



# WEBER STATE UNIVERSITY

## Water Action Plan

**Purpose:** The Water Action Plan identifies measures the University can implement to conserve water resources, reduce water costs, improve water quality through proper stormwater management, and optimize sustainable management of campus facilities.

### Introduction

WSU is a regional leader in higher education for sustainable facilities management, thanks largely to its commitment to carbon neutrality by 2050.<sup>1</sup> The Water Action Plan represents the University's continued longitudinal planning for long-term growth through fiscally sustainable practices. It was created with advice and input from WSU's water council (see Appendix 1 for member list). The Energy & Sustainability Office staff appreciates the time and effort put into this plan by staff, faculty, students, and community experts who served on the council.

The Water Action Plan aligns with Governor Gary Herbert's June 2015 executive order to increase water conservation measures in state facilities.<sup>2</sup> The order named water as among Utah's "most critical resources" and charged state agencies with an "obligation to lead by example" in enacting water savings.<sup>3</sup> This plan also aligns with the Utah Department of Natural Resources' (DNR) regional water conservation goals established in 2019<sup>4</sup>, and The Association for the Advancement of Sustainability in Higher Education<sup>5</sup> (AASHE) Sustainability Tracking, Assessment & Rating System (STARS) goals. This plan will serve as a guide for reaching those goals and will be revisited and updated every five years.

### Background

Utah is the nation's second driest state, vulnerable to water shortages and drought, including a five-year drought from 2012 to 2016.<sup>6</sup> Great Salt Lake levels have reached their lowest in recorded history,<sup>7</sup> and reduced snowpack has caused low reservoir levels across Northern

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<sup>1</sup> WSU Climate Action Plan, 2009

<sup>2</sup> EO 2015/004

<sup>3</sup> *ibid.*

<sup>4</sup> Utah Department of Natural Resources Water Goals, 2019

<sup>5</sup> STARS Version 2.2 Technical Manual, 2019

<sup>6</sup> National Weather Service, 2017

<sup>7</sup> U.S. Geological Survey, Oct. 2016

Utah,<sup>8</sup> with further snowpack reductions expected as climate patterns shift.<sup>9</sup> These dwindling water supplies face increased demand, as the state’s population is projected to double between 2010 and 2060.<sup>10</sup> Given these factors, the University must plan for higher water costs in coming years. Water conservation projects can mitigate rising costs and support long-term institutional growth.

This Water Action Plan seeks to maximize institutional resources while providing top-quality facilities. The plan focuses on key facilities upgrades, efficiency measures, and improved stormwater management. It also calls for increased metrics to improve water planning and management. With proactive planning, targeted improvements, and strategic use of technology, the University can sustainably manage its water resources to achieve both exceptional facilities and water savings.

The first section of the Water Action Plan will address the overall water conservation goals and how baseline consumption was measured. Second, culinary water conservation goals, objectives, and strategies will be discussed. Secondary water conservation goals, objectives, and strategies will be outlined in the third section. Finally, stormwater goals and management strategies will be discussed in the final section of the plan.

### Water Consumption Baseline and Conservation Goals

WSU has reliable culinary water consumption records going back to 2001 but only has dependable secondary water consumption data going back to 2016. Therefore, an average of three fiscal years, FY 2016 to FY 2018, were utilized to calculate the baseline for this water plan. Three years were selected to ensure a more accurate depiction of WSU’s consumption over cooler and warmer years. WSU’s baseline culinary, secondary, and total water consumption are reported in Table 1 below.

**Table 1 – WSU’s Baseline Water Consumption**

<b>Fiscal Year</b>	<b>Culinary Water (Gallons)</b>	<b>Secondary Water (Gallons)</b>	<b>Total (Gallons)</b>
2018	67,115,900	92,331,698	159,447,598
2017	75,168,600	89,741,415	164,910,015
2016	68,946,400	86,281,500	155,227,900
<b>Average</b>	<b>70,410,300</b>	<b>89,451,538</b>	<b>159,861,838</b>

As discussed previously, goals for the water plan were derived from two sources: the Utah Division of Water Resources’ 2019 plan, *Utah’s Regional M&I Water Conservation Goals*, and the Sustainability Tracking Assessment and Rating System (STARS) Version 2.2 technical manual

<sup>8</sup> National Weather Service, 2016

<sup>9</sup> Utah Climate Center, 2012

<sup>10</sup> Utah Governor’s Office of Economic Development, 2017

created by the Association for the Advancement of Sustainability in Higher Education (AASHE). STARS Version 2.2 outlines three water conservation goals for reporting institutions: reduce culinary water use by 30% per Weighted Campus User (WCU) compared to WSU’s baseline, reduce culinary water use by 30% per gross square foot of floor area compared to WSU’s baseline, and reduce total water use by 30% per acre of vegetated grounds compared to WSU’s baseline.

STARS provides a formula to calculate WCU and defines it as a measurement of an institution’s population that is adjusted to accommodate how intensively certain community members use the campus. Institutions are not required to achieve these goals by specific date; rather an institution will receive full points once the goals have been achieved. WSU is currently working to achieve the points associated with all three water goals by the year 2025.

The Utah DWR 2019 plan divides the State into nine conservation regions and sets a different municipal and industrial (M&I) water conservation goal per region. All of WSU’s campuses fall within the Weber River conservation region, which has a goal to reduce M&I gallons per capita per day consumption by 20% by 2030 as compared to 2015 baseline consumption. As stated previously, reliable secondary consumption data was not available until 2016 and therefore WSU is utilizing an average of FY 2016 – FY 2018 as the baseline. Also, as can be seen in Table 2, Water Goals Summary below, the Utah DWR goal is significantly less stringent than the STARS goals.

**Table 2 – Water Goals Summary**

<b>Goal</b>	<b>Baseline Consumption (gallons)</b>	<b>Goal Year</b>	<b>Goal Consumption (gallons)</b>
STARS 1: Reduce <u>culinary</u> consumption by 30% per Weighted Campus User (WCU)	70,410,300	2025	<b>50,678,044</b>
STARS 2: Reduce <u>culinary</u> consumption by 30% per square foot	70,410,300	2025	<b>50,676,766</b>
STARS 3: Reduce <u>total</u> water consumption by 30% per vegetated acre	159,861,838	2025	<b>111,408,128</b>
Utah DWR: Reduce <u>total</u> M&I consumption by 20% gallons per capita	159,861,838	2030	<b>136,580,661</b>

To calculate goal consumption for Table 2, changes in the institution’s population, square feet, and vegetated grounds were projected. Please refer to Appendix 2 for a detailed summary and projection explanation.

## Culinary Water Conservation

**Goal 1:** Reduce culinary consumption by 30% per Weighted Campus User (WCU) by 2025

**Goal 2:** Reduce culinary consumption by 30% per square foot by 2025

Based upon projected increases in population and square feet, culinary water consumption will have to be reduced by approximately 20 million gallons over the next five years to achieve the above goals. The following objectives and strategies will be deployed to help WSU achieve those goals.

Objectives	Strategies
<p>I. Monitor culinary water consumption, maintain up-to-date records, and identify/respond to leaks and line breaks in a timely manner.</p>	<ol style="list-style-type: none"> <li>1. Install culinary sub-meters on all buildings where missing, connect all meters to Lucid Dashboard, set alerts, and regularly monitor to immediately identify abnormal consumption.</li> <li>2. Collect and input monthly consumption and cost data into the baseline spreadsheet and produce annual report.</li> <li>3. Immediately identify and repair leaks and broken lines as necessary.</li> </ol>
<p>II. Improve aging water infrastructure to diminish the possibility of leaks and line breaks.</p>	<ol style="list-style-type: none"> <li>1. Create a plan to replace existing water lines with polypropylene piping and place in the tunnels for easier maintenance.</li> <li>2. Annually request capital improvement funding to execute the plan in phases.</li> </ol>
<p>III. Existing facilities: Identify and implement projects that will reduce consumption of culinary water.</p>	<ol style="list-style-type: none"> <li>1. Review all existing building retrofit/upgrade projects to ensure that plumbing and water fixture upgrades are included.</li> <li>2. Transition cooling tower water use from culinary to secondary water.</li> <li>3. Work with appropriate staff to identify existing water-inefficient equipment in need of an upgrade (e.g. autoclaves, clothes and dishwashers) and implement upgrades as is financially feasible.</li> <li>4. Strategically schedule existing building MEP upgrades so that entire legs of the steam system can be retired and eliminate energy and water consumption.</li> <li>5. Annually audit facilities to identify additional water conserving projects, estimate costs, and request funding to implement.</li> </ol>
<p>IV. Ensure that all new construction is as water efficient as practicable.</p>	<ol style="list-style-type: none"> <li>1. Review all new construction plans to ensure that they are compliant with all water-related components of WSU's OPR and standards.</li> <li>2. Review and update WSU's OPR and standards annually.</li> </ol>
<p>V. Reduce culinary water use in landscaping to the greatest extent possible.</p>	<ol style="list-style-type: none"> <li>1. Work with WSU landscape staff to create a plan to transition Ogden and Davis campus culinary irrigation to secondary irrigation wherever feasible.</li> <li>2. Estimate costs and identify funding to implement.</li> </ol>

## Secondary Water Conservation

**Goal 1:** Reduce total water consumption by 30% per vegetated acre by 2025

**Goal 2:** Reduce total M&I consumption by 20% gallons per capita by 2030

Explicit secondary water conservation goals are not stated in either the Utah DWR or STARS documents; instead progress is measured by total (culinary and secondary combined) reduction. However, assuming a culinary goal consumption of 50,676,766 gallons and a total goal consumption of 111,408,128 gallons by 2025, (see Table 1 above) you can derive the secondary consumption goal of 60,731,362 gallons. The following objectives and strategies will be deployed to help WSU achieve those goals.

Objectives	Strategies
I. Monitor secondary water consumption, maintain up-to-date records, and identify/respond to leaks and line breaks in a timely manner.	<ol style="list-style-type: none"> <li>1. Identify needed secondary sub-meters and install in order of priority as funding becomes available.</li> <li>2. Connect all meters to Lucid Dashboard (or other program where real time data can be viewed), set alerts, and regularly monitor to immediately identify abnormal consumption.</li> <li>3. During the irrigation season send weekly consumption reports to landscape staff and produce annual report.</li> <li>4. Immediately identify and repair leaks and broken lines as necessary.</li> </ol>
II. Annually implement the Water Warrior Challenge <sup>11</sup> to continuously improve irrigation efficiency.	<ol style="list-style-type: none"> <li>1. Conduct a water audit for all Ogden and Davis campus irrigation management areas to acquire baseline data.</li> <li>2. Annually collaborate with landscape staff to work towards a Distribution Uniformity (DU) goal of 65-75%.</li> <li>3. Improve irrigation run times by using data from irrigation audits to create efficient irrigation schedules.</li> <li>4. Annually identify and implement improvement projects by priority and as funding is available.</li> </ol>
III. Ensure that landscaping associated with all new construction projects is as water efficient as practicable.	<ol style="list-style-type: none"> <li>1. Review all landscape plans associated with new construction projects to ensure that they are compliant with WSU's OPR and standards.</li> <li>2. Ensure that all new landscaping, and associated irrigation systems, provide a DU of at least 65-75%.</li> <li>3. Review and update WSU's OPR and standards annually.</li> </ol>
IV. Connect all irrigation clocks to an online smart irrigation system (i.e. RainMaster).	<ol style="list-style-type: none"> <li>1. Create a plan to remove all irrigation zones from manual operation and replace with programmable irrigation clocks.</li> <li>2. Connect all irrigation clocks to a weather station.</li> </ol>

<sup>11</sup> The Water Warrior Challenge is an incentive-based program, run by the water conservation specialist, working with the landscape area managers as the participants. The program is designed to improve Distribution Uniformity, which is a measurement of how evenly water is applied to a landscape area. The lower the DU the more water is needed to maintain the landscaping. Each of the twelve landscape area managers and the water conservation specialist chose an area that needs improvement. After an area is chosen a water audit is performed. A water audit, among other things, provides the DU of the zone. After the water audit is performed, a plan to improve the DU is created and executed. After the improvement has been implemented a second water audit is performed and the data is compared. The landscaper that has the most DU percentage improvement wins the water warrior challenge and a large trophy.

<p>V. Identify opportunities to reduce turf and replace with water wise landscaping when feasible.</p>	<ol style="list-style-type: none"> <li>1. Study WSU's water needs to come up with amount of water WSU will need for landscaping, ground water recharge, and all other water needs.</li> <li>2. Identify inefficient, time-consuming, &amp; difficult maintenance areas covered by turf.</li> <li>3. With Honors Dept., study effects of different forms of xeriscaping and turf removal on heat island effect.</li> <li>4. Implement best practice forms of xeriscaping and turf removal (e.g. gardens, mulch, low-water and indigenous plants) in targeted areas.</li> <li>5. Install educational signs in improved areas.</li> <li>6. Create plan to organize and prioritize turf areas to be converted.</li> </ol>
<p>VI. Install drip irrigation, or very low-flow heads, in shrub beds.</p>	<ol style="list-style-type: none"> <li>1. Create plan to organize and prioritize shrub areas and flower beds to be converted.</li> <li>2. Identify preferred drip irrigation and low flow heads to be used.</li> <li>3. Implement projects using best practices.</li> </ol>
<p>VII. Create demonstration gardens on Ogden campus and Davis.</p>	<ol style="list-style-type: none"> <li>1. Identify prime areas for demonstration gardens.</li> <li>2. With Faculty &amp; Staff, create demonstration garden plan (e.g. plant selection, maintenance, signage, academic &amp; co-curricular uses, student involvement).</li> <li>3. Work with State of Utah for potential funding.</li> <li>4. Implement demonstration garden plan.</li> </ol>
<p>VIII. Research possibility of allocating unused water rights to the Great Salt Lake</p>	<ol style="list-style-type: none"> <li>1. Work with Friends of the Great Salt Lake to get unused secondary water allocated to the GSL.</li> </ol>

## Stormwater Management

**Goal 1:** Meet and exceed, where possible, all state and federal stormwater management regulations

Objectives	Strategies
I. Implement WSU's stormwater management plan and maintain compliance with all state and federal regulations.	<ol style="list-style-type: none"> <li>1. Identify &amp; implement stormwater improvement projects by priority.</li> <li>2. Inspect all outfalls annually.</li> <li>3. Review all construction and renovation plans for compliance with the plan.</li> <li>4. Conduct and maintain records for all required stormwater inspections.</li> <li>5. Create and oversee stormwater management training of appropriate staff.</li> <li>6. Create and provide required public stormwater education.</li> <li>7. Regularly review and update WSU's plan as needed.</li> </ol>
II. Improve water quality in Ogden campus retention pond.	<ol style="list-style-type: none"> <li>1. Annually test and analyze pond water data with the help of appropriate faculty and staff.</li> <li>2. Create and implement a plan to improve pond water quality based on data analyses &amp; best practices.</li> </ol>
III. Increase reclaimed water usage.	<ol style="list-style-type: none"> <li>1. Consider feasibility of reclaimed water usage on all new construction &amp; renovation projects.</li> <li>2. Improve irrigation system around Ogden campus retention pond for consistent source of irrigation.</li> </ol>
IV. Implement bioswales on Ogden campus.	<ol style="list-style-type: none"> <li>1. Identify &amp; map prime spots for bioswales.</li> <li>2. Implement bioswales according to greatest impact.</li> <li>3. Consider use of bioswales on all new construction projects.</li> </ol>
V. Improve the Great Salt Lake (GSL)	<ol style="list-style-type: none"> <li>1. Identify ways that WSU can help preserve adequate lake levels and improve water quality of the GSL</li> <li>2. Research ways to earmark unused secondary water to flow to the GSL</li> <li>3. Work with Faculty &amp; Staff, develop a program that educates the public about the GSL</li> </ol>

## Appendix 1 – Water Council Members

<b>Name</b>	<b>Title and Affiliation</b>
Dr. Carie Frantz	WSU Geosciences Department Faculty
Jennifer Bodine	WSU Sustainability Manager
Troy Bell	WSU Landscape Manager
Weston Woodward	WSU FM Campus Services Director
Dr. Matt Gnagey	WSU Economics Department Faculty
Josh Polmer	Utah Department of Natural Resources Division of Water Resources Public Relations
Matt Haack	Ogden City Water Conservation Coordinator
Ben Quick	Pineview
Dave Rice	Weber Basin
Dr. Mindy Mortensen	WSU Botany Department Faculty
Dr. Carla Trentelman	WSU Sociology Department Faculty
Marcus Benoff	WSU student



**Appendix 2**

<b>Goal</b>	<b>Baseline Consumption (gallons)</b>	<b>Baseline Unit Measurement</b>	<b>Goal Year</b>	<b>Goal Year Projected Unit Measurement</b>	<b>Goal Consumption (gallons)</b>
STARS 1: Reduce culinary consumption by 30% per Weighted Campus User (WCU)	70,410,300	13,111 WCU	2025	13,481 WCU <sup>1</sup>	<b>50,678,044</b>
STARS 2: Reduce culinary consumption by 30% per square foot	70,410,300	3,020,397 s.f.	2025	3,105,194 s.f. <sup>2</sup>	<b>50,676,766</b>
STARS 3: Reduce total water consumption by 30% per vegetated acre	159,861,838	440 vegetated acres	2025	439 vegetated acres <sup>2</sup>	<b>111,408,128</b>
Utah DWR: Reduce total M&I consumption by 20% gallons per capita	159,861,838	13,111 WCU	2030	14,002 WCU <sup>3</sup>	<b>136,580,661</b>

<sup>1</sup>Goal Year Weighted Campus User (WCU) projected based upon past population increases.

<sup>2</sup>Goal Year square foot increase and vegetated acre decrease based on projected growth from WSU’s Facilities Management Director.

<sup>3</sup>Utah DWR’s goal is measured using gallons per capita. For WSU’s purposes this goal was translated from per capita to WCU for a more accurate measurement. Many WSU students are distance learners or part-time students and therefore their actual use of WSU facilities may range from not at all to limited or minimal use.

