Utah’s Regional M&I Water Conservation Goals

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Utah Division of Water Resources

Steven C. Jones, P.E.
Hansen, Allen & Luce

Utah Water Users Workshop
St. George, UT
March 2019
Welcome.
I hope you are here because you are anxious to learn about the Regional Water Conservation Goals proposed for 2030.
I am Rachel Shilton, the Division manager for this project
Steve Jones from Hansen, Allen and Luce Engineers is the consultant project lead
He will be presenting information about the 2030 Regional Water Conservation Goal Report
I appreciate the time and effort our consulting engineers dedicated to this project
This presentation will be available.

https://water.utah.gov/
waterwise@utah.gov

MISSION: PLAN, CONSERVE, DEVELOP AND PROTECT UTAH'S WATER RESOURCES

Utah Division of Water Resources
The Utah Division of Water resources is one of the seven division's housed within the Department of Natural Resources. Tasked with Planning, Conserving, Developing and Protecting Utah’s Water Resources, the Division earnestly strives to be Utah’s water steward.

Utah is a semi-arid state and its water future is one of the most significant challenges facing us today. The State of Utah and the Division recognize the vitality in finding sustainable solutions to ensure Utah families have reliable water, that agriculture and businesses can be successful and that the environment can prosper.
This presentation will be available to you
The Division of Water Resources website is currently under construction, however, the information in this presentation will be posted
Our website is found at: https://water.utah.gov/
Additionally, you can request a copy from waterwise@utah.gov and I will send the information to you
Division of Water Resources

Mission: Plan, conserve, develop, and protect Utah’s water resources

Project Purpose: Propose regional boundaries, goals, and practices for M&I water conservation
Developing regional water conservation goals is consistent with the Division’s mission to conserve water.
This information presented today is draft. I can’t emphasize that word enough....
This information is still draft and is subject to change.
Regional Water Conservation Goal Report

✓ Municipal water use

2030 Goals

2040 and 2065 Projections
The report presents municipal and industrial water conservation Goals to be accomplished by 2030. It also projects additional water conservation for 2040 and 2065 milestone years. Those projections are too far into the future to be reliable. The projections are presented to show the direction we need to be moving and to remind all of us that water conservation efforts do not end at 2030. The Division plans to address the next milestone goals every time regional goals are reviewed.

There are few topics that are not addressed in this draft report.
Regional Water Conservation Goal Report

✓ Municipal water use
Ø Future supply
Regional Water Conservation Goal Report

- Municipal water use
- Future supply
- New source development
Regional Water Conservation Goal Report

✓ Municipal water use
Ø Future supply
Ø New source development
Ø Agriculture water
This plan does not address:

Future Water Supply and reliability
How to determine projected water supply
Neither projects nor source development are discussed
Agriculture water use and converting agriculture water to urban uses are topics for later discussions

This report focuses on regional goals out to the year 2030 in order to conserve municipal and industrial water to provide the current supply to as many users as possible.
Current Goal established by Governor Herbert is: reduce water use 25% by 2025
That goal represented 1% per year reduction for 25 years
It is not yet 2025, so why change the goals now?

Many of you know the answer:
Statewide, M&I use has declined by at least 18% since 2000
Why now?

Celebrate success!!
Why now?

Celebrate success!!

Because some communities have already reduced their water use by 25% or more
We want to celebrate their success
We want to acknowledge that these practices work
We recognize that real people are making a real difference in water use
Why now?

• Celebrate success

• Comply with 2015 Legislative Audit Report (15-01)
Why now?

- Celebrate success
- Comply with Legislative Audit Report 15-01
- Promote future conservation
Legislative Audit Report 15-01 recommended regional goals; although the audit was difficult, I personally appreciate the effort that went into making it meaningful. The division took the recommendations seriously; acted on many and are still working on implementing others. Establishing regional water conservation goals specific to different areas of the state rather than one state wide goal was one of the audit recommendations. Encourage more focus on conservation today, while promoting additional future conservation. We want to keep the momentum going. We recognize that implementing conservation practices early saves more water and money. When communities begin development with conservation practices in place, it is less expensive than retro-fitting existing structures and infrastructure.
So....

What’s different?
9 Water Conservation Regions
Regions were define which are consistent with the Board of Water Resources River Districts. Are these perfect boundaries? No. However, these region boundaries do align well with the past water use and water conservation progress.
Goals are customized for each region.
What else is different?

- Goals are customized for each region

Up next, Steve Jones, from Hansen, Allen and Luce Engineers, will describe how the goals were set.
What else is different?

✓ Goals are customized for each region
✓ Deeper commitment to water conservation
Ø Wasteful water practices
We want to keep water conservation momentum going
We want water conservation to be a way of life instead of a sacrifice
We want to end wasteful water use practices at every level
We want to preserve quality drinking water for culinary water uses
WE NEED YOU TO CONSERVE WATER
WE NEED **YOU**

**TO CONSERVE WATER**

The **next levels** of commitment requires **all** of us: Every Utahan to accept, commit to, **support** and take steps to conserve water.

Now, Steve **Jones** with Hansen, Allen and Luce Engineers will present the Regional Water Conservation **Goals for 2030**
Utah’s Regional M&I Water Conservation Goals

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Goal Development Process

Public Involvement

Current Use → Statistical Model

Regions → Potential → Practices → Goals

Climate Change → Costs
Goal Development Process

Public Involvement

Current Use → Statistical Model

Regions

Potential

Practices

Goals

Climate Change

Costs
Public Involvement

Broad and Brief

Online Survey

Open Houses

Stakeholder Interviews and Draft Reviews

Deep and Focused
Q12 On a scale of 1 to 7, where 1 is very unwilling and 7 is very willing, how willing are you to do the following to become more efficient?

Answered: 1,407  Skipped: 248

- Take shorter showers
- Only water my landscape at...
- Avoid running water while...
- Avoid watering my landscape...
- Install a smart sprinkler...
- Adjust sprinklers t...
- Raise lawn mower to keep...
Q9 Why is it important to use water efficiently?

Answered: 1,402  Skipped: 253

- Because waste is not OK
- To help supply water for...
- To pay less on my water bill
- To delay costly...
- For sustainabili...
- It isn't important
- Other (please specify)
Q6 What source of water do you use to irrigate your landscape?

- Drinking water
- Pressurized irrigation systems
- Ditch water
- Combination of drinking water
- Other (please specify)

Answered: 1,646  Skipped: 9
Open Houses
OUTDOOR WATER USE PROJECTIONS FOR DIFFERENT DEVELOPMENT PATTERNS

Past Practices

- Traditional Landscaping – 80% turf 20% planting beds and hardscaped areas.
- Historic irrigation efficiency = 50% (Double the amount needed)

Scenario 1

- Traditional Landscaping – 80% turf 20% planting beds and hardscaped areas.
- Increased irrigation efficiency to 70%

Scenario 2

- 50% turf 50% planting beds and hardscaped areas.
- Increased irrigation efficiency to 80%

Scenario 3

- 20% turf 80% planting beds and hardscaped areas.
- Increased irrigation efficiency to >80%
### Past Practices
- Water use averages prior to 2000.
- Limited use of high efficiency fixtures and appliances.

### Scenario 1
- 40% conversion to high efficiency fixtures and appliances.

### Scenario 2
- 80% conversion to high efficiency fixtures and appliances.

### Scenario 3
- 100% conversion to high efficiency fixtures and appliances.
- Elimination of leaks.
- Improved awareness and focus on water conservation.

Source: Water Research Foundation
Open House and Stakeholder Concerns:

- Landscaping practices
- Water use culture
- The goals are too aggressive or not aggressive enough
- Water use data management
- Cost and funding for conservation and water supply
- Water supply limitations
- Water rates
- Credit for past water conservation efforts
Goal Development Process

Public Involvement

Current Use → Statistical Model

Regions

Potential

Climate Change

Practices

Costs

Goals
Goal Development Process

Current Use → Statistical Model

Regions → Potential

Potential → Practices

Practices → Goals

Potential → Climate Change

Climate Change → Costs

Costs → Goals

Public Involvement

POTENTIAL CONSERVATION MODEL
Potential Conservation Model

- Education
- Cost
- Acceptability
- Climate
- Metering
- Water Use Practices
- Landscapes
Population vs. Water Supply Over Time

![Graph showing the relationship between population and water supply over time.]
Goal Development Process

1. Regions → Potential
2. Potential → Practices
3. Practices → Goals
4. Current Use → Statistical Model
5. Public Involvement
6. Regions → Climate Change
7. Potential → Costs

Flowchart: Regions → Potential → Practices → Goals
- Regions
- Potential
- Practices
- Goals
- Current Use
- Statistical Model
- Public Involvement
- Climate Change
- Costs
Potential

- Population growth
- Development density increase
- Landscape change
- Increase in indoor efficiency
- Increase in irrigation efficiency
Practices

**GENERAL**

**Education**

**Pricing**

- Lower base rates
- Increase tiers for usage
- Review funding sources
- Use customer feedback technology.
Practices

**INDOOR**

- Fixture and appliance conversion
- Fix indoor leaks
- Change in indoor water use habits
Practices

OUTDOOR

Improved irrigation efficiency
• Secondary metering
• Smart irrigation controls
• Drip irrigation systems

Water-wise landscaping
• Water-wise new construction
• Convert existing landscapes

Lot size and density guidelines
• Smaller lot sizes
• Less irrigated area
Goal Development Process

Regions → Potential → Practices → Goals

Current Use → Statistical Model

Public Involvement

Climate Change → Costs
Climate Change Impacts in Utah by 2050

- Temperature increases by 2.3 °F
- Spring runoff occurs 1 month earlier
- Irrigation season lengthens by 8 days
- Precipitation becomes more rain and less snow
Goal Development Process

- Current Use
- Statistical Model
- Regions
- Potential
- Practices
- Goals
- Climate Change
- Costs

Public Involvement
## Cost of 2030 Conservation

<table>
<thead>
<tr>
<th>Region</th>
<th>Required Investment in M&amp;I Water Conservation by 2030</th>
<th>Expected Annual Water Savings (ac-ft)</th>
<th>Annualized Unit Cost ($/ac-ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bear River</td>
<td>$199,700,000</td>
<td>10,895</td>
<td>$1,192</td>
</tr>
<tr>
<td>Green River</td>
<td>$37,500,000</td>
<td>2,129</td>
<td>$1,146</td>
</tr>
<tr>
<td>Lower Colorado River North</td>
<td>$61,900,000</td>
<td>3,641</td>
<td>$1,106</td>
</tr>
<tr>
<td>Lower Colorado River South</td>
<td>$358,300,000</td>
<td>8,395</td>
<td>$2,776</td>
</tr>
<tr>
<td>Provo River</td>
<td>$791,800,000</td>
<td>39,281</td>
<td>$1,311</td>
</tr>
<tr>
<td>Salt Lake</td>
<td>$901,300,000</td>
<td>41,675</td>
<td>$1,407</td>
</tr>
<tr>
<td>Sevier River</td>
<td>$77,500,000</td>
<td>5,455</td>
<td>$924</td>
</tr>
<tr>
<td>Upper Colorado</td>
<td>$46,800,000</td>
<td>3,454</td>
<td>$881</td>
</tr>
<tr>
<td>Weber River</td>
<td>$786,400,000</td>
<td>49,905</td>
<td>$1,025</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$3.26 billion</strong></td>
<td><strong>164,830</strong></td>
<td><strong>$1,287</strong></td>
</tr>
</tbody>
</table>

1 Annualized over 30 years at 5%. 

- **Region**: The different regions where conservation efforts are planned.
- **Required Investment in M&I Water Conservation by 2030**: The estimated investment needed by 2030 for water conservation in each region.
- **Expected Annual Water Savings (ac-ft)**: The expected annual water savings in acre-feet for each region.
- **Annualized Unit Cost ($/ac-ft)**: The annualized cost per acre-foot for each region.
<table>
<thead>
<tr>
<th>Source</th>
<th>Capital Cost</th>
<th>Yield (ac-ft)</th>
<th>Unit Capital Cost ($/ac-ft)</th>
<th>Annualized Capital Cost ($/ac-ft)</th>
<th>O&amp;M Cost ($/ac-ft)</th>
<th>Total Cost ($/ac-ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake Powell Pipeline</td>
<td>$1,383,430,000²</td>
<td>86,249</td>
<td>$16,040</td>
<td>$1,043</td>
<td>$208³</td>
<td>$1,252</td>
</tr>
<tr>
<td>Bear River Pipeline—to JWWCD</td>
<td>$723,260,182³</td>
<td>50,000</td>
<td>$14,485</td>
<td>$941</td>
<td>$188³</td>
<td>$1,129</td>
</tr>
<tr>
<td>Central Water Project³</td>
<td>$16,736</td>
<td>1</td>
<td>$16,736</td>
<td>$1,089</td>
<td>$156</td>
<td>$1,245</td>
</tr>
<tr>
<td>Reuse—High⁵,⁷</td>
<td>$56,957,000</td>
<td>4,200</td>
<td>$13,581</td>
<td>$882</td>
<td>$528</td>
<td>$1,411</td>
</tr>
<tr>
<td>Reuse—Low⁵,⁷</td>
<td>$11,546,000</td>
<td>1,341</td>
<td>$8,610</td>
<td>$560</td>
<td>$258</td>
<td>$818</td>
</tr>
<tr>
<td>Average Sized Municipal Well⁷</td>
<td>$8,073,000⁶</td>
<td>807</td>
<td>$10,009</td>
<td>$651</td>
<td>$186</td>
<td>$837</td>
</tr>
<tr>
<td>Mixed Portfolio of Local Water Sources⁶,⁷</td>
<td>$9,900⁸</td>
<td>1</td>
<td>$9,900</td>
<td>$844</td>
<td>$117</td>
<td>$761</td>
</tr>
</tbody>
</table>
Goal Development Process

- Current Use
- Statistical Model

Regions

Potential

Practices

Goals

Public Involvement

Climate Change

Costs
WHERE ARE WE AT TODAY?

STATEWIDE WATER USE 2015

- Industrial Water Use - Manufacturing, plants, oil and gas producers, mining companies, dairies and stock watering.
- Institutional Water Use - Various public agencies and institutions (i.e. schools, municipal buildings, churches)
- Commercial Water Use - Office spaces, retail businesses, restaurants and hotels.
- Residential Indoor Water Use - Residential drinking water, cooking, washing clothes, miscellaneous cleaning, personal grooming and sanitation.
- Residential Outdoor Water Use - Irrigation of lawns, gardens and landscapes, and other residential activities.

Total - 242 gallons per capita per day (gpcd)

Source: Utah Division of Water Resources
Goal Development Process

Public Involvement

Current Use → Statistical Model

Regions → Potential → Practices → Goals

Climate Change → Costs
Hydraulic and system-specific
○ Ratio of public water systems with tiered water rates (individual responses)
○ Ratio of public water systems with documented water conservation programs or policies (individual responses)
○ Ratio of public water systems with clearly defined water conservation goal (individual responses)
○ Ratio of public water systems also covered by secondary water service (individual responses)
○ Ratio of total water use as industrial water use (DWRe 2018a, 2018b)

Demographic
○ 2015 population (DWRe 2018a, 2018b)
○ Population density (computed)
○ Average age (U.S. Census Bureau 2015a)
○ Ratio of second homes (vacation, recreational, or occasional) to total homes (U.S. Census Bureau 2015c)
○ Median household income (U.S. Census Bureau 2015b)
○ Persons per household (U.S. Census Bureau 2015b)

Climatic
○ Climate zone (Gillies and Ramsey 2009)
○ Average annual precipitation, 1981–2010, raster (PRISM 2018a)
○ Average annual evapotranspiration, 1980–2017, raster (DWRe 2018c; Lewis and Allen 2017)
○ Average minimum vapor pressure deficit, 1981–2010, raster (PRISM 2018a)
○ Average maximum annual air temperature, 1981–2010, raster (PRISM 2018a)
○ 2015 total precipitation, raster (PRISM 2018b)
○ 2015 total evapotranspiration, raster (DWRe 2018d; Lewis and Allen 2017)
○ 2015 growing season (May–Sept.) average temperature, raster (PRISM 2018b)
○ 2015 growing season (May–Sept.) total precipitation, raster (PRISM 2018b)
○ 2015 growing season (May–Sept.) total evapotranspiration, raster (PRISM 2018b)

Geographic
○ County (AGRC 2014)
○ Area (AGRC 2014)
○ Water right duty (DWRi 2018)
○ Ratio of developed area as green space (DWRe 2018a)
○ Average elevation (USGS 2018)
Regression Model Comparison

2015 M&I Water Use (gpcd)

- **Observed**
- **Predicted**

Elevation
Evapotranspiration
Vapor pressure deficit
Population
Population density
Second homes
Income
Industrial water use

Adj. $R^2 = 0.85$
RMSE = 82 gpcd
All $p < 0.03$
Goal Development Process

Public Involvement

- Current Use
- Statistical Model

Regions
- Potential
- Practices

Climate Change
- Costs

Goals
2030 Goals

- 253 gpcd (17%)
- 187 gpcd (13%)
- 188 gpcd (17%)
- 329 gpcd (18%)
- 233 gpcd (18%)
- 277 gpcd (8%)

- 192 gpcd (23%)
- 243 gpcd (10%)
- 274 gpcd (19%)
## 2030 Goals and Future Goal Projections

<table>
<thead>
<tr>
<th>Region</th>
<th>2015 Baseline (gpcd)</th>
<th>2030 Goal</th>
<th>2040 Projection</th>
<th>2065 Projection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bear River</td>
<td>304</td>
<td>253</td>
<td>17%</td>
<td>232</td>
</tr>
<tr>
<td>Green River</td>
<td>270</td>
<td>243</td>
<td>10%</td>
<td>234</td>
</tr>
<tr>
<td>Lower Colorado River North</td>
<td>286</td>
<td>233</td>
<td>18%</td>
<td>214</td>
</tr>
<tr>
<td>Lower Colorado River South</td>
<td>303</td>
<td>277</td>
<td>8%</td>
<td>267</td>
</tr>
<tr>
<td>Provo River</td>
<td>226</td>
<td>188</td>
<td>17%</td>
<td>174</td>
</tr>
<tr>
<td>Salt Lake</td>
<td>214</td>
<td>187</td>
<td>13%</td>
<td>176</td>
</tr>
<tr>
<td>Sevier River</td>
<td>401</td>
<td>329</td>
<td>18%</td>
<td>306</td>
</tr>
<tr>
<td>Upper Colorado River</td>
<td>337</td>
<td>274</td>
<td>19%</td>
<td>257</td>
</tr>
<tr>
<td>Weber River</td>
<td>250</td>
<td>192</td>
<td>23%</td>
<td>176</td>
</tr>
</tbody>
</table>

Note M&I = municipal and industrial; gpcd = gallons per capita per day based on permanent population. Reported per-capita use includes all residential, commercial, institutional, and industrial uses averaged over the permanent population in each region.
Salt Lake Region

Past Practices

Scenario 1

- Current Use (214 gpcd)

- 2030 Goal (187 gpcd) 13%

- 2040 Projection (176 gpcd) 18%

- 2065 Projection (167 gpcd) 22%
Lower Colorado South Region
Key Clarifications

Ø Utah should not be compared to other states that report water use differently
Ø The regions should not be compared to each other
Ø Current water use should not be compared to 2000 water use
Report will soon be available at [water.utah.gov](http://water.utah.gov)

Thank You