# Salina Kansas Drought Resiliency Strategies

Kansas Water Symposium
Dyck Arboretum of the Plains
Hesston, Kansas
March 7, 2026

City of Salina

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# AGENDA

- Salina’s Community Water Supply
- Drought of 2000-2006
- Drought Resiliency Strategies
- Raw Water Supply Study (2010)
- Water Supply Access District for Smoky Hill River Supply
- Questions

# Salina's Community Water System

**Downtown Water Treatment Plant**

- Smoky Hill River – 10 MGD
- Downtown Wellfield (19 Wells) – 13 MGD
- WTP Capacity – 20 MGD
- Water Supply Access District – 4,660 Acre Feet

**South Water Treatment Plant**

- South Wellfield (4 Wells) – 3.5 MGD
- SWTP Capacity 3.5 MGD

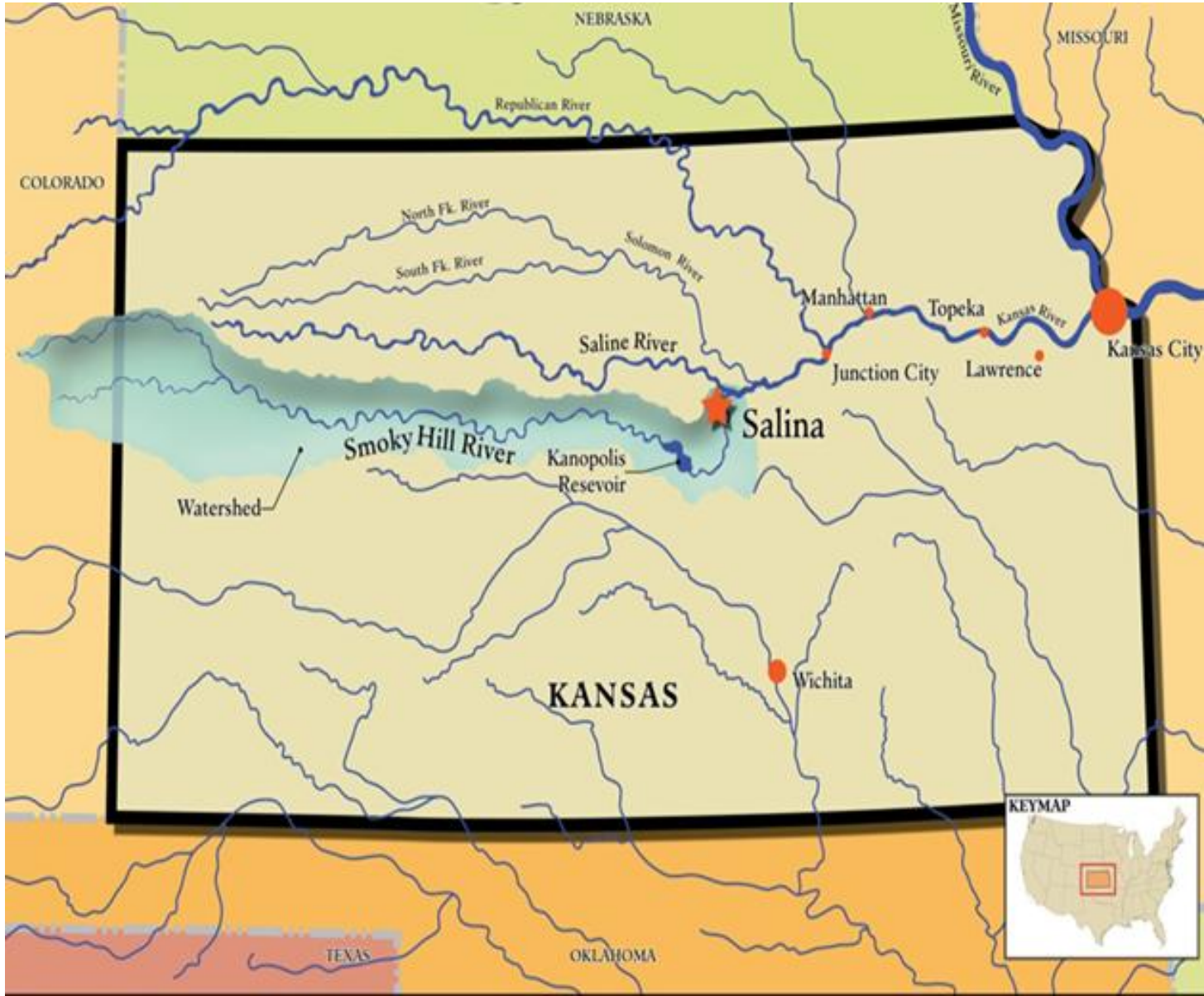
**<u>2025</u>**

**Population – 47,834**

**Service Area – 25 Square Miles**

**Daily Average Usage – 5.70 MGD**

**Peak Day Usage – 8.40 MGD**



# SUMMARY OF WATER RIGHTS

| Source | Annual Quantity (Ac-Ft) | Max Diversion Rate (MGD) |
|---|---|---|
| Smoky Hill River [1] | 5,028 | 10.02 |
| Downtown Wellfield [2,3] | 4,993 | 13.13 |
| South Wellfield [4] | 2,511 | 3.68 |
| Total | 12,532 | 26.83 |
| Limits | 11,760 | 23.69 |

[1] Appropriated cert. 3043 dated October 16, 1954

[2] Includes vested water right, appropriated cert. 7635 dated October 30, 1957, appropriated cert. 31,363 dated April 11, 1978.

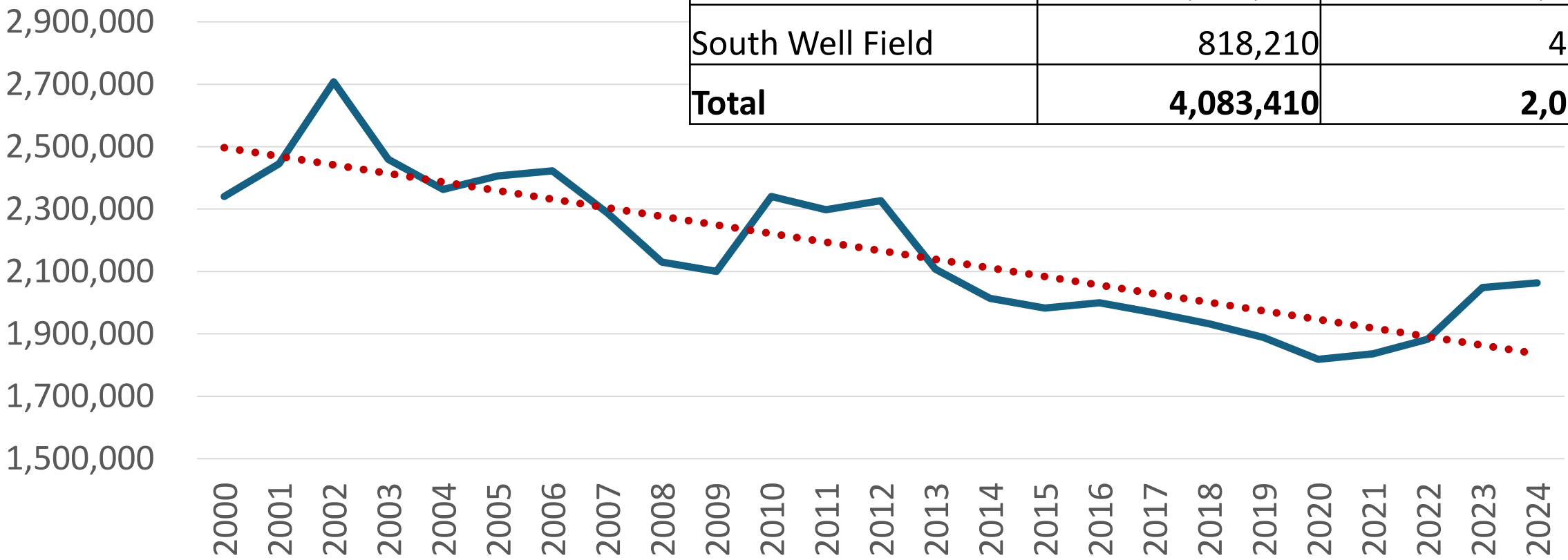
[3] Each well has limits on annual quantity and max diversion rate

[4] Vested water right

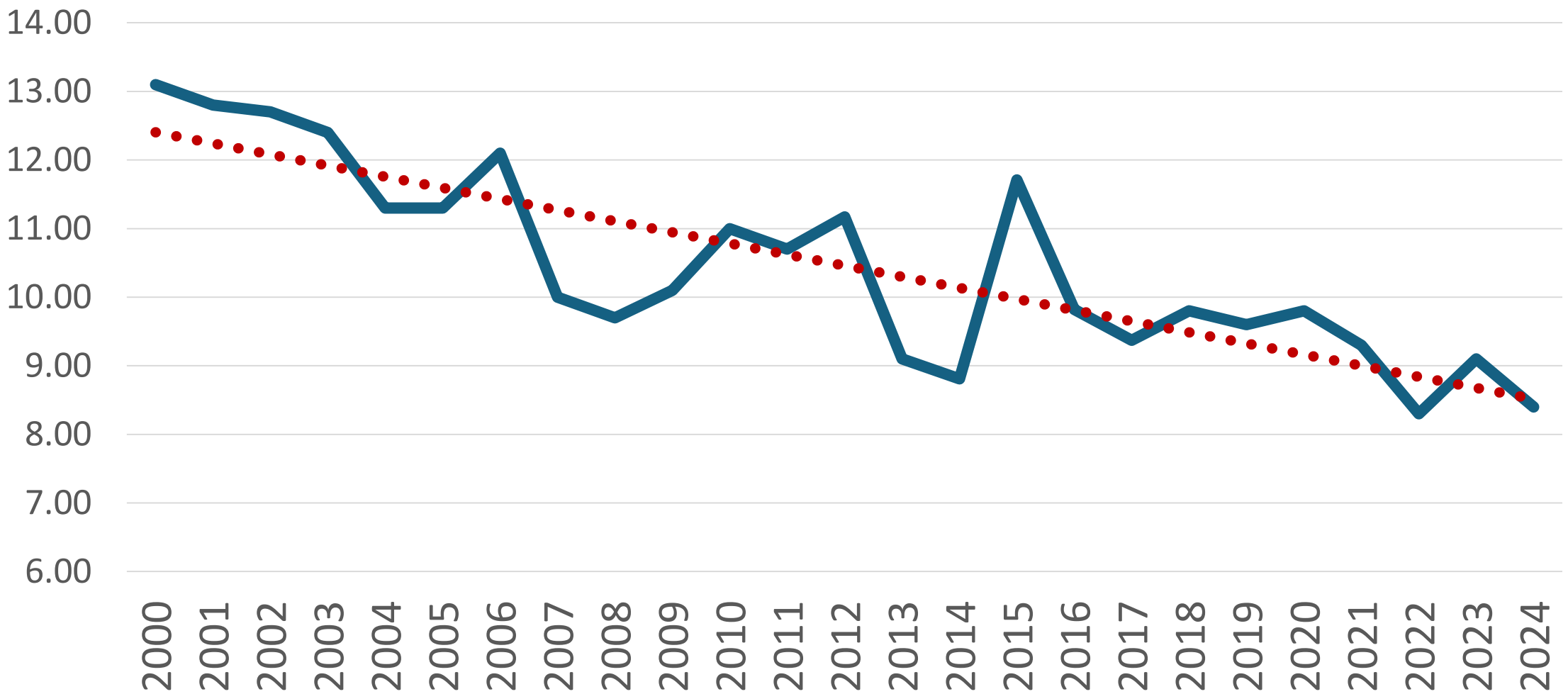
# SUMMARY OF WATER RIGHTS

| | (in Billion Gallons) | |
|---|---|---|
| Source | Gallons Per Year | 2024 Usage |
| Smoky Hill River | 1,638,400 | 498,701 |
| Downtown Well Field | 1,626,800 | 1,164,284 |
| South Well Field | 818,210 | 400,708 |
| **Total** | **4,083,410** | **2,063,693** |

## Usage/ Billion Gallons
## 2000 - 2024



# Peak Day Water Use 2000 - 2024



# Drought of 2000 Through 2006

- Less severe in terms of precipitation than previous droughts
- More severe in terms of stream flows than previous droughts
- Future droughts likely to mimic drought of 2000-2006
- “Paper Water Rights”
- Additional Water – During Droughts

# Kanopolis Lake Drought Level

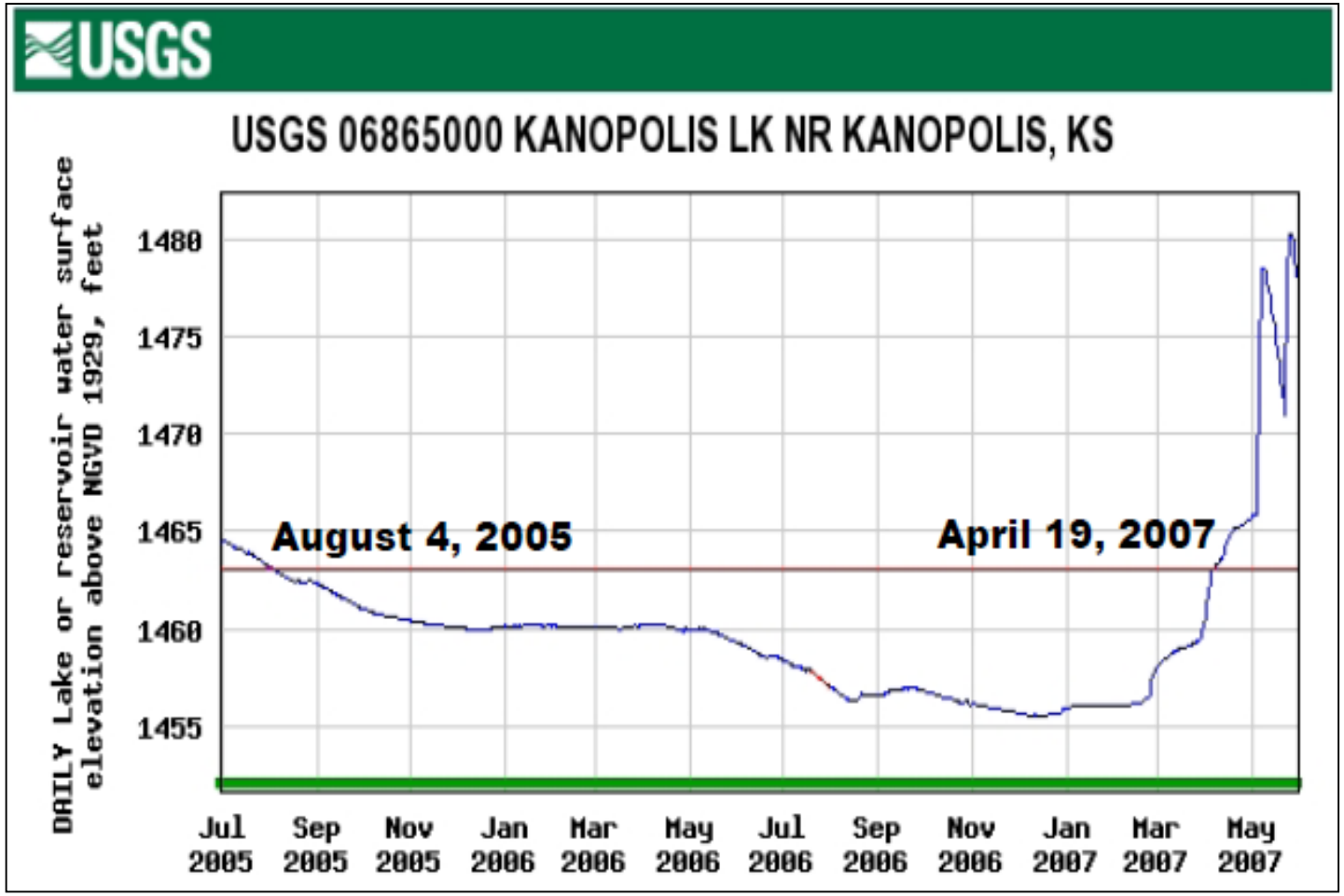
From August 4, 2005 to April 19, 2007 water level was 8 feet below the conservation level:

- KWO requested deviation – water releases
- Stakeholders' concern

In May 2007, a rain events filled Kanopolis Lake

**Kanopolis Lake Minimum Release Criteria**

| Month | Release |
|---|---|
| January –February | 10 cfs |
| March | 15 cfs |
| April | 20 cfs |
| May | 30 cfs |
| June – September | 50 cfs |
| October | 25 cfs |
| November | 15 cfs |
| December | 10 cfs |



# Smoky Hill River Availability 2006

**July 17**

- City Consumption of 12.1 mdg
- River flow – 19 cfs (12.2 mgd)

**July 20**

- Closed flood control gate to bypass channel
- Division of Water Resources (DWR) preliminary assessment of irrigation uses along river between Kanopolis Lake and Salina
- River flow- 9 cfs (5.8 mgd)

**July 21**

- Water Watch declared
- City consumption of 9.7 mgd
- River flow = 7.7 cfs (4.9 mgd)

**July 26**

- Water Emergency declared
- City consumption of 11.5 mgd
- River flow 3.2 (2.0 mgd)

# Smoky Hill River Availability 2006

**July 27**

- City requested DWR administer water rights
- City consumption 7.1 mgd
- River flow 1.3 cfs (0.83 mgd)

**July 31**

- Downgraded Water Emergency to Water Warning
- City consumption of 7.3 mgd
- River flow 17 cfs (10.9 mgd)

**Aug. 3**

- River water flowing over dam at river intake structure
- Increased river water pumps to 7.5 cfs (4.8 mgd)

**Aug. 4**

- DWR administering water rights to irrigators along the river

**Aug. 31**

- DWR rescinded legal notice, signifying out of administration of water rights

**Sept. 18**

- City Commission modified Water Warning Restriction

# Water Action Plan

- ✓Water Restrictions and Enforcement Plan
- ✓Well Field Evaluation Study
- ✓Water Conservation Tier Rates
- ✓Reviewed existing Water Rate Structure – Eliminated Declining Rate Structure
- ✓Reviewed Landscaping Requirements and Included Xeriscaping Requirements
- ✓Update Municipal Water Conservation Plan – Drought/Emergency Contingency
- ✓Water Loss Survey
- ✓Manage Groundwater Contamination

- Schilling Air Force Base
- Downtown Well Field

- ✓Raw Water Supply Study

# Drought Resiliency Strategies

- Water Conservation Ordinance (2008)
  - Prohibits substantial amounts of water to drain onto public property
  - Prohibits outdoor watering 10 am – 6 pm from June 1st through September 30th
- Water Conservation Rates (2008)
  - Unit Block Rate:  Cost per 1,000 gallons
  - Excess Use Charge:  Double Unit Block Rate
  - Excess Use Baseline 120% of WQA (January – March) or MWQA (6000 gallons)
- Raw Water Supply Study (2010)
- Water Distribution System Leak Survey (2012)
- Municipal Water Conservation Plan (2013)
  - Private domestic wells follow Water Conservation Ordinance and Municipal Water Conservation Plan
  - Water conservation goal of 121 gallons per capita per day
- Water Meter Replacements (2011-2014)

# Water Conservation Ordinance (2008)

- **Regulation of Use**
  - Adopted: June 9, 2008
- **Outdoor Watering with Potable Water**
  - Prohibited between the hours of 10:00 a.m. and 6:00 p.m.
  - Effective between June 1 and September 30
- **No Customer Shall**
  - Allow substantial amounts of water to escape or drain from private property onto public property

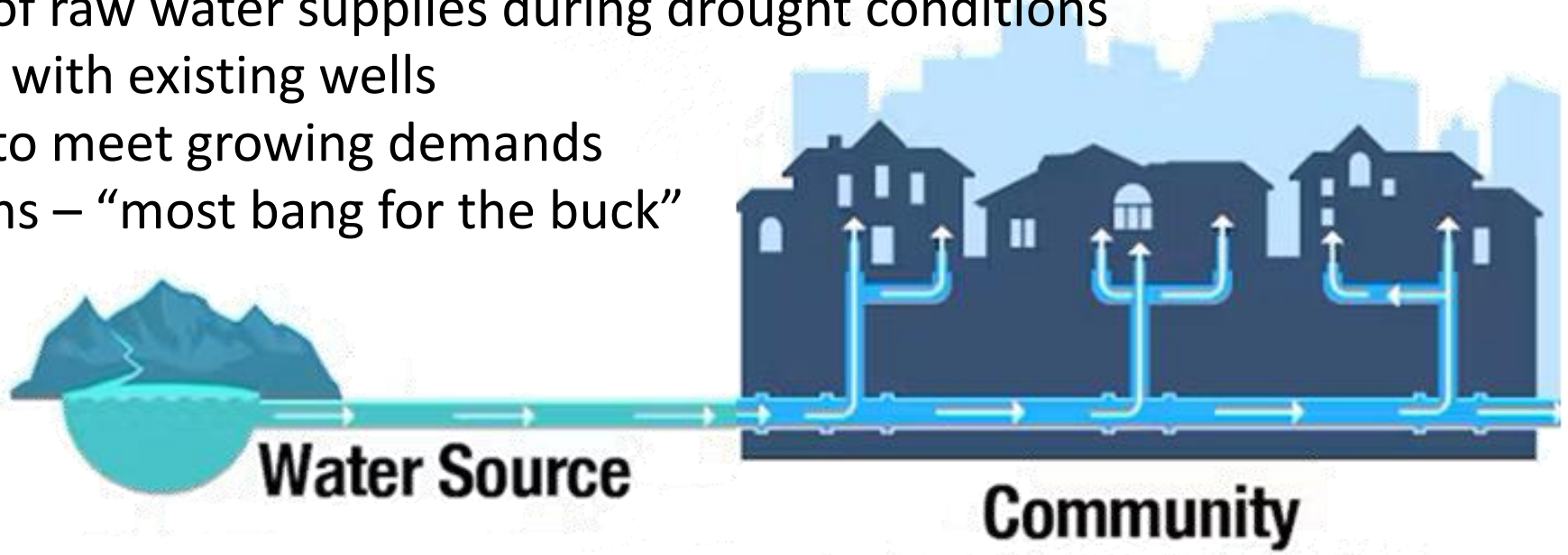

## No More Waste of Water

# Water Conservation Rates (2008)

- **Excess Use Rate Structure**
  - Was placed into effect July 16, 2008
- **Winter Quarter Average (WQA)**
  - Average water consumption during the months of January, February and March
- **Minimum Winter Quarter Average (MWQA)**
  - 5,984 gallons.
- **Excess Use Baseline**
  - Shall equal the greater of 120% of the WQA or 120% of the MWQA
- **Excess Use Charge**
  - All irrigation meters (except Residential)
  - Any use in excess of the excess use baseline
- **Unit Block Rate**
  - Cost per 1000 gallons
- **Excess Use Charge**
  - Double Unit Block Rate per 1000 gallons

# RAW Water Supply Study (2010)

- **Project Objectives**
  - Increase the reliability of raw water supplies, especially during drought conditions
  - Support economic growth and development
  - Optimize existing infrastructure where possible
  - Minimize risks to the City and its customers
- **Problem Definition**
  - Decreased reliability of raw water supplies during drought conditions
  - Contamination issues with existing wells
  - Need water supplies to meet growing demands
  - Cost effective solutions – “most bang for the buck”



# Multi-Phase Capital Improvement Plan

Phase I – DONE!

- Improvements at WTP and Downtown Wellfield (10 MGD to 13 MGD)
  - Re-drill 4 wells and piping improvements
  - Retrofit of air stripping facilities

Phase II – DONE!

- Improvements at South Wellfield (13 MGD to 16.5 MGD)
  - Addition of 3.5 MGD groundwater treatment facility
  - 1 MG of finished water storage
  - 2 observation wells
  - Piping improvements
  - Rehabilitate 4 existing wells

# Multi-Phase Capital Improvement Plan

Phase III – WHEN NEEDED

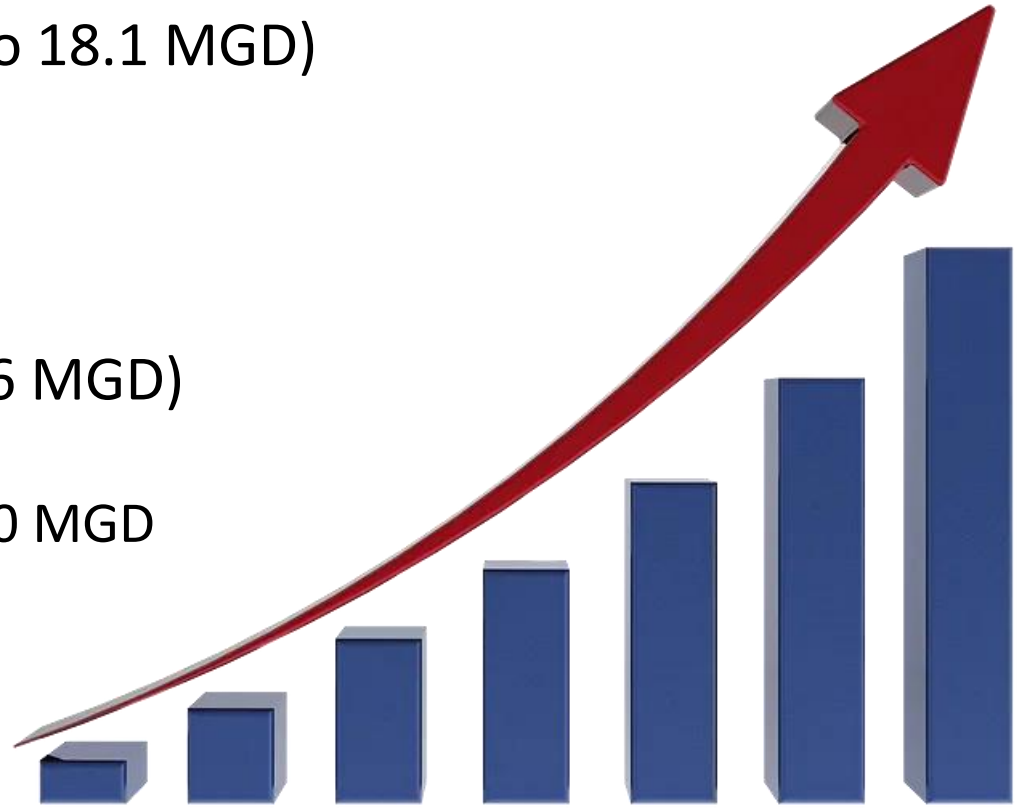
- Improvements at Downtown Wellfield (16.5 MGD to 17.0 MGD)
  - Re-drill 2 wells

Phase IV – WHEN NEEDED

- Improvements at Downtown Wellfield (17.0 MGD to 18.1 MGD)
  - Re-drill one well

Phase V – WHEN NEEDED

- Improvements at South Wellfield (18.1 MGD to 20.6 MGD)
  - Purchase an additional 2.5 MGD of water rights
  - Upgrade Water Treatment Plant from 3.5 MGD to 5.0 MGD
  - Add 1 MG of finished storage
  - Piping improvements



# Water Supply Access District

**2006 – Drought**

**2007-2009 – Improved understanding of water resources**

- Basis for changing management of River system
- Hydrologic modeling Smoky Hill River below Lake

**2011 – Legislation passed/authorized formation of Access District**

**2012 – Kanopolis Lake Releases**

- Meet target flow/Mentor Gage
- Release as needed
- Saved 1600 Acre Feet in 2012

**2013 – Rules and regulations published**

- Lower Smoky Hill River Irrigation District formed

**2014 – Petition for Access District formation and incorporation**

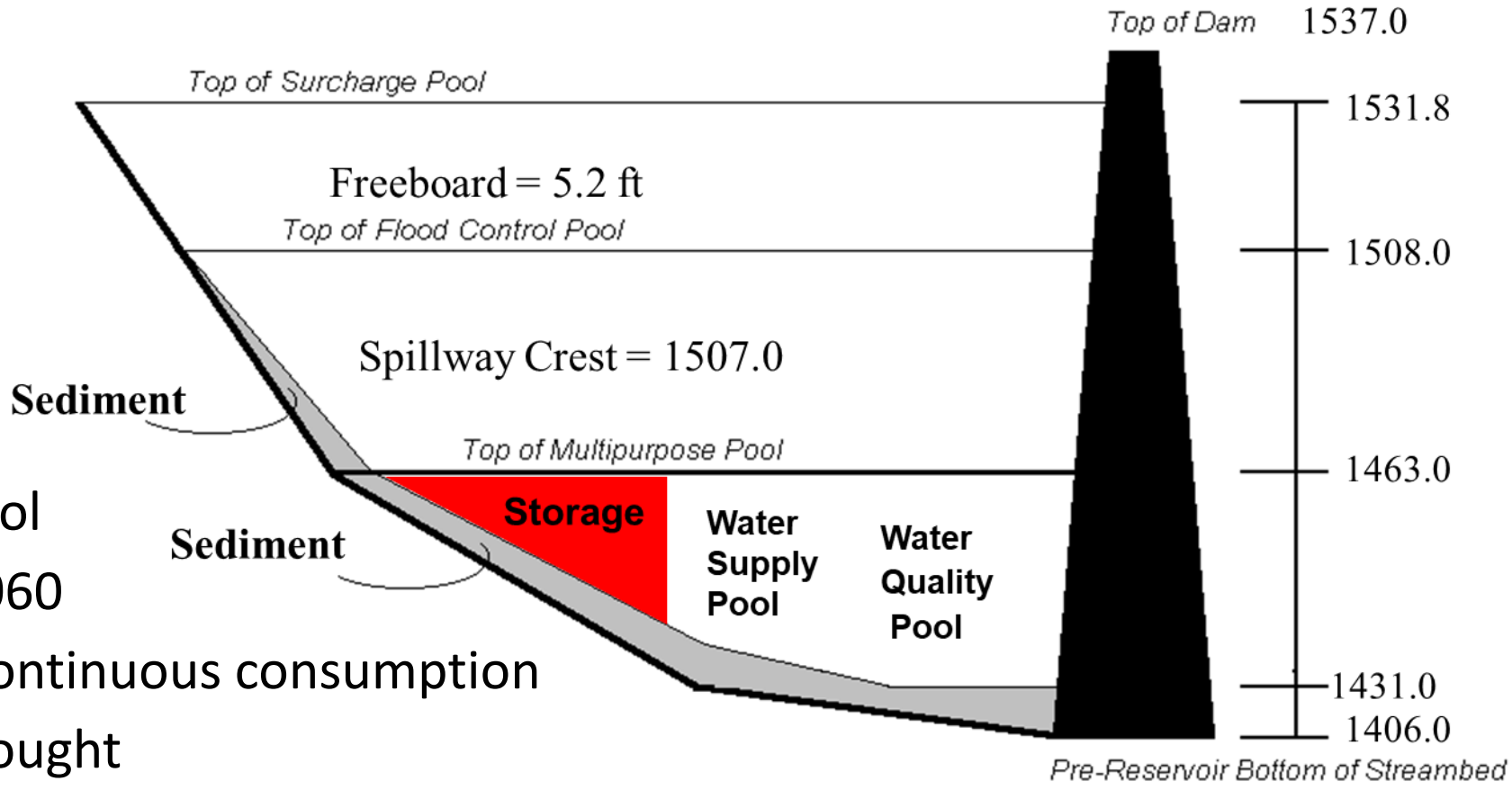
- Approved by Secretary of State's office

**2016 – Access District incorporated**

**2017 – Operations Agreement with KWO**

# Water Supply Access District

| Access Storage at Kanopolis Lake - Year 2060 | |
|---|---|
| One – Irrigation Season<br>(June - August)<br>One – Summer Season<br>(May – September) | 4,660[1]<br>(Acre Feet) |
| Total Cost : | $2.5 Million |
| [1]Based on 121 gpd/c – 2013 Municipal Water Conservation Plan Goal | |

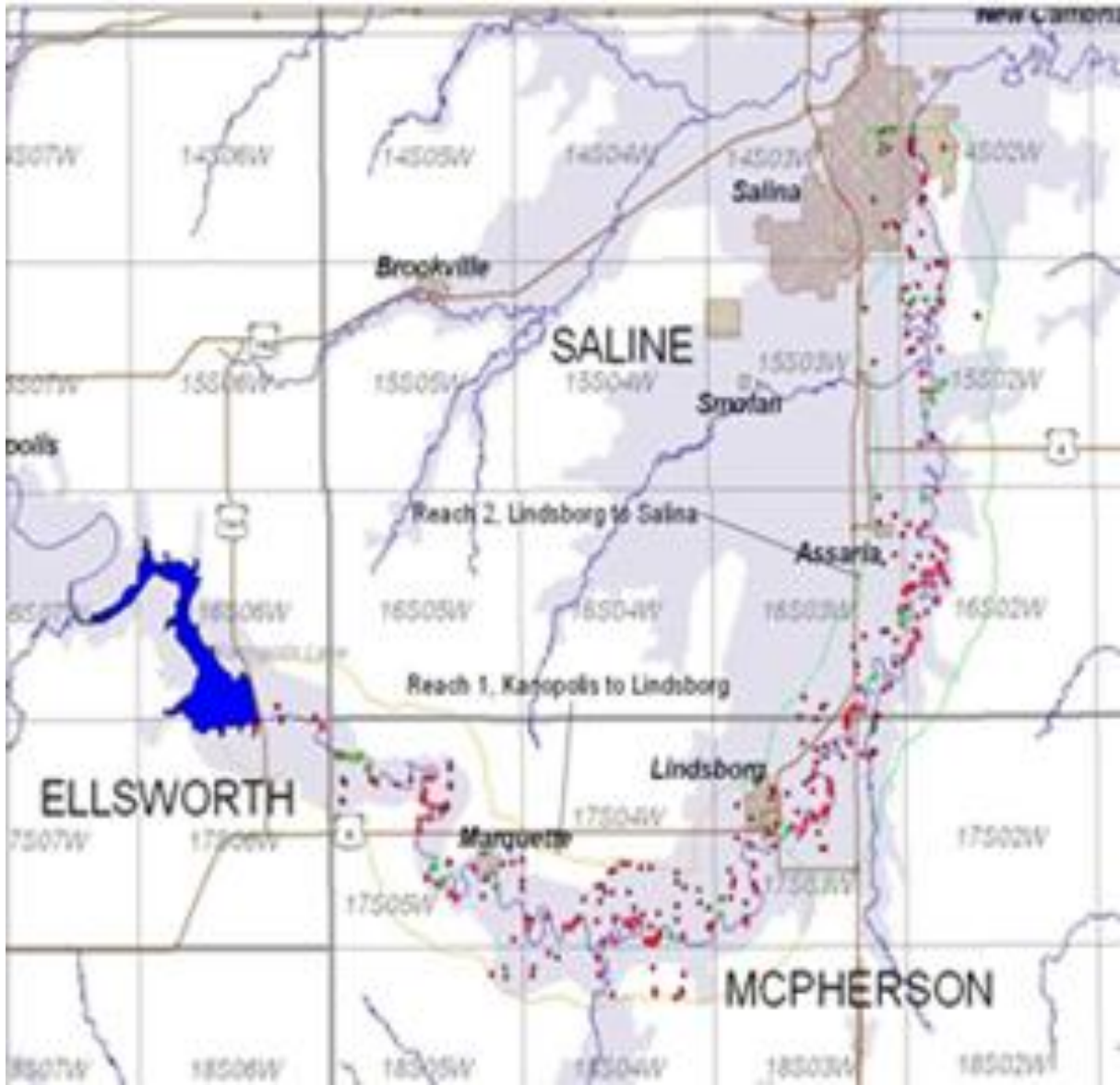



## Access District

- Storage in Water Supply Pool
- Useful life of Lake ≈ Year 2060
- Not purchasing water for continuous consumption
- Insurance policy against drought
- Water Supply Pool empties during drought conditions
- Water Supply Pool refills during rain events
- Natural flows pass through Lake to meet Surface Water Rights below Lake

# Water Supply Access District

- **Surface Water Users Along River/Below Lake**
  - Obtain long-term water storage in Kanopolis Lake
  - Back up their water rights
  - Natural flows do not meet needs
- **Access District Can Include:**
  - Special Irrigation District
  - Municipalities
  - Industries
  - Recreational
- **Voluntary Participation**



# Water Supply Access District
# Local & Regional Implications

- Provides Salina with an affordable alternative water source during drought conditions consistent with recommendations in the raw water plan
- Allows Salina to formalize regional water partnership with other communities, industries, and rural irrigators of the Lower Smoky Hill
- Formalizes regional collaboration needed to formally address Kanopolis Reservoir releases, water conservation and customized stream management
- Creates a model of urban-rural partnership for the rest of Kansas

# Municipal Water Conservation Plan

**1997 – Adopted a plan with KWO Municipal Water Plan Guidelines**

Issues with 1997 plan:

- No documented method for determining the stream flow triggers
- Streamflow triggers may not be accurate based on the most recent drought conditions
- No differentiation between winter and summer conditions for streamflow triggers
- No reliable way of getting in and out of stage results in changing stages frequently as river flows change quickly
- Data analysis required for groundwater triggers

**2013 – Adopted a revised Municipal Water Conservation Plan**

Solutions with 2013 plan:

- Select the streamflow triggers by considering upstream water rights and losses to the aquifer during a losing stream situation
- Differentiate between summer and winter
- Include a provision/procedure for getting into and out of each stage of the plan
- Provide specific groundwater levels based on the Oakdale monitoring well
- Develop and implement water conservation rebate program
- Drought regulations for domestic well owners

2013

# Municipal Water Conservation Plan

| | Watch | Warning | Emergency |
|---|---|---|---|
| Treatment Operations | 75% capacity or more for three consecutive days | 90% capacity or more for three consecutive days | 100% capacity or more for three consecutive days |
| River(May-September) | Discharge at Mentor Gage is less than 30 cfs and in a generally declining trend for at least 7 consecutive days | Discharge at Mentor Gage is less than 20 cfs and in a generally declining trend for at least 5 consecutive days | Discharge at Mentor Gage is less than 15 cfs and in a generally declining trend for at least 3 consecutive days |
| River(October-April) | Discharge at Mentor Gage is less than 20 cfs and in a generally declining trend for at least 7 consecutive days | Discharge at Mentor Gage is less than 10 cfs and in a generally declining trend for at least 5 consecutive days | Discharge at Mentor Gage is less than 5 cfs and in a generally declining trend for at least 3 consecutive days |
| Groundwater | When groundwater is the only source and the depth of water at Oakdale Monitoring Well is less than 32 ft | When groundwater is the only source and the depth of water at Oakdale Monitoring Well is less than 30 ft | When groundwater is the only source and the depth of water at Oakdale Monitoring Well is less than 28 ft. |

# Lessons Learned

- Many lessons are still left to be learned
- Cities, industries and irrigators have many similar and different water interest
- Cooperation with many different governmental and private entities takes time
- Collaboration and compromise are better than contempt and conflict

- Involve public early in the process
- Involve decision makers early in the process
- News releases
- Articles in the newspaper
- Listen to the public
- Communicate with KWO, DWR and Stakeholders

# QUESTIONS?

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