OKLAHOMA COMPREHENSIVE WATER PLAN
Ensuring Water Supply Reliability in Oklahoma

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Julie Cunningham
Planning & Mgmt. Division Chief
OWRB Mission

To protect and enhance the quality of life for Oklahomans by managing and improving the state’s water resources to ensure clean and reliable water supplies, a strong economy, and a safe and healthy environment.

Oklahoma Water Resources Board
(9 members)

Executive Director

Administrative Services
Planning & Management
Water Quality & Monitoring
Financial Assistance
A Tale of 5 Junes

June 2011

June 2012

June 2013

June 2015

June 2014
OKC officials look to pipeline project to help during drought

State pension systems show performance is improving

DESTROYED MEMORIES

Homeowner fights back against squatting contractor

"LIKE A MONSTER"

Flooding kills at least two, forces many from homes

Residents lose belongings, but thankful they are safe
Historical Dipoles in Central Oklahoma

Experts predict that extreme events will only become more frequent.

Annual Precipitation History with 5-year Tendencies
Oklahoma Statewide: 1895-2015
2012 Update of the Oklahoma Comprehensive Water Plan

- Over $13M effort— USACE, USBOR, USGS, State
- Most technically sound, extensively vetted Plan
- 13 Watershed Planning Region Reports and numerous technical studies
- 21 policy recommendations from 3-yr. public process
- Governor and Legislature in 2012 supported with major funding for implementation

Overriding goal to provide safe, reliable water supplies to meet needs of all Oklahomans
2060 Water Demands- Total

M&I (Public Water Supply)
772,773 AFY (32%)

Crop Irrigation
897,464 AFY (37%)

Other Demands
762,326 AFY (31%)

Other Demands:
- Thermoelectric Power - 450,227 AF (18%)
- Oil & Gas - 115,570 AF (5%)
- Livestock - 101,040 AF (4%)
- Self-Supplied Industrial - 54,334 AF (2%)
- Self-Supplied Residential - 41,155 AF (2%)
2060 Demands - Sector/Region

**Pie Charts**
2060 - Total Demands by Sector (% of Total Region Demands)
- Thermoelectric Power
- Self-Supplied Rural Residential
- Self-Supplied Large Industrial
- Oil and Gas
- Municipal and Industrial
- Livestock
- Crop Irrigation

**Map Base**
2060 - Total Demands by Region (AFY)
- 55,637 - 100,000
- 100,001 - 250,000
- 250,001 - 350,000
- 350,001 - 473,836
2060 Water Supply Side

- Reliable Supply
  - Physical Availability
  - Permit Availability – new Permits
  - Infrastructure - Treatment Capacity and System Reliability
  - Water Quality
Physical Availability—Reservoir Storage

- Storage essential during times of drought and flooding!
- Ok. has 4\(^{th}\) highest # of dams in U.S.
- OK’s 34 largest reservoirs have the capacity to store 13 million acre-feet of water
- 4,773 reservoirs (Federal, state, local, public utility, private)
- Vast majority built for flood and sediment control
RESERVOIR LEVELS 2015 VS. 2016

Oklahoma Surface Water Resources
Reservoir Levels and Storage as of 2/18/2015

Reservoir Levels
Position number indicates the lake level is feet above the normal pool elevation
Negative number indicates the lake level is feet below the normal pool elevation

Reservoir Storage
(Percent of Normal Pool Storage as of 2/18/2015)
- > 100%
- 100% - 90%
- 90% - 80%
- 79% - 70%
- 69% - 60%
- 59% - 50%
- < 50%

Oklahoma Surface Water Resources
Reservoir Levels and Storage as of 6/14/2016

Reservoir Levels
Position number indicates the lake level is feet above the normal pool elevation
Negative number indicates the lake level is feet below the normal pool elevation

Reservoir Storage
(Percent of Normal Pool Storage as of 6/14/2016)
- > 100%
- 100% - 90%
- 90% - 80%
- 79% - 70%
- 69% - 60%
- 59% - 50%
- 49% - 40%
- 39% - 30%
- < 30%
Physical Availability—Ground Water Resources

23 major groundwater aquifers store an estimated 320 million acre-feet of water.
GW LEVELS 2010 VS. 2016
 Permit Availability— Oklahoma Stream Water Law

• Stream water publicly-owned and subject to appropriation by the OWRB (“domestic uses” exempt)

• Law requires OWRB to determine if water available prior to permit issuance

• Model based on avg. annual rainfall, existing water rights, reservoirs, compacted water, etc.

• Permit does not guarantee water—Seniority of use by water right date

• No priority of use type
Permit Availability- Oklahoma Groundwater Law

• Groundwater considered private property belonging to the overlying surface owner, although subject to reasonable regulation by the OWRB

• Current law enacted in 1973 as a utilization law
  – Created for economic development; mining law allowing for depletion
  – Requires OWRB to base appropriation on hydrologic study

2016

• 10,929- Active Permits
• 3.4 million a.f. per year Permitted

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Total Amount (AF/YR)</th>
</tr>
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<tbody>
<tr>
<td>Irrigation</td>
<td>2,834,853</td>
</tr>
<tr>
<td>Public Water</td>
<td>661,897</td>
</tr>
<tr>
<td>Other</td>
<td>1,063</td>
</tr>
</tbody>
</table>
2060 Water Quality Availability Assessment

Watershed mgmt. decreases water supply treatment, dredging, and capacity expansion costs.

- assessed trends in designated beneficial uses for impaired or threaten waters (e.g. turbidity, nitrogen, phosphorus, turbidity, chlorophyll-a (lakes), PPWS, and Ag uses)
Projected 2060 Supply Limitations

Alluvial Groundwater

Surface Water

Bedrock Groundwater
Infrastructure Financing
Conservation, Reuse, Recycling
Monitoring
Supply Reliability
Fish & Recreation Flows
Excess/Surplus
State/Tribal Resolution
Regional Planning
OCWP Priority Recommendation

Water Supply Reliability- Availability Studies

Recommendation called for ensuring water availability for future growth through **fair and sustainable water allocation**

- aquifer yield studies- Statutorily mandated
- stream water allocation models
- Analysis of various water rights management approaches

- Funded through 2012 Gross Production Tax, extended with 2016 legislation
2012 Update of the OCWP

Fish & Recreation Flows

- Recognized non-consumptive water needs that support recreational & local economic interests
- Assess the suitability & structure of a potential in-stream flow program for Oklahoma
OCWP Priority Recommendation

Water Infrastructure Financing

• Address Oklahoma‘s projected $82+ billion water and wastewater infrastructure need by 2060.

• OWRB’s 5 successful ("AAA") grant & loan programs could only satisfy an estimated 4-9% of this need.

• In 2012 SQ 764 established the Water Infrastructure Credit Enhancement Reserve Fund to provide additional leveraging capacity in the municipal bond mkt.
OWRB Financial Assistance Program

- Assist communities and rural water districts in financing water and wastewater infrastructure improvements
- $3.4 billion in loans and grants to date

OWRB Loan and Grant Programs
- Clean Water State Revolving Fund Loans
- DW State Revolving Fund Loans
- State Revenue Bond Loan Program Loans
- Emergency Grants
- Rural Econ. Action Plan Grants

Funding Sources—
- Federal dollars
- Debt Issuance
- Loan Repayments
- Interest on Bond Loan Program Reserve
- General appropriations
- Special Appropriations
Oklahoma Funding Agency
Coordinating Team

- Fed. and state water financing agencies—drinking water, sewer, and “green” projects for Oklahoma public entities
- Meet quarterly to identify best funding source, cross-train funding agencies, adopt streamline application/guidance

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<thead>
<tr>
<th>Members</th>
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<tbody>
<tr>
<td>Oklahoma Water Resources Board</td>
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<tr>
<td>Oklahoma Department of Commerce</td>
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<tr>
<td>Indian Health Service</td>
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<tr>
<td>Oklahoma Department of Environmental Quality</td>
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</tbody>
</table>
Future Supply Infrastructure Opportunities

OCWP assessed several options—generally more statewide in perspective:

1. Reservoir Viability
2. Conservation- Efficiency and Reuse
3. Marginal Quality Water
4. Artificial Recharge
5. Regionalization
New Reservoirs?

Construction Cost $9 Million-$1 Billion
East-West Conveyance?

$4-20 Billion + $600 Million annual O&M
Smaller Out-of-Basin Water Transfers?

Kaw to Enid/NW?
Water for 2060 Act sets statewide goal of consuming no more fresh water in 2060 than we consumed in 2010.

Advisory Council recently sent recommendations to Governor and Legislature.

Recommended voluntary programs/policies, financial incentives and education.
## Case Studies in Conservation

<table>
<thead>
<tr>
<th>City</th>
<th>Problem</th>
<th>Examples of Approach</th>
<th>Goal/Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albuquerque, NM</td>
<td>Dry climate and &gt; population growth</td>
<td>Conservation rates, education, high-efficiency plumbing, landscaping &amp; large-use programs</td>
<td>Decreased peak demand by 14%</td>
</tr>
<tr>
<td>Cary, NC</td>
<td>Dry, hot summers and &gt; population growth</td>
<td>Conservation rates, education, landscape &amp; irrigation codes, toilet flapper rebates, residential audits, other</td>
<td>Reduce retail water production by 4.6 mgd by end of 2028 (16% savings)</td>
</tr>
<tr>
<td>Goleta, CA</td>
<td>Dry climate and &gt; population growth</td>
<td>Plumbing retrofits such as high-efficiency toilets &amp; showerheads &amp; increased rates</td>
<td>Decreased use by 30%; delayed WW treatment plant expansion</td>
</tr>
<tr>
<td>Irvine Ranch Water District, CA</td>
<td>Drought and &gt; population growth</td>
<td>New rate structure</td>
<td>Water use declined by 19% after 1st year</td>
</tr>
<tr>
<td>Seattle, WA</td>
<td>Dry summers and &gt; population growth</td>
<td>Seasonal rate structure, plumbing codes, leak reduction</td>
<td>Per-capita consumption dropped by 20%</td>
</tr>
</tbody>
</table>

Source: EPA Cases in Water Conservation 2002
# Final Report Submitted!

## Water for 2060 Advisory Council Recommendations

<table>
<thead>
<tr>
<th>All Water Use Sectors (A)</th>
<th>A-1</th>
<th>Develop public education and outreach materials, a statewide resources conservation campaign, and an Oklahoma water efficiency portal.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Water Supply (PWS)</td>
<td>PWS-1</td>
<td>Develop an Oklahoma public water supply system water efficiency best practices guide.</td>
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<tr>
<td></td>
<td>PWS-2</td>
<td>Develop a state recognition and rewards program for highly efficient public water supply systems.</td>
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<tr>
<td></td>
<td>PWS-3</td>
<td>Develop an Oklahoma water system loss reduction best practices guide.</td>
</tr>
<tr>
<td></td>
<td>PWS-4</td>
<td>Provide state funding and financing for water system loss reduction.</td>
</tr>
<tr>
<td></td>
<td>PWS-5</td>
<td>Encourage regionalization and supply sharing.</td>
</tr>
<tr>
<td>Crop Irrigation (CI)</td>
<td>CI-1</td>
<td>Apply state financing programs to water-efficient crop irrigation equipment conversion and practices.</td>
</tr>
<tr>
<td></td>
<td>CI-2</td>
<td>Develop an Oklahoma crop irrigation best practices guide.</td>
</tr>
<tr>
<td></td>
<td>CI-3</td>
<td>Actively support federal crop insurance reform.</td>
</tr>
<tr>
<td>Energy &amp; Industry (EI)</td>
<td>EI-1</td>
<td>Facilitate increased sharing of information and supplies between energy and industry water users.</td>
</tr>
<tr>
<td></td>
<td>EI-2</td>
<td>Develop an energy and industry water use best practices guidance and recognition program.</td>
</tr>
<tr>
<td></td>
<td>EI-2</td>
<td>Promote industrial use of marginal quality waters.</td>
</tr>
</tbody>
</table>
Education & Outreach Campaigns

Dewey says, "Adjust your sprinkler system to the change of the season. Plants need a lot less water in the fall and winter."

Fall tips to save even more.
Reuse: Marginal Quality Waters

**SOURCES**
- Stormwater runoff
- Oil & gas flowback/produced water
- Brackish water
- Treated wastewater
- Other lower-quality sources

**POTENTIAL USES**
- M&I – potable & nonpotable
- Self-supplied residential
- Self-supplied industrial
- Thermoelectric power
- Oil & gas
- Crop irrigation
- Livestock watering

2016 Governor directed OWRB to establish Produced Water Working Group to identify potential sources and uses.
Marginal Quality Water

Basins with Greatest Potential to Offset Fresh Water Use with MQ Water
2016 State legislation directed OWRB to promulgate rules framework to allow permitting for Aquifer Storage and Recovery.
Regionalization

- Oklahoma has ~700 water systems serving less than 1,000 customers
- Economy of scale benefits; systems with multiple sources more resistant to drought
OCWP Priority Recommendation

Regional Planning

• “Bottom-up” water planning & implementation of OCWP initiatives at the regional level
• Local stakeholders representing unique interests of each region
• Happening organically now
• Developing short, med., long-term strategies
Double-Down on Drought

• Plan... locally, ahead, for the worst
• Conserve, reuse, recycle, find/create new untapped sources and storage!
• Invest in the repair and construction of smart, efficient projects
• Monitor & measure
• (Rinse.) Repeat.
Questions?

Julie Cunningham
Chief, Planning and Management Division
Julie.Cunningham@owrb.ok.gov
Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118
Ph: 405.530.8800 • Fx: 405.530.8900
www.owrb.ok.gov • @OKWaterBoard