

### RESTORE WATER SUPPLY LOST TO SEDIMENTATION THROUGH DREDGING AND OTHER IN- LAKE SEDIMENT MANAGEMENT TECHNIQUES

#### RESERVOIR ACTION ITEMS

##### PHASE I

1. Conduct workshops with state and federal agencies and local stakeholders on data collection and research findings and discuss impacts, benefits and feasibility of implementing alternatives
2. Remove and dispose up to three million cubic yards of sediment from John Redmond Reservoir

##### PHASE II

1. Collect data and conduct analysis of modifications to the geometry and operations of John Redmond Reservoir to increase the passage of sediment through the reservoir
  - Collect sediment cores from John Redmond Reservoir, suspended sediment samples in lake and downstream on the Neosho River and lake flow and outflow data
  - Develop computer model to simulate the hydrodynamics and sediment transport for John Redmond Reservoir. Use the model to assess the impact of modification scenarios on sedimentation and water supply storage
2. Analyze and evaluate feasibility of sediment transport and hydrosuction sediment removal at Tuttle Creek Reservoir to reduce stored sediment while maintaining downstream flood control and water quality

##### PHASE III

1. Complete in-lake dredging at John Redmond Reservoir, modifying the reservoir geometry to encourage sediment bypass

### ALLOW FOR THE TRANSFER OF WATER SUPPLIES BETWEEN BASINS WHERE FEASIBLE AND COST EFFECTIVE

#### STATEWIDE ACTION ITEMS

##### PHASE I

1. Eliminate statutory prohibition to use drinking water State Revolving Loan Fund (SRF) funds for water transfers and identify other state policies which unnecessarily limit transfers

2. Review opportunities to increase utilization of the Missouri River to meet Kansas' needs while recognizing and protecting the existing users
3. Communicate and collaborate with neighboring states on potential water transfers

## PHASE II

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1. Complete evaluation of large water transfers including legal, environmental, economic and technical issues
2. Review use of right-of-ways for use by water transfer infrastructure

## PHASE III

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1. Identify suitable areas and ability to transfer water to areas of need

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### RESERVOIR ACTION ITEMS

#### PHASE I

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1. Develop interconnected water storage computer model for all eastern Kansas basins with federal water supply reservoirs

#### PHASE III

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1. Update mid 1980s Kansas Water Office plan to interconnect reservoirs across multiple basins to move water to higher demand and increase overall yield
2. Evaluate opportunities to connect reservoirs to improve overall management and serve as a hydrologic conduit and where appropriate implement system to transfer high flows to increase system yield

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### EVALUATE THE SOURCES AND POTENTIAL USES OF LOWER QUALITY WATER

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#### STATEWIDE ACTION ITEMS

##### PHASE I

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1. Compile inventory of lower quality waters, including type, quantity and location, as well as, an assessment of potential uses and contaminants contained in water. Lower quality waters include treated wastewater effluent, grey water, stormwater runoff, oil and gas flow back and produced water, brackish surface and ground water and other waters with elevated levels of contaminants
  - Identify all barriers that may exist to allow the use of lower quality waters

- State and local laws, regulations, guidelines and policies
- Review irrigation supplements to wastewater and current calculations that impact the consumptive use at the facility
- Utilize USGS model to determine the effect of chloride remediation activities in the Equus Beds Aquifer
- Ensure that cost-share incentives are available for stockwater users to adopt reuse technology

## PHASE II

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1. Identify best treatment technologies for lower quality water for various beneficial uses
  - Determine research needs that exist for technology developed specific to Kansas waters
  - Partner with irrigation equipment manufacturers and agronomists to develop equipment technology capable of utilizing lower quality water suitable for irrigation
  - Address water quality implications with delivery systems and potential/risk for cross contamination, including implications to National Pollution Discharge Elimination System (NPDES) Permits and minimum desirable stream (MDS) flow designations
2. Consider incentives for the oil and gas industry which encourage the use of produced water
3. Expand assessment of the water quality and physical characteristics of aquifers containing brackish ground water
4. Pursue opportunities to recycle and reuse appropriated stockwater
  - Investigate opportunities to build programs or regulatory procedures to promote efficiencies
5. Develop an education/training strategy through the implementation of pilot projects, in partnership with public water suppliers and other water users, to demonstrate the potential uses of lower quality water

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SECURE ALL AVAILABLE STORAGE AT FEDERAL RESERVOIRS INCLUDING REALLOCATING STORAGE WHERE SUCH ACTIONS ARE POSSIBLE

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**RESERVOIR ACTION ITEMS**

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PHASE I

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1. Develop a plan to address future use storage in Milford, Perry, Big Hill, Clinton and Hillsdale Reservoirs; including the collection of revenue to call future use storage into service in Clinton and Hillsdale

PHASE II

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1. Address items identified in hydrologic adequacy evaluations at Kanopolis Reservoir and implement pool raise. Evaluate feasibility of filling v-notch to create additional water supply storage
2. Complete feasibility study at Lovewell Reservoir
3. Coordinate with city of El Dorado on a plan to address future use storage in El Dorado Reservoir
4. Evaluate availability of water quality storage in Elk City reservoir for water supply in trade for storage at Big Hill
5. Reallocate future use water supply storage to water quality storage at Milford and Perry Reservoirs and initiate calling remaining portion of future use storage into service

PHASE III

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1. Increase pool elevations and reallocate storage at Council Grove Reservoir
2. Initiate calling future use storage into service at Clinton, Big Hill and Hillsdale Reservoirs
3. Reallocate water quality and other storage to water supply storage at Melvern, Pomona and Fall River Reservoirs

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INCREASE OTHER SOURCES OF AVAILABLE STORAGE FOR WATER SUPPLY

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**STATEWIDE ACTION ITEMS**

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PHASE II

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1. Within municipal systems, develop methods to use locally collected stormwater and increase adoption of on-site or individual storm water collection through activities such as rain barrels and rain gardens

2. Review of policies limiting capture of urban stormwater runoff and reuse in areas where capture may serve as an additional source of supply without impairing water quality
3. Evaluate opportunities for additional managed sub-surface or aquifer storage within Kansas
4. Consider the development of rural water districts in areas where domestic ground water supplies have been depleted or are unusable
5. Increase collection of agricultural on-site rainwater collection
  - Inventory existing farm ponds and look for opportunities to utilize funding for further development and remediation
  - Evaluate existing rain lagoons and opportunities to utilize collected water in lieu of ground water sources

### PHASE III

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1. Evaluate need for additional on-site collection and use
2. Evaluate use of Department of Transportation right-of-ways for water supply storage and implement where feasible
3. Implement urban stormwater runoff capture and reuse in areas where such storage and reuse may serve as an additional source of supply without impairing water quality

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### RESERVOIR ACTION ITEMS

### PHASE II

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1. Develop larger on-site storage for irrigation and stockwater with potential funding assistance
2. Identify additional small multipurpose reservoirs that can be built and determine their feasibility

### PHASE III

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1. Construct additional Multi-Purpose Small Lakes (MPSL) reservoirs that have been identified as needed and feasible
2. Identify off stream storage sites that will limit sedimentation and evaporation loss
3. Identify additional large reservoir sites and evaluate costs, limitation and overall benefits (including economic) of new large reservoirs and secure suitable sites from development
4. Implement design and construction of off-stream storage if determined feasible

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## OGALLALA-HIGH PLAINS AQUIFER ACTION ITEMS

### PHASE I

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1. Encourage research on the rate and volume of water moving from playas to the Ogallala- High Plains Aquifer; quantify the levels of restoration needed and enumerate the average amount of water deposited annually in playas