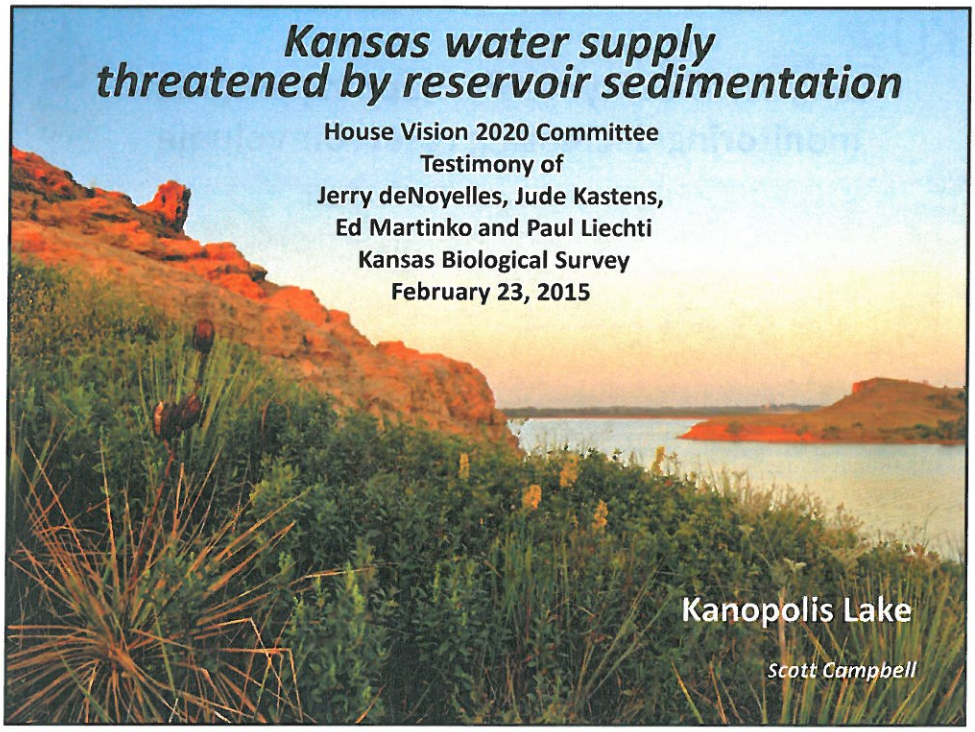
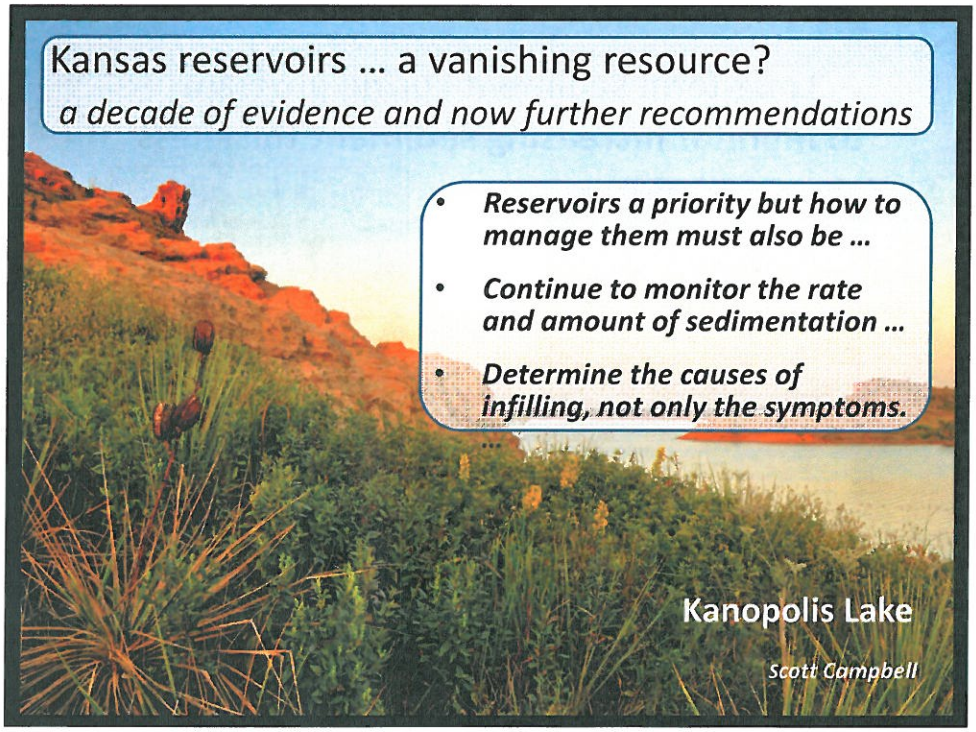

Kansas water supply
threatened by reservoir sedimentation
House Vision 2020 Committee
Testimony of
Jerry deNoyelles, Jude Kastens,
Ed Martinko and Paul Liechti
Kansas Biological Survey
February 23, 2015
Kanopolis Lake
Scott Campbell

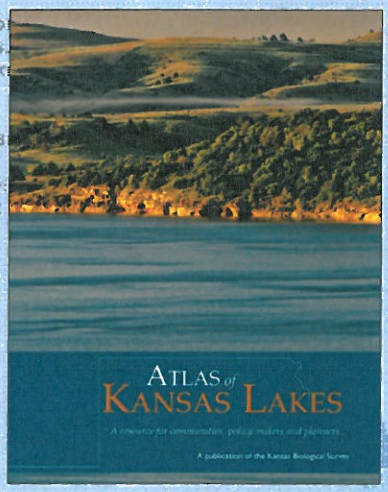

Kansas reservoirs ... a vanishing resource?
a decade of evidence and now further recommendations
Reservoirs a priority but how to manage them must also be ...
Continue to monitor the rate and amount of sedimentation ...
Determine the causes of infilling, not only the symptoms.
...
Kanopolis Lake
Scott Campbell

KU KANSAS BIOLOGICAL SURVEY The University of Kansas

KANSAS WATER OFFICE

Long-term bathymetric mapping program monitoring decreasing reservoir volume

Council Grove Reservoir



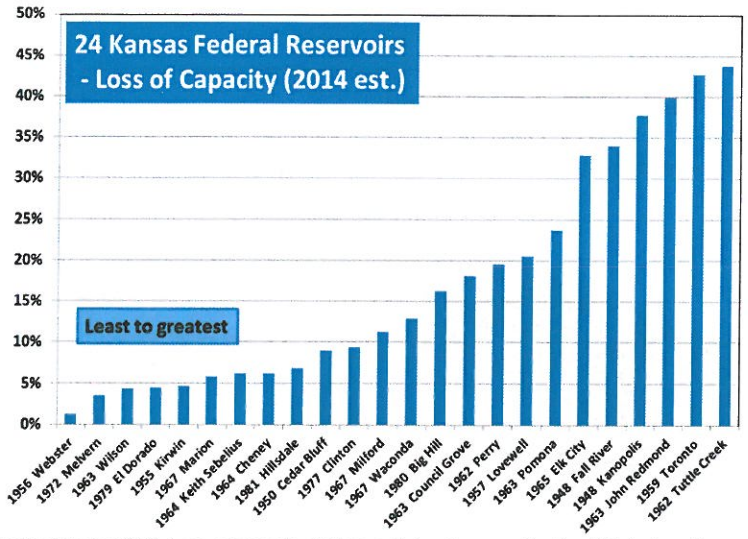
- calculate basin volume
- compare to past measures
- determine sedimentation rate

KU KANSAS BIOLOGICAL SURVEY The University of Kansas

KANSAS WATER OFFICE

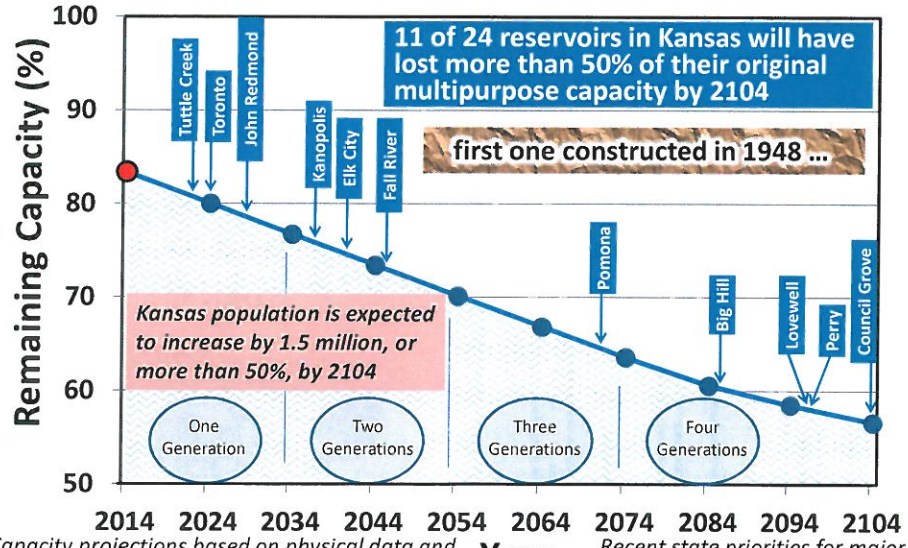
Long-term sediment coring program to monitor increasing sediment thickness

24 Kansas federal reservoirs infilling since construction



Loss of capacity by 2014 as percent of the original capacity for 24 federal reservoirs in Kansas. Capacity loss estimates are based on original capacity compared to capacity measured over the past seven years using acoustic bathymetry, projected to 2014.

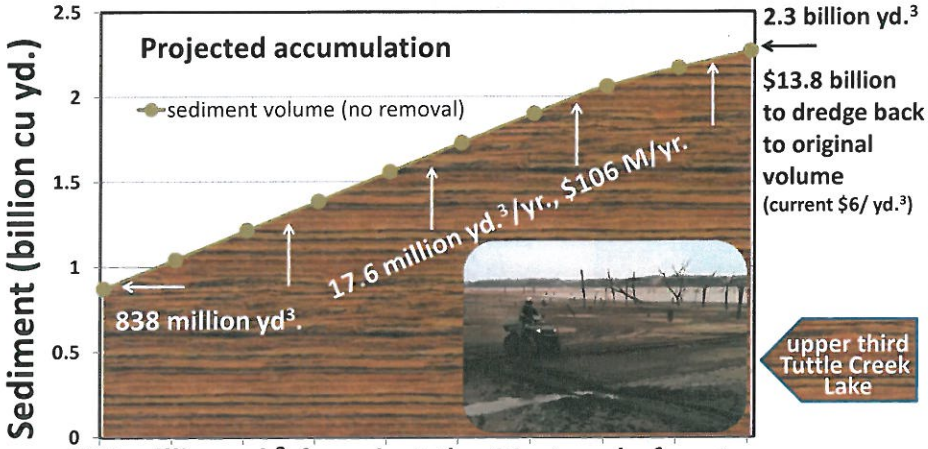
11 Kansas federal reservoirs 50% infilled this century



Capacity projections based on physical data and estimated sedimentation rates for the 24 federal reservoirs in Kansas, provided by KWO & KBS

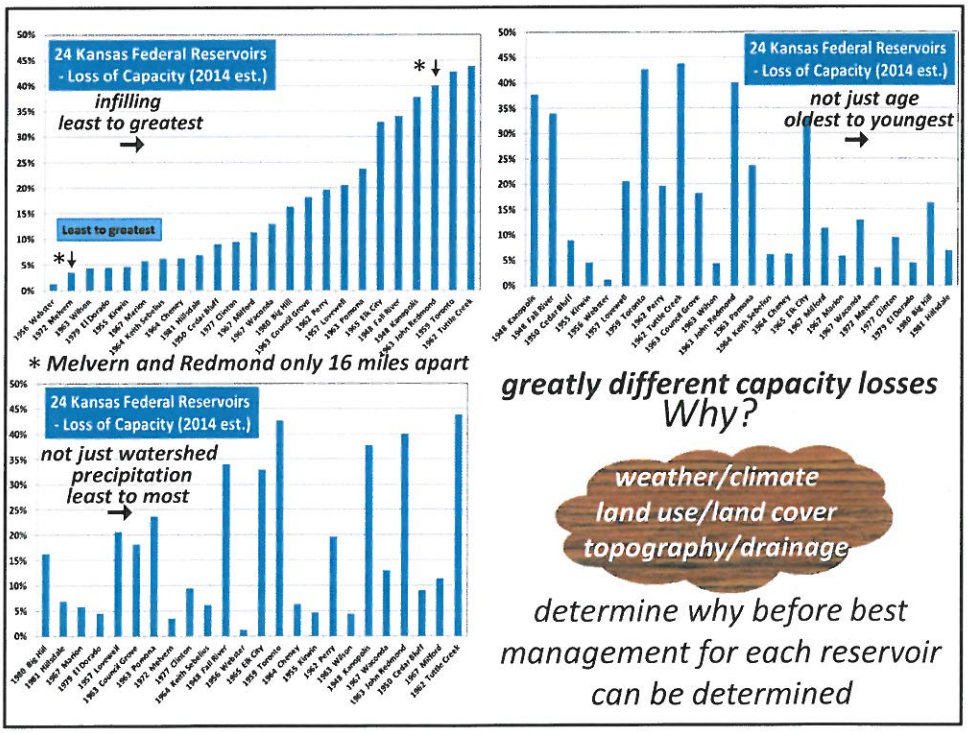
Recent state priorities for major restoration actions have been for reservoirs ~50% infilled

24 Kansas federal reservoirs accumulating sediment



927 million yd.³ from just the 11 at end of century

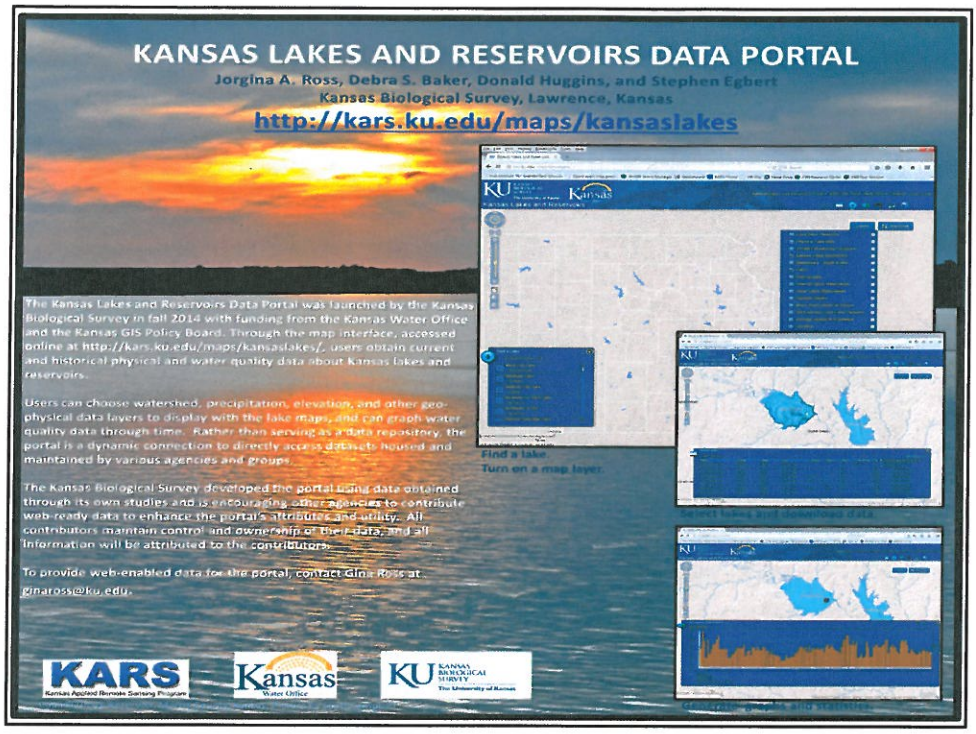
574,740 acres of sediment one foot deep
522,000 football fields one foot deep

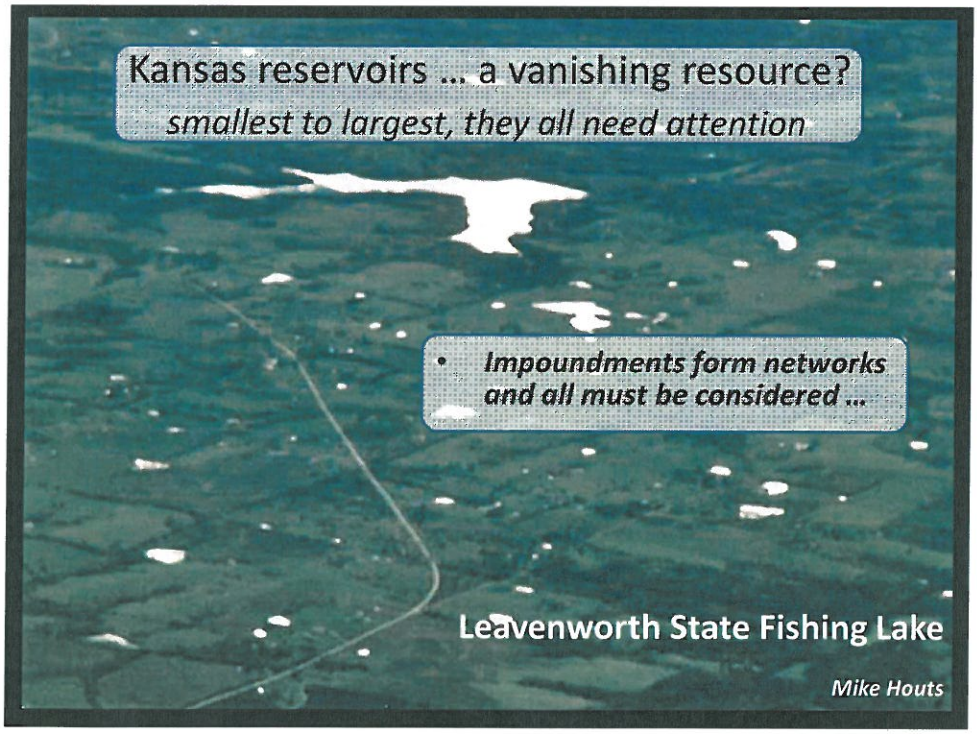


greatly different capacity losses
Why?

weather/climate
land use/land cover
topography/drainage

determine why before best management for each reservoir can be determined


KANSAS LAKES AND RESERVOIRS DATA PORTAL
Jorgina A. Ross, Debra S. Baker, Donald Huggins, and Stephen Egbert
Kansas Biological Survey, Lawrence, Kansas
http://kars.ku.edu/maps/kansaslakes
The Kansas Lakes and Reservoirs Data Portal was launched by the Kansas Biological Survey in fall 2014 with funding from the Kansas Water Office and the Kansas GIS Policy Board. Through the map interface, accessed online at http://kars.ku.edu/maps/kansaslakes/, users obtain current and historical physical and water quality data about Kansas lakes and reservoirs.
Users can choose watershed, precipitation, elevation, and other geo-physical data layers to display with the lake maps, and can graph water quality data through time. Rather than serving as a data repository, the portal is a dynamic connection to directly access datasets housed and maintained by various agencies and groups.
The Kansas Biological Survey developed the portal using data obtained through its own studies and is encouraging other agencies to contribute web-ready data to enhance the portal's attributes and utility. All contributors maintain control and ownership of their data, and all information will be attributed to the contributors.
To provide web-enabled data for the portal, contact Gina Ross at ginaross@ku.edu.
Find a lake
Turn on a map layer
KARS
Kansas
KU KANSAS BIOLOGICAL SURVEY


Kansas reservoirs … a vanishing resource?
smallest to largest, they all need attention
• Impoundments form networks and all must be considered …
Leavenworth State Fishing Lake
Mike Houts

Understanding where it all began …

long ago the bounty from deep rich soils was discovered

Understanding where it all began …

but with water only at times, impoundments were built

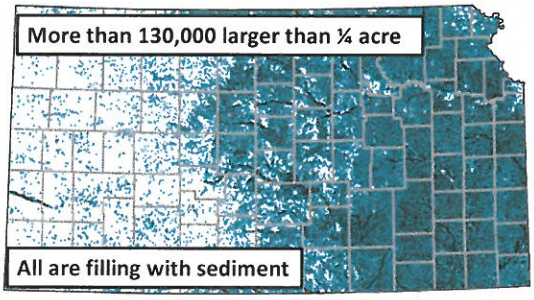
Will history repeat itself?

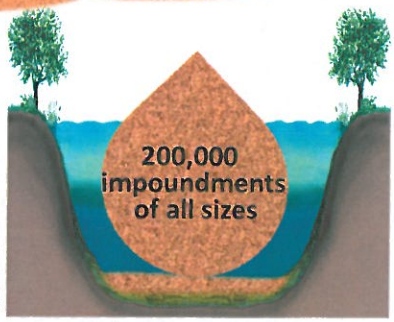
built for good reasons ...

but being infrastructures like roads, they need fixing

now with storage loss, water is rushing by again

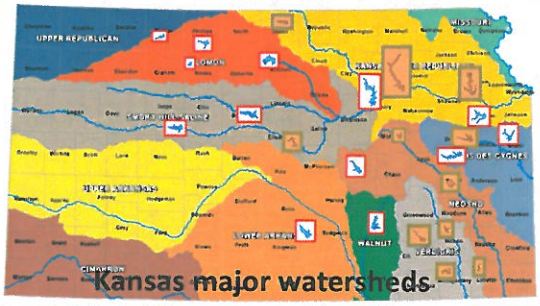
Impoundments across the Kansas landscape



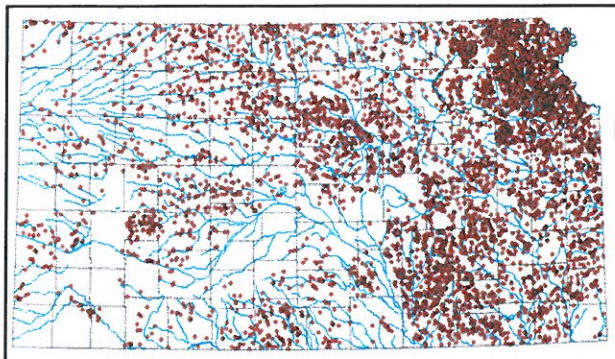


the 11

24 federal reservoirs have three times the water volume of all of our other Kansas impoundments



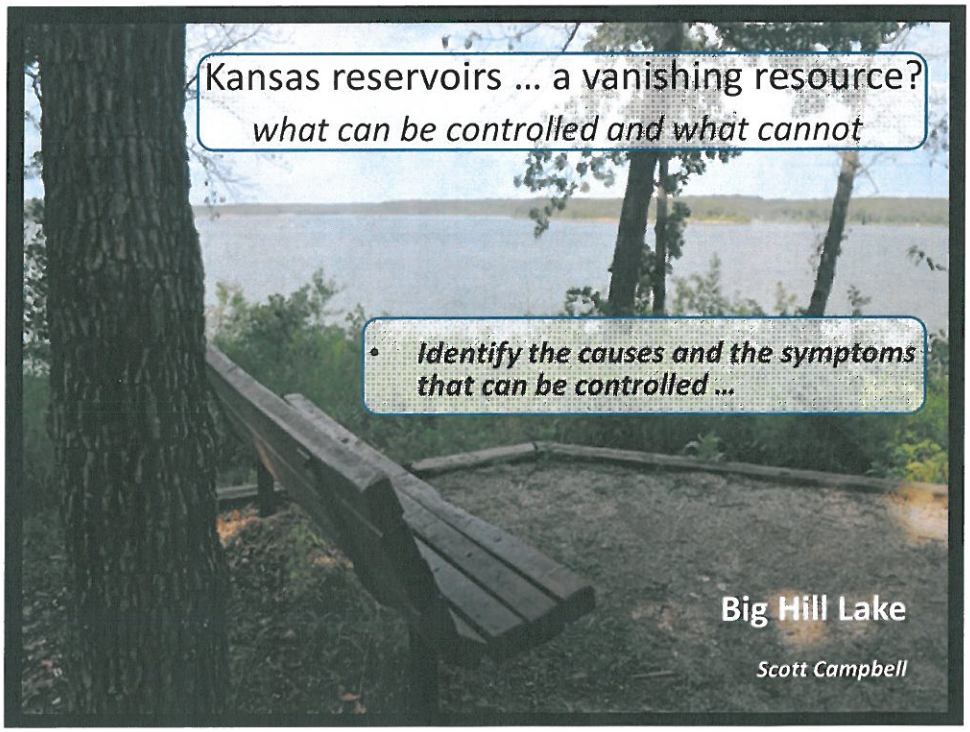
Kansas major watersheds



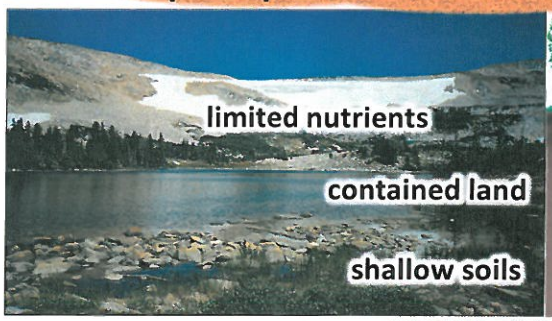
Kansas stream network and 5784 largest reservoirs of the 200,000 of all sizes
(National Inventory of Dams)

Our surface waters are an interconnected network. They all affect each other and all require our attention.

We now know the infilling rates of the 24 but few of the other 200,000.



How do reservoirs differ from natural lakes?
... perhaps here is where it all begins ...



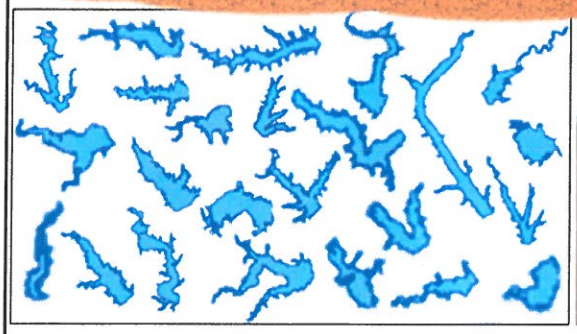
Natural lakes are 1000s of years old but reservoirs never will be.

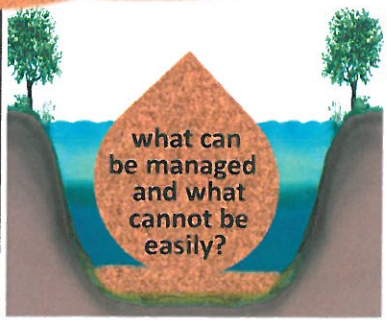
is time  *running out?*

What is it about where they are constructed and other ways they differ from lakes?

where there are few lakes 

First recognize "built in" reservoir problems.

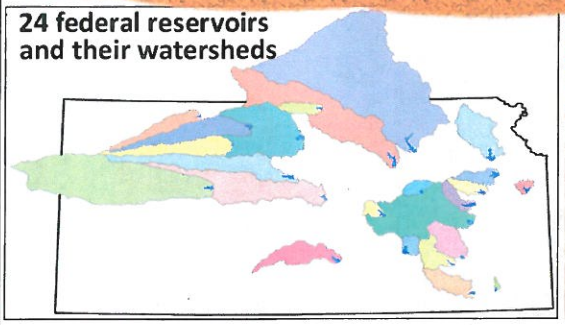


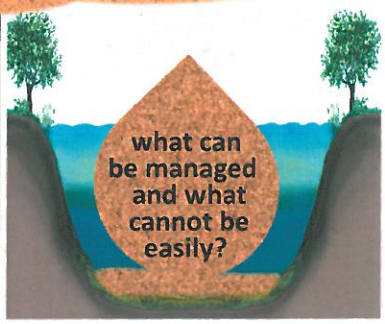


<u>Certain reservoir characteristics promote infilling and plant growth</u>

- basins large river origin, long
- principal upper end inflow force
- build maximize water collecting
- high catchment:basin area (2-3x)
- U.S. most lower latitude, warmer
- longer growing season, more N,P
- biota imported not evolved
- early less stable biota

Manage what can be managed.





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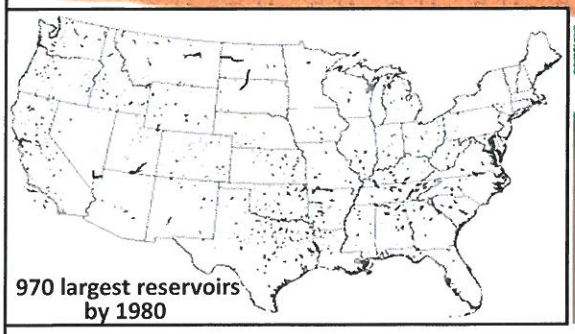

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Reservoirs always challenged by unstable biota?







- U.S. most lower latitude, warmer
- longer growing season, more N,P
- biota imported not evolved
- early less stable biota

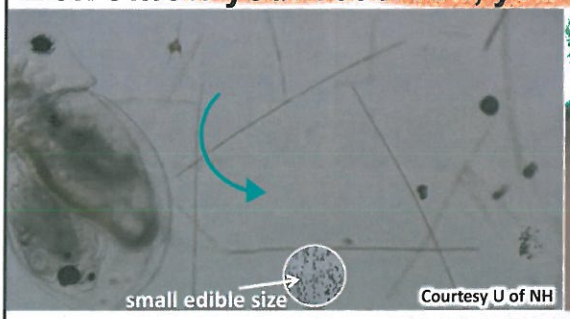
Why so much plant growth in our impoundments?

KDHE Advisories/Warnings:

2012:

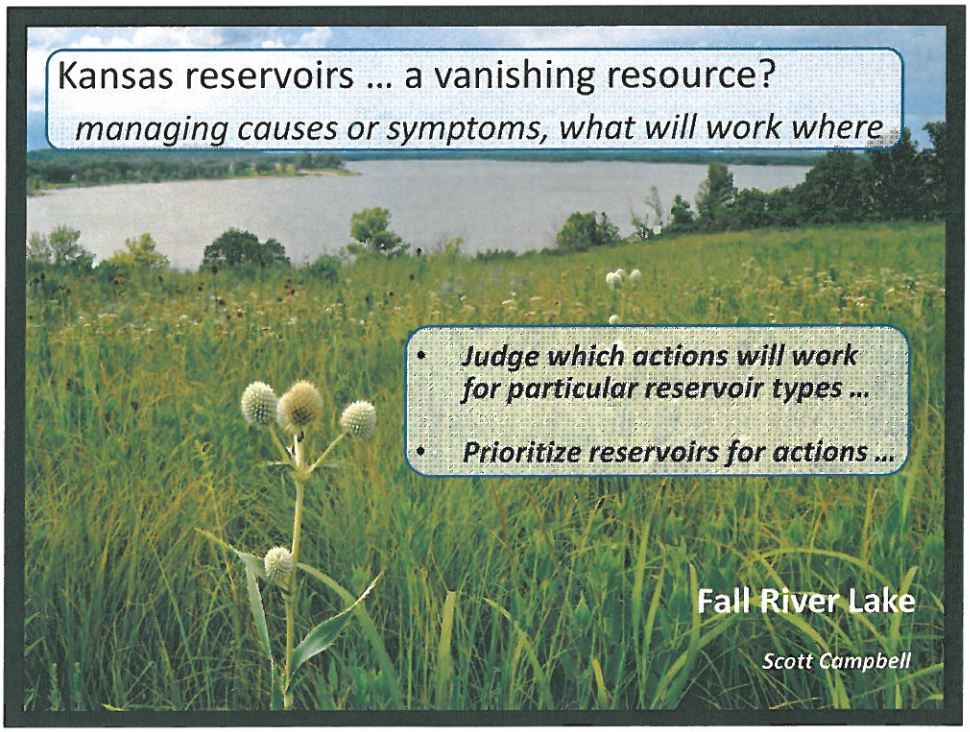
Antioch Park South Lake	Hiawatha City Lake
Atchison County Lake	Lake Scott
Brown Co. SFL	Logan City Lake
Cedar Bluff Lake	Lovewell Lake
Central Park Lake	Marion County Lake
Centralia Lake	Marion Lake
Chisholm Creek Park Lake	McPherson Co. SFL
Deanna Rose Park Lake	Milford Lake
Harvey Co. East Lake	Rigg's Park Lake
Harvey Co. West Lake	South Lake
Herington City Lake	Veteran's Lake
Herington Reservoir	Winfield City Lake

Don't mow your lawn, you will get a lot of grass!
Don't mow your reservoir, you will get a lot of algae!



Why massive growth of some plants in reservoirs?
large, floating cyanobacteria

Plants favored by elevated nutrients and reduced deeper light are too large to be eaten by the grazers.



Managing and restoring reservoirs … vision to action

Erosion control is very important to slow sedimentation for time for other actions but will not stop it.

Still uncertain how much the infilling is slowing.

There is increasing stream bank and channel erosion thus restoration is very important but is it effective.

Watershed of most of the 24 has thousands of miles of channels.

Managing and restoring reservoirs … vision to action

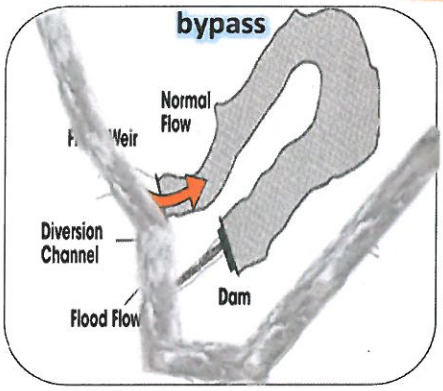
The 24 cannot all be restored by dredging, maybe not even just a few.

Too expensive, billions of dollars, and where will billions of cubic yards go and what effects will there be.

What about all of the others of all sizes; excavate up to 200,000.

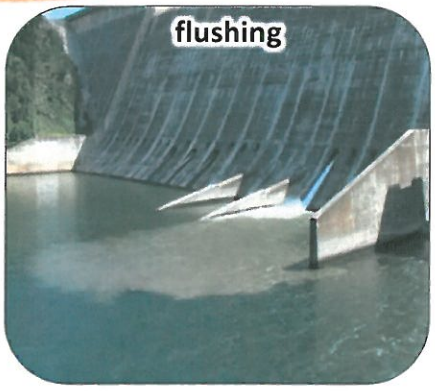
Smaller ones protect the larger but when do these sediment "catchers" begin flushing and become sources.

Managing and restoring reservoirs … vision to action



Heaviest silt loads being carried in coincide with heaviest inflow.

But diversion during flooding is not practical for reservoirs built for flood control like so many in Kansas.



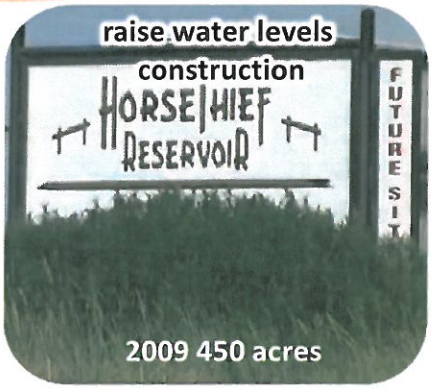
Directing normal flow over bottom to lift and carry materials downstream requires operation modifications.

Compactness of the sediment will affect ability of "modest" flow over bottom to lift sediment but may not.

Managing and restoring reservoirs …vision to action

Not necessarily moving hundreds of miles for many billions of dollars.

11 largest reservoirs will become 50% infilled this century but 13 will not … 8 of the 11 within 35 miles of one of the 13. But what else moved.



Build new ones but have we already used most of the best locations …

and is it wise to build more of what we still are unable to effectively manage for long into the future.

Other means of water storage?

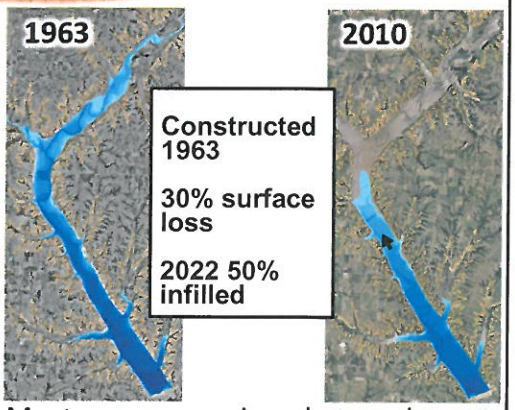
Managing and restoring reservoirs … vision to action

CONSERVATION

The one best action right now for surface water and ground water …

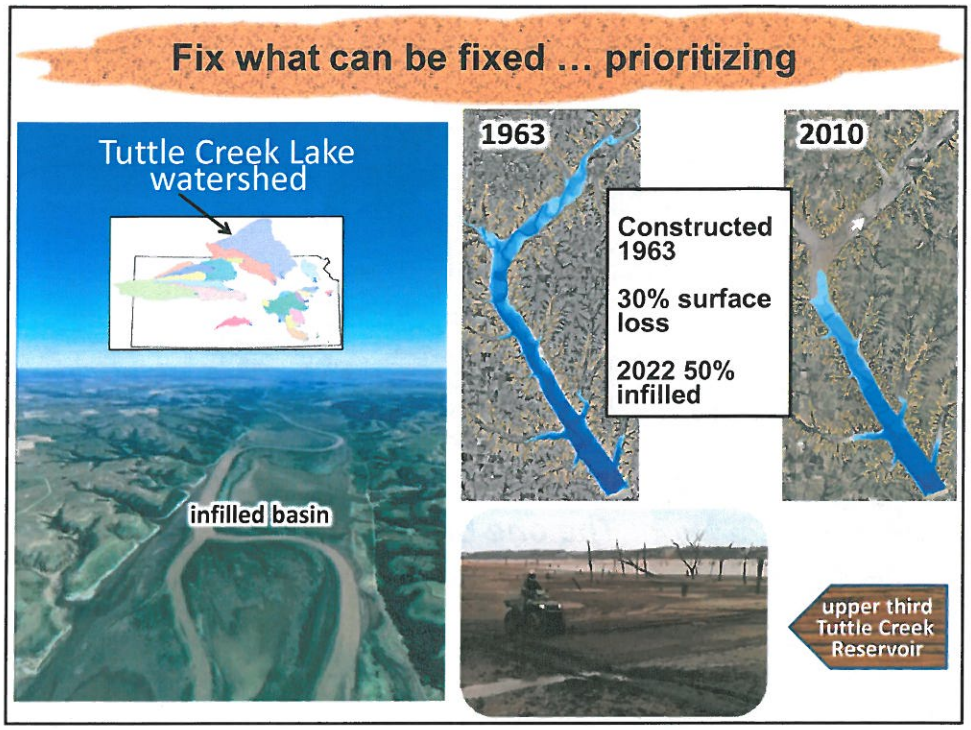
USE LESS

Fix what can be fixed … prioritizing



Must soon recognize what can be maintained and what cannot.

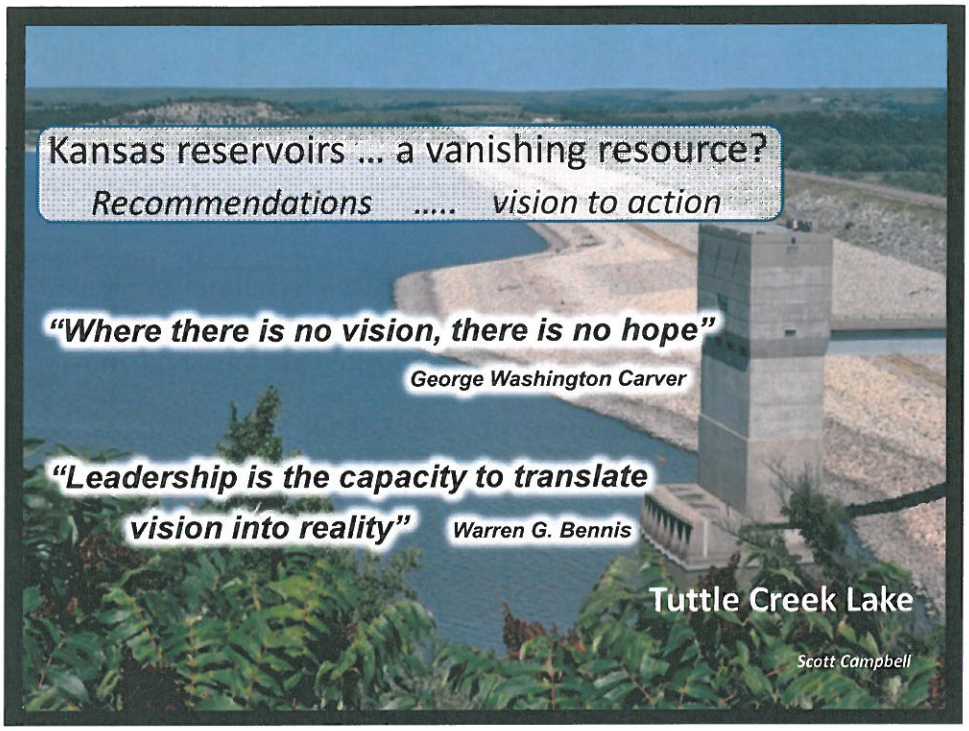
Set priorities for taking any action, then types of actions and where they will be most effective.


Fix what can be fixed … prioritizing
Tuttle Creek Lake watershed
infilled basin
1963
2010
Constructed 1963
30% surface loss
2022 50% infilled
upper third Tuttle Creek Reservoir


Kansas reservoirs … a vanishing resource?
monitor management effectiveness
Managing the causes will be most effective …
Continue to monitor management effectiveness …
Elk City Lake
Harland J. Schuster


Pottawattamie Co., KS
• reservoir infilling does not appear to be slowing
• effective land management for years, now there appears to be more stream channel erosion
• past sediments deposited here are now moving
• the forces of water holding less from land now pick up more from the streams
• *Monitor Management Effectiveness*


Doing all of this effectively, can we save reservoirs?
protection
stream restoration
dredging
excavation
bypass
Normal Flow
Flood Weir
Dam
flushing
securing storage
Tuttle Creek Res.
transporting
Texoma to Dallas
raise water levels,
HORSETHIEF RESERVOIR
construction
2009 450 acres
conservation
conservation
conservation



Now at the Governor's request we have a vision for the future of water supply in Kansas

Some other recommendations to consider:

Reservoir sedimentation is now a priority but "exactly" how to manage it must also become a priority.

- *Continue to monitor the rate and amount of sedimentation …*
- *Impoundments form networks and all must be considered …*
- *Determine the causes of infilling, not only the symptoms …*
- *Identify the causes and the symptoms that can be controlled …*
- *Judge which actions will work for particular reservoir types …*
- *Managing the causes will be most effective …*
- *Continue to monitor management effectiveness …*