

Kansas Grows Where Water Flows: The Kansas Aqueduct Project (KAP)

Supporting a Kansas Water Authority Summer 2013 discussion



Mark Rude
Executive Director
Southwest Kansas Groundwater Management District No. 3



The Big 3 World Food Producers

- Aquifer depletion now threatens harvests in China, India and the USA

Together, they produce half of the world's grain.

The question is not
whether water shortages will affect harvests,
but rather
when they will do so.



The Big 3 World Food Producers

- China
 - 4/5ths of China's grain harvest comes from irrigated land, most of it drawing on surface water.
- India
 - 3/5ths of its grain is irrigated, mostly with groundwater.
- USA
 - only 1/5th of the harvest is from irrigated land. The bulk of the grain crop is rain-fed, produced in the Midwestern Corn Belt where there is little or no irrigation.
 - Texas, shallow end of the Ogallala,
 - irrigated grain area peaked in 1975 and has now shrunk by two-thirds, with the most precipitous drop in recent years.
 - Kansas peak came in 1982 and irrigated grain area has since fallen 41%.
 - With Irrigation efficiencies, the wheat state is now producing more corn than wheat, and enjoying strong integrated agribusiness.

ESRI Map of US Irrigated areas

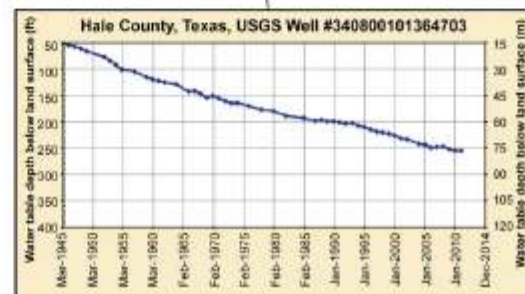
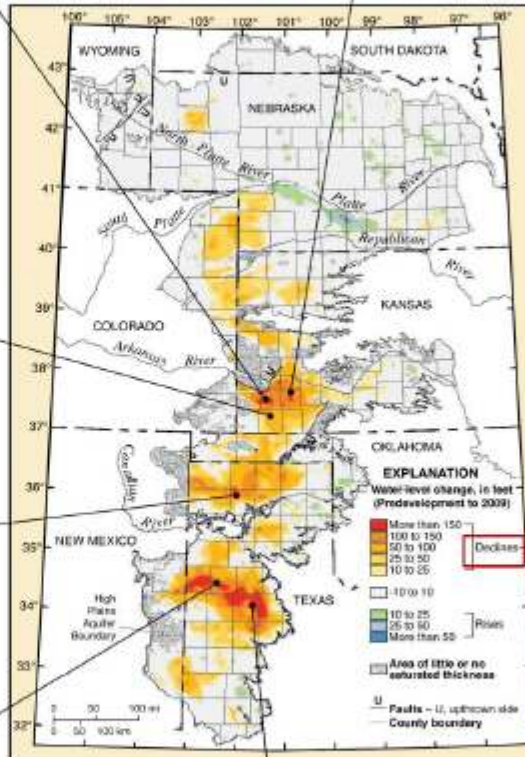
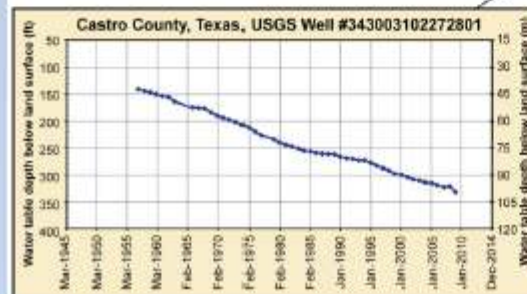
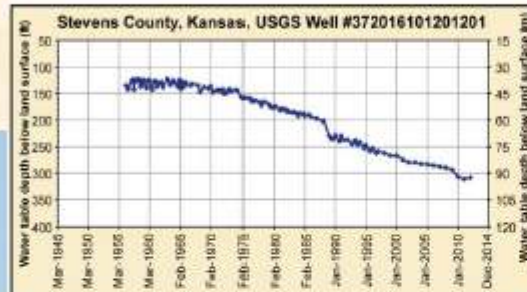
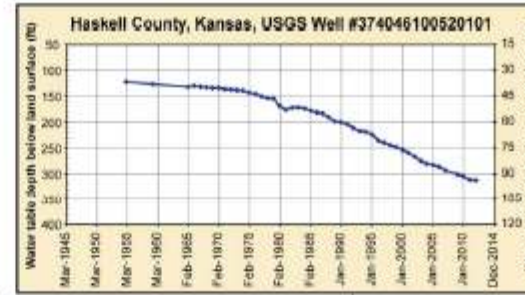
Darker blue = more irrigation



The water-level decline of the High Plains-Ogallala aquifer is the largest single water-management concern in the US

1945-2012 ground-water-level hydrograph declines

(Modified from Sophocleous, 2010)



Groundwater-level changes: Predevelopment to 2009

(McGuire, 2011)

From USGS Presentation to GMDA, 2013

Climate Variability

GMDA - 2013 Summer Conference

Climate Change and Groundwater

A presentation by Bruce Bacon, AMCi
Golden, Colorado

Third National Climate Assessment Report

- * Draft for Public Comment – 11 Jan. 2013

- * After Further Review By

 - * National Academies of Sciences

 - * Public

- * Will Be Rewritten and Submitted As:

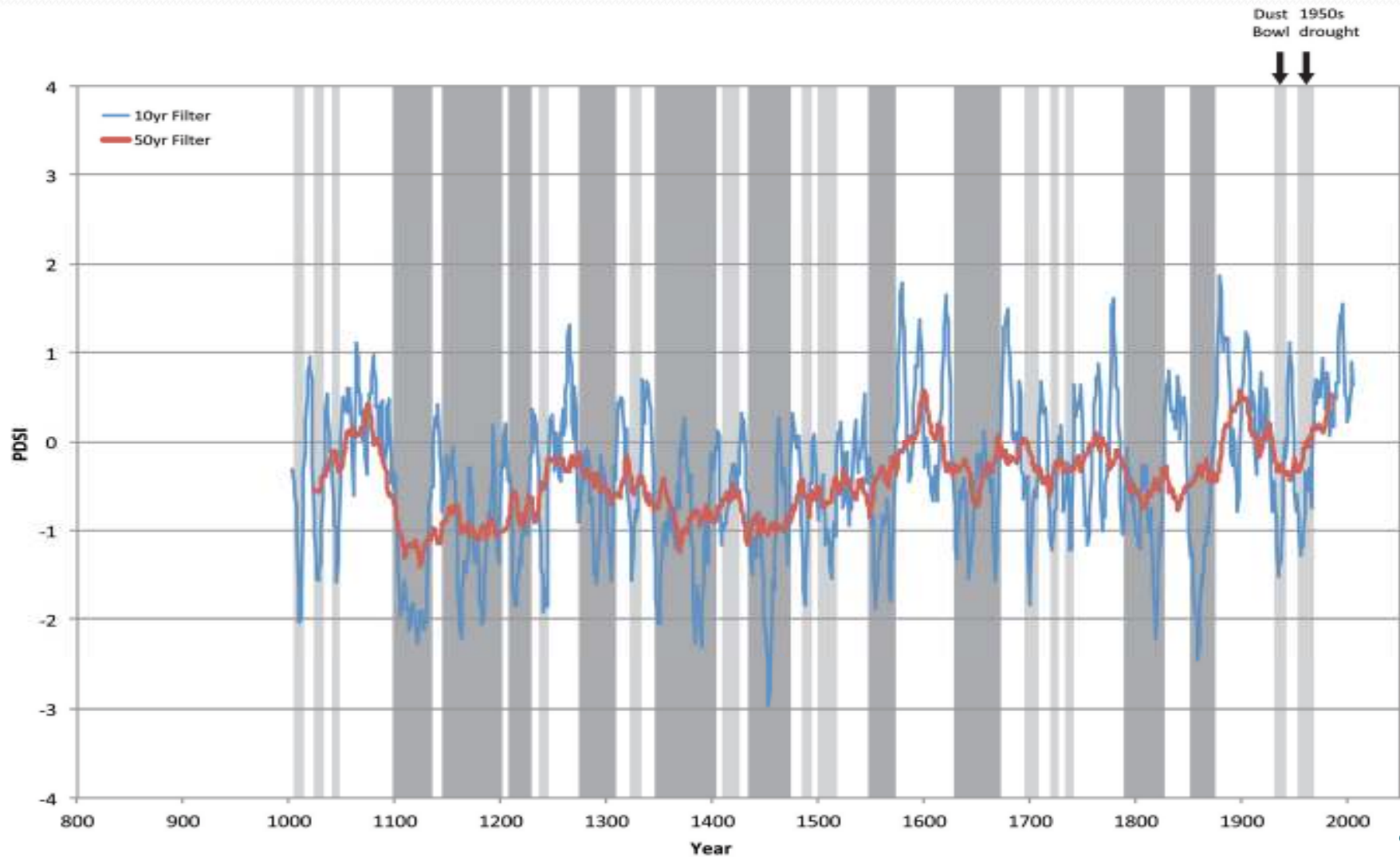
“Third National Climate Assessment Report”
also referred to as “NCA”

Takeaways

- * Water supplies in the west will diminish.
- * Conjunctive surface water and groundwater management as part of an overall adaptation strategy is critical.
- * Increased monitoring and study of aquifers and groundwater dynamics is critical for prudent management.

NE Kansas Climatic Variability

Anthony L. Layzell, KGS. PDSI = Palmer Drought Severity Index



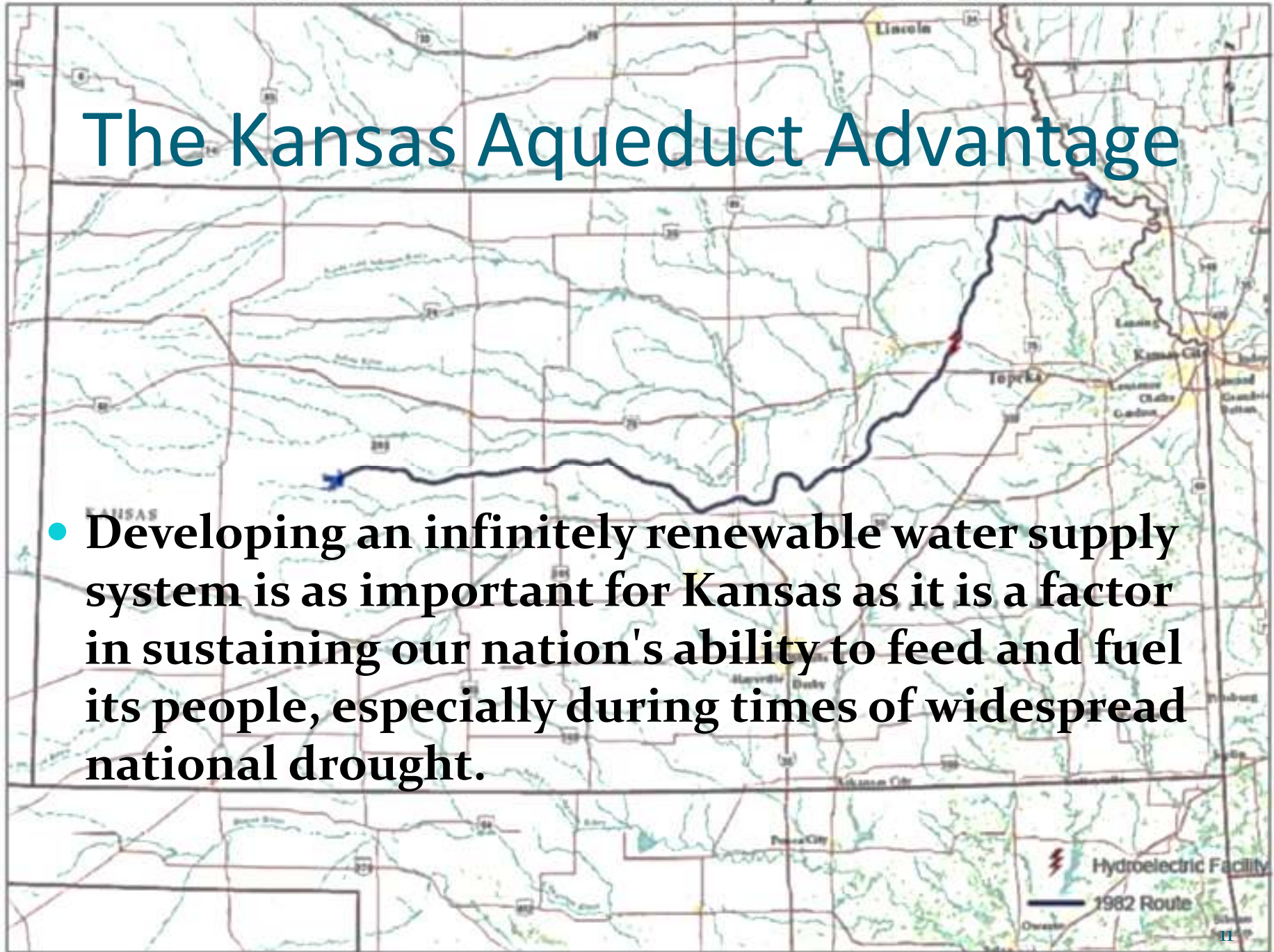


Kansas Water leadership

Securing Kansas water assurance
with available Kansas water supplies
using Kansas water policies with fidelity and
adaptable management strategies
to solve a big Kansas supply-to-demand gap
while planning to advance Kansas to meet the water
dependent needs and opportunities of future Kansas
farms, families and communities.

The Kansas Aqueduct Advantage

- **Developing an infinitely renewable water supply system is as important for Kansas as it is a factor in sustaining our nation's ability to feed and fuel its people, especially during times of widespread national drought.**





The Business of Water

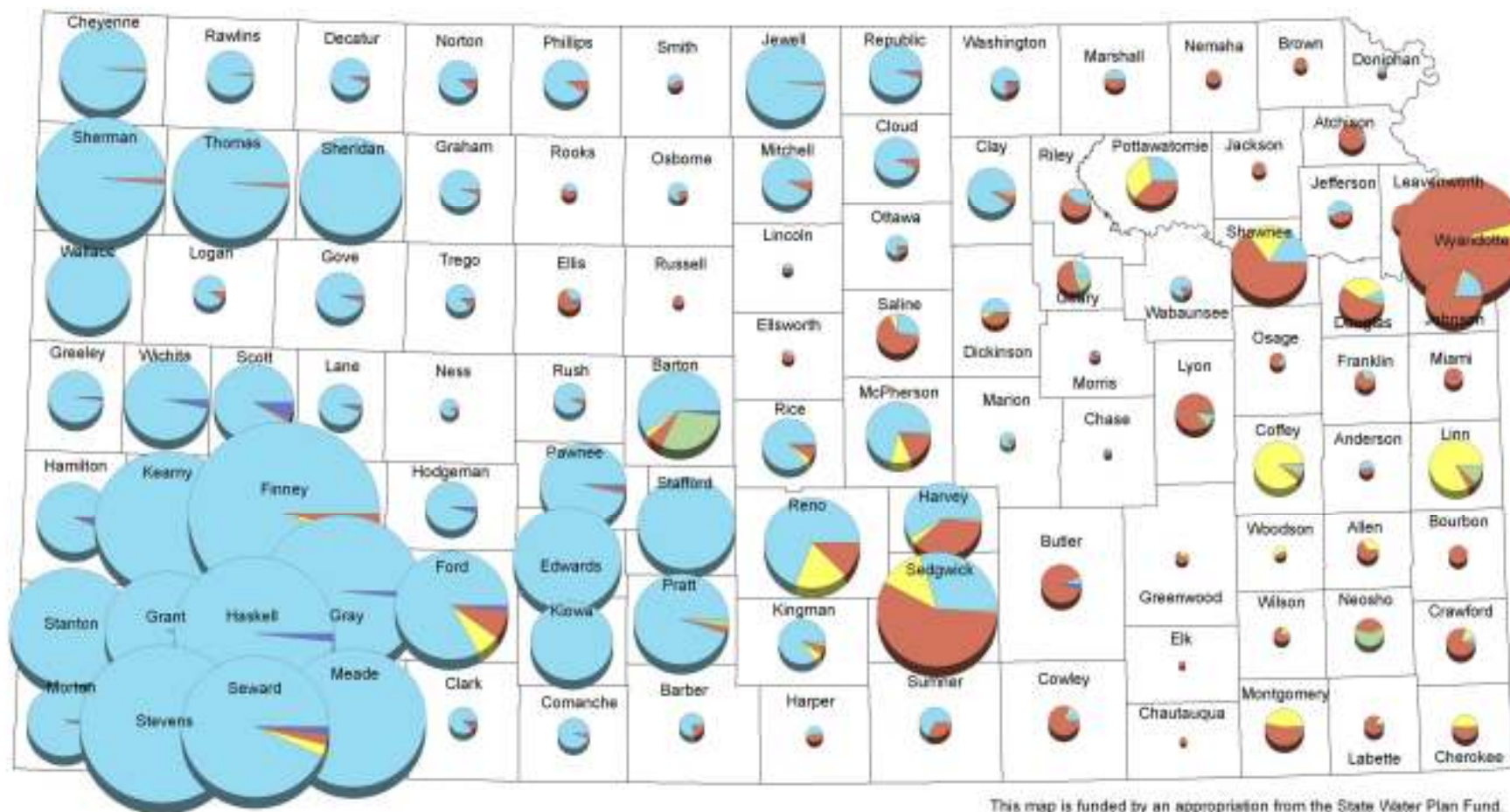
- It is commonly said, the problem of water is not one of physical shortage but, rather, one of governance.
 - Governance is matching demand with supply, of ensuring that there is water at the right location, and the right time of year, and at a cost that people can afford and are willing to pay for.
- Without Kansas water assurance, water dependent equities are diminished, investment capital is discouraged, opportunity for new families is diminished and a sustained economy can not be expected.



The Big Kansas Gap

- Very low natural aquifer recharge rates in Southwest Kansas of .41 inches per year.
- Modeling indicates only nine percent (9/100ths) of the two million acre feet used annually in southwest Kansas is sustainable.
- Agribusiness is the big economic engine for Kansas.

2007 Reported Water Use, by Type of Use for Kansas Counties



This map is funded by an appropriation from the State Water Plan Fund.

Disclaimer: Features on this map represent conditions as of the date of the map and are subject to change. The user is referred to specific policies, regulations and/or orders of the Chief Engineer.

Percentages of 1.5% or less do not show up in the pie charts.

This map is intended for planning purposes only.



Kansas Department of Agriculture
Division of Water Resources
Water Use Unit
March 3, 2009

Use Made of Water



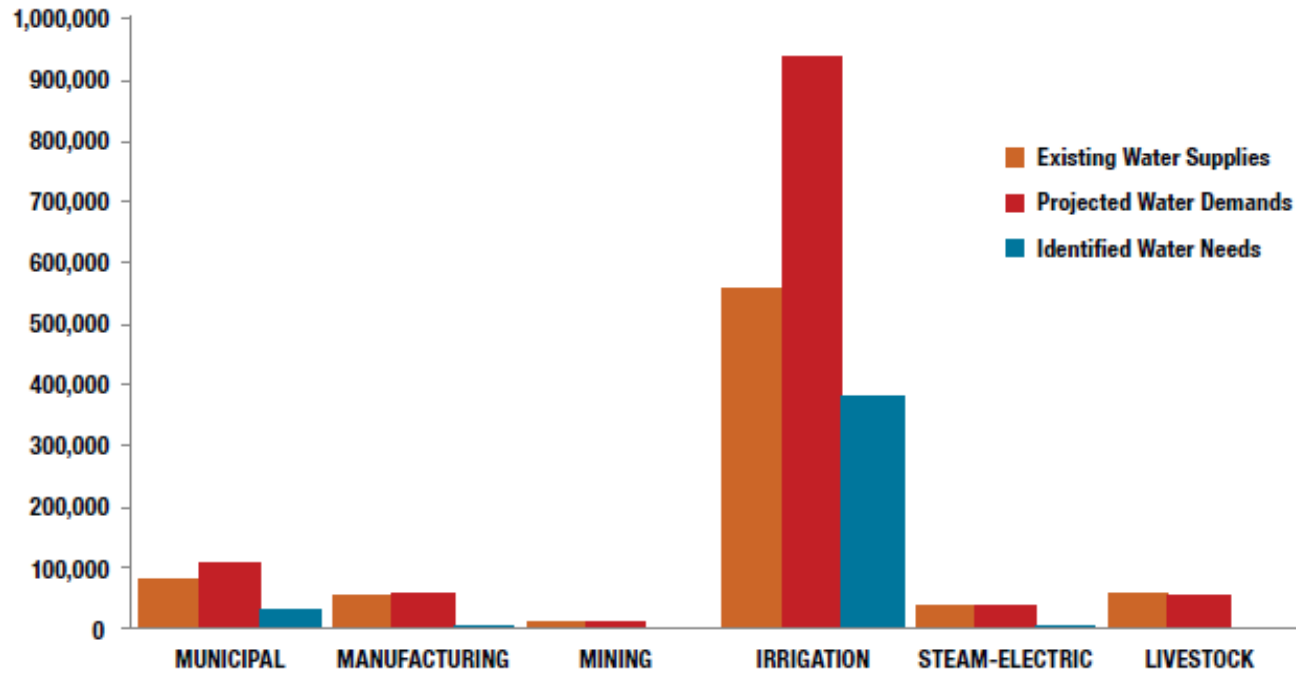
Pratt: 70,221 AF
McPherson: 32,240 AF
Lane: 14,386 AF

0 37.5 75 150 Miles

KS Plan could use info on Future Need vs. Supply gap

Example: A similar region overlying the Ogallala aquifer

FIGURE A.2. 2060 PANHANDLE REGION EXISTING SUPPLIES, PROJECTED DEMANDS, AND IDENTIFIED WATER NEEDS BY WATER USE CATEGORY (ACRE-FEET PER YEAR).



The Economic Importance of Western Irrigated Agriculture

Water Values, Analysis Methods, Resource Management Decisions

Direct Net Value Estimates For Irrigated Agriculture



**Direct Net Values
And Opportunity
Costs**

1) Columbia River Basin:

- Water Markets.
- Annualized Capital Value.
- \$1,500/Acre-ft.

2) Western Irrigation Range:

- Water Markets.
- \$1,500-2,500/Acre-ft.

3) Western U.S.:

- Municipal Sector
Alternative Costs
=> \$2,500/Acre-ft.



A matter of Kansas Public Interest

- delaying action by Kansans on a major water transfer project;
 - Until either the unyielding laws of hydrology naturally close the supply to demand gap
 - or the legal principles of priority and administrative regulation artificially reduce water use, to achieve a balance in supply
 - assures an inevitable devastation of Kansas communities and an exodus of families and investment capital.



Kansans Financial Future

- The KAP must be vigorously pursued while production income, property values and the strong agriculture economic system are in place to support the project.
- The significant cost of Kansas water will have its effect on Kansans:
 - as an ebbing economy and lost opportunity cost,
 - Or, as an investment cost of a sustainable, growing Kansas.

Funding for water?



YES on 4A is about accessing dependable sources of water. It's about protecting our local farms and ranches. It's about preserving our rural environment, open space and quality of life.

Central Colorado Water Conservancy District

YES on 4A

Secure Water Prevent Farm Dry-Ups Keep Ranches Working Protect Our Local Economy

A Recent successful \$60 million Bond Election campaign by the local Central Colorado Water Conservancy District to purchase senior water rights to assure water to local farms and communities.

Water Matters.

We need to act now to secure adequate water for our future needs before the opportunity is gone forever.

Central Colorado Water Conservancy District

YES on 4A

Secure Water • Prevent Farm Dry-Ups • Protect Our Local Economy

Filed for by
Yes for Water
801 8th Street, No. 228
Greeley, CO 80631

www.YesForWater.org

Water is the lifeblood of farming and ranching. And both industries play a major role in our local economy and quality of life. Your YES vote on Measure 4A is critical.



“Thousands of jobs are tied to farming and ranching in our community. Without additional and reliable water supplies, we’re literally sunk. That’s no exaggeration. To ensure a strong economic future for our children and grandchildren, please vote YES for 4A.”

—Weld County Commissioner David Cerny



YES on 4A is about accessing dependable sources of water. It's about protecting our local farms and ranches. It's about preserving our quality of life.



Printed by
Yes for Water
801 4th Street, No. 220
Greeley, CO 80632

www.YesForWater.org



Secure Water



Prevent Farm
Dry-Ups



Keep Ranches
Working



Protect Our
Local Economy

Water Matters.

Your YES vote on Measure 4A will secure water for the long term and protect our local economy.

The Problem...

Water is becoming more scarce. And without water, our local economy is going to be hit even harder.

- Denver Metro area cities and water providers are purchasing senior water rights within our district and drying up valuable, productive farm land, hurting our local farmers and ranchers.
- Municipalities in Arapahoe and Douglas counties are becoming more aggressive in reclaiming reusable water, drastically reducing flows to the South Platte River.
- Productive farm land across the South Platte River basin will dry up if we are not active in securing additional water supplies now.
- Impact of water shortage on local farmers and ranchers is even worse with devastating drought conditions.

The Solution...

We need to act now to secure adequate water for our future needs before the opportunity is gone forever.

Your YES vote on Measure 4A will provide funding to address critical water projects in Weld, Adams and Morgan counties, including:

- Participating in the Chatfield Reservoir Reclamation Project
- Securing senior surface water rights
- Developing groundwater recharge facilities
- Developing water storage projects in strategic locations within the district



Measure 4A is a small investment with a big return for our local economy...

- The estimated monthly tax impact of Measure 4A is \$1.12 per \$100,000 of a home's market value.
- Measure 4A protects the fertile area within the Central Colorado Water Conservancy District, land which provides thousands of jobs in Weld, Adams and Morgan counties.
- Farms in our community not only produce billions of dollars in agricultural products, but they also preserve our rural environment, open space and quality of life. And they allow Coloradans to buy locally-grown food rather than importing it.



Secure Water



Prevent Farm
Dry-Ups



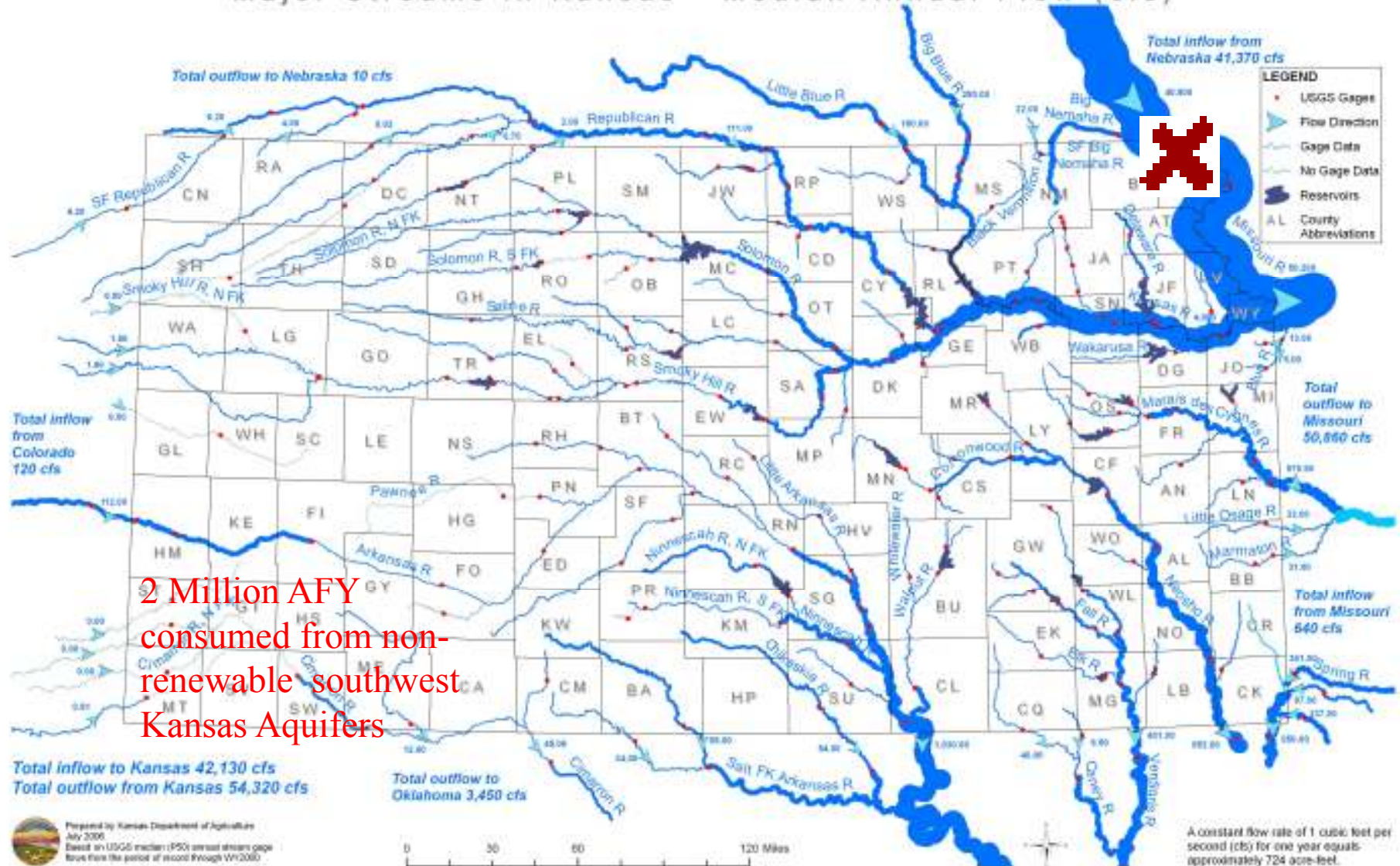
Keep Ranches
Working



Protect Our
Local Economy

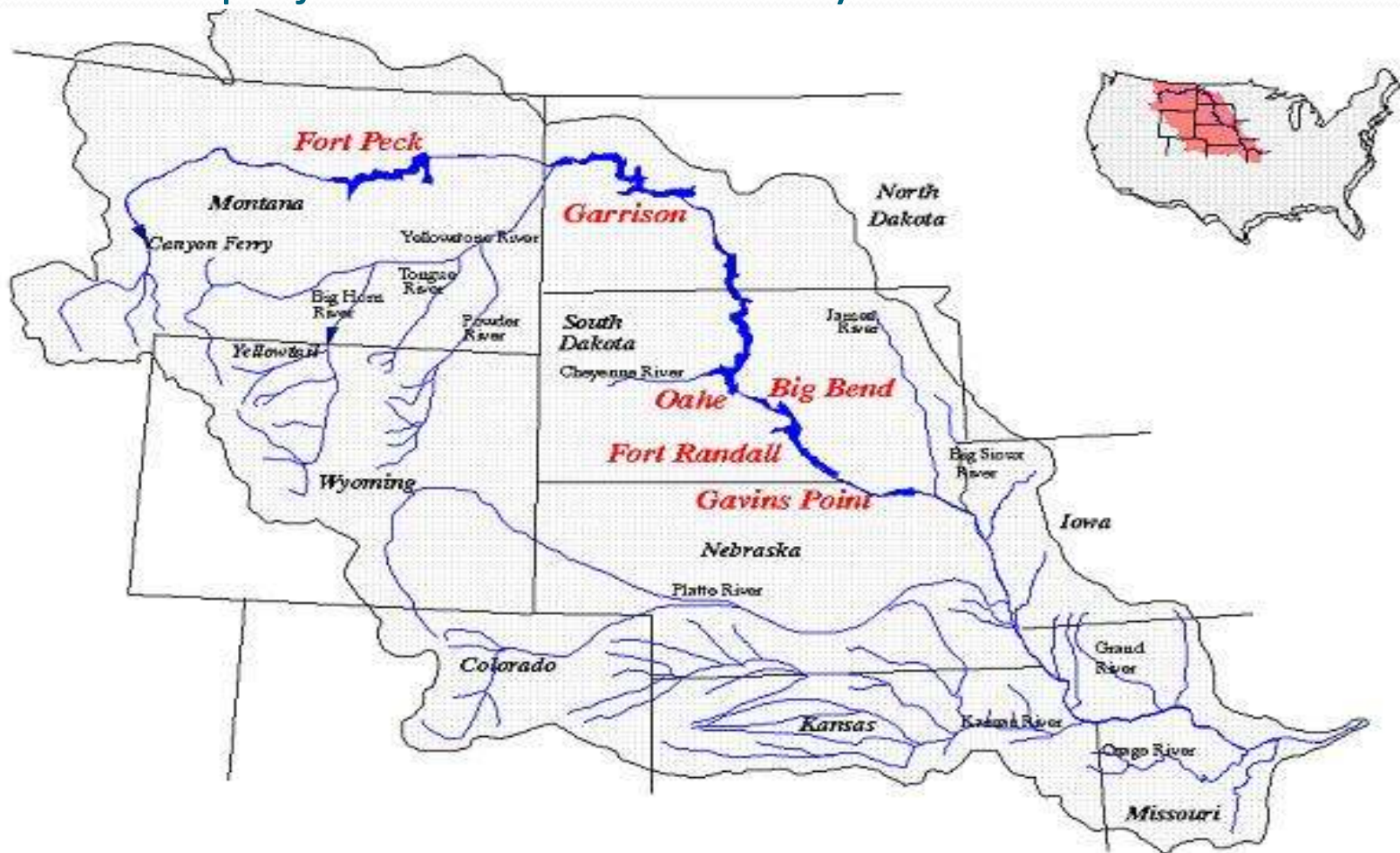
29.5 Million AFY by White Cloud Kansas

Major Streams in Kansas - Median Annual Flow (cfs)



Missouri River basin

US Army Corps of Engineers has reservoir system control and other project duties authorized by 1944 “Pick-Sloan Act.”





Update of 1944 Pick – Sloan Act?

Needs A Comprehensive Review of issues.

- Development of Recreation Industry
- Navigation Industry Never Reached Projections
 - Tonnage peaked in 1970's
 - Effectively no navigation in Kansas for a decade.
- Municipal & Industrial Projects
- Fraction of Irrigation Projects Completed
- Mo. River Ecosystem Restoration added
 - \$51 Million in '08 Budget
 - 2 Billion over next 20 years – COE Projected Need
- Tribal Issues Remain Largely Unaddressed
- State Water Rights



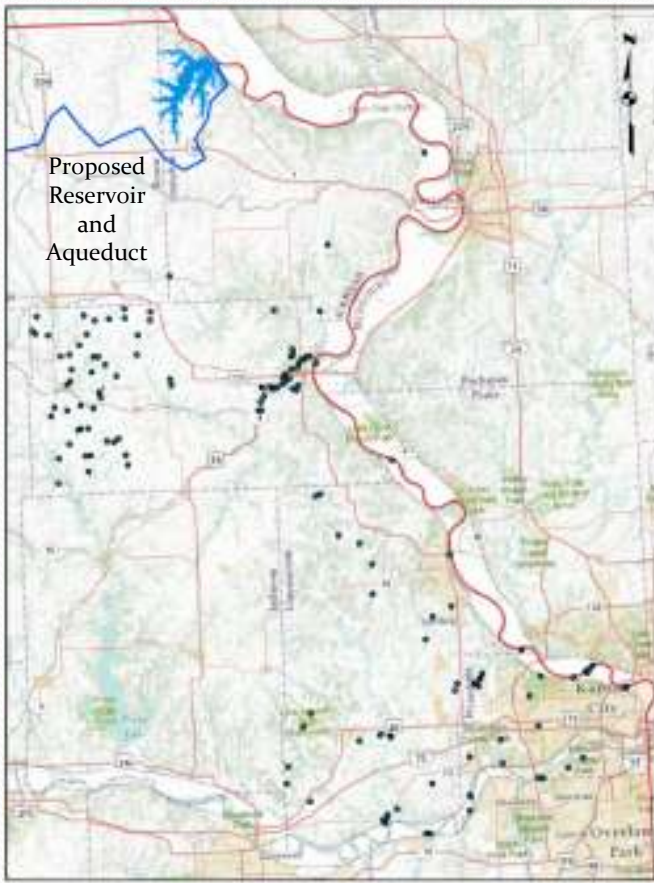
2011 Missouri River Flood Affect

- At present the Corps serves as a de facto river master, exercising considerable authority in managing the reservoir system pursuant to the Flood Control Act of 1944.
- In a recent hearing before the House Subcommittee on Water Resources and Environment, basin farmers, elected leaders, and interested persons criticized the Corps for operating the System to benefit enumerated multiple purposes beyond flood control.
- Missouri Representative Sam Graves expressed, “I believe that we are asking the Corps of Engineers to juggle too many priorities We must make clear once and for all that the prevention of flooding has to be the number one priority.”
- Governors from seven basin states and senior staff of the Wyoming Governor; called for an independent review.
- These officials are revisiting the idea of forming an interstate compact among Missouri River basin states to expand their role in managing the river.

Recent Missouri River interstate compact discussion

- “INTERSTATE WATER COMPACT VERSION 3.0:
 - MISSOURI RIVER BASIN COMPACT DRAFTERS SHOULD CONSIDER AN INTER-SOVEREIGN APPROACH TO ACCOMMODATE FEDERAL AND TRIBAL INTERESTS IN WATER RESOURCES”
 - JEFFREY T. MATSON
 - 2012 NORTH DAKOTA LAW REVIEW, VOL. 88:97

The long term Missouri River water supply for Kansas is at risk.



Kansas segment & DWR Well locations

- Largest Kansas renewable surface water supply routinely passed downstream
- Relatively little appropriation of Missouri River water requested and granted under Kansas Law
- US Army Corps of Engineers has broad discretion to operate flood control project for project purposes of congress.
- No Compact exists, but compact proceedings with sister states could occur without warning, setting Kansas future portion near zero.



Kansas Water Appropriation Policy

- Kansas water law dedicates Kansas water to Kansans, and dictates that first in time is first in right.
- An act by Kansans to formally seek available Kansas water to meet existing Kansas needs should be viewed as an appropriate and necessary action under Kansas law.
- Key initial elements for a
 - Access to Point of Diversion from the supply
 - Filing Fee based on amount requested

Kansas looked at legal issues in Study

Kansas Law Review

LEGAL CONSTRAINTS ON DIVERTING WATER
FROM EASTERN KANSAS TO WESTERN
KANSAS*

*John C. Peck***

- “Since the Missouri River is a gaining stream, and since there has been major flooding of the Missouri River in the past, the taking of water during peak flow periods from the Missouri River might well be viewed by Missouri and points downstream as a positive, rather than a negative, development.” (30 U. Kan. L. Rev. 1981-1982, pg. 195)

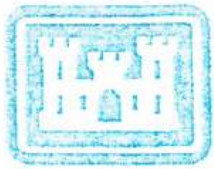
* The research forming the basis for this Article was conducted under Contract No. EDA-78-2550 from the Economic Development Administration of the United States Department of Commerce. The views expressed are those of the author.

** Associate Professor of Law. B.S. 1968, Kansas State; J.D. 1974, Kansas. The author acknowledges the valuable research assistance of Michael Ramsey, Class of 1980, University of Kansas School of Law.



Another look at a 35 Year old idea

- 1976 Public Law for the High Plains Study
Section 193 of the 1976 Water Resource Development Act (Public Law 94-587) authorizes and directs the Secretary of Commerce to study the impacts of depletion of water resources of the Ogallala Aquifer and to develop plans to increase water supplies in the area.
- Resulting 1982 High Plains Study Report to the Secretary of Commerce.
- Five progressive aquifer management elements evaluated:
- The U.S. Army Corp of Engineers was directed by Congress to examine the engineering feasibility of transferring water from the east to the High Plains.
- The Kansas Water Transfer south route was found engineering feasible and the least expensive route identified.



US Army Corps
of Engineers
Kansas City District

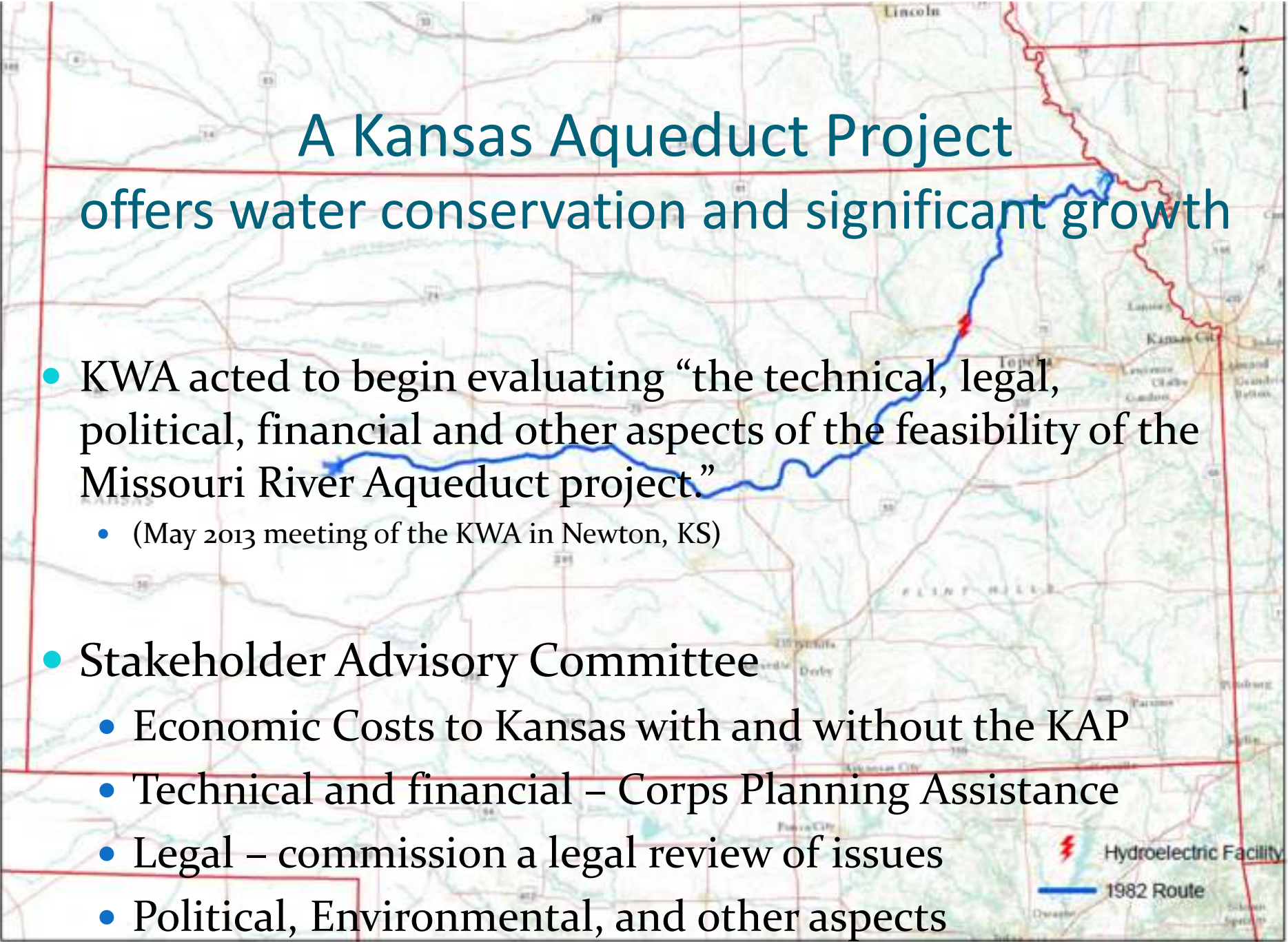
Six-State High Plains Ogallala Aquifer Regional Resources Study

Water Transfer Element

Water Transfer From Missouri River To Western Kansas

September 1982

Appendix B



A Kansas Aqueduct Project offers water conservation and significant growth

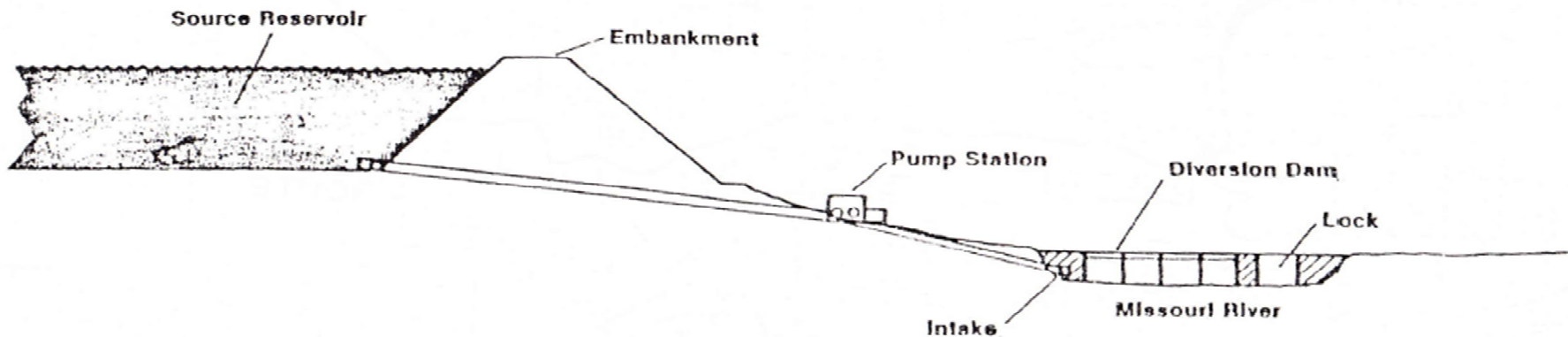
- KWA acted to begin evaluating “the technical, legal, political, financial and other aspects of the feasibility of the Missouri River Aqueduct project.”
 - (May 2013 meeting of the KWA in Newton, KS)
- Stakeholder Advisory Committee
 - Economic Costs to Kansas with and without the KAP
 - Technical and financial – Corps Planning Assistance
 - Legal – commission a legal review of issues
 - Political, Environmental, and other aspects



Elements of the Kansas Aqueduct Project

- The work of the KAP is doing what must be done to grow and sustain future generations of Kansans.
- Missouri River high flows harvested to meet existing water demands.
- Put-and-Take structure in the Kansas River to improve water supply and management options.
- Benefits each area across Kansas, including social, food security, energy and environmental benefits.
- Use together with Aquifers and Reservoirs provides investment confidence and sustainability.
 - Replace dependence on depleting Ogallala/High Plains Aquifer.
 - No expansion of irrigated acres.

1982 study: Envisioned a river dam w/navigation lock, pump intakes and source reservoir.



Source Features

Less river intrusive diversions: bank storage (collector) wells



Proposed Bank Storage Well Locations



Potential for supply benefits all across Kansas



Canal size or capacity may depend on the final project elements

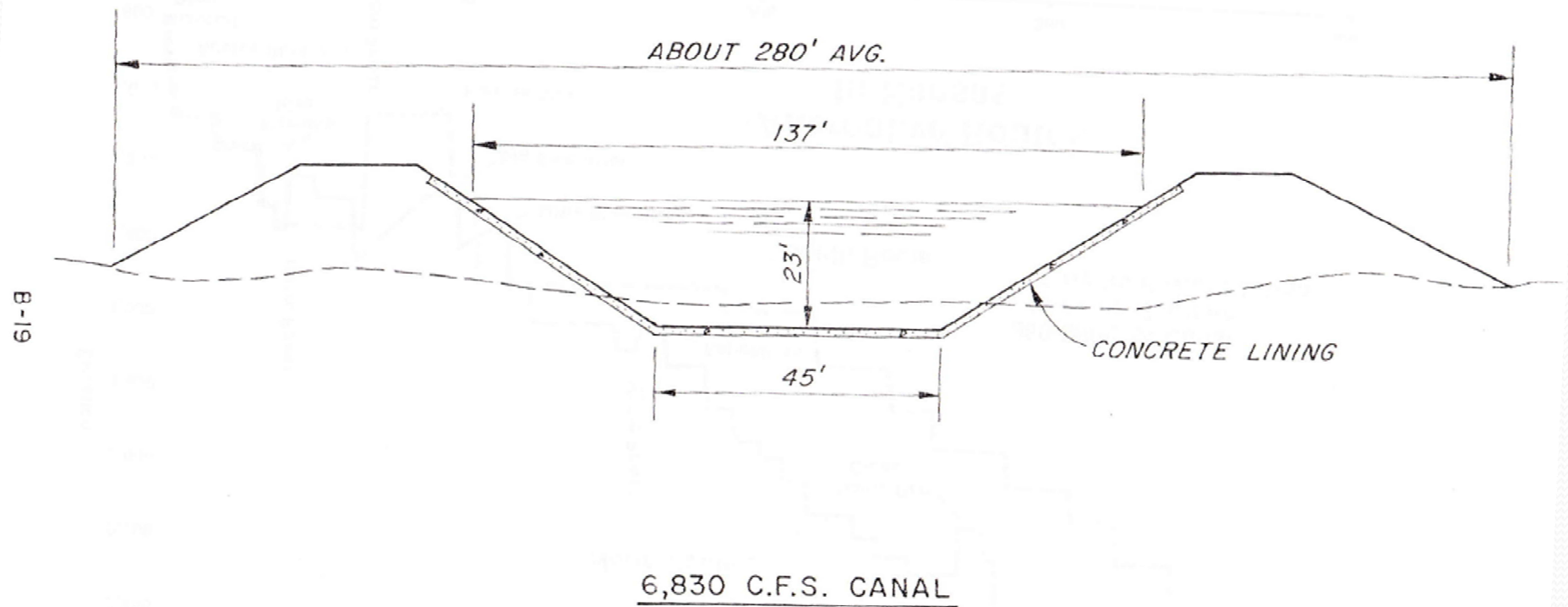


FIGURE 5 - TYPICAL CANAL DESIGN

Expensive pipeline alternatives
solve some issues and create other



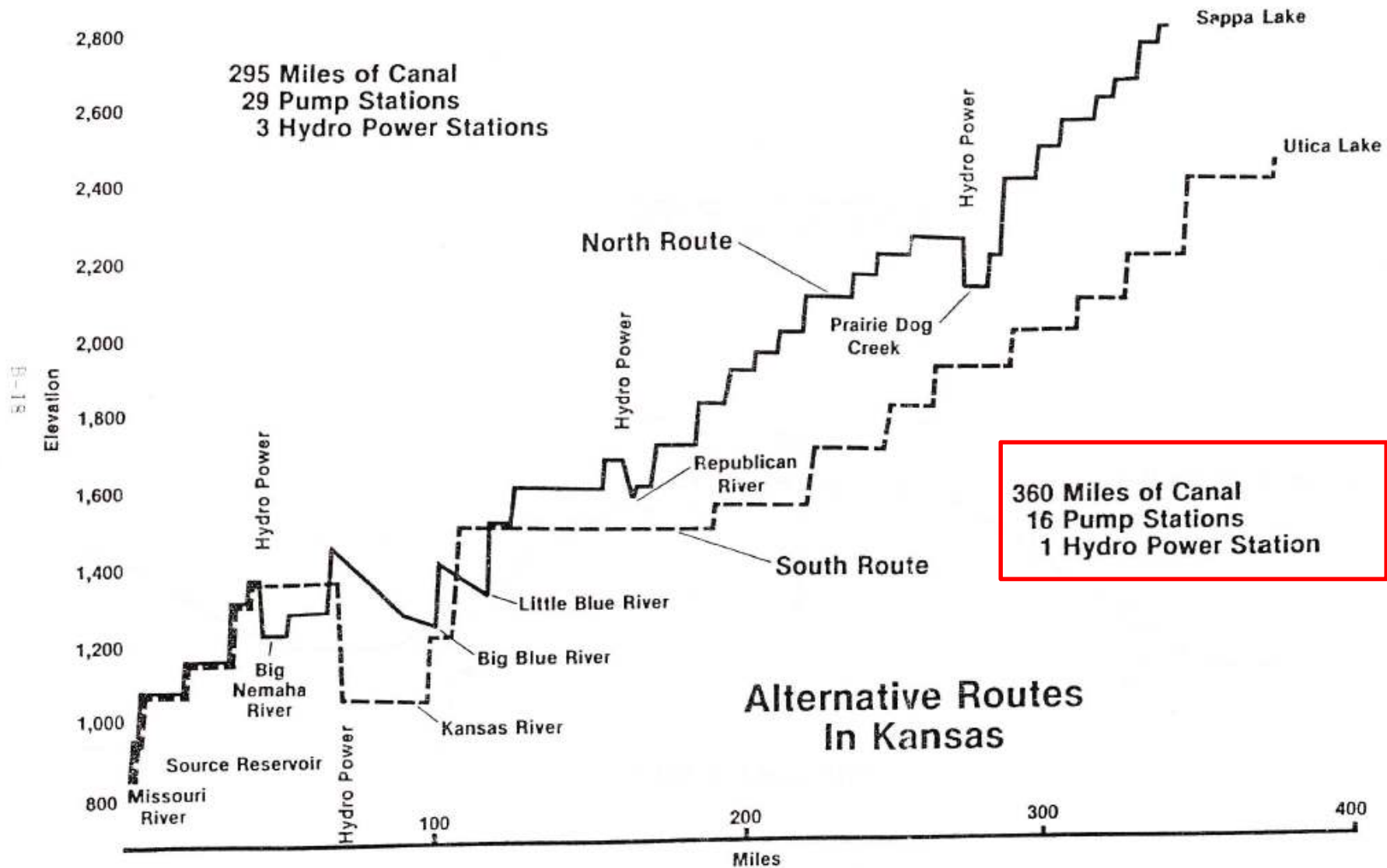
1982 Study: water lifted west with 16 pump stations, and gravity flow between stations



1982 Study: Water moves 5' per second, dropping $\frac{1}{2}$ foot per mile west between lift stations.



Kansas South Route preferred



The Perry Loop: provides water assurance to local farms and a large Kansas population



Flint Hills Ridgeline provides SE Kansas Water Assurance

Base flow
stream
augmentation

Council Grove Res.,
and Neosho River
water assurance.

Northern Flint Hills tourism

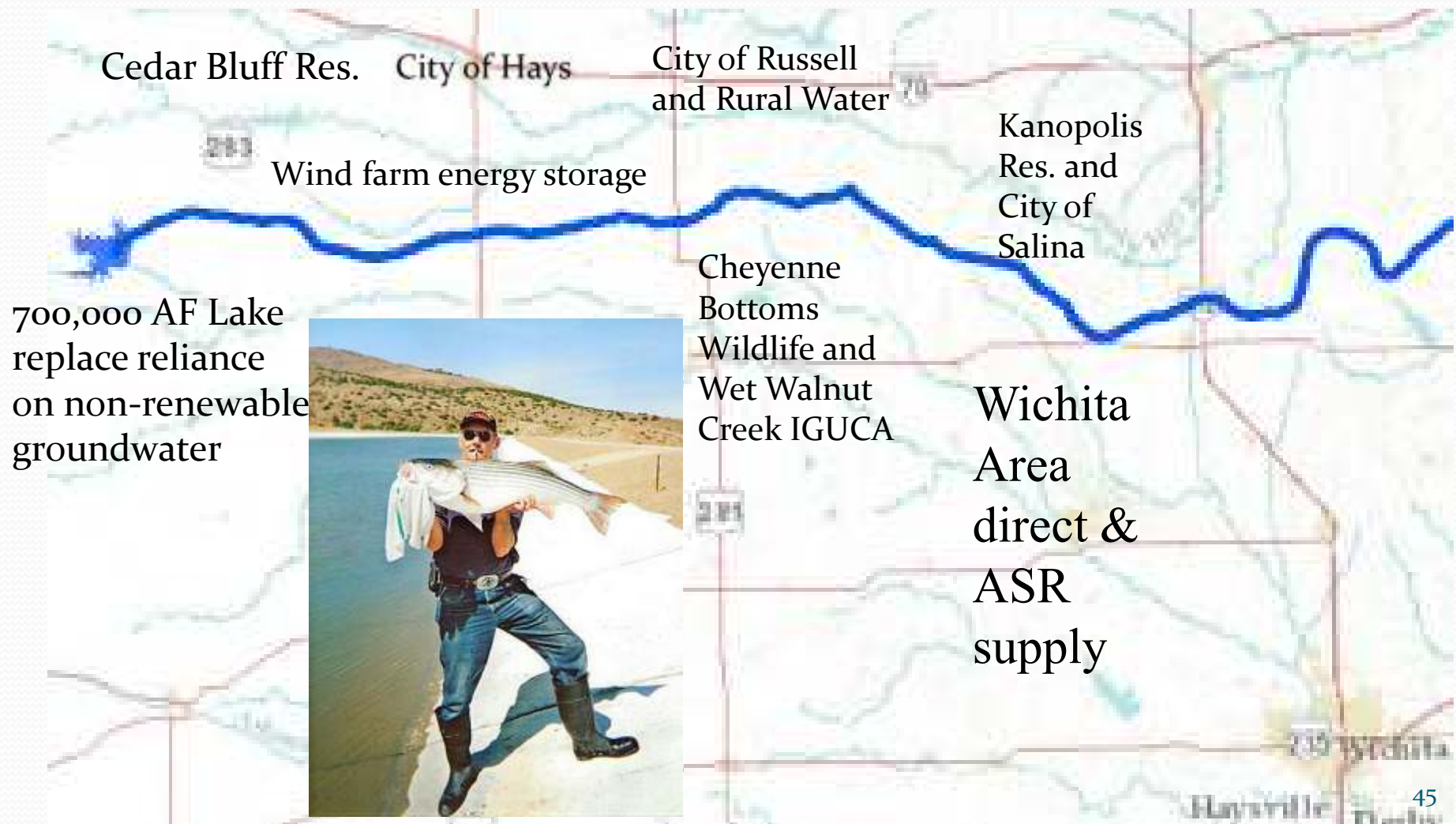
Marion
Reservoir.

John Redmond Res.
Water Assurance to
Wolf Creek Nuclear
Power Plant

Hydroelectric Facility

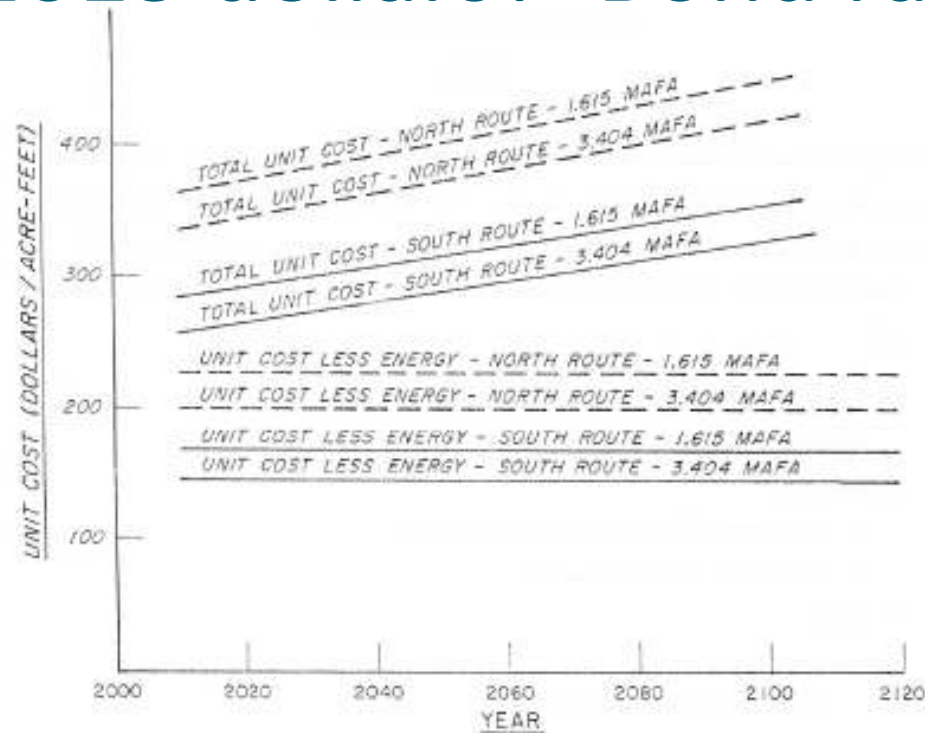
1982 Route

Western Ridgeline Water Supply Assurance



Financial

Costs estimated in 1978 dollars 2013 dollars? Bond rates?



NOTE:
COSTS REFLECT 15-YEAR
CONSTRUCTION PERIOD.

ANNUAL COSTS WITH PROJECTED ENERGY COSTS
KANSAS CITY DISTRICT - CORPS OF ENGINEERS

FIGURE B

Aqueduct Issues Continuum

One step at a time

- Initial Kansas water appropriation filing.
- Who's in?
- Studies; “Will this dog hunt?”
- Financing the benefits; who pays?
- Is there synergy in moving energy and water together?
- Support from indirect beneficiaries: tourism, recreation, habitats, etc.
- Concerns over eminent domain affects on private Kansans
- Concerns by neighbors outside the dedications of Kansas law
- Federal Thinking; The Nature of the “triple bottom line.”
 - The TBL is the new accounting framework adopted at the federal level to incorporate three dimensions of federal investment performance: social, environmental and financial.
 - Differs from traditional reporting frameworks as it includes ecological (or environmental) and social measures that can be difficult to assign appropriate means of measurement.
 - The TBL dimensions are also commonly called the three Ps: people, planet and profits.
 - Backlog of federal projects that are authorized but not funded may hold up federal involvement beyond study.
 - Sister states expressing concern in court over the effects of the project on their water supply and navigation.
 - Changing USACE administrative policies developed with other Federal agencies broadly applied with little local input or flexibility.

