

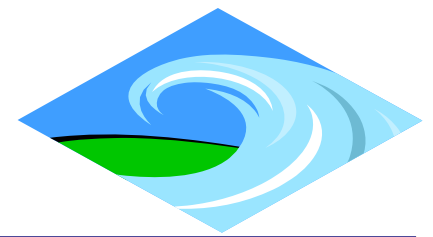
# SEDIMENTATION IN OUR FEDERAL RESERVOIRS: THE SITUATION IN KANSAS



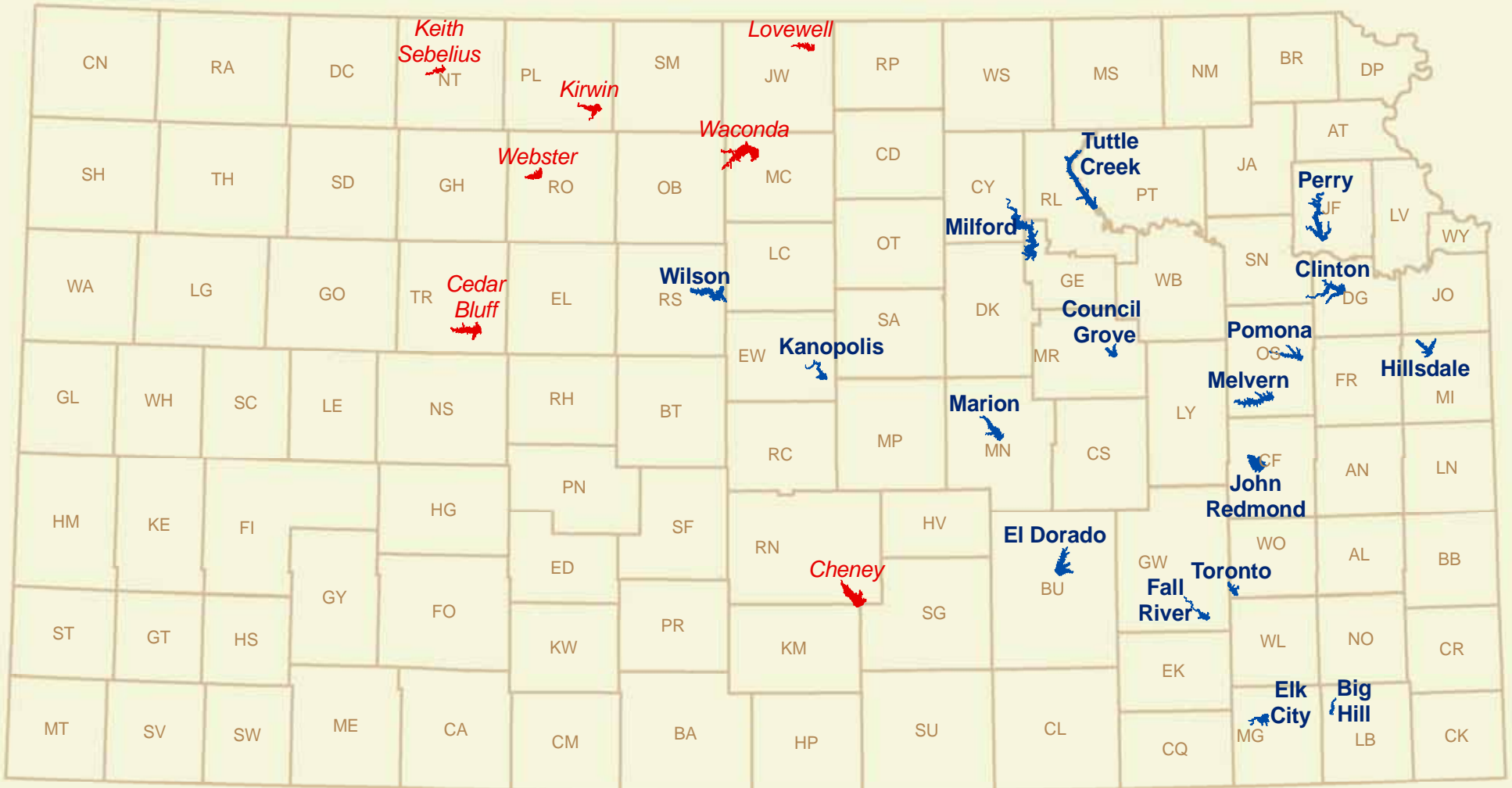
W.L. Hargrove  
Director, KCARE



# Federal Reservoirs



## Federal Reservoirs in Kansas



United States Army Corps of Engineers Lake  
United States Bureau of Reclamation Lake



# THE STATE'S INTEREST IN FEDERAL RESERVOIRS

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- Average age is 43 years; designed for life of 150 yrs
- 21 of them are public water supplies, serving two-thirds of the population of KS
- The state owns storage in 13 CoE reservoirs
- Storage capacity is diminished over time by sedimentation (range in loss 3-47%; six >20%).
- Many are filling faster than anticipated; life expectancy reduced by as much as 50 years.
- The top three are Tuttle Creek, John Redmond, and Kanopolis.



# SOURCES OF SEDIMENT

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- Stream Corridor: Beds, Banks, Riparian
- Cropland
- Grassland
- Confined livestock
- Home sites
- Roads and roadway ditches
- Urban/suburban areas







# Water Quality Impairments Due to Cattle





# RELATIVE CONTRIBUTIONS

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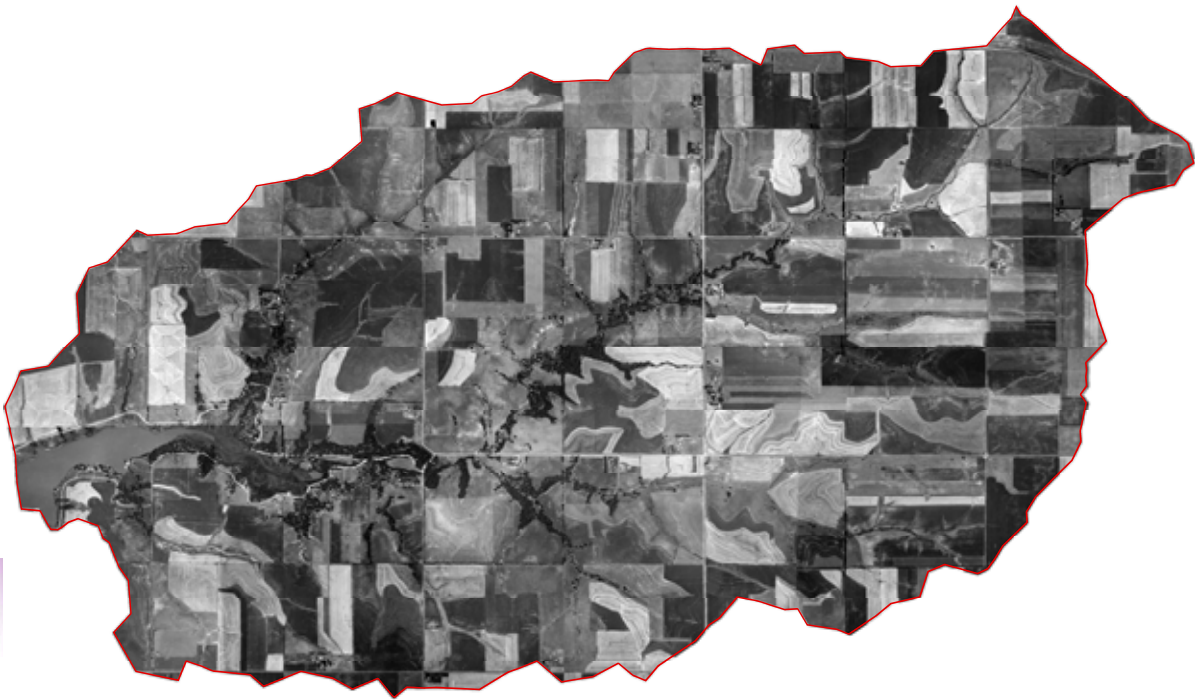
- Stream corridors and agricultural land, esp. cropland, are more important
- Measurements of relative contribution vary widely
- Mission Lake: 80% from streambank
- Cheney Lake: 50/50, streambank/ag land
- Tuttle Creek: majority from cropland



# ACCOMPLISHMENTS

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- Erosion on cropland reduced by 20-25%
- Conversion to pasture
- Conservation Reserve Program
- Terraces
- Conservation tillage
- Vegetative buffers



1954

2003

Atchinson  
County  
Lake





# EFFECTS OF SEDIMENTATION

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- Loss of storage
- Contributes to taste and odor problems
- Negative biological impacts – eutrophication
- Recreational losses





# STRATEGIES FOR REDUCING SEDIMENTATION

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## Preventive Measures

- Conservation practices on ag land
- Streambank stabilization
- Sediment trapping above reservoirs

## Corrective Measures (Very Costly)

- Dredging (\$2.50-14.00/yd; or \$1 billion for a 7,000 acre lake)
- Decommissioning or replacement



# SEDIMENTATION RESEARCH STRATEGY

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Three small lakes in NE KS have been selected for detailed study:

- Banner Creek Lake (Reference good condition); 12,200 acres
- Mission Lake; 5,500 acres
- Atchison Co. Lake; 5,950 acres



# Three-Part Strategy

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- Characterize geology, soils, hydrology in relation to sediment load (KGS and USGS, lead agencies)
- Characterize land use and management and extent and condition of riparian area in relation to sediment load (KSU and KFS, lead agencies)
- Evaluate the impact of sediment load on the chemical and biological conditions in the lakes (KBS lead agency)



# Geology, Soils, Hydrology

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- Geologic, chemical, and mineralogical description of soils, and stream and lake sediments; fingerprint sources
- Isotope fingerprinting; N15, C13, Cs133, and others
- Flow duration and peak flow estimates from StreamStats model
- Stream gages in the three watersheds
- Direct measure of sediment load



# Land Use and Riparian Condition

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- Obtain and analyze existing data on land use and riparian areas
- Verify and augment management info from local experts
- Conduct a survey of land use and management and riparian extent and condition; groundtruthing of above
- Conduct a soil erosion assessment
- Map infiltration rates
- Assess soil erosion potential using models



# Chemical and Biological Characterization of Lakes

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- Water quality will be measured
- Biological assessments made through sampling/collections
- Assess loss of designated uses



# ULTIMATE GOAL

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- Policy interventions that will lead to protection of watersheds and reservoirs



# NATIONAL CONFERENCE

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*From Dust Bowl to Mud Bowl: Conservation Measures  
and the Future of Reservoirs*

- September 14-16, 2009, Westin Crown Center, Kansas City, MO
- Planned by a consortium of state and federal agencies and universities plus Soil and Water Conservation Society
- Includes invited plenary speakers, concurrent sessions, poster papers, and brainstorming breakout sessions



# QUESTIONS?

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For more information, see:

[www.oznet.ksu.edu/kcare/](http://www.oznet.ksu.edu/kcare/)

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