This can be accomplished via:
  - water right administration,
  - an Intensive Groundwater Use Control Area (IGUCA), or
  - a Local Enhanced Management Area (LEMA)
- A combination of augmentation and pumping reductions

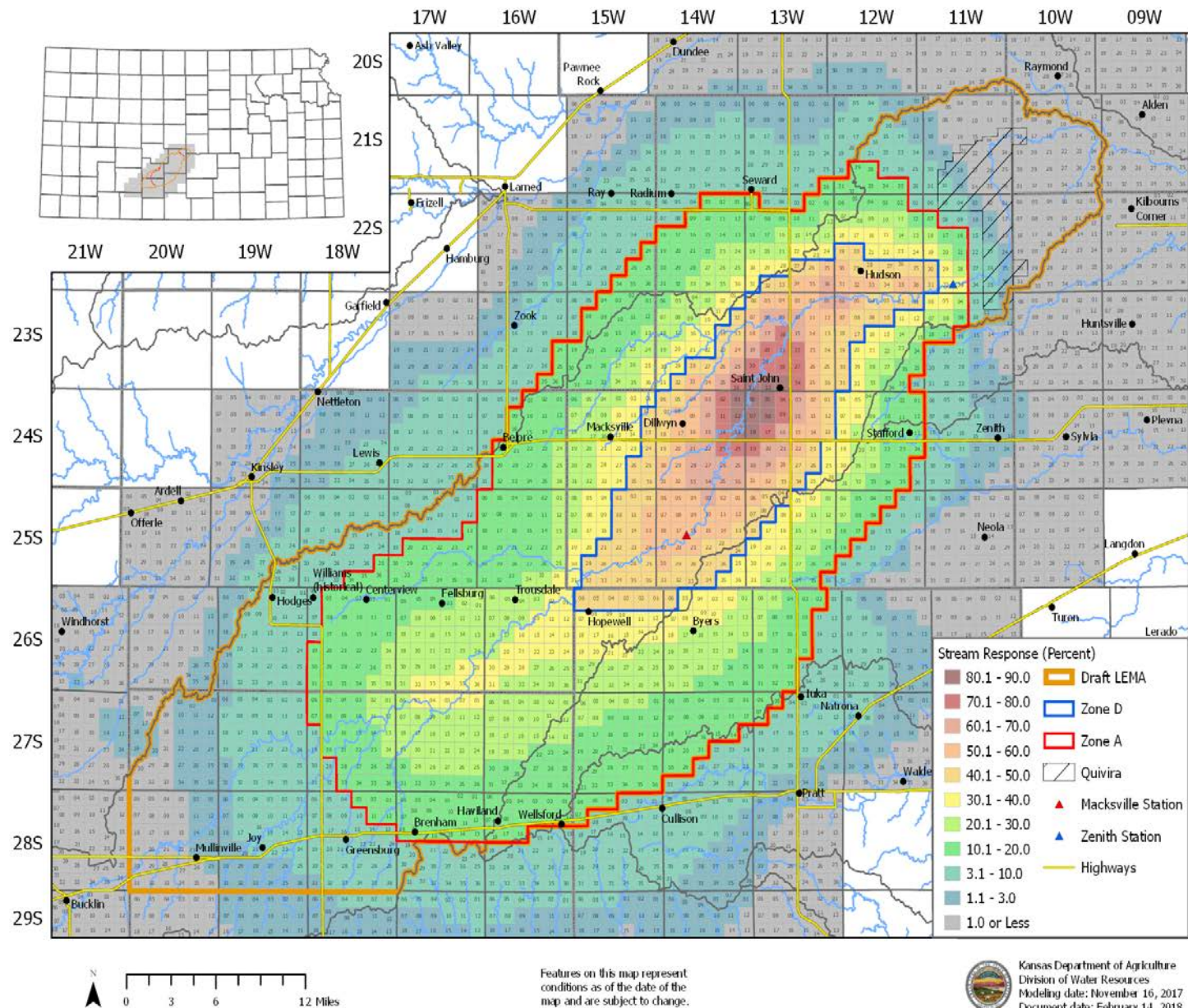


# Negotiations seeking a Remedy

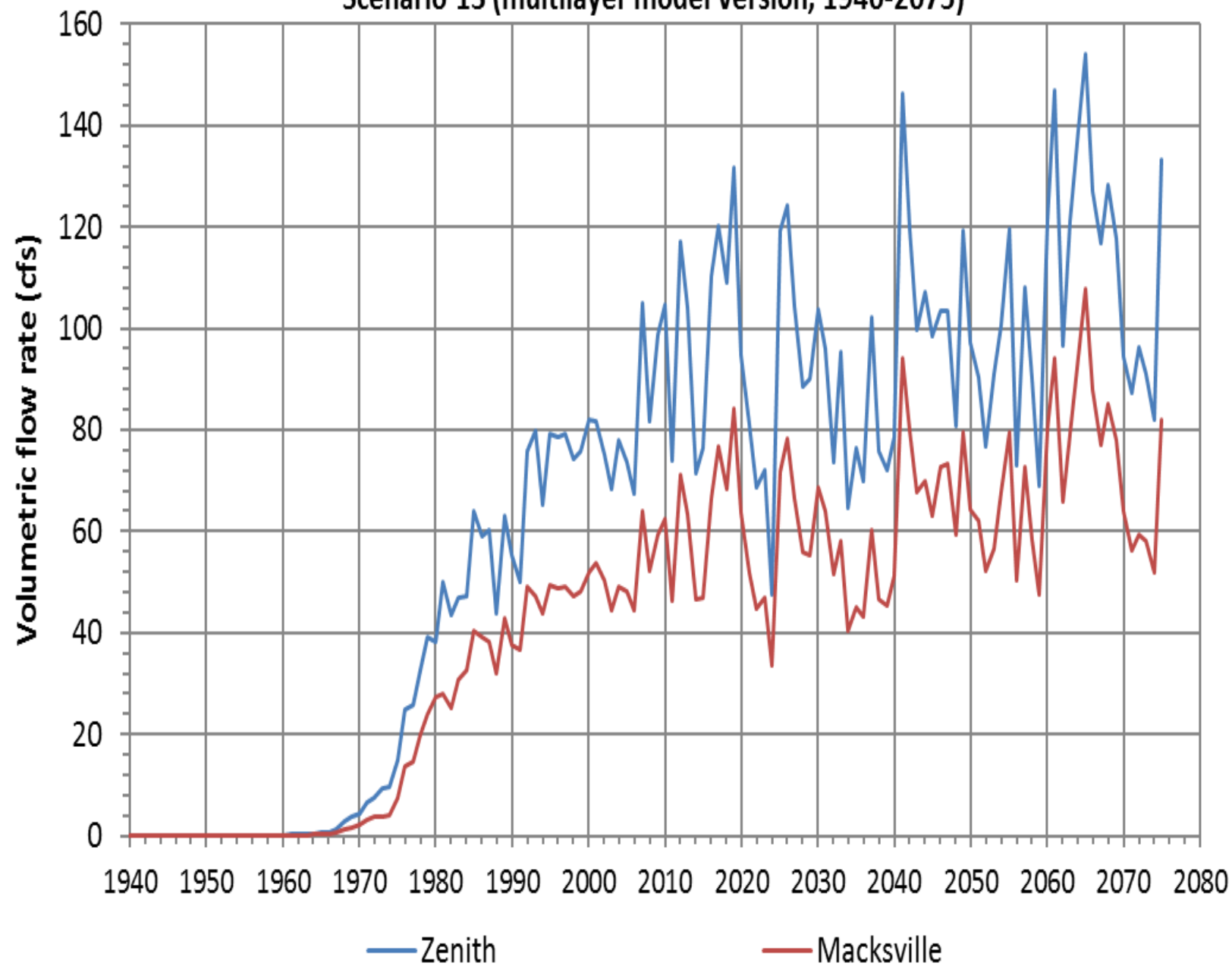
- GMD 5 provided two offers to the U.S. Fish and Wildlife Service (Service) to settle the matter but were unable to reach agreement.
- The Service indicated that augmentation could be an acceptable part of the solution if the quantity and quality are sufficient, but that some level of pumping reductions is needed to make the plan sustainable over the longer term.
- With the inability to reach agreement with the Service, GMD asked what DWR would require to resolve the impairment.
- DWR completed additional technical work to provide a preliminary answer to the question, presented in July 2017

# Rattlesnake Creek Streamflow Response Regions

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



Annual impact of pumping on Rattlesnake C streamflow at Zenith and Macksville  
Scenario 13 (multilayer model version, 1940-2075)

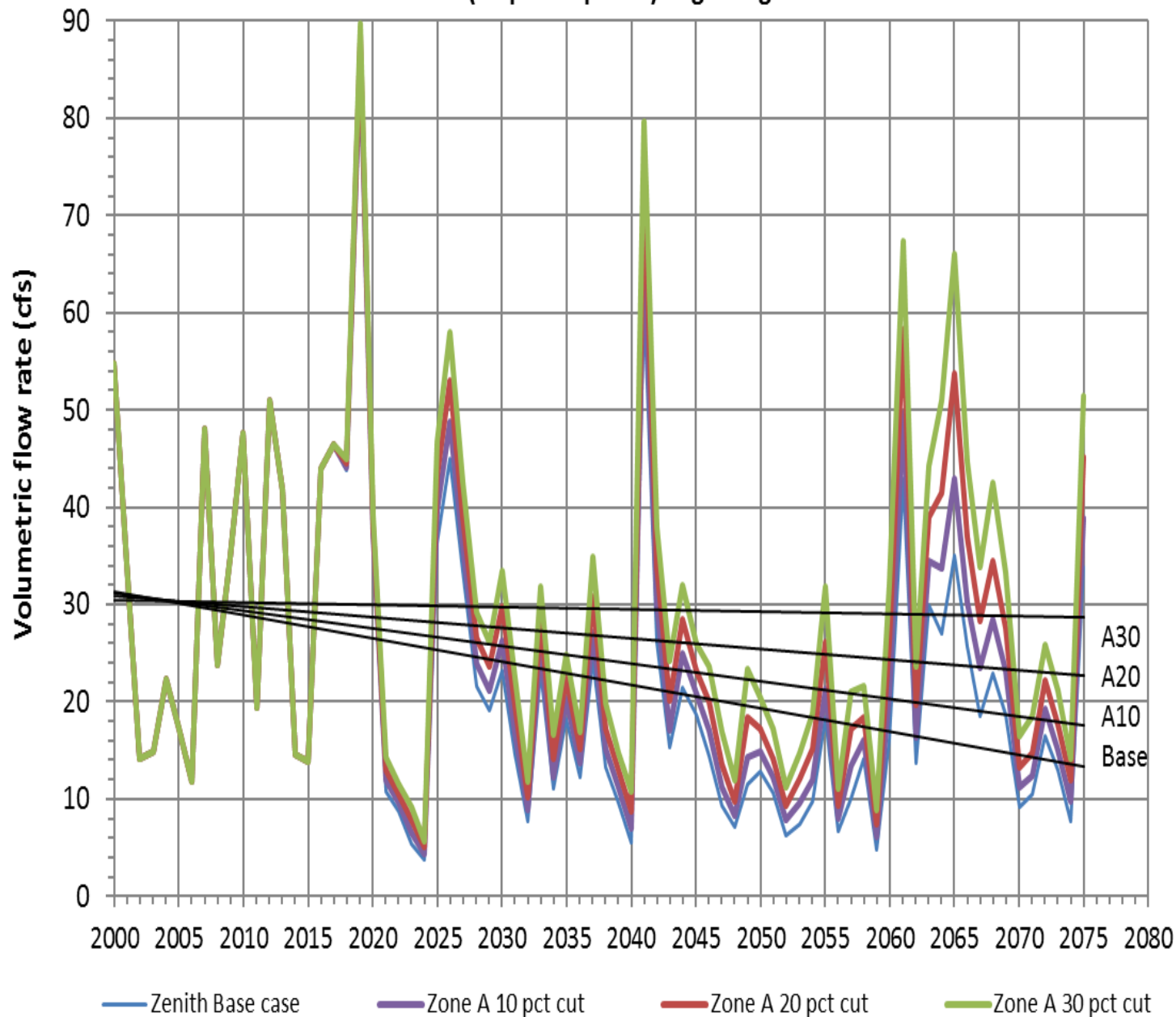


# What level of pumping reductions would be required to stabilize the streamflow depletions?

- We reviewed the benefit of pumping reductions of 10, 20 and 30% within two zones.
  - **Zone A** – area of 10% or greater long-term impact (approx. 135,000 acres with 160,000 AF of average pumping).
    - 10% reduction, averaging 16,000 AF (13,500 AF net pumping)
    - 20% reduction, averaging 32,000 AF (27,000 AF net pumping)
    - 30% reduction, averaging 48,700 AF (40,700 AF net pumping)
  - **Zone B** – area of 20% or greater long-term impact (approx. 85,000 acres with 100,000 AF of average pumping).
    - 10% reduction, averaging 10,000 AF (8,500 AF net pumping)
    - 20% reduction, averaging 20,000 AF (17,000 AF net pumping)
    - 30% reduction, averaging 30,000 AF (25,500 AF net pumping)



Projected streamflow at Zenith for base case and 10-30 pct pumping reductions  
in Zone A (10 pct response) beginning in 2018



# Draft Proposal to remedy impairment to QNWR, July 2017

- **Zone A** is the area of 10% or greater long-term impact (approx. 135,000 acres)
- An immediate 15% reduction in pumping in Zone A for 5 years, 2018-2022.
  - Provided as a 5-year allocation, in inches per acre, with significant flexibility in use. As average use is approx. 14 inches per acre, a 15% reduction would be 11.9 inches per acre (92% of NIR).
- If Augmentation provided within 5-years:
  - the 15% reduction phase will be extended to 10 years (through 2027).
  - The needed additional reduction to stabilize streamflows beyond 2027 will be determined and implemented via a second IGUCA process (or negotiation)
- If Augmentation is not provided, a 30% reduction will be implemented in years 2023-2027, and a future process would determine additional reductions required.

# Local Enhanced Management Areas (LEMA)

## K.S.A. 82a-1041

- 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?

# GMD LEMA discussions

- During September, the GMD indicated its desire to implement a LEMA to resolve the impairment:
  - Augmentation, up to 5,000 AF/year, 15 cfs
  - End gun removal
  - Other un-ordered means to accomplish the 15% reduction (reductions via buyouts, moving water out of the high impact area, voluntary reductions, etc.).
    - GMD believes the removal of end guns will accomplish most of the required reductions.



# LEMA requirements to resolve impairment

- LEMAs have a goal and corrective controls to implement those goals.
- To allow use of a LEMA to resolve this impairment, we need certainty that the augmentation and pumping cuts will happen. This will require:
  - A schedule to put augmentation in place.
  - A quantitative goal to reduce pumping over 2020-2024 which will lead to halving the rate of increase of depletions
  - Early 2025 – an evaluation of whether required reductions are on track.
  - If required reductions are achieved, the plan continues for another 5-years, with evaluations at the end of each period.
  - If the required reductions are not achieved, allocations prescribed in the LEMA will be implemented for 2025-2029 to insure the required reductions over the entire 2020-2029 period are met.

# Questions