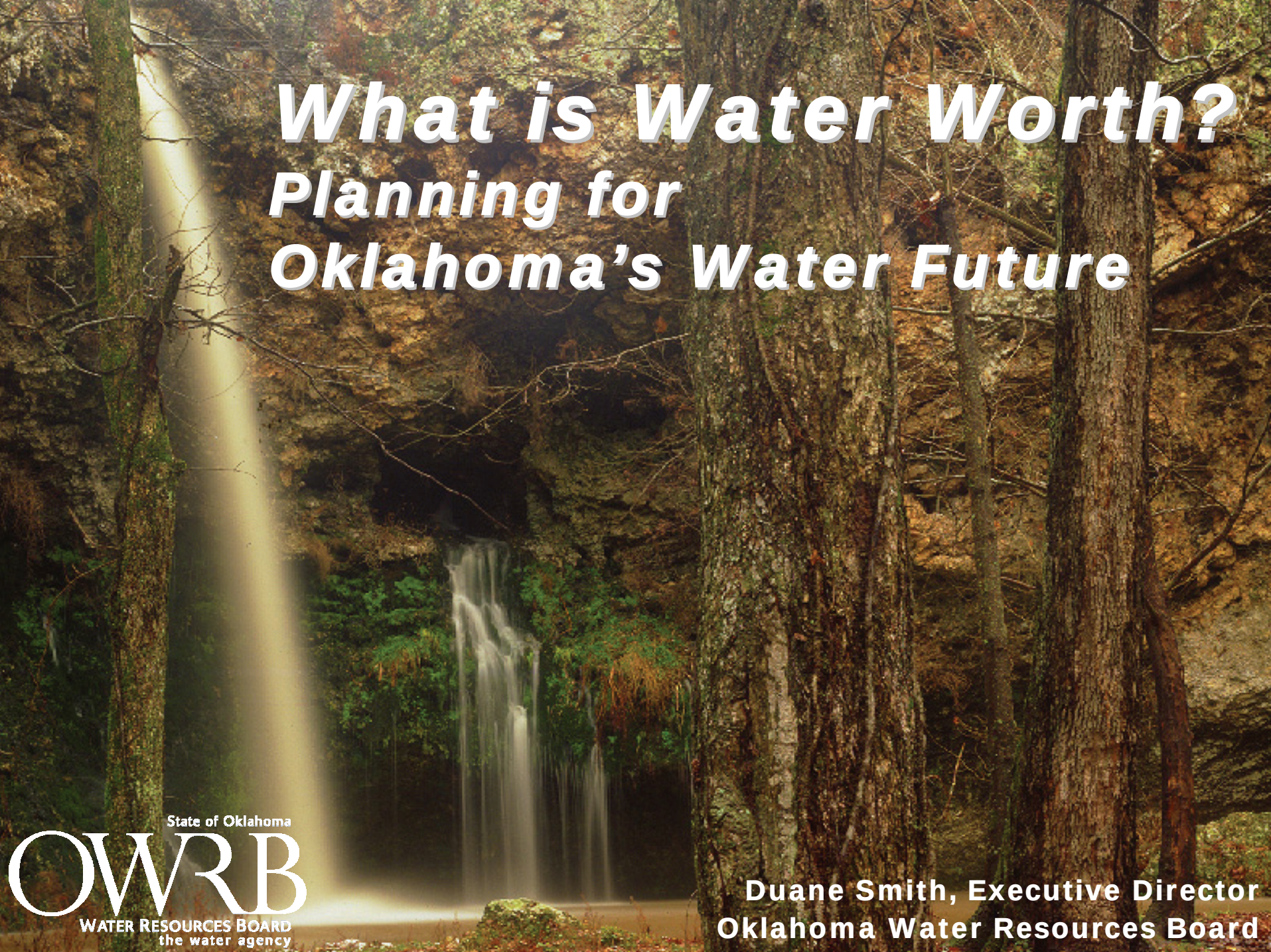
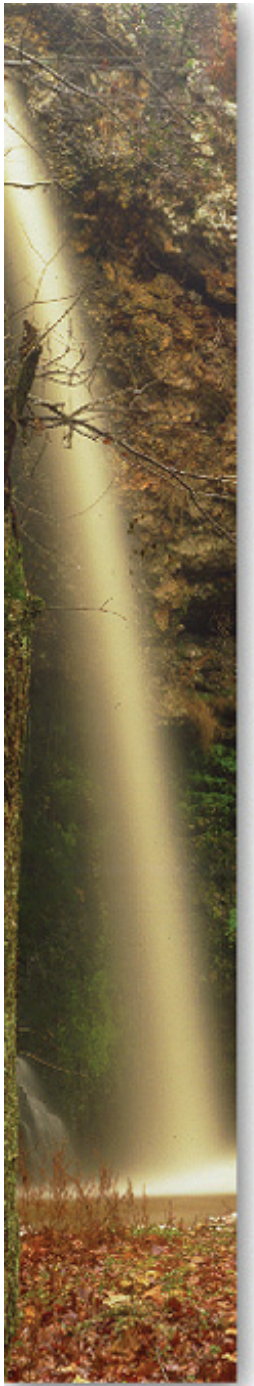


What is Water Worth?

Planning for Oklahoma's Water Future

State of Oklahoma
OWRB
WATER RESOURCES BOARD
the water agency

Duane Smith, Executive Director
Oklahoma Water Resources Board



What is Water Worth?

- One gallon of water weighs 8.33 pounds.
- One cubic foot of water weighs 62.4 pounds.
- If all the world's water were fit into a gallon jug, the fresh water available for use would equal only about one tablespoon.
- Groundwater constitutes approximately 30% of the world's fresh water.

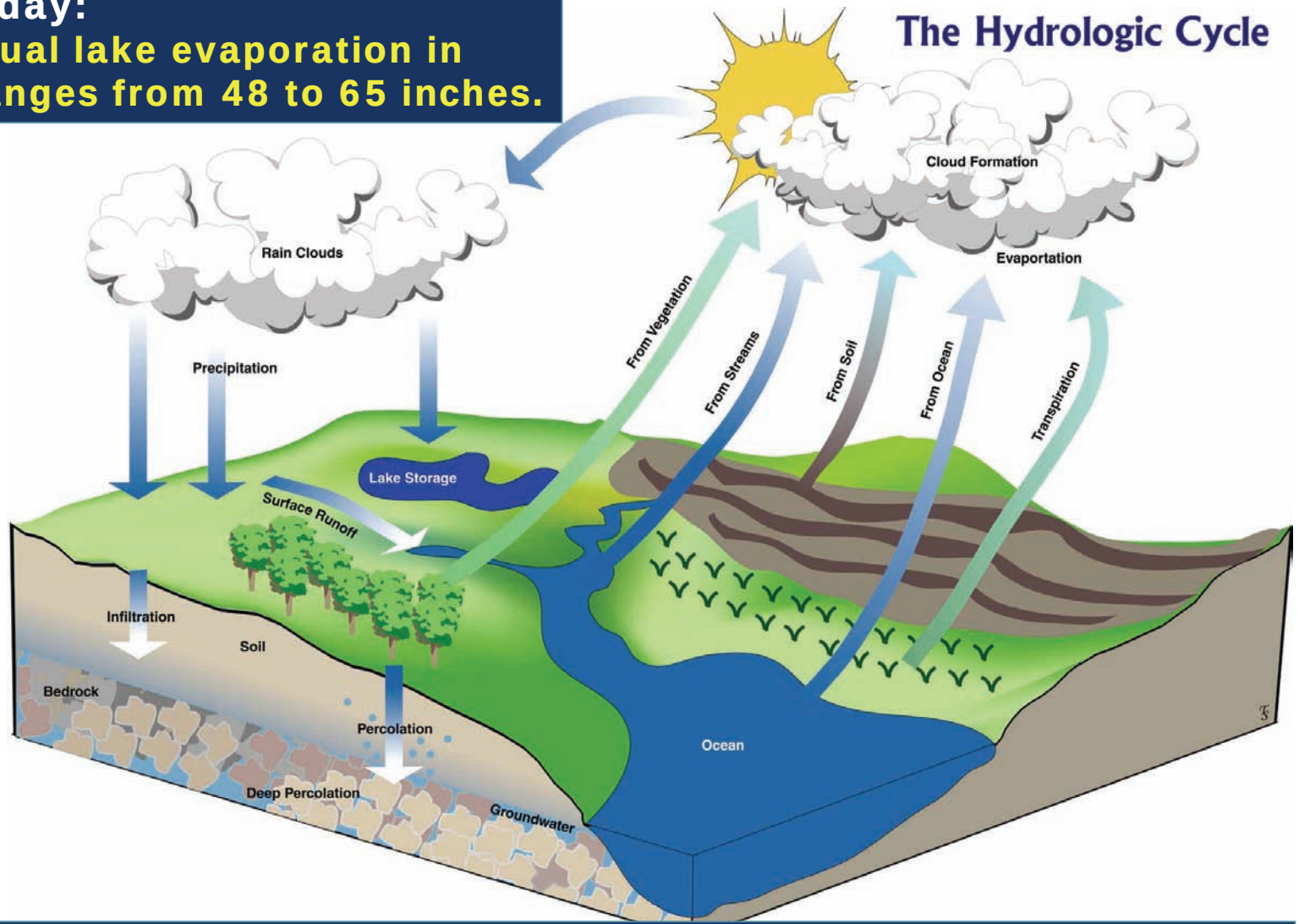
A single tree will give off 70 gallons of water per day in evaporation.

An acre of corn will give off 4,000 gallons of water per day in evaporation.

It can take a human lifetime for groundwater to travel one mile.

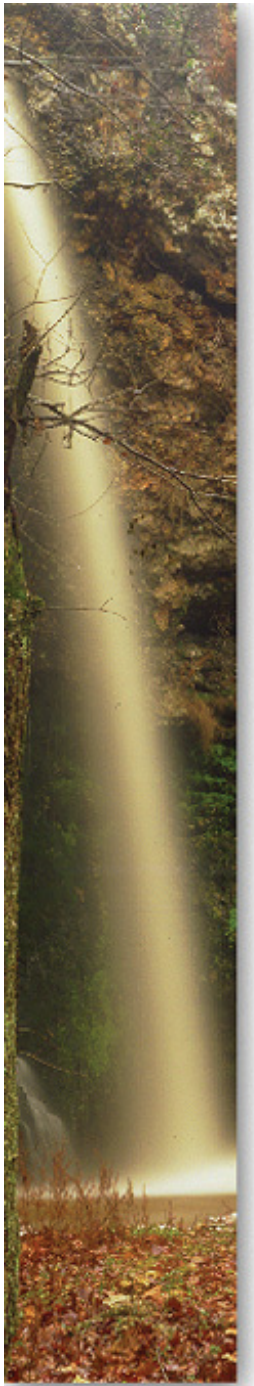
The sun evaporates 1 trillion tons of water each day:

- **Average annual lake evaporation in Oklahoma ranges from 48 to 65 inches.**



1 inch of rainfall on 1 acre of land equals 27,154 gallons of water:

- **34 million AF (11 trillion gallons) of unused water flows out of Oklahoma each year–about 18 times the state's total annual usage (1,984,640 AF/yr)**
  - **Equivalent to 9 inches of water over the state's entire land/water area.**



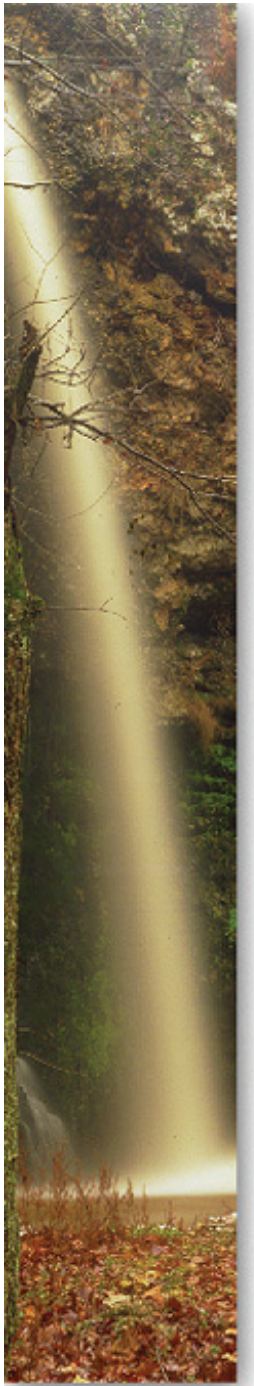
What is Water Worth?

Water Use:

- Total U.S. water withdrawals in 2000 = 408,000 MGD
  = 457,000,000 AF
- Average water use per U.S. household = 107,000 gallons/year
- Average water use per U.S. citizen = 80-120 gallons/day
- A century ago, the average American used about 10 gallons of water per day to drink, cook, clean, and bathe. Today, we use 100 gallons per day.
- About 6,800 gallons of water is required to grow a day's food for a family of four; 42,000 gallons of water is needed to grow and prepare a typical Thanksgiving dinner for eight in the U.S. (enough to fill a 30- by 50-foot swimming pool).
- Water required to refine 1 barrel of crude oil = 1,850 gallons
- Water required to process 1 barrel of beer = 1,500 gallons

A person can live about a month without food, but only about a week without water.

Human blood is 83% water.



What is Water Worth?

Water Systems:

- There are almost 60,000 community public water supply systems in the U.S. These systems process 34 billion gallons of water each day.
- If all community water systems in the U.S. had to be replaced, the total cost would exceed $175 billion.
- The annual cost to operate U.S. water systems is more than $3.5 billion.
- There are approximately 1 million miles of pipelines and aqueducts in the U.S. and Canada, enough to circle the earth 40 times.
- Almost 15 million U.S. households use private wells for their water supply. More than 90,000 new wells are drilled throughout the United States each year.

"Water" was the first word that Helen Keller learned. "Water" was the last word spoken by President Ulysses S. Grant (a famed alcoholic).

In some areas of the world rain is so uncommon that the natives do not have a word for it.

What is Water Worth?
The Cost of Water

- In the U.S., the average person pays about 25 cents each day for water.
- The average cost for water supplied to a home in the U.S. is about $2.00 for 1,000 gallons, which equals about 5 gallons for a penny.
- Bottled water can be thousands of times more expensive than tap water.
  - There are almost 800 different brands of bottled water for sale in the United States.

What is Water Worth?

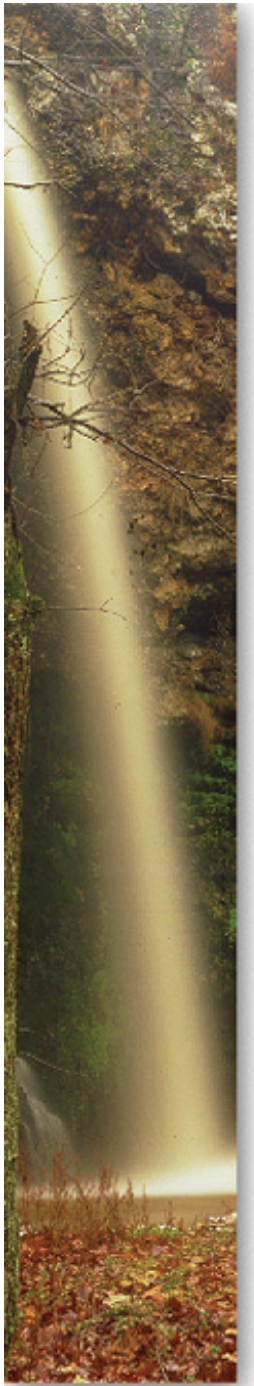
Rural/Municipal Water vs. Bottled Water

- $2 dollars for 1,000 gallons

  equals…

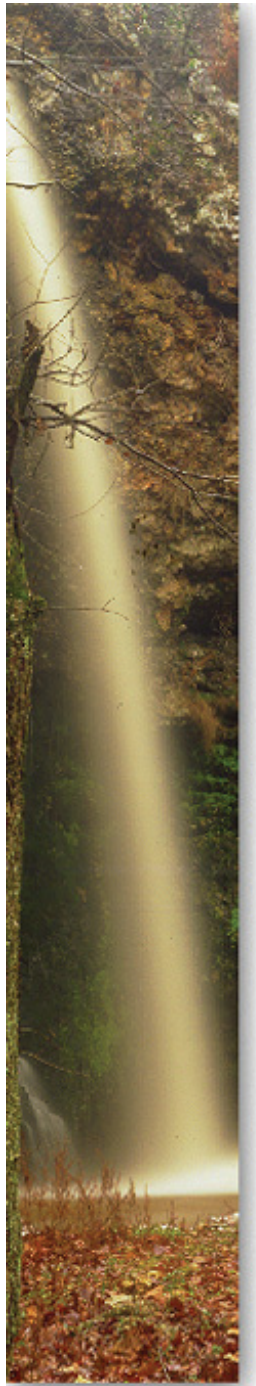
- 3,200 bottles of water
  - (based on 40 oz. of bottled water purchased for $2 dollars at a typical convenience store)

- Cost for comparable amount of bottled water = **$6,400**



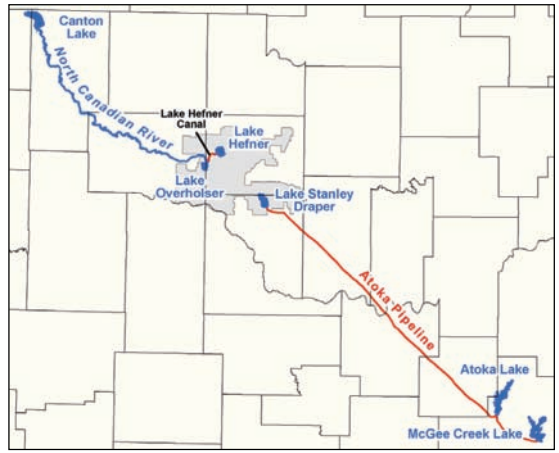
Determining the Cost of Water

- Major Variables impacting the cost of water to the consumer:
  - Storage
    - Costs associated with storage and maintenance
  - Conveyance (distance/geography)
    - Pipeline and pumping costs vary according to distance/geography
  - Treatment
    - Costs vary according to initial quality of raw water
  - Distribution
    - Pipeline/pumping costs
- Other Variables:
  - Environmental Uses/Needs
  - Competing Uses/Interests



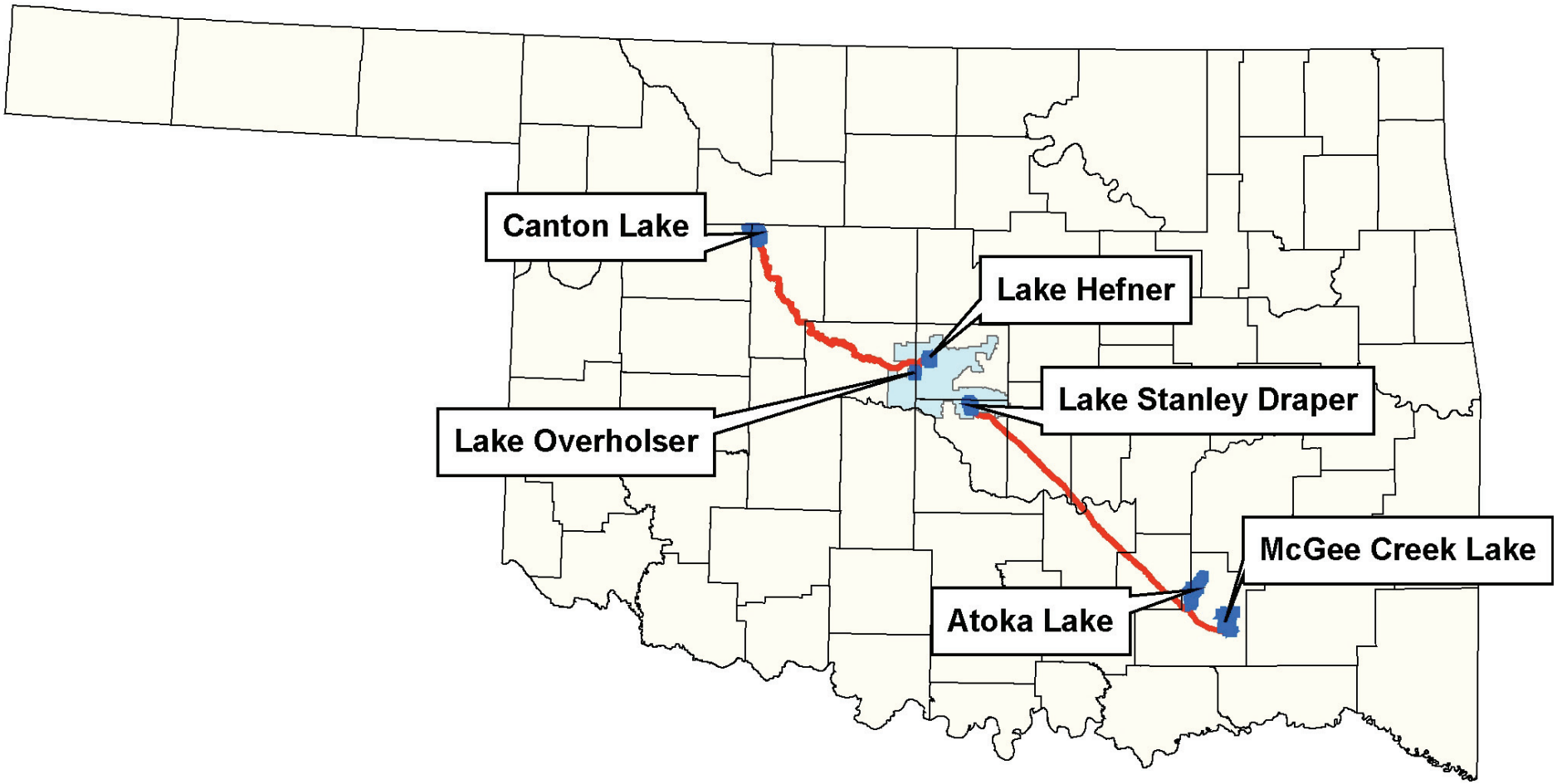
What is Water Worth?

The Oklahoma City Example:

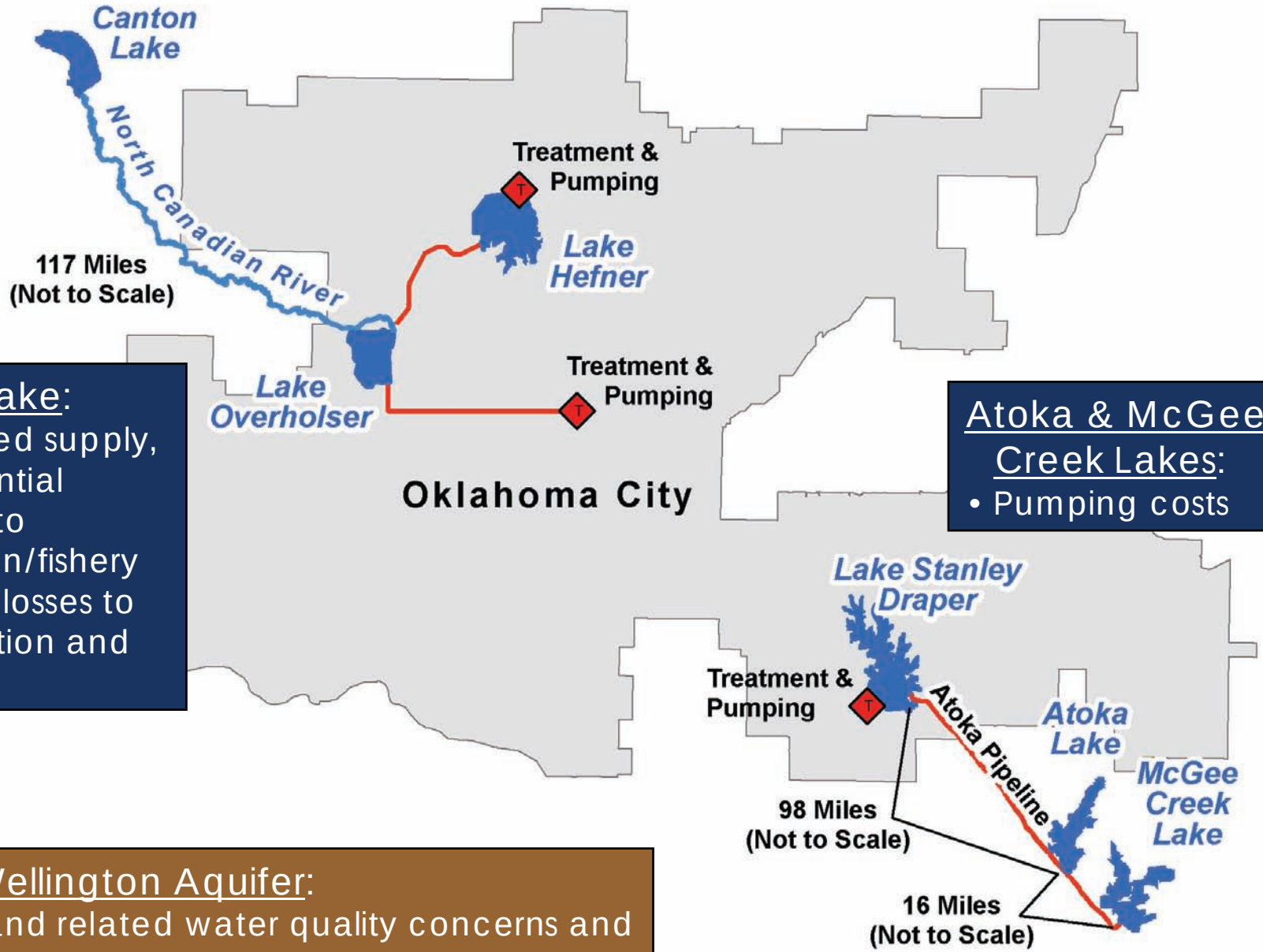


- OKC Water & Wastewater Utilities serves more than 500,000 people in Okla. City and metropolitan area
- Oklahoma City gets raw water from the North Canadian River, supplemented by Canton Reservoir (in the northwest) and Atoka and McGee Creek Reservoirs (in the southeast)
- Water treatment facilities located at Lakes Draper, Hefner, and Overholser treat approximately 80 million gallons per day (193 MGD capacity)
- Present usage is 80,000 acre-feet (total allocation of 210,000 AF)
- Water production growth anticipated at 1.5% per year; adequate supply anticipated for next 50 years

Oklahoma City Water Supply



Oklahoma City Water Supply

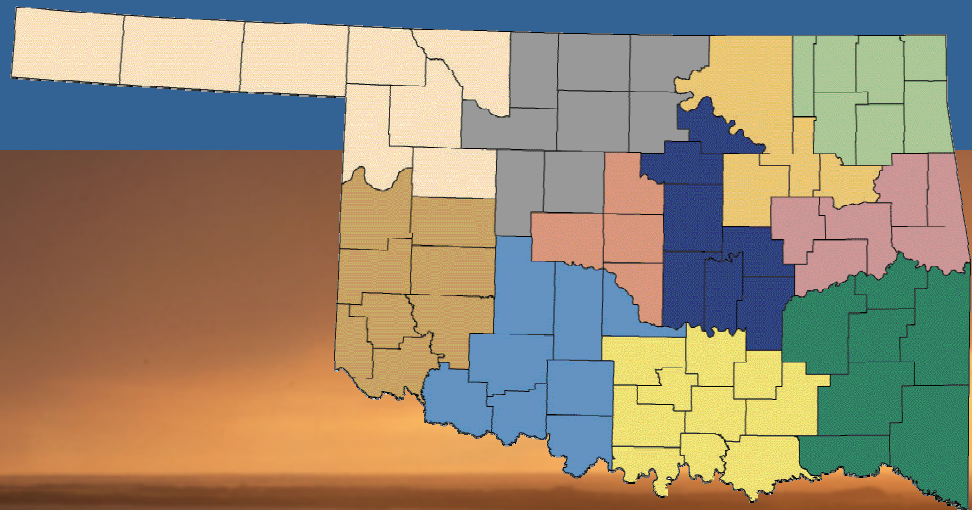


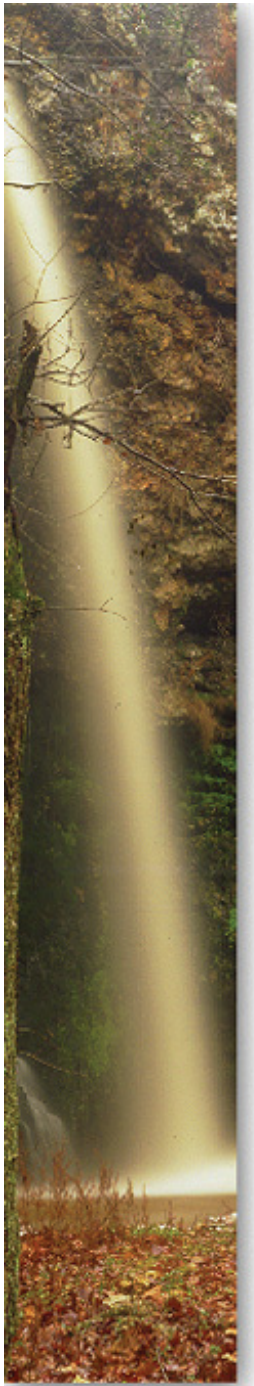
Canton Lake:
- Gravity fed supply, but potential impacts to recreation/fishery
- Channel losses to evaporation and seepage

Atoka & McGee Creek Lakes:
- Pumping costs

Garber-Wellington Aquifer:
- Arsenic and related water quality concerns and treatment costs prohibit groundwater use

Update of the Oklahoma Comprehensive Water Plan



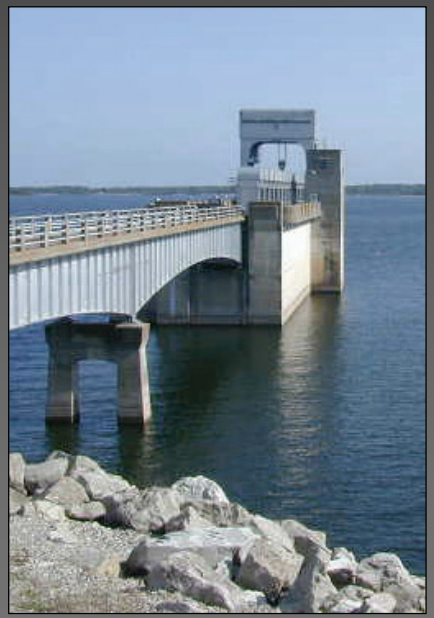


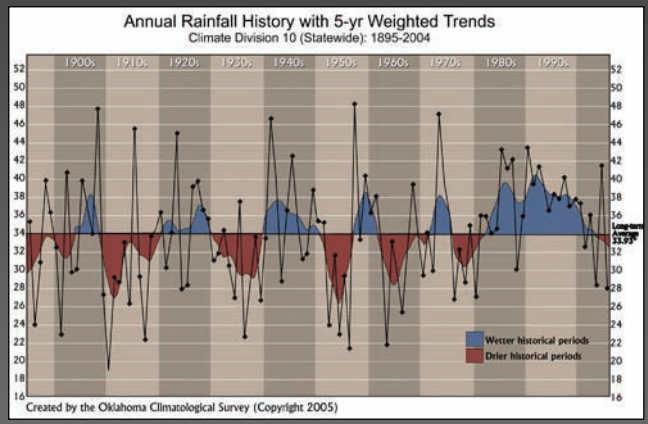
Update of the Oklahoma Comprehensive Water Plan

- Funding:
  - State Gross Production Tax:
    - Oklahoma Conservation Commission:
      - Conservation Cost-Share Program, Conservation Reserve Enhancement Program, and rehabilitation of watershed dams
    - Oklahoma Dept. of Tourism:
      - onetime capital expenditures
    - OWRB:
      - estimated $2.14 million will be deposited annually over next five years into Revolving Fund for the OCWP update and to help recapitalize the Financial Assistance Program

Oklahoma requires an effective and comprehensive plan to meet future water supply challenges…

- **Address population growth**
- **Address future water / wastewater infrastructure costs**

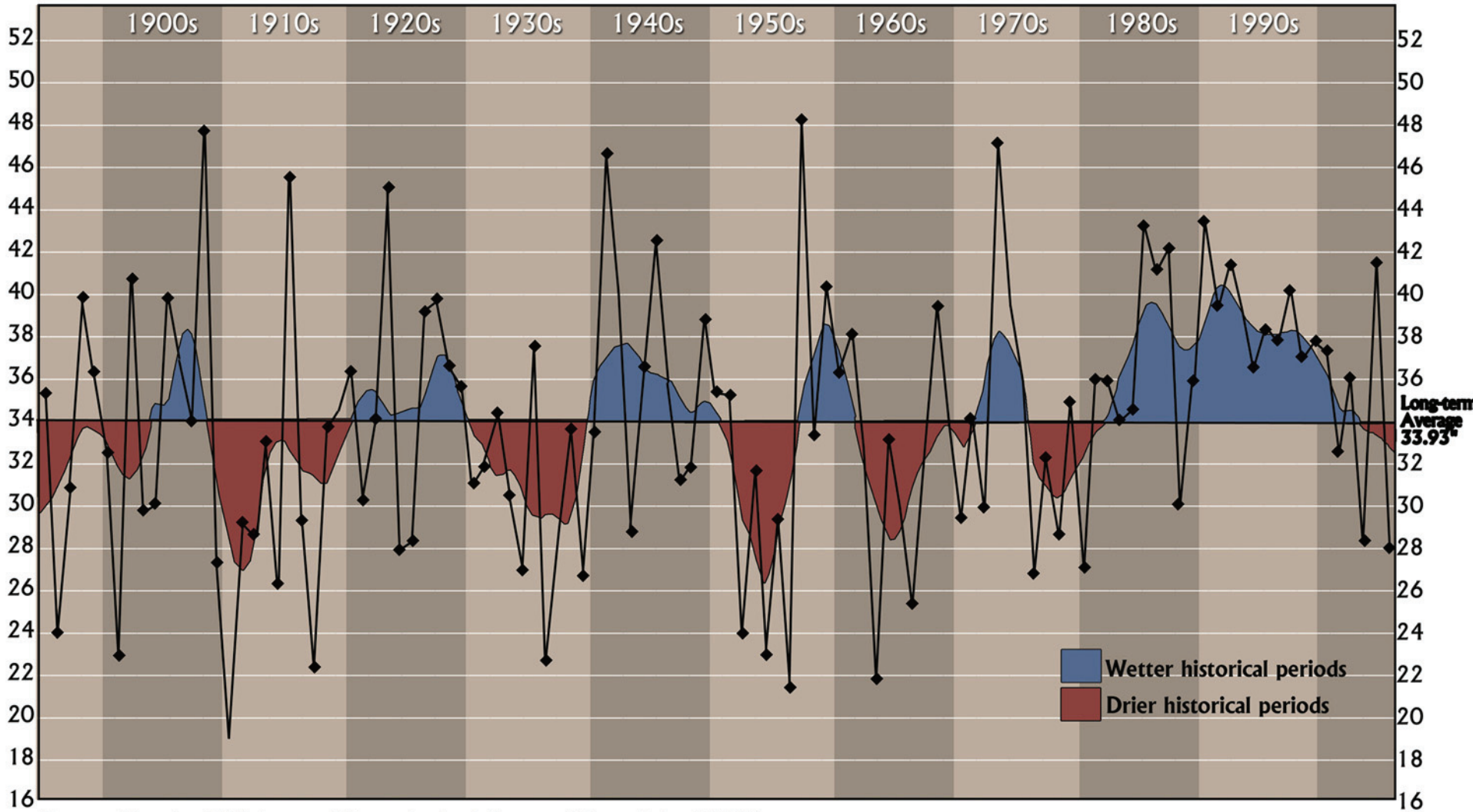




- **Balance economic development and the environment**
- **Satisfy competing water interests**
- **Reduce vulnerability to drought**
- **Implement system-level water planning**

Annual Rainfall History with 5-yr Weighted Trends

Climate Division 10 (Statewide): 1895-2004



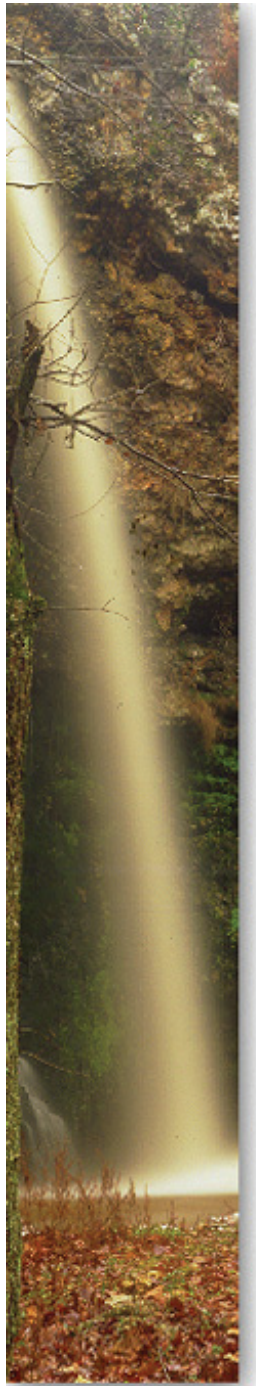
Created by the Oklahoma Climatological Survey (Copyright 2005)

Update of the Oklahoma Comprehensive Water Plan

Goals

Provide safe and dependable water supply for all Oklahomans while maintaining the state's economy and protecting the environment.

Provide the information necessary for water providers, policy-makers, and citizens to make informed decisions concerning the use and management of Oklahoma's water resources.



Update of the Oklahoma Comprehensive Water Plan

The Water Planning Process

Assessment

Identify Problem Areas/Concerns

Data Collection on Problem Areas

Develop Alternatives/Options (Projects)

Compare/Prioritize Alternatives to Problems/Concerns

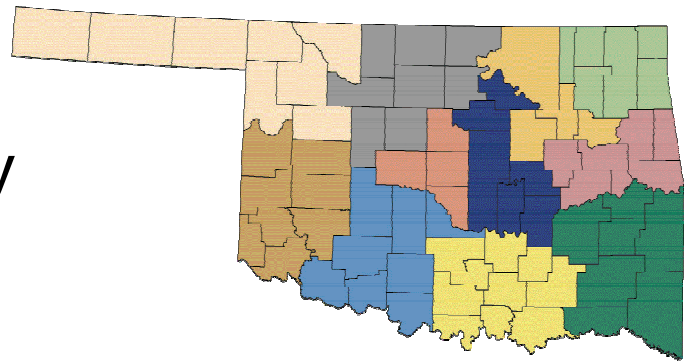
Evaluate Effects of Alternatives

Select Recommendations

Implementation

Update of the Oklahoma Comprehensive Water Plan

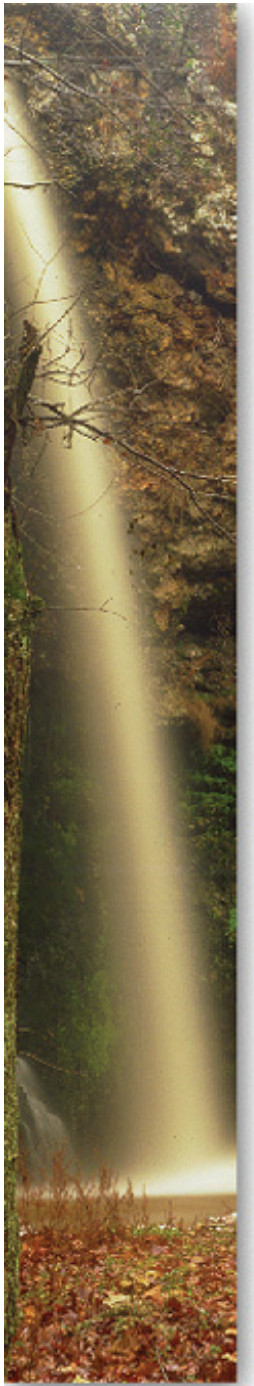
- Phase I:
  - Regional water demand projections (Corps of Engineers)
  - Water supply inventory and analysis through forecast year 2060



*** <u>Regions keyed to substate planning districts</u>:**

*** water demand projections supplied on county basis**

*** water supply inventory**



Update of the Oklahoma Comprehensive Water Plan

- Phase II:
  - Identify local/regional problems and opportunities related to water use:
    - Public participation
  - Public Water Supply Appraisal
  - Identify and prioritize infrastructure needs

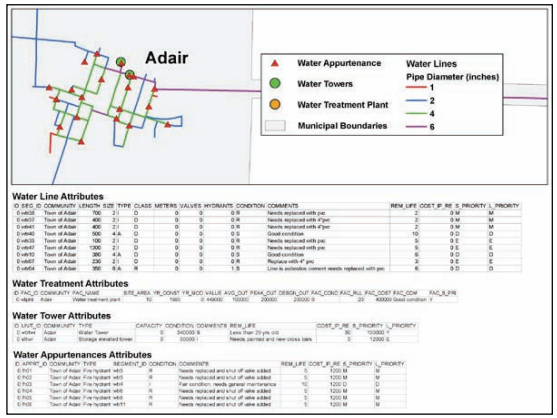
***OCWP Steering Committee & Advisory Group:**

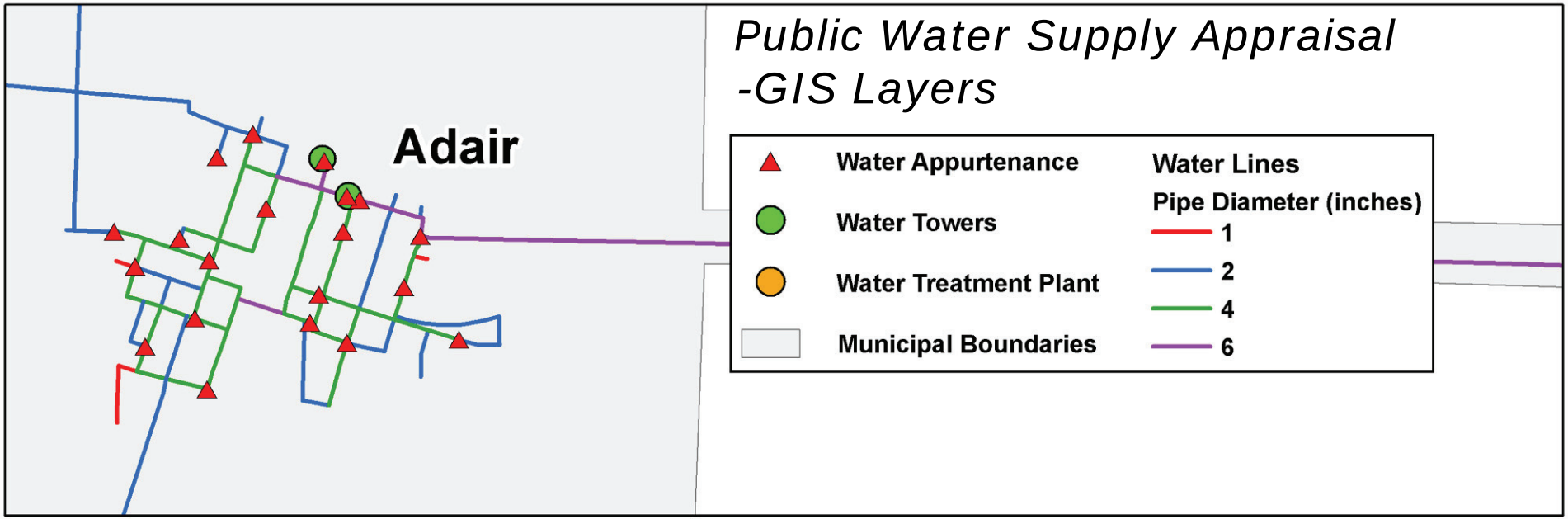
***experts from water use sectors, local, state and federal governments, and universities**

***develop policy issues and recommendations**

Update of the Oklahoma Comprehensive Water Plan

- Phase II--<u>Public Water Supply Appraisal</u>:
  - Inventory of local water system infrastructure
  - Leverage appropriated funds to obtain federal assistance
  - 1,717 active public water supply systems:
    - 1,240 community water systems (including municipalities and rural water districts)
    - 124 non-transient, non-community systems (schools, factories, etc.)
    - 353 non-community systems (rest stops, parks, etc.)
    - plus assorted smaller systems





Water Line Attributes

ID	SEG_ID	COMMUNITY	LENGTH	SIZE	TYPE	CLASS	METERS	VALVES	HYDRANTS	CONDITION	COMMENTS	REM_LIFE	COST_IP_RE	S_PRIORITY	L_PRIORITY
0	wtr38	Town of Adair	700	2	I	D	0	0	0	R	Needs replaced with pvc	2	0	M	M
0	wtr37	Town of Adair	400	2	I	D	0	0	0	R	Needs replaced with 4"pvc	2	0	M	M
0	wtr41	Town of Adair	400	2	I	D	0	0	0	R	Needs replaced with 4"pvc	2	0	M	M
0	wtr40	Town of Adair	500	4	A	D	0	0	0	S	Good condition	10	0	D	D
0	wtr35	Town of Adair	100	2	I	D	0	0	0	R	Needs replaced with pvc	5	0	E	E
0	wtr47	Town of Adair	1300	2	I	D	0	0	0	R	Needs replaced with pvc	5	0	E	E
0	wtr10	Town of Adair	380	4	A	D	0	0	0	S	Good condition	6	0	D	D
0	wtr07	Town of Adair	230	2	I	D	0	0	0	R	Replace with 4" pvc	3	0	E	E
0	wtr04	Town of Adair	350	6	A	R	0	0	1	S	Line is asbestos cement needs replaced with pvc	6	0	D	D

Water Treatment Attributes

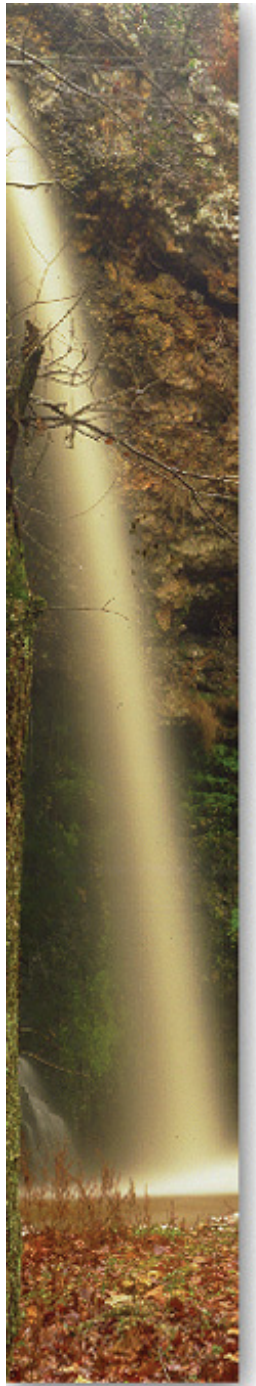
ID	FAC_ID	COMMUNITY	FAC_NAME	SITE_AREA	YR_CONST	YR_MOD	VALUE	AVG_OUT	PEAK_OUT	DESGN_OUT	FAC_COND	FAC_RUL	FAC_COST	FAC_COM	FAC_S_PRI
0	wtplnt	Adair	Water treatment plant	10	1995	0	449000	100000	200000	200000	S	20	400000	Good condition	Y

Water Tower Attributes

ID	UNIT_ID	COMMUNITY	TYPE	CAPACITY	CONDITION	COMMENTS	REM_LIFE	COST_IP_RE	S_PRIORITY	L_PRIORITY
0	wtrtwr	Adair	Water Tower	0	340000	S	Less than 20 yrs old	30	150000	Y
0	sttwr	Adair	Storage elevated tower	0	50000	I	Needs painted and new cross bars	3	12000	E

Water Appurtenances Attributes

ID	APPRT_ID	COMMUNITY	TYPE	SEGMENT_ID	CONDITION	COMMENTS	REM_LIFE	COST_IP_RE	S_PRIORITY	L_PRIORITY
0	fh01	Town of Adair	Fire hydrant	wtr3	R	Needs replaced and shut off valve added	5	1200	M	M
0	fh02	Town of Adair	Fire hydrant	wtr3	R	Needs replaced and shut off valve added	5	1200	M	M
0	fh03	Town of Adair	Fire hydrant	wtr4	I	Fair condition, needs general maintenance	10	1200	D	D
0	fh04	Town of Adair	Fire hydrant	wtr6	R	Needs replaced and shut off valve added	5	1200	M	M
0	fh05	Town of Adair	Fire hydrant	wtr8	R	Needs replaced and shut off valve added	5	1200	M	M
0	fh06	Town of Adair	Fire hydrant	wtr11	R	Needs replaced and shut off valve added	5	1200	M	M



Update of the Oklahoma Comprehensive Water Plan

- Phase III:
  - Development of planning initiatives and tools to address needs/issues identified in Phase II:
    - Policy recommendations for consideration by Legislature

Submit Interim Report to State Legislature:
- **February 2007**

* **Implementation (infrastructure development):**
- * **OWRB's Financial Assistance Program:**
  - **Responsible for $1.6 billion in loans/grants to Oklahoma's water and wastewater systems**

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