1) Drought in Kansas: A Long History

2) Reliance on a Declining Aquifer

3) Vision for Future of the High Plains Aquifer
1. Western Ks is semi-arid
2. Limited surface water
3. Extensively developed groundwater
4. Prior Appropriation State
Kansas has a history of Drought with the 1930s and 1950s iconic

The drought of 2011, 2012 and 2013 also has taken a toll
Weeks of Extreme and Exceptional Drought
April 19, 2011 - December 31, 2013 (133 weeks)

Weeks County in Extreme or Exceptional Drought

Source: U.S. Drought Monitor maps, approximately 50% of county or more in D3 or D4

Prepared by Kansas Water Office
Drought duration – SW Kansas

Mega-droughts 40-50 years

From Anthony Layzell and Catherine Evans, Kansas Geologic Survey, 2013, Public Information Circular
State’s Immediate, Short Term Responses:

- Outreach to Public Water Suppliers
- Water made available for livestock from federal and state lakes
- Cost share assistance on stock water pond dredging
- Drought Term Permits (2011), Multi-year Flex Accts
- Governor’s Drought Response Team – agency coordination, provide current information
• MYFA Amended in 2012
• 5 year Term Permits
• Increased Flexibility
• Not Water Conservation
• Not to increase Average Use
Reliance on A Declining Aquifer
Groundwater was first developed for 

*When It Doesn’t Rain*

The aquifer isn’t drought proof

- Well Yields may not keep up
- Water Rights limit use
- Draw downs
- Water table declines

Farmers’ adaptations to declining water supply:

- Reduce seed population
- Invest in a more efficient irrigation system
- Change tillage practice
- Switch to different crops
- Reduce acres irrigated
Water Use vs Water Level Change, by GMD

Annual Water Use and Mean Annual Water-level Change during 1996-2012

Kansas Geological Survey
Long Term Challenge for western KS water: Ag Industry Complex Depends on the High Plains Aquifer

Kansas ranks 3rd nationally with 5.85 million cattle

Irrigated cropland in Ogallala region has a $5 billion value

Ogallala was responsible for $1.75 billion in corn production and $2 billion in beef production
USGS declines in High Plains Aquifer predevelopment to 2011

USGS Scientific Investigations Report
2012 - 5291
Index Well Program- Continuous Water-Level Monitoring
Accumulated Water Level Change, 1996 to 2012
Modeled GMD3 change in storage with current pumping

2008 to 2018

2008 to 2028

Kansas Geological Survey
Communicating the Aquifer Conditions: Estimated Usable Lifetime

Estimated Usable Lifetime for the High Plains Aquifer in Kansas (Based on ground-water trends from 1996-1998 to 2009-2011 and the minimum saturated thickness required to support well yields at 400 gpm under a scenario of 90 days of pumping with wells on 1/4 section)

Years Until the Average 2009-2011 Saturated Thickness (ST) Reaches Minimum Thresholds
- ST Already Below Minimum Threshold
- Water Table Above 1996-1998 Levels
- Under 25
- 25 - 50
- 50 - 100
- 100 - 250
- Over 250

Based on average water-level changes from 1996-1998 to 2009-2011

Extent of the Saturated Portion of the High Plains Aquifer

Kansas Geological Survey
Well Logs –

What they indicate about the subsurface, water storage and movement

Topsoil
Clay, Fine Sand
Fine Sand, Clay
Fine Sand
Sandy clay, Sand
Fine to Medium Sand
Fine to Coarse Sand, Medium Gravel
Clay, Sand
Clay
Medium Sand and Gravel
Clay
Fine to Medium Sand, Gravel
Clay
Sandy clay, Sand
Medium to Coarse Sand, Fine to Coarse Gravel, Clay
Sandy clay, Fine Sand
Static Versus Pumping Water Levels - Haskell Co Index Well

Estimated Usable Lifetime for the High Plains Aquifer in Kansas (Based on ground-water trends from 2001-2003 to 2011-2013 and the minimum saturated thickness required to support well yields at 400 gpm under a scenario of 90 days of pumping with wells on 1/4 section)

Years Until the Average 2011-2013 Saturated Thickness (ST) Reaches Minimum Thresholds
- ST Already Below Minimum Threshold
- Water Table Above 2001-2003 Levels
- Under 25
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- 50 - 100
- 100 - 250
- Over 250

Based on average water-level changes from 2001-2003 to 2011-2013

Haskell Co Index Well
27S 31W 36BDC

- Hourly Water Level Measurements
- Periodic Electric Tape Measurements
- Annual Program Measurements

Elevation of Water Level (ft AMSL)
Estimated Usable Lifetime for the High Plains Aquifer in Kansas (Based on ground-water trends from 2001-2003 to 2011-2013 and the minimum saturated thickness required to support well yields at 400 gpm under a scenario of 90 days of pumping with wells on 1/4 section)

Years Until the Average 2011-2013 Saturated

Kansas Geological Survey
Visions for Future of High Plains Aquifer
Common pool aquifer management considerations

- Each well subtracts from total water resource
- Impact of a single user, conservation or abuse, has small impact to long term viability.

Prior appropriation administration
- Senior rights have priority when not enough water
  - Establishing which wells impacts senior right takes time
  - Can be a harsh remedy
  - May not alter regional decline trend

Regional Conservation Plans
- A water users’ regional plan can significantly extend the usable life of the aquifer.
- With conservation goals set, more efficient irrigation systems, crop water management tools, and increased options can help producers.
Ogallala Aquifer Initiative

Governor Brownback provides his administration’s support for Local Vision on aquifer

Public meeting in Garden City, 2012
Legislative and Regulatory Changes

- Amended MYFA (multiyear flex accts)
- Removed the “Use it or Lose it” water right requirement in Closed Areas
- Increased Penalties for Over pumpers
- Established LEMA option
- Amended Water Banks
Increased Penalties for Overpumpers

Began in 2013

1st: Notice of Non Compliance

2nd: $1,000 fine and reduction of 2X overpumped in following irrigation season

3rd: $1,000/days overpumped fine (capped at $10,000) and 1 year suspension

4th: Water right revoked
Local Enhanced Management Areas (LEMA) Locals Take Leadership Role

Photos:
- Harvesting in Hoxie, KS
- Public meeting in Leoti, KS
Local Enhanced Management Areas (LEMA)

- Must be within a Groundwater Management District
- If approved by GMD, they forward to Chief Engineer
- Two public hearings
- If ordered by Chief Engineer, becomes enforceable
- Can be proposed for any size reasonable for management
- Locally proposed corrective measures for water conservation
- Flexibility to achieve water conservation goals
LEMA in discussions

SD-6 LEMA

SD-6 Goals
GMD1 Discussed Goals
A Water Bank is a market based method to lease and move water, and save for future use.

Requires 10% conservation

Safe deposit accounts now up to > 100
Looking forward 2014

- Development of 50 year water vision
- LEMA discussions
- New Farm Bill
- Work to align state and federal programs with Kansas water goals

Any new policy or program issues to be addressed?
Thank You

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Natural Resources Conservation District (NRCS)
EQIP Contracts for Water Conservation

Recommend changes:

1. MYFA – allow water conservation over 5 years, not annual achievement

2. Add ranking points if enrolled into WRCP (5 or 10 years)

3. Add ranking points if in LEMA
Climate Change Adds to Challenge

- **Observed:**
  - Nine or more frost free days
  - Warmer, with higher nighttime maximum temps

- **Projected:**
  - Reduced soil moisture
  - Changes to crop cycles with warming winters
  - More variability in summer precipitation