Approved: March 17, 2011
Date

MINUTES OF THE HOUSE VISION 2020 COMMITTEE

In the initial absence of Chairman Sloan, the meeting was called to order by Vice Chairman Vern Swanson at 3:30 p.m. on February 9, 2011, in Room 144-S of the Capitol.

All members were present except:
Representative Brett Hildabrand- excused
Representative Don Hineman- excused
Representative Mike Peterson- excused
Representative Ron Worley- excused

Committee staff present:
Sean Ostrow, Office of the Revisor of Statutes
Corey Carnahan, Kansas Legislative Research Department
Jay Hall, Kansas Legislative Research Department
Mary Koles, Committee Assistant

Conferees appearing before the Committee:
Earl Lewis, Kansas Water Office
Greg Foley, State Conservation Commission
Dr. Ed Martinko, Kansas Biological Survey

Others attending:
See attached list.

Chairman Swanson welcomed the presenters and requested that the committee ask questions at the conclusion of all the presentations.

Earl Lewis, Assistant Director, Kansas Water Office, provided an update on reservoir sustainability. He noted that interstate cooperation and interaction with the Corps of Engineers are important/crucial. The assessment of the Verdigris Basin is complete: more than 50% of the water is consumed by municipal use; a decrease in population in the basin is projected; there is a potential for industrial growth; available supplies are decreasing due to sedimentation – sixty-four hotspots have been identified, salt scars and gullies are possible sources of sedimentation; and the estimated cost for streambank stabilization around the Fall River Reservoir is $1.4 million.

Because of the threat to water supplies, the Neosho Basin was the first to be addressed in as comprehensive a manner as possible. Twelve project sites have been identified; streambank stabilization is a popular program with landowners and offers the most protection to the storage and drinking water supplies. The Tulsa Corps is addressing levee issues. (Attachment 1)

Greg Foley, Executive Director, State Conservation Commission, addressed reducing sedimentation: the programs, the state buffer initiative, sediment control projects, streambank restoration projects (118), and tons of soil saved FY2006-2010. He discussed and sediment control practices (399 projects) implemented in 2009 and noted water pollution control projects (green projects), streambank stabilization, scheduled for 2011 and 2012. He also mentioned multipurpose small lakes, water supply restoration projects and constructing watershed flood control dams. (Attachment 2)

Dr. Edward A. Martinko, State Biologist and Director, Kansas Biological Survey, explained the issues, implications, and initiatives of the Kansas Reservoir Assessment. Due to severe sedimentation, lost capacity is becoming more common in our reservoirs as are the associated issues of taste and odor. Taste and odor problems can be dangerous, all are costly and can affect recreational activities and habitat. Dr. Martinko maintains that reservoirs should be thought of as critical economic infrastructure - a billion dollar investment. Like highways, reservoirs need attention and it is time to think about maintaining them.

Assessing the current status of our reservoirs began in 2007 with bathymetric mapping (calculate capacity and change over time), sediment surveys (assess sediment thickness and physical/chemical properties), and determining water quality. To date, over fifty reservoirs have had this type of integrated assessment.

The minutes of the Vision 2020 Committee at 3:30 p.m. on February 9, 2011, in Room 144-S of the Capitol.

As more data is gathered and analyzed, we should be able to predict future odor and taste events and prepare for them. Similarly, we need better information and understanding to make the kind of investment necessary to ensure water availability when a crisis, such as a drought, occurs. (Attachments 3 and 4*)

Following the presentations, questions were asked, comments made, and discussions occurred. Participants included: Chairman Sloan and Chairman Swanson and Representatives Gail Finney, Don Hill, and Bill Otto. Both Tracy Streeter, Director, Kansas Water Office, and Paul Graves, Assistant Chief Engineer, Division of Water Resources, Department of Agriculture, were in the audience and shared their expertise alongside Earl Lewis, Greg Foley, and Dr. Ed Martinko.

The next meeting is scheduled for February 14, 2011.

The meeting was adjourned at 4:50 p.m.

*Committee Assistant's note regarding Attachment 4: two (2) Kansas Biological Survey information notes pertain to Dr. Ed Martinko's presentation. One describes bathymetric mapping, the other discusses and makes available to the reader a water resources planner online mapping tool. Both were received February 10, and distributed at the February 14 Vision 2020 Committee meeting.

Guest List

House Vision 2020 Committee

Wednesday, February 9, 2011

Name	Client/Authority
Mike Reecht	Doc Braden
GALEN E BIERY	KRWA DIST 1 & CNRBWA DIST 3
Ryland Duncan	Rep. Sloan
Scott Campbell	Kansas Biological Survey
Jerry deNoyelles	Kansas Biological Survey
Ed Martinko	KS. Biological Survey
Paul Astren	KFB
Pat Lehman	KACD
Susan Metzger	KWO
Tracy Streeter	KWO
Earl Lewis	KWO
Greg A. Foley	SCC
Paul Graves	KDA
Chad Voigt	KDA
Chris Beightel	KDA

Kansas Water Office

Vision 2020 Committee

Update on Reservoir Sustainability

February 9, 2010

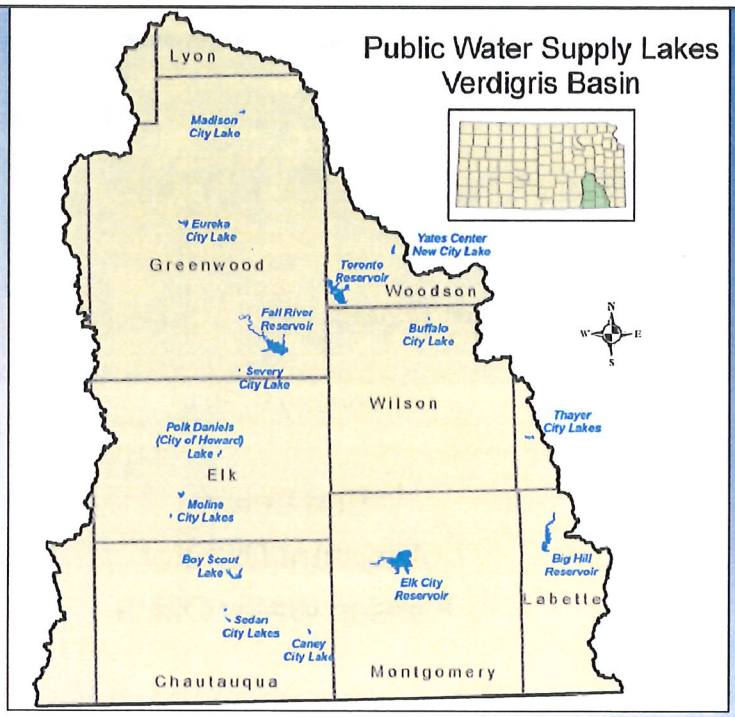
Earl Lewis
Assistant Director
Kansas Water Office

Kansas Water Office

Reservoir Roadmap

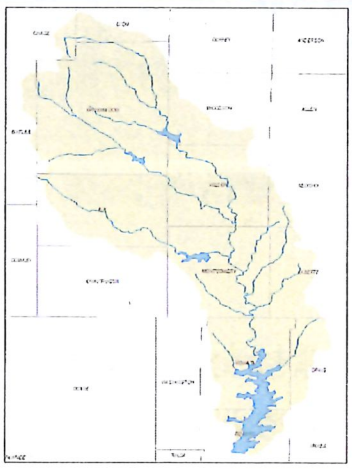
- Vision 2020 Committee request in 2009
- Kansas Water Authority report delivered in 2010
- Three volumes
- Neosho Basin first to be addressed
- Verdigris Basin completed now

Kansas Water Office



Kansas Water Office

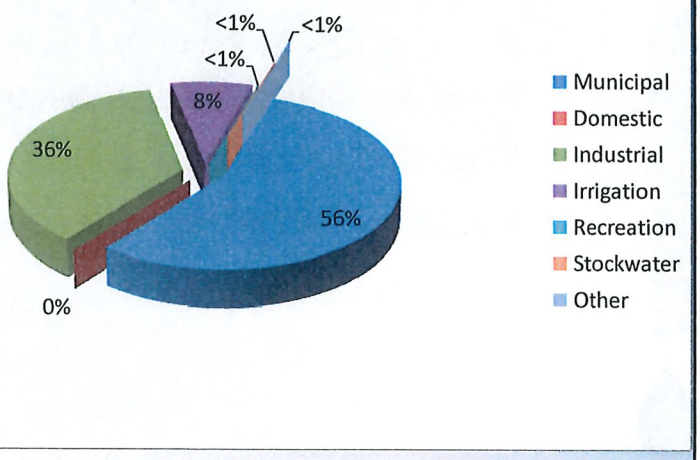
Interstate Importance



- Oologah Reservoir on the Verdigris River in OK is a major drinking water supply for Tulsa
- Approximately 2/3 of the watershed above Oologah is in Kansas

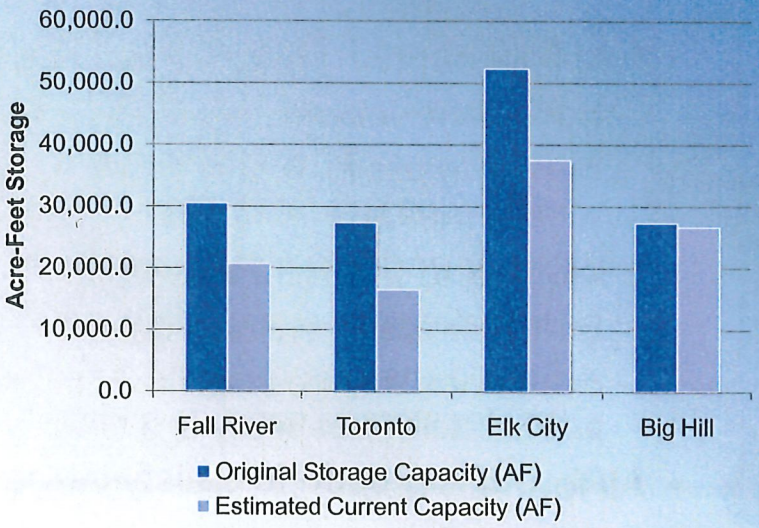
Kansas Water Office

Water Use by Type



Kansas Water Office

Loss of Capacity



Kansas Water Office

Supply and Demand

- 11 public water supply systems
- All counties in basin projected to have a decrease in population
- Potential industrial growth
- Supplies available are decreasing

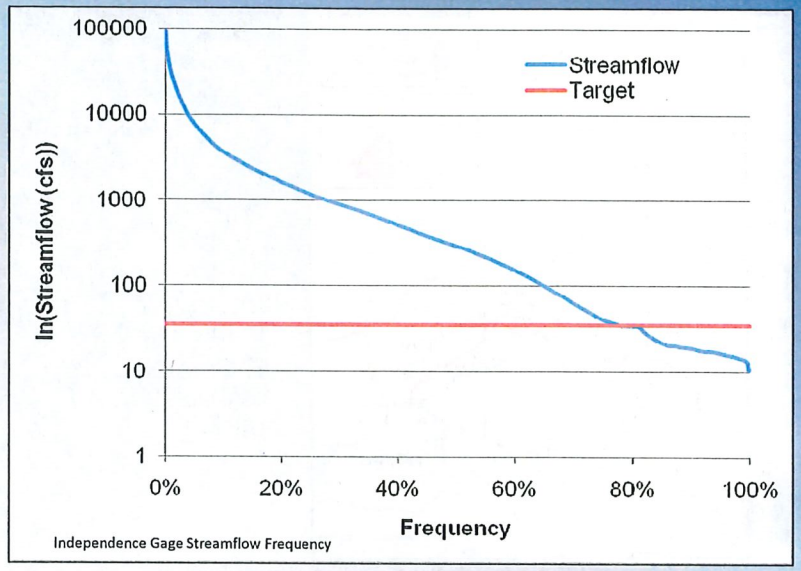
Kansas Water Office

Reservoir Supply

- Fall River and Toronto Reservoirs
  - Built before water supply storage law
  - State may ask for M&I releases without paying for storage
- Elk City and Big Hill Reservoirs
  - Built after cost share requirement
  - State owns storage and is required to pay for storage capacity and O&M
- All four are used to satisfy demand

Kansas Water Office

Streamflow at Target Locations

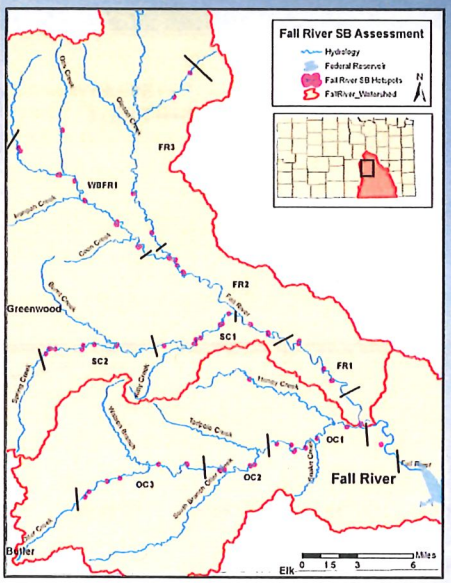


Kansas Water Office

Streambank Erosion Hotspot

Kansas Water Office

Fall River Reservoir



- 64 Hotspots covering 19,691 feet identified (Fall River, Otter Creek, West Branch Fall River, and Spring Creek)
- Estimated 40,364 tons/year lost from streams each year
- Accounts for only 12% of the total load estimated in the TMDL
- Estimated cost for stabilization = $1.4 million

Kansas Water Office

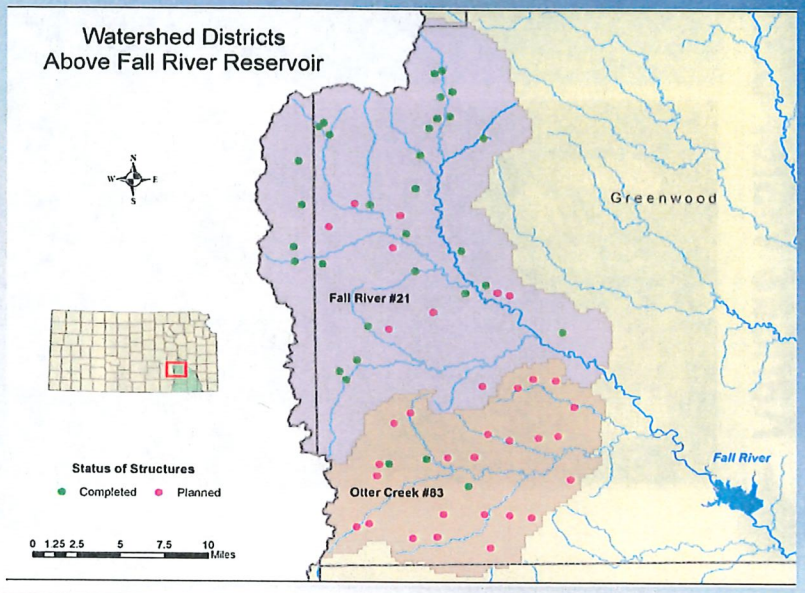
Possible Sources of Sediment in Verdigris Basin

Salt Scars

Gullies

Kansas Water Office

Fall River Reservoir



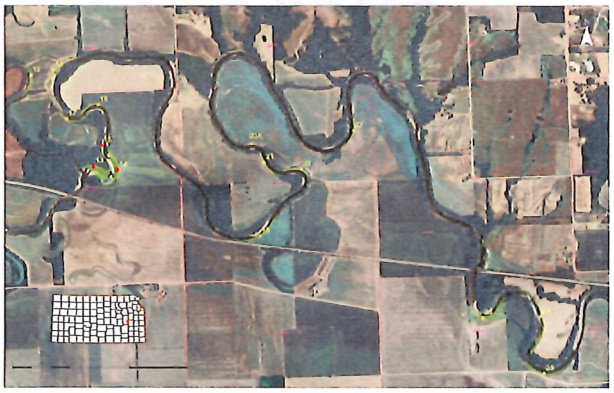
Kansas Water Office

Neosho Implementation

- Streambank Stabilization
  - ARRA project – 12 Sites
  - 8.3 mile stretch above John Redmond

Kansas Water Office

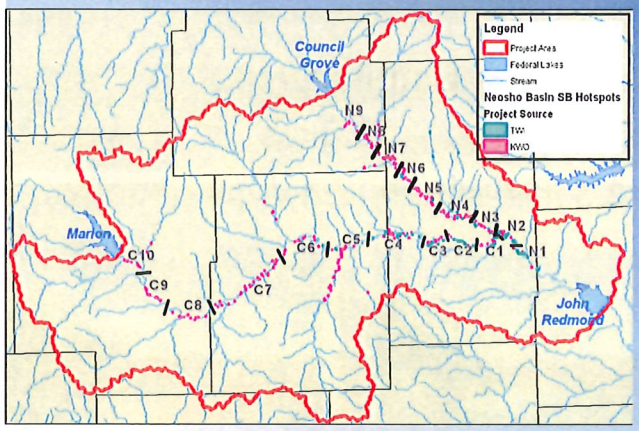
Neosho Streambank Stabilization



Site	AF loss/yr
13	4.9
14	4.3
15	0.6
16	0.9
17	0.9
18	1.6
19	2.3
20	1.3
21	1.1
22	1.1
23	2.6
24	2.6
25	1.4
Total	**25.6**

Kansas Water Office

Streambank Stabilization



Reach	Storage Secured (AF)
N1	31
N2	51
N3	12
N4	15
N5	16
N6	10
N7	12
N8	5
N9	2
C1	21
C2	25
C3	11
C4	21
C5	13
C6	6
C7	14
C8	8
C9	9
C10	4
Total	286

Kansas Water Office

Neosho Implementation

- John Redmond Pool Rise
- Increase permanent pool by 2 feet to offset sediment
- Hartford Levee inadequate during highest flooding events
- Tulsa Corps of Engineers revaluating levee issues

Kansas Water Office

Interaction with Corps of Engineers

- Joint meeting with Texas and Oklahoma in January
- 75 % of Corps water supply storage in three state region
- Draft agreement to work together
- Joint Water Resources Development Act proposals

Kansas Water Office

Legislative

- Interim Committee on Energy and Environmental Policy
- October, November and January
- Full review of issues

Kansas Water Office

Questions

Earl Lewis,
Kansas Water Office
785-296-3185

State Conservation Commission Report to Vision 2020 February 9, 2011

Sediment Reduction Accomplishments

1

SCC Programs that Reduce Sediment Load

- Water Resources Cost-Share Program
- Non-Point Source Pollution Control Program
- Riparian and Wetland Protection Program
- Buffer Program
- Water Supply Restoration Program
- Watershed Dam Construction Program
- Multi-purpose Small Lakes Program

Sediment Control for Watersheds Above Reservoirs/Lakes FY06-10

Reservoir/Lake	Field Treatment Acres Protected	Tons of Soil Saved	Cost-Share Expended
Milford	5,361	25,001	$345,443
Perry	2,044	29,794	$272,728
Tuttle Creek	7,739	38,908	$648,844
Clinton	1,877	13,251	$92,542
Cheney	2,099	15,808	$116,760
Hillsdale	492	1,867	$62,750
Melvern	648	3,399	$43,713
Pomona	2,236	11,996	$87,341
Council Grove	1,066	5,030	$78,263

Sediment Control Watersheds Above Reservoirs/Lakes FY06-10 (cont.)

Reservoir/Lake	Field Treatment Acres Protected	Tons of Soil Saved	Cost-share Expended
John Redmond	4,501	17,498	$416,457
Marion	997	6,177	$81,316
Cedar Bluff	14,492	17,068	$381,093
Kanopolis	7,348	38,858	$337,313
Waconda	8,810	42,462	$218,496
Keith Sebelius	2,348	5,813	$67,836
Elk City	1,143	5,208	$43,016
Fall River	1,234	26	$3,774
Toronto	1,846	1,664	$15,249
El Dorado	560	54	$9,708
Big Hill	105	69	$2,223
Totals	**66,958**	**278,555**	**$3,324,876**

Water Resources Cost-Share Program

Erosion/Sediment Control




Riparian and Wetland Protection Program
FY 2006-2010

Streambank Restoration

- Bank Stabilization (Weirs, Shaping)
- Bank Revegetation
- Riparian Forest Buffers
  - Kansas Forest Service
- Riparian Forest Buffers
  - Continuous CRP
- Filter Strips
  - Continuous CRP

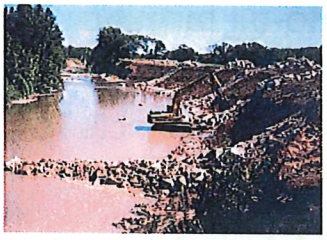
Streambank Restoration Funding FY 2006-2010

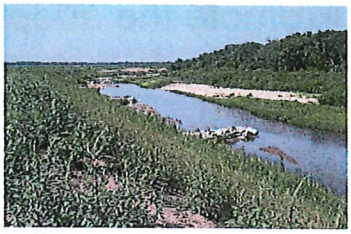
- Government Agencies
  - NRCS (Natural Resources Conservation Service)
    - EQIP (Environmental Quality Incentives Program)
  - SCC (State Conservation Commission)
    - Riparian and Wetland Program
  - American Recovery and Reinvestment Act
    - Delaware WRAPS
- Non Governmental Agencies
  - KAWS (Kansas Alliance for Wetlands and Streams)

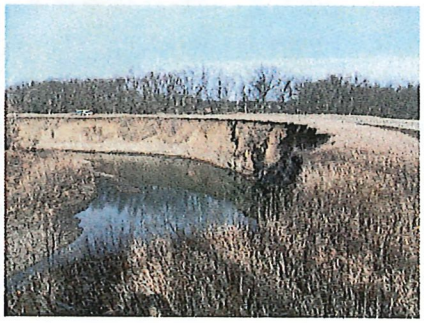
Streambank Restoration Summary FY 2006-2010

- 118 Streambank restoration projects
- 28 miles of riparian area restored
- $1,000,000 administered in Technical Service Provider contracts
- $604,000 SWP Funds Committed
- Watershed Restoration and Protection (WRAPS) $542,022
- Over $2,500,000 in combined Federal, State, and landowner project cost

Streambank Restoration







Kansas Water Pollution Control Revolving Fund (Green Projects)

- Allocate up to $500,000 of FY 2011 and FY 2012 NPS funds to provide 25% non-federal match for up to $1,500,000 of KWPCRF federal funds for streambank stabilization projects.
- Two projects have been submitted to KDHE.
  - Glacial Hills RC&D for the Delaware River
  - Flint Hills RC&D for the Cottonwood River.
- SCC match would be used for engineering design and construction costs.

No-till Education Funds

- Promote the adoption of no-till farming practices to reduce soil erosion.
  - Provides funding to conservation districts for no-till workshops or field days.

State Buffer Initiative FY 2006-2010

- State Incentive Payment to encourage enrollment of riparian areas into the Continuous Conservation Reserve Program (CCRP)
  - Grass Filter Strips
  - Riparian Forest Buffers
- 10 to 15 year Contracts
- $58,000 paid annually on contracts above the Federal Reservoirs
  - 501 Contracts
  - 2,800 acres
  - 293 miles of stream buffers

State Buffer Initiative

FFY 2009 NRCS EQIP Sedimentation Practice Implementation

SCC KANSAS

- Under the categories of Water Quality, Cropland Health, and Sediment reduction above Federal Reservoirs the NRCS implemented 399 projects statewide for $6.6 million the majority of which were erosion and sediment control practices.

Multipurpose Small Lakes Program

Objective:

To develop, **to its fullest potential**, a site that is being planned for flood control and water supply or recreation. Projects funded by the legislature will receive assistance in the form of a grant for flood control and, if included, recreation. Funds appropriated for the water supply component shall be on a loan to be paid back to the state.

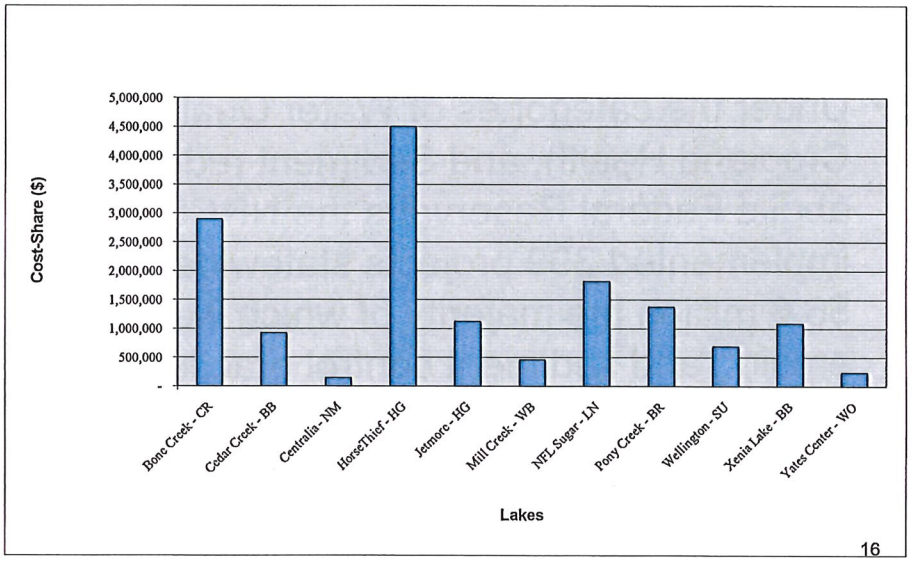
Activities:

Since inception, 1985:

- **Cost-shared on 11 multipurpose dams**
- **Funding: $15.2 million**

15

Multipurpose Small Lakes Program



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Water Supply Restoration Program

State Water Plan Funds derived from the Clean Drinking Water Fee Fund - Enacted 2007

Objective:

- To assist eligible sponsors to restore and protect water supply systems where appropriate watershed restoration and protection are planned or in place.

Activities:

- Pilot Project: Mission Lake, Horton, Kansas: $2.6 million
- Washington County RWD No.1: $882,069
- Augusta Lake: $1,000,000.

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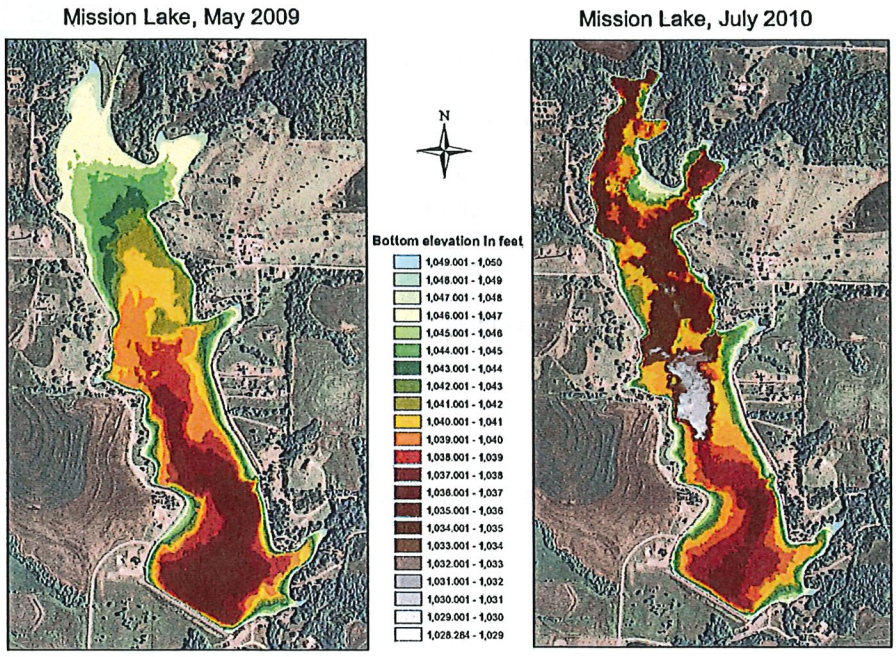
Water Supply Restoration Program

Fiscal Year	Funding	Mission Lake	WS CO RWD 1	Augusta Lake
2007	$0	-	-	-
2008	$2,483,603	$2,483,603	-	-
2009	$998,466	$116,397	$882,069	-
2010	$0	-	-	-
2011(*)	$653,673	-	-	$653,673
2012(^)	$656,298			$346,327
Σ	$4,792,040	$2,600,000	$882,069	$1,000,000

Water Supply Restoration Program

- **Mission Lake, City of Horton – Pilot Project:**
  - Built in 1924, the storage was: 1,866 ac-ft
  - In 2007, before DREDGE, the storage: 1,036 ac-ft
  - In 2010, after DREDGE, the storage: 1,656 ac-ft
- **Mission Lake Cost and Funding:**
  - SCC: $2.6 million
  - City of Horton: $4 million



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Watershed Dam Construction Program

1. New Construction of Flood Control Dams
2. Rehabilitation of existing Flood Control Dams
3. Breach Inundation Mapping

Flood Control Dams are built also **to trap sediment loads, from the dam's drainage area,** for 50 or 100 years.

Watershed Dam Construction Program

FYI	Construction	Rehabilitation	I-Map	Total
2,006	347,423	0	0	347,423
2,007	351,499	419,966	494,525	1,265,990
2,008	688,600	230,719	167,094	1,086,413
2,009	581,694	270,517	86,282	938,493
2,010	464,262	226,892	0	691,154
	2,433,478	1,148,094	747,901	3,982,050

2006-10

Construction

28 new flood control dams, 12 (43%) above federal reservoirs

Trapped sediment load from 42.15 square miles

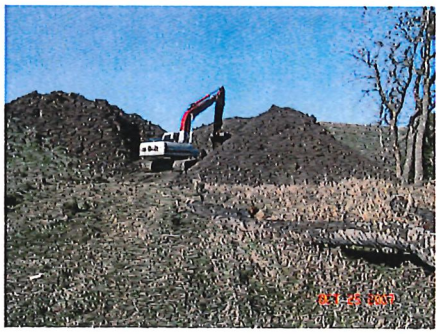
Rehabilitation

38 existing flood control dams

Inundation Mapping

228 Breach Inundation Maps

Watershed Dam Construction Program



STATE CONSERVATION COMMISSION

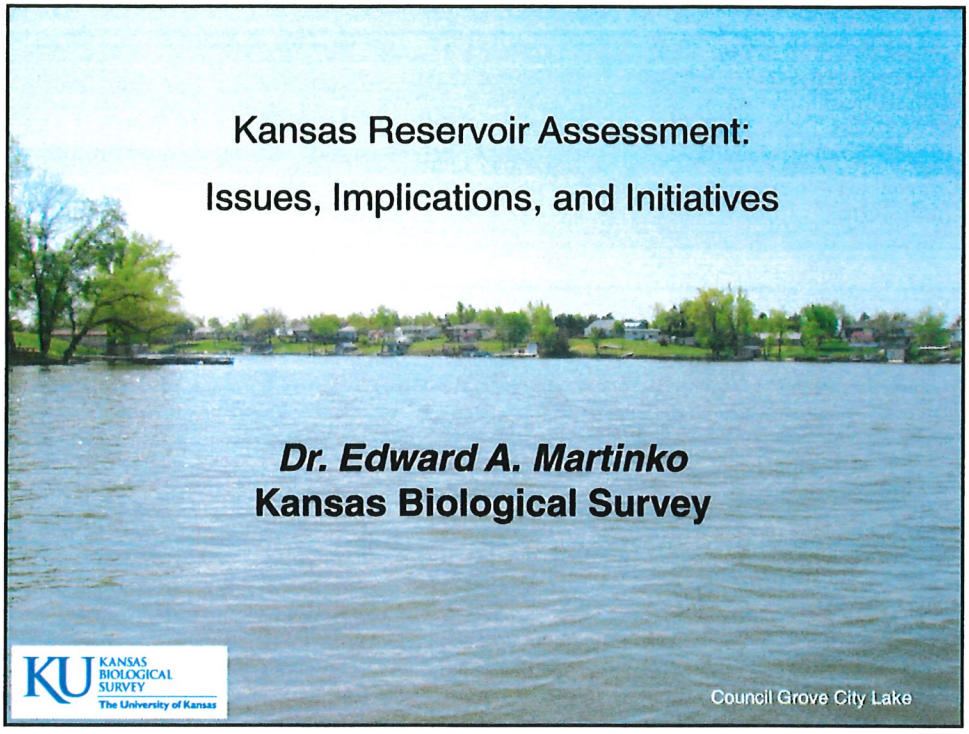
- **For More Information on any of theses Programs:**

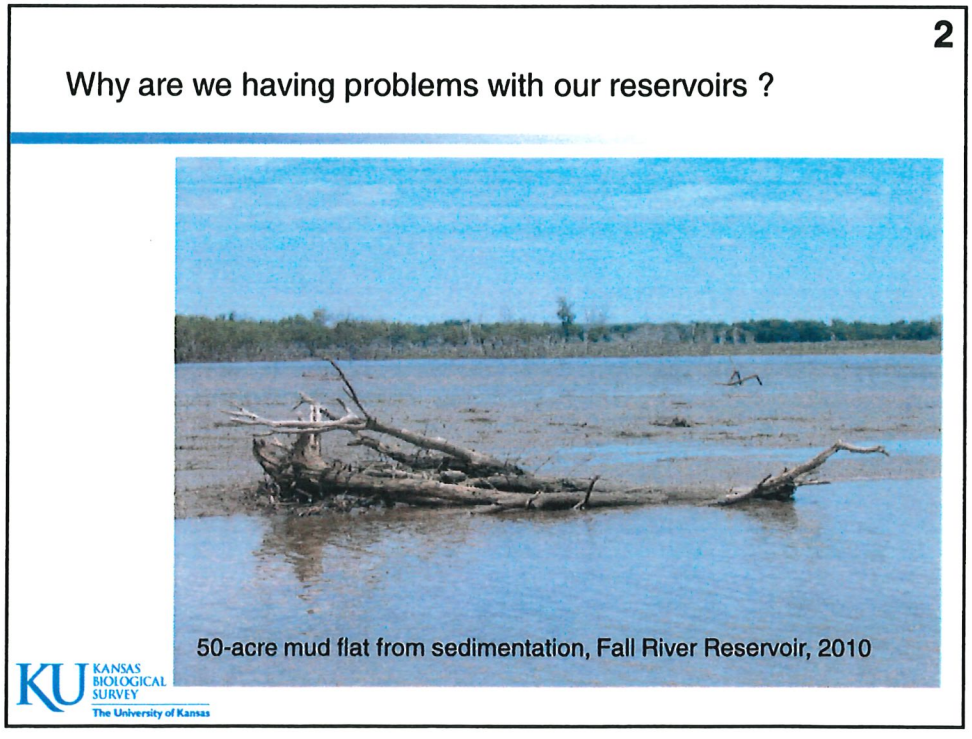
www.scc.ks.gov

or contact,

SCC Office at (785) 296-3600

SCC
KANSAS

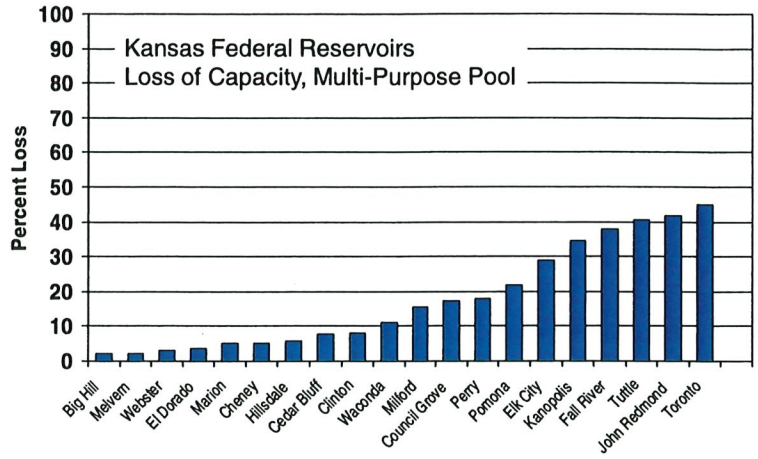




House Vision 2020
2-9, 2011
Attachment 3

3

Why are we having problems with our reservoirs ?



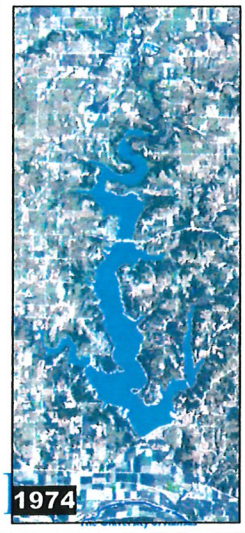
These 20 reservoirs were constructed from 1948-1981, and most are currently used as drinking water supplies

KU KANSAS BIOLOGICAL SURVEY The University of Kansas

Source: KWO

4

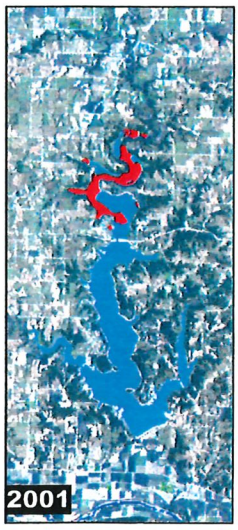
Severe sedimentation: Perry Lake Upper Basin



Accumulation since construction in 1969

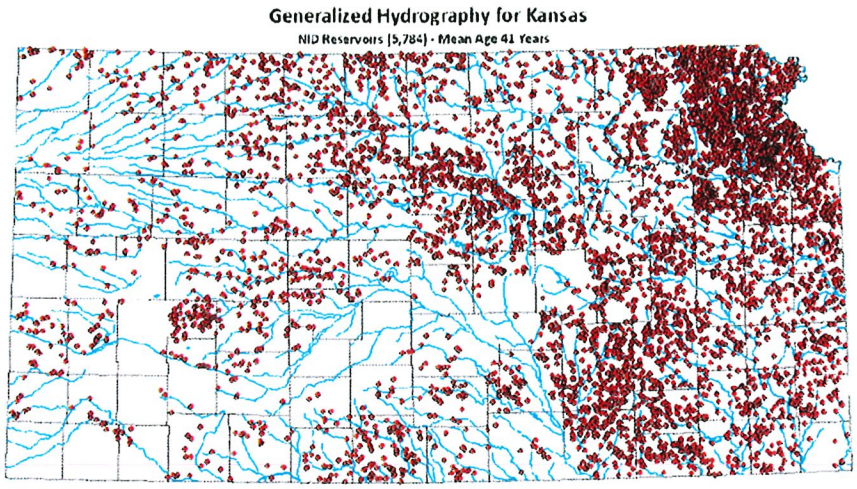
Estimated 1000+ acres surface area lost

18% of water storage capacity lost (2005)



We have built many reservoirs across the Kansas landscape

5



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The University of Kansas

6

Reservoirs should be thought of as critical economic infrastructure: a multi-billion dollar investment

"...the City of Horton is going to be limited in economic and population growth by the amount of water that is available to the City.... (City of Horton, 2006)

By comparison:

"Area transportation planners have identified $732 million worth of road projects needed in Douglas County between now and 2030." (Lawrence Journal-World, 2/2/08)

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7

Integrated Reservoir Assessment

In support of the objectives of securing, protecting, and restoring reservoirs in our state.

Assessing the Current Status of Our Reservoirs:

Bathymetric Mapping

- Current capacity ?
- Historic capacity ?
- How much capacity has been lost ?

Sediment surveys

- Sediment thickness ?
- Rates and spatial patterns of deposition ?
- Chronological pattern of deposition ?
- Nutrients and chemical contaminants ?

Water Quality Status

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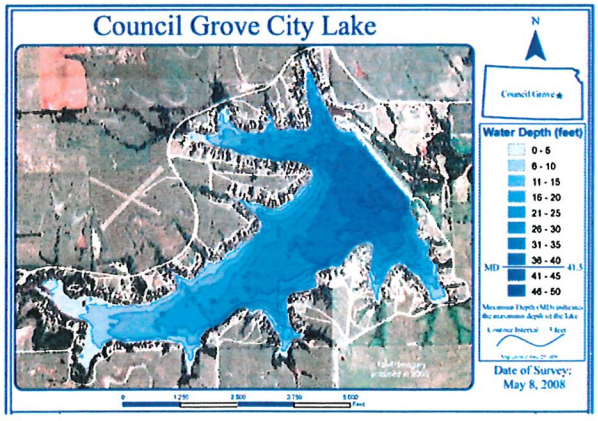
8

Bathymetric surveys to calculate reservoir capacity and change in capacity over time



KU KANSAS BIOLOGICAL SURVEY The University of Kansas

9

A long-term bathymetric mapping program

KANSAS WATER OFFICE

Reservoirs mapped by KBS for KWO since 2007

ALMA CITY LAKE
ANTHONY CITY LAKE
AUGUSTA LAKE
AUGUSTA SANTA FE LAKE
BANNER CREEK LAKE
CEDAR VALLEY LAKE
CENTRALIA LAKE
CHENEY RESERVOIR
CLINTON RESERVOIR
COUNCIL GROVE CITY LAKE
COUNCIL GROVE RESERVOIR
EL DORADO LAKE
ELK CITY LAKE
EUREKA LAKE
FALL RIVER LAKE
FT. SCOTT CITY LAKE
HERINGTON LAKE
HERINGTON RESERVOIR
HILLSDALE RESERVOIR
JOHN REDMOND RES.
KANOPOLIS RESERVOIR
LAKE AFTON
LAKE SHAWNEE
LEAVENWORTH CO. SFL
LOUISBURG SFL
MADISON CITY LAKE
MELVERN LAKE
MIOLA LAKE
MISSION LAKE
MOLINE CITY LAKE
OLPE CITY LAKE
OSAGE CO. SFL
OSAGE CITY LAKE
PARSONS LAKE
PLEASANTON RESERVOIR
POLK DANIELS
POMONA LAKE
POTTAWATOMIE CO SFL #1
PONY CREEK /SABETHA LAKE
ROCK CREEK LAKE
SEVERY CITY LAKE
SOUTH OWL (YATES CTR OLD)
TORONTO LAKE
WABAUNSEE LAKE
WELLINGTON CITY LAKE
WILSON RESERVOIR
WILSON CO. SFL
WOODSON CO. SFL
WINFIELD CITY LAKE
WOLF CREEK LAKE
WYANDOTTE CO. LAKE
YATES CENTER RESERVOIR

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Reservoirs mapped in 2010

10

Many reservoirs in the state have not been mapped for decades – and most have never been mapped.

Reservoirs mapped by KBS for KWO

ALMA CITY LAKE
AUGUSTA LAKE
AUGUSTA SF LAKE
BANNER CREEK LAKE
CEDAR VALLEY LAKE
CENTRALIA LAKE
CHENEY LAKE
CLINTON RESERVOIR
COUNCIL GROVE CITY LAKE
COUNCIL GROVE RESERVOIR
EL DORADO LAKE
ELK CITY LAKE
EUREKA LAKE
FALL RIVER LAKE
FT. SCOTT CITY LAKE
HERINGTON LAKE
HILLSDALE RESERVOIR
JOHN REDMOND RESERVOIR
KANOPOLIS RESERVOIR
LAKE AFTON
LAKE SHAWNEE
LEAVENWORTH CO. SFL
LOUISBURG SFL
MADISON CITY LAKE
MELVERN LAKE
MIOLA LAKE
MISSION LAKE
MOLINE CITY LAKE
OLPE CITY LAKE
OSAGE CO. SFL
OSAGE CITY LAKE
PARSONS LAKE
PLEASANTON RESERVOIR
POLK DANIELS LAKE
POMONA LAKE
POTTAWATOMIE CO SFL #1
PONY CREEK LAKE
ROCK CREEK LAKE
SEVERY CITY LAKE
SOUTH OWL LAKE
THAYER NEW CITY LAKE
TORONTO LAKE
WABAUNSEE LAKE
WELLINGTON CITY LAKE
WILSON RESERVOIR
WILSON CO. SFL
WOODSON CO. SFL
WINFIELD CITY LAKE
WOLF CREEK LAKE
WYANDOTTE CO. LAKE
YATES CENTER RESERVOIR

Some reservoirs that are NOT yet mapped:

ANTHONY CITY LAKE
ATCHISON CO. SFL
BARBER CO. SFL
BLUE MOUND CITY LAKE
BOURBON CO. SFL
BROWN CO SFL
BUTLER CO. SFL
CEDAR BLUFF LAKE
CHANUTE SF LAKE
CHASE CO. SFL
CLARK CO. SFL
COWLEY CO. SFL
DOUGLAS CO SFL
FORD CO. LAKE
GARDNER CITY LAKE
GEARY CO. SFL
GOODMAN SFL
HARVEY CO. EAST LAKE
HARVEY CO. WEST LAKE
JEWELL CO. SFL
KINGMAN CO SFL
KIRWIN LAKE
LAKE CRAWFORD
LAKE KAHOLA
LAKE MEADE
LAKE SCOTT
LAKE WEATHERBY
LONE STAR LAKE
LOVEWELL LAKE
LYNDON CITY LAKE
LYON CO. SFL
MARAIS DES CYGNES
MARION CO. LAKE
MCPHERSON CO. SFL
MONTGOMERY CO. SFL
MIAMI CO SFL
MALLARD LAKE
CIMARRON LAKE
MOUND CITY LAKE
NEOSHO CO. SFL
NEOSHO WA
NORTON LAKE
OTTAWA CO. SFL
POTTAWATOMIE CO SFL #2
PRATT CO. LAKE
RICHMOND CITY LAKE
ROOKS CO. SFL
SABETHA CITY LAKE
SEDAN CITY NORTH LAKE
SEDAN CITY SOUTH LAKE
SHAWNEE CO. SFL
SHAWNEE MISSION LAKE
SHERIDAN CO. SFL
WACONDA LAKE
WASHINGTON CO SFL
WEBSTER LAKE
XENIA LAKE

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Bathymetric mapping should be repeated every 5-10 years to determine rates of sedimentation

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Sediment surveys to assess sediment thickness and physical /chemical properties

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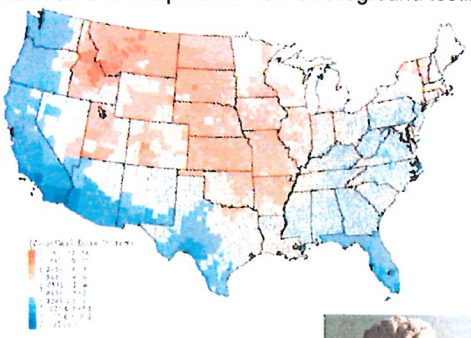
Integrated Reservoir Assessment:

Sediment core dating by radionuclide analysis

WHEN was the sediment deposited ?

- Need a "marker" in the sediment to fix a date
  - Preimpoundment interface usually visible (lake construction)
- Radionuclides:
  - Fallout from weapons tests
  - Onset in the early 1950's
  - Peak activity in 1963
  - Decrease for post-1963.
  - $^{239+240}$Plutonium use as marker
    - Rapid analysis
    - PU binds to clay (less mobile post-deposition)

Radioactive fallout patterns from aboveground testing



Aboveground testing ceased in 1963

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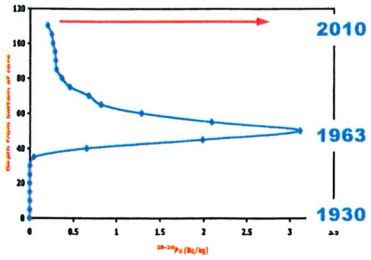
Augusta Lake: Sedimentation rate



~ 60 cm in 33 years (1.8 cm/yr) (1930-1963)

~ 60 cm in 47 years (1.2 cm/yr) (1963-2010)

Sedimentation rate slowing ?

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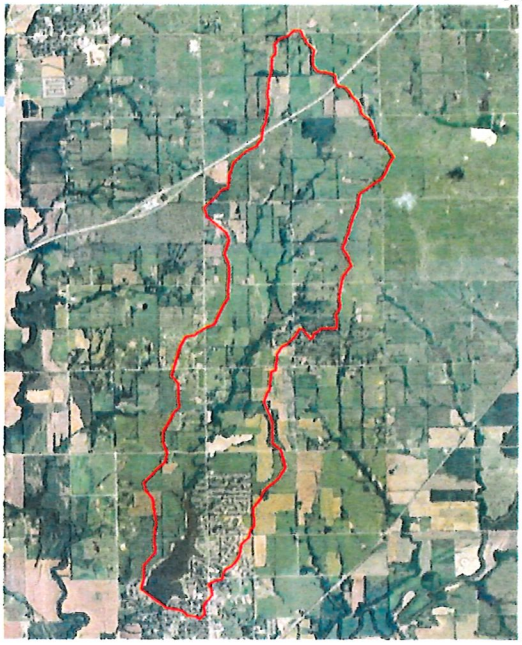
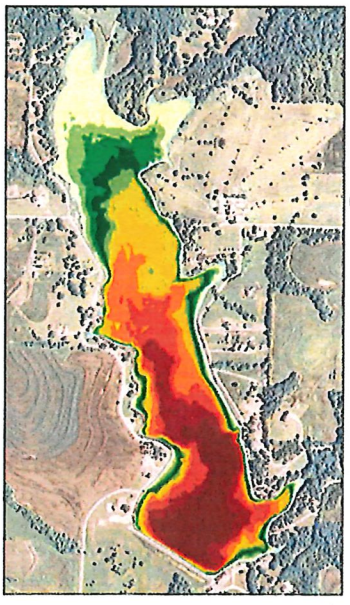


14

A recent dredging action

State and local investment

Mission Lake, May 2009

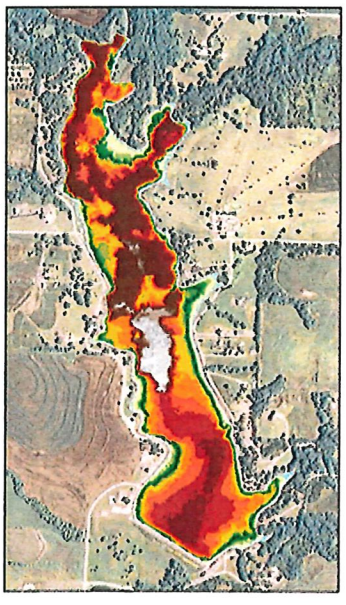


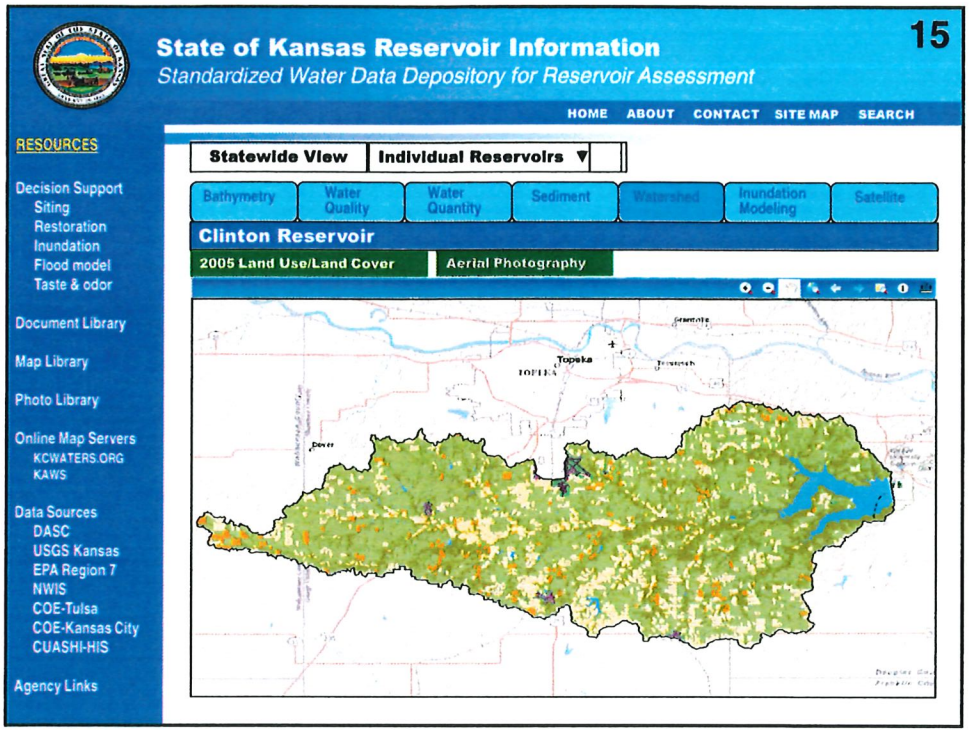
123-acre reservoir

one year
$6.6 million
~ 1 mil yds^3

Bottom elevation in feet

Mission Lake, July 2010




State of Kansas Reservoir Information
Standardized Water Data Depository for Reservoir Assessment
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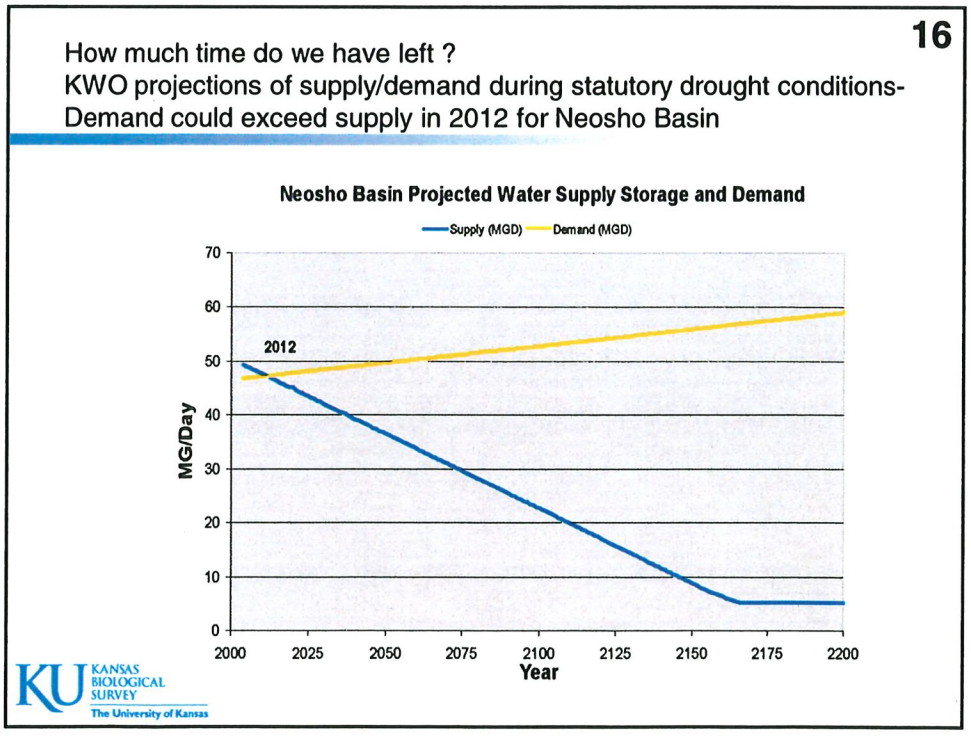
HOME ABOUT CONTACT SITE MAP SEARCH
RESOURCES
Decision Support
Siting
Restoration
Inundation
Flood model
Taste & odor
Document Library
Map Library
Photo Library
Online Map Servers
KCWATERS.ORG
KAWS
Data Sources
DASC
USGS Kansas
EPA Region 7
NWIS
COE-Tulsa
COE-Kansas City
CUASHI-HIS
Agency Links
Statewide View
Individual Reservoirs
Bathymetry
Water Quality
Water Quantity
Sediment
Watershed
Inundation Modeling
Satellite
Clinton Reservoir
2005 Land Use/Land Cover
Aerial Photography
Topeka
TOPEKA


16
How much time do we have left ?
KWO projections of supply/demand during statutory drought conditions-
Demand could exceed supply in 2012 for Neosho Basin
Neosho Basin Projected Water Supply Storage and Demand
Supply (MGD)
Demand (MGD)
2012
MG/Day
Year
0
10
20
30
40
50
60
70
2000
2025
2050
2075
2100
2125
2150
2175
2200
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Kansas Biological Survey

Information Note
November 2010

Applied Science and Technology for Reservoir Assessment

Reservoir Assessment: Bathymetric Mapping

Sediment accumulation continues to create water quality problems that affect the many uses of Kansas reservoirs. Bathymetric (lake bottom contour) mapping and reservoir assessments are particularly important as federal, state, and local agencies contemplate and initiate sediment management projects to renovate Kansas reservoirs. Recognizing the critical need for information on reservoir sedimentation and conditions, The Kansas Biological Survey (KBS) i created the Applied Science and Technology for Reservoir Assessment (ASTRA) Program in 2006. ASTRA focuses on integrated reservoir assessment by bathymetric and sediment surveys, watershed analysis, remote sensing, and computer modeling.

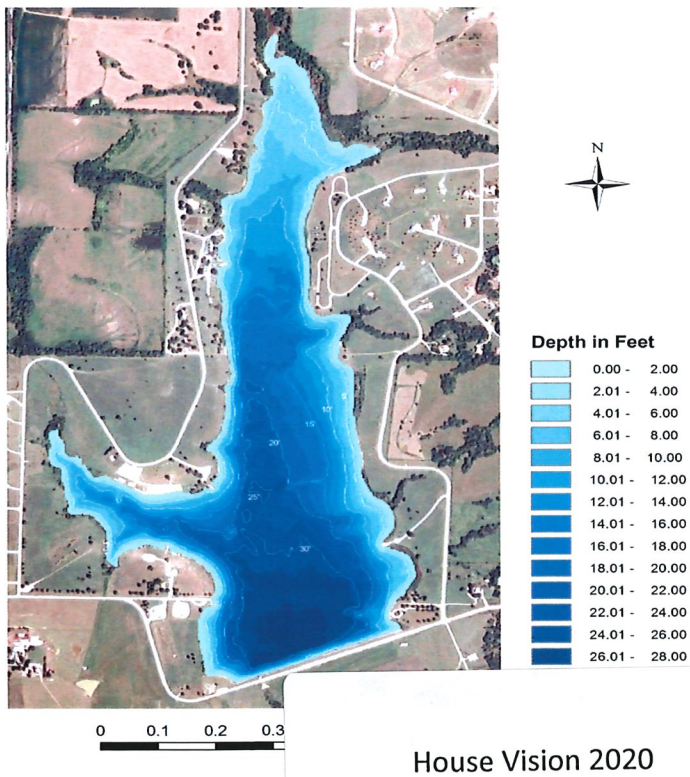
Why are bathymetric surveys important ?

Bathymetric data is not available for a majority of the more than 5,000 regulated reservoirs in Kansas. A review of 18 federal reservoirs in Kansas showed that on average, the time since the previous bathymetric survey was 15 years. Bathymetric surveys for state and local reservoirs in Kansas are even more rare, performed on an ad-hoc basis, and often are in error or incomplete. Repeated bathymetric surveys provide significant insight into the rates and patterns of sedimentation in a reservoir. Enhanced knowledge of sediment deposition in reservoirs helps determine effectiveness of watershed protection practices. When dredging appears to be the best alternative to extend the life of a reservoir, sediment deposition data indicates how much sediment needs to be removed and can help determine how much sediment was removed by the dredger. Contour maps that pre-date the reservoir and show the shape of the land before the reservoir was created can be digitally overlaid onto bathymetry maps created from lake surveys to help identify and estimate sedimentation rates and patterns in a reservoir.

How are the bathymetric surveys performed ?

KBS operates a Biosonics™ DT-X echosounding system with a 200 kHz split-beam transducer and a 38-kHz single-beam transducer. Latitude-longitude information is provided by a global positioning system (GPS) that interfaces with the Biosonics system. The *ArcGIS™* geographic information systems (GIS) software is used for on-lake navigation and positioning. Power is provided to the echosounding unit, command/navigation computer, and auxiliary monitor by means of a inverter and battery backup device that in turn draw power from the 12-volt boat battery. The survey boat is guided around the reservoir using computer maps and global positioning systems data to ensure all areas are mapped.

Miola Lake Depth Map



House Vision 2020
2-9, 2011
Attachment 4

Thousands of measurements of water depth at closely spaced locations on the reservoir are collected by the echosounder during the survey

After field data collection is completed, the raw data are processed to generate files of latitude, longitude, and depth. Depths are converted to elevations of the lake bottom based on the water surface elevation of the lake on the date of the survey. Computer processing transforms the thousands of data points collected by the echosounder into a depth map of the reservoir. Area-volume-elevation tables are computed from the lake bottom surface model. Computer analysis of the data recorded by the echosounder also provide information on fish, aquatic plants, and the composition of the reservoir bottom.

ASTRA scientists performing a bathymetric survey of Council Grove Citv Lake in 2008.

What lakes have been surveyed ?

As of November 2010, the following lakes have been surveyed by ASTRA:

Alma City Lake
Anthony City Lake
Augusta Lake
Augusta Santa Fe Lake
Banner Creek Lake
Cedar Valley Lake
Centralia Lake
Cheney Reservoir
Clinton Reservoir
Council Grove City Lake
Council Grove Reservoir
El Dorado Lake
Elk City Lake
Eureka Lake
Fall River Lake
Ft. Scott City Lake
Herington Lake
Herington Reservoir
Hillsdale Reservoir
John Redmond Reservoir
Kanopolis Reservoir
Lake Afton
Lake Shawnee
Leavenworth Co. SFL
Louisburg SFL
Madison City Lake
Melvern Lake
Miola Lake
Mission Lake
Moline City Lake
Olpe City Lake
Osage Co. SFL
Osage City Lake
Parsons Lake
Pleasanton Reservoir
Pomona Lake
Pottawatomie Co. SFL #1
Pony Creek Lake
Rock Creek Lake
Sabetha-Pony Creek Lake
Severy City Lake
South Owl Lake
Thayer City Lake East
Thayer City Lake West
Toronto Lake
Wabaunsee Lake
Wellington City Lake
Wilson Reservoir
Wilson Co. SFL
Woodson Co. SFL
Winfield City Lake
Wolf Creek Lake
Wyandotte Co. Lake
Yates Center Reservoir

Our expanding reservoir information database provides state and local officials with the facts needed to make informed decisions about the safety, supply, and reliability of our valuable water resources.

For more information, please contact:

Dr. Mark Jakubauskas, ASTRA Program, 2101 Constant Ave., Lawrence, Kansas 66047.
Telephone: (785) 864-1508, email: mjakub@ku.edu. Website: http://www.astra.ku.edu

Dr. Edward A. Martinko, Director, Kansas Biological Survey, 2101 Constant Ave., Lawrence, Kansas 66047.
Telephone: (785) 864-1500, email: martinko@ku.edu.

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The Kansas Biological Survey (KBS) at the University of Kansas is a non-regulatory research and service agency of the state that has been providing objective, scientific information for more than a century about the state's natural resources to policymakers, resource managers, and citizens of Kansas.

Kansas Biological Survey

Information Note
November 2010

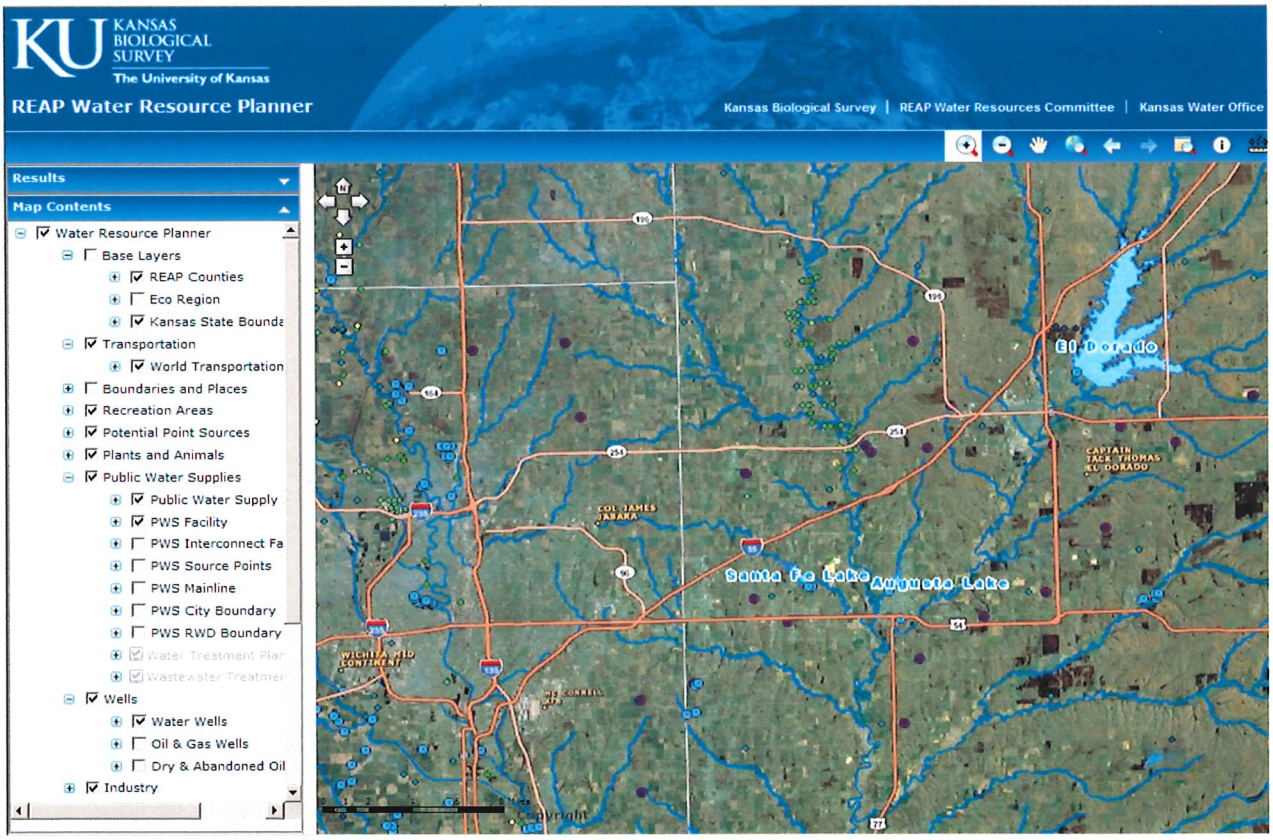
Applied Science and Technology for Reservoir Assessment

Water Resources Planner Online Mapping Tool

The Kansas Biological Survey has partnered with the Regional Economic Area Partnership (REAP) Water Resources Committee and the Kansas Water Office to develop an online Water Resources Planner (WRP) for the greater Wichita area.

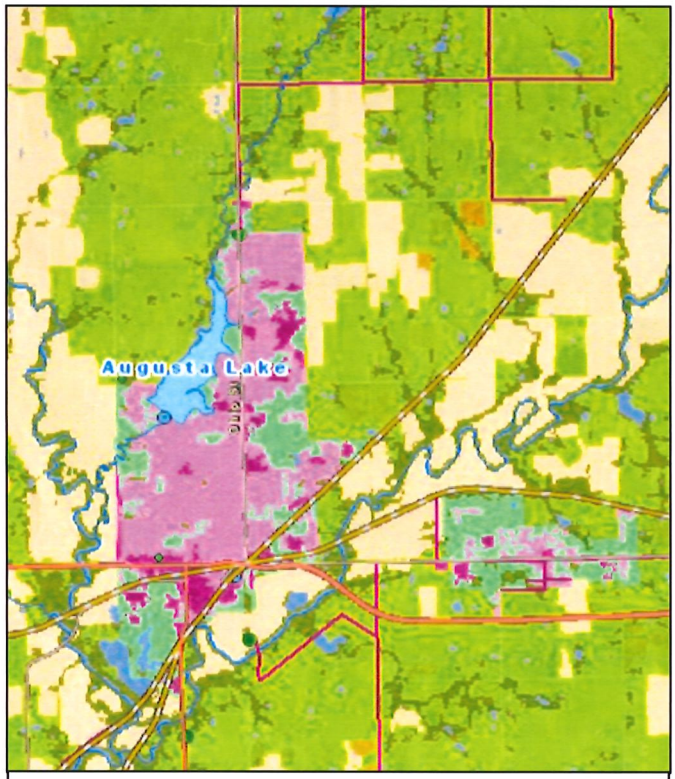
The Regional Economic Area Partnership is comprised of thirty-seven city and county governments in nine counties of south-central Kansas, including Butler, Cowley, Harper, Harvey, Kingman, McPherson, Reno, Sedgwick and Sumner Counties. REAP's mission is to guide state and national actions that affect economic development, and to adopt joint actions among member governments that enhance the regional economy. Within REAP, the Water Resources Committee identifies and coordinates collaborative efforts on regional issues of water quality and supply in South Central Kansas.

Continued, sustainable availability of high quality water supplies are crucial to maintaining the viability of the industries and other enterprises that employ residents and support the regional economy. With the potential for continued growth and the need for land use planning within south-central Kansas, KBS, REAP, and KWO have created an online mapping tool, the Water Resource Planner, for displaying the natural resources and infrastructure of the REAP region.



The REAP area has experienced growth at a consistently high rate over the last few decades, resulting in increasing demands being placed on existing water supplies. The ongoing development of large numbers of individual domestic wells is placing demand on a local ground water sources with unknown consequences. Development of energy sources, especially biofuels, and the demand on water resources and effects on water quality, are not fully understood. Urbanization of the region will continue into the future, and the need for a comprehensive water supply and land use planning across major basin, county and city boundaries is recognized.

The WRP provides a valuable decision support database for land use and development decisions in the REAP area by allowing users to overlay data sets related to water resources to better understand the possible impacts of land use decisions.



Map detail from the Water Resource Planner, showing land cover, roads, and water supply lines in the Augusta,

Some of the map layers available include Public Water Supply (PWS) facilities, PWS source points, wells, stream flow stations, confinement ponds, dry and abandoned oil and gas wells, floodplains, soil conditions, landfills, and quarries. Additional data and layers and more comprehensive data for the existing layers will be added as they become available.

The Water Resource Planner can be accessed at: http://www.kars.ku.edu/maps/wrp/

For more information, please contact:

Kansas Biological Survey: Mark Jakubauskas, Kansas Biological Survey, 2101 Constant Ave., Lawrence, Kansas 66047. Telephone: (785) 864-1508, email: mjakub@ku.edu. Website: http://www.astra.ku.edu

REAP Water Resources: Dane Baxa, Executive Officer. Hugo Wall School of Urban and Public Affairs, Wichita State University. 1845 Fairmount St., Wichita, KS 67260. Telephone: (316)-978-6638, email: dane.baxa@wichita.edu. Website: http://reap-ks.org/water.html

Kansas Water Office: Debra Baker, Kansas Water Office, 901 S. Kansas Avenue, Topeka, KS 66612. Telephone: (785) 296-3185, email: Debra.Baker@kwo.ks.gov. Website: http://www.kwo.org

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