CALIFORNIA STATE UNIVERSITY, LONG BEACH

WATER ACTION PLAN UPDATE

Fall 2017

CSULB WATER ACTION PLAN

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Chapter 1. Introduction

BACKGROUND: REGULATORY FRAMEWORK for WATER CONSERVATION

Efficient water use has been recognized as one of the key components for increasing the reliability and resiliency of the California's water supply. Several regulatory actions have been enacted in recent years to promote water conservation efforts. In 2009, Senate Bill X7-7, also referred to as the 20x2020 Water Conservation Plan, set forth a statewide goal to achieve a 20 percent reduction in urban water use by the year 2020. While the state's Department of Water Resources established a baseline usage of 192 gallons per capita per day, based on 2005 water use and population, water providers have a number of methods to establish their baseline use and targeted reductions.

The drought caused water conservation measures to become more urgent. Calendar year 2013 was the driest year in California's recorded history. This prompted Governor Brown to declare a state of drought emergency in January 2014, calling for voluntary water conservation measures to be taken throughout the state. CSU Interim Vice Chancellor Sally Roush responded by issuing a system wide memorandum asking all CSU campuses to reduce water usage in all possible areas.

January 2014 also saw release of the California Water Action Plan, a joint effort from the California Natural Resources Agency, the California Environmental Protection Agency, and the California Department of Food and Agriculture. The California Water Action Plan provides a roadmap for the state's journey toward sustainable water management and specifically called for actions to "make water conservation a California way of life."

As the drought persisted, in April 2015 Governor Brown issued an Executive Order calling on the State Water Resources Control Board to issue mandates for water conservation to reduce urban water use by 25%, the first time water conservation had ever been mandated by the state. The drought resulted in the driest four-year statewide precipitation levels on record (2012-2015) and the lowest Sierra snowpack on record in 2015, with 5 percent of average. The drought period also set records for the warmest years on record (2014-2016) for statewide average temperatures.

In April 2017, following a very wet winter and successful conservation measures, Governor Brown ended the drought state of emergency in most of California, while maintaining water reporting requirements and prohibitions on wasteful practices, such as watering during or right after rainfall. Although the state has finally received a reprieve from drought conditions, the long history of water in California shows that drought is an inevitably recurring phenomenon in this region of the world. Coupled with projected population growth and increased extremes in weather caused by climate change, it is prudent and necessary to continue to pursue improvements and innovations in water conservation and water use efficiency.

CSU and CSULB RESPONSE TO CALIFORNIA's DROUGHT EMERGENCY

In response to Governor Brown's 2014 declaration of a State of Emergency on water due to severe drought conditions, CSU Interim Vice Chancellor Sally Roush issued a system wide memorandum asking all CSU campuses to reduce water usage in all possible areas, and to report monthly water use to the Chancellor's office. While the drought emergency is over for now, the mandate to achieve the 20% reduction still stands. CSULB acknowledges this urgent call to action and will take the necessary steps to help achieve the water use reduction goal.

CSULB has been implementing water conservation projects as part of the campus overall sustainability goals including transitioning to drought tolerant landscaping, converting landscape areas to drip irrigation, use of waterless and low flow urinals, installing touch free automatic faucets with low flow restrictors, installing weather based central irrigation controllers, and using reclaimed water for irrigation. Although the recent drought has ended, CSULB is moving forward with plans to conserve our precious water resources.

CSU AND CSULB GOALS

The CSU system plays a critical role in water conservation. Among its 23 campuses, there are 12 water research institutes, with more than 250 faculty members studying water issues from drought patterns to groundwater storage. CSU's Water Resources and Policy Initiatives (WRPI) is a collaboration of CSU campuses that addresses all aspects of water use, with scholarly reports, field research and policy recommendations. WRPI promotes academic engagement by sponsoring small grants to fund the development of research proposals, and hosts an annual conference where faculty and students can share and discuss research and water-related projects.

The CSU sustainability policy adopted by the campus also mandates reduction in water consumption by 10% by 2016 and by 20% by 2020 from its 2013 baseline.

CSULB is committed to sustainability in all operations including the use of natural resources such as water. The campus aims to reduce water use as much as possible and use water resources wisely and efficiently in all campus operations. CSULB will endeavor to achieve the target water reduction goal of 20 percent by implementing this Water Action Plan. The Physical Planning and Facilities Management department will take the campus lead in coordinating and implementing the plan.

CSULB WATER ACTION PLAN

CSULB's specific goals are to 1) reduce our reliance on potable water; and 2) reduce overall campus water use. The objectives defined to meet these goals are listed below. The Sustainability Task Force's Water Efficiency and Conservation Working Group, formed in 2015, developed their work plan based on these goals and objectives (see Appendix 2). It is the purpose of the Working Group to update this Water Action Plan and to assist in carrying out its objectives.

OBJECTIVE	STATUS
1. Perform a comprehensive water use audit.	Complete
2. Adopt and implement applicable best management water use practices for all campus operations.	Ongoing
3. Identify opportunities to use reclaimed in place of potable water.	Ongoing
4. Implement low cost quick payback projects immediately.	Complete
5. Identify, plan, and phase implementation of high cost capital projects.	Ongoing
6. Develop a communication plan to encourage campus wide water conservation.	Ongoing
7. Collaborate with faculty and students on water related courses and projects.	Ongoing
8. Share best practice with campus auxiliaries and provide technical support to help develop water and implement conservation projects.	Ongoing
9. Strengthen partnerships and increase collaboration with local water utility and regional water agencies to support CSULB water initiatives.	Ongoing
10. Plan future campus development for water resiliency.	Ongoing

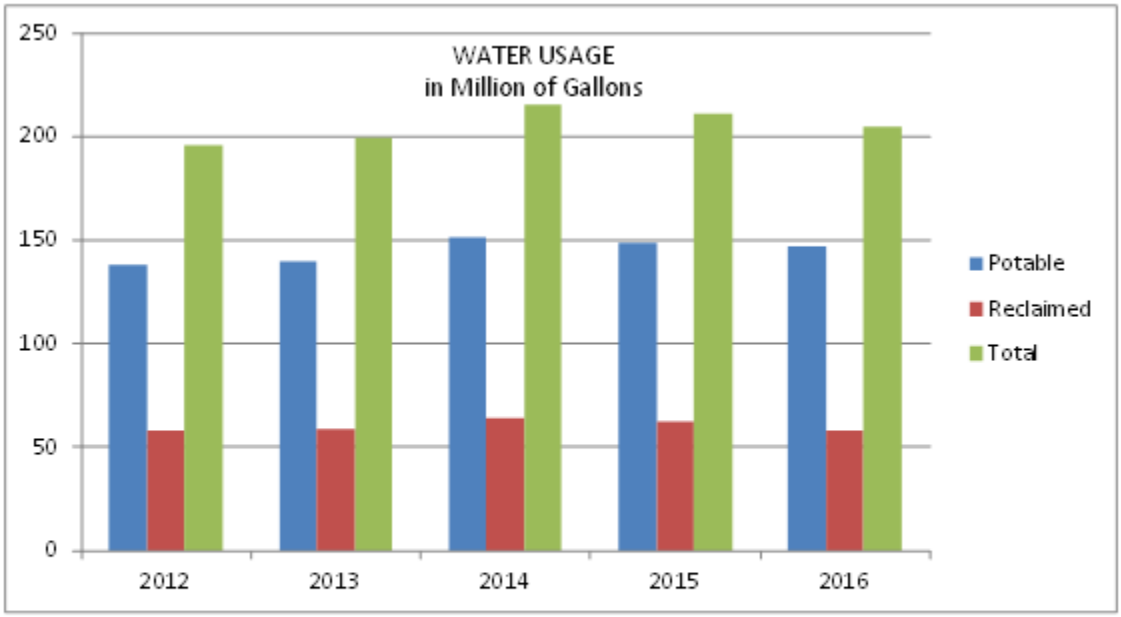
Further discussion of these objectives and accomplishments to date are included in chapters 3 and 4.

Chapter 2. Campus Water Use

Against the background of the dramatic recent events and regulatory actions regarding water in California, CSULB has continuously implemented water conservation projects, contributing towards statewide water conservation goals.

Water is vital to campus life and operations, supporting a wide variety of campus functions. Water is used to heat and cool buildings; water provides the necessary source of nourishment to keep campus landscapes lush and green; water supports academic activities and research; and most importantly, water is needed for domestic drinking, hygiene, and sanitary uses to sustain campus life.

A water usage study was completed in 2015 by P2S Engineering, which stated campus water use at 220 million gallons per year in 2014.



	2012	2013	2014	2015	2016
Potable	138	140	151	149	147
Reclaimed	58	59	64	62	58
Total	196	199	215	211	205

Figure 1. Potable and reclaimed water consumption (Million gallons). Source: *Long Beach Water Department Billing Data*

A 2017 review of water use data, provided by the Long Beach Water Department, reports that CSULB consumes approximately 200 million gallons of water each year, a 10% reduction between 2014 and 2016. To put this in perspective, that is enough water to fill more than 300 Olympic sized swimming pools, or to fill the Walter Pyramid four times. The major uses of water on campus are landscape Irrigation, heating and air conditioning, domestic water use, Dining Services, and swimming pools.

About a quarter of the annual campus water needs each year are able to be fulfilled by recycled water as a direct result of the commitment to using recycled water as a valuable resource. CSULB will continue to find opportunities to use recycled water and preserve precious potable drinking water supplies.

The total cost to provide water service to the CSULB campus is over $800,000 per year, and the cost of water is projected to rise as water becomes an increasingly scarce resource. Water conservation efforts can help to mitigate the financial impacts of these rising water costs.

Water has many uses on campus but a few systems consume the most. Major water consuming systems on campus include the following:

1. Landscape Irrigation
2. Central Plant (Heating and Air Conditioning)
3. Domestic Water Use
4. Dining Services
5. Swimming Pools

These uses are the target areas for water efficiency and conservation practices on campus.

Chapter 3. Water Efficient Best Practices

Best Management Practices for Water Use in CA State Government Facilities

Activity	Water Management and Conservation Best Practice	Current practice	New practice	Evaluate	Not applicable
	Best Management Practices - General				
0.1	Verify preventative maintenance schedules and work order requests are current for all water related systems identified in this list (be prepared to report on all deferred activities or outstanding repairs)	X			
0.2	Coordinate water use inspections and maintenance with regular facility inspections/preventative maintenance activities. Accelerate activities only as required to meet the goals of this Water Use Best Practices check list	X			
0.3	Coordinate water inspections and maintenance with regular facility inspections and preventative maintenance activities	X			
0.4	Identify, modify or establish procedures to minimize or eliminate non-essential water use	X			
	Examples:	X			
	Turn off water to unused facility areas	X			
	Limit building wash-downs, use wipe-downs instead of wash-downs	X			
	Sweep instead of mopping, wash-downs, or pressure washing				X
0.5	Contact local water utility for rebates and assistance on water saving audits and equipment	X			
1	***Best Management Practice 1 - Water Management Planning***				
1.1	Create a written water management and conservation policy statement addressed to staff that addresses short term water conservation goals and a commitment to the longer term water management efficiency of the facility		X		
1.2	Publicize the water management and conservation policy statement to staff and facility occupants		X		
1.3	Establish procedures to record the facility water meters on a monthly basis or more	X			
2	***Best Management Practice 2 - Information and Education Programs***				
2.1	In a public place in the facility, post informational graphics and other outreach information about facility water consumption and water conservation goals	X			
3	***Best Management Practice 3 - Distribution System Audits, Leak Detection and Repair***				
3.1	Perform a basic visual/audible leak detection survey of the primary water delivery and distribution systems	X			
3.2	Identify and repair all leaks	X			

Activity	Water Management and Conservation Best Practice	Current practice	New practice	Evaluate	Not applicable
3.3	Install water leak detection devices and reporting systems that can be integrated into existing building security or automated control systems	X			
3.4	Establish response protocols for water emergencies	X			
4	***Best Management Practice 4 - Water-Efficient Landscaping***				
4.1	Identify, modify or establish procedures to apply mulch regularly around trees and shrubs and in planting areas. Avoid highly flammable mulches. Mulch should be composted wood or other organic products free of toxic or inorganic materials. Mulch should be applied to a depth of at least 2 inches	X			
4.2	When mowing turf, avoid scalping and keep grass length long to reduce watering needs. Generally, grass should be left about 3" long	X			
4.3	Restrict the use of herbicides and hand-pull weeds regularly to avoid unwanted plants consuming water	X			
4.4	Use brooms and rakes to sweep hardscapes near landscaped areas instead of spraying with water	X			
4.5	Provide education for sustainable and environmentally friendly landscape practices	X			
4.6	Use water moisture probes to a depth of at least 3" to determine watering needs or planting areas			X	
4.7	Establish a soil management plan to reduce runoff, eliminate the need for chemicals, and encourage healthy plant growth. The soil management plan should include an analysis of soil health including biological assays and soil probing to determine compaction			X	
4.8	Identify, modify or establish procedures to apply organic fertilizers around the root zone or base of the plant. Fertilizers should be applied only upon individual plant needs or soil test results	X			
4.9	Identify existing plant types and maintain a log of plant replacement. Use drought-tolerant, fire-resistant, native plants	X			
4.10	When planting large trees and shrubs, limit individual species to no more than 10% of the area total to reduce the risk of catastrophic losses to diseases or pests	X			
4.11	Implement a regular maintenance schedule that includes regular inspections, adjustments and repairs of irrigation systems and its components and replenishing mulch and removing obstructions to irrigation emission devices	X			
4.12	Implement storm water management practices to minimize runoff and increase on-site retention and infiltration of water	X			
5	***Best Management Practice 5 - Water-Efficient Irrigation***				
5.1	Check for leaks in the primary irrigation system valves and distribution lines	X			
5.2	Identify the location of all leaks and record relative severity (serious or minor)	X			

Activity	Water Management and Conservation Best Practice	Current practice	New practice	Evaluate	Not applicable
5.3	Repair all leaks, otherwise cap off or close any temporarily unrepairable breaks or significant leaks at the closest location. Irrigate affected landscape areas sparingly with a hose until leak is repaired	X			
5.4	Inspect sprinkler and drip irrigation head functions. Identify and repair poor performing or broken sprinkler heads. Use replacement irrigation heads that have uniform distribution rates for the same irrigation zones, unless otherwise directed by the manufacturer's specifications	X			
5.5	Adjust system to minimum specified pressure. Install pressure regulators where required	X			
5.6	Verify that automatic irrigation controls and timers functioning correctly. Irrigation watering windows shall meet, and not exceed Department of Water Resources best management practice recommendations	X			
5.7	Verify irrigation schedules are appropriate for time of day, climate, soil conditions, plant materials, grading and season	X			
5.8	Identify, modify or establish procedures to avoid watering during heavy winds, or during rain seasons	X			
5.9	Identify, modify or establish procedures to adjust irrigation times and durations seasonally	X			
5.10	Post a copy of the irrigation schedule inside irrigation controller box doors	X			
5.11	Install shut-off nozzles or quick-couplers for all hoses	X			
5.12	Replace leaking shut-off nozzles, quick couplers and hoses	X			
5.13	Install faucet timers for hose or hand irrigation	X			
5.14	Maintain a monthly log of irrigation water use with account and meter numbers	X			
5.15	Provide education for the management of landscape irrigation	X			
5.16	Install irrigation water meters and master valves		X		
5.17	Upgrade existing irrigation controllers with weather-based irrigation controllers that use onsite weather stations or free weather base evapotranspiration web data	X			
5.18	Maintain planting and irrigation record drawings for baseline information and submit a copy to Agency/Department and landscape architect (these records help identify areas in need of water conservation improvements)		X		
5.19	Identify and modify manually operated irrigation valves to automated valves			X	
5.20	Identify planter areas that experience runoff and adjust irrigation to prevent runoff. Install check valves or anti-drain valves to hold water in the system to prevent drainage from sprinkler heads when the system is off	X			
5.21	Turn off water fountains and establish maintenance procedures for existing pumps and equipment		X		
5.22	Inspect and maintain backflow prevention devices	X			

Activity	Water Management and Conservation Best Practice	Current practice	New practice	Evaluate	Not applicable
6	***Best Management Practice 6 - Toilets and Urinals***				
6.1	Adjust fixtures to use the minimum amount of water required for proper function	X			
6.2	Replace broken fixtures with low-flow water conserving fixtures	X			
6.3	Repair leaking toilets	X			
6.4	Toilets that need to be replaced due to normal wear-and-tear should be replaced with low-flow models	X			
6.5	Install toilet tank water displacement devices, such as toilet dams, bags, or weighted bottles				X
6.6	Retrofit flushometer (tank-less) toilets with water-saving diaphragms	X			
6.7	Replacing toilets with low-volume models. Toilets can use as much as 3.5 gallons per flush, while low-volume toilets can use as low as 1 to 1.28 gallons per flush	X			
6.8	Set urinals with programmable automatic flush valves to a water saving mode that flushes the urinal after more than one use			X	
6.9	Install waterless urinals wherever possible	X			

7	***Best Management Practice 7 - Faucets and Showerheads***				
7.1	Adjust fixtures to use the minimum amount of water required for proper function	X			
7.2	If replacing broken fixtures, install water conserving devices	X			
7.3	Repair leaking or dripping faucets or showerheads	X			
7.4	Showerheads or faucets in need of replacement due to normal wear-and-tear, should be replaced with low-volume models	X			
7.5	Low-volume showerheads use only 2 gallons of water each minute; older models may use as much as 3 gallons per minute	X			
7.6	Replace 2.5 gallons per minute kitchen faucets with those that use only 1.5 - 1.8 gpm	X			
7.7	Replace restroom faucets that use as much as 1.5 gallons per minute with those which use only 0.5 gpm	X			
7.8	Replace restroom faucets with programmable faucets that use 0.20 gallons per cycle	X			

8	***Best Management Practice 8 - Boiler/Steam Systems***				
8.1	Perform a basic visual/audible leak detection survey of the primary steam distribution pipes and steam traps. Develop a steam trap inspection plan. Replace faulty steam traps with effective, low-maintenance units	X			
8.2	Identify the location of all leaks and record relative severity (serious or minor)	X			
8.3	Repair all leaks as feasible, otherwise verify that all non-repairable leaks are adequately documented in maintenance management logs and databases	X			

Activity	Water Management and Conservation Best Practice	Current practice	New practice	Evaluate	Not applicable
8.4	Inspect piping and main tank insulation, repair or replace as necessary	X			
8.5	Identify, modify or establish procedures to reuse steam condensate and boiler blow-down water for other purposes where feasible; Steam condensate shall be returned to the boiler unless volumes are too low to justify condensate return loops; in the latter case, the condensate shall be reused beneficially wherever possible	X			
8.6	Identify, modify or establish procedures to avoid once-through/single pass operations	X			
8.7	Where water softening is used, regeneration shall be controlled by actual hardness or by a flow volume control that is based on the hardness of the water to be softened. Softeners that use timers for recharging should be eliminated	X			

9	***Best Management Practice 9 - Single Pass Cooling Equipment***				
9.1	Perform a basic visual/audible leak detection survey of the primary cooling water distribution pipes; as part of Preventive Maintenance Program	X			
9.2	Identify the location of all leaks and record relative severity (serious or minor)	X			
9.3	Repair all leaks as feasible, otherwise verify that all non-repairable leaks are adequately documented in maintenance management logs and databases	X			
9.4	Inspect piping, chiller and storage tank insulation, repair or replace as necessary	X			
9.5	Condensate from the air conditioner cooling coils should be captured and used for cooling tower makeup or other purposes. Building design should be considered that would help facilitate the easy capture of condensate by location of air handling units			X	
9.6	Find alternative uses for single-pass effluents such as landscaping, boiler or cooling tower make-up water, or toilet flushing			X	
9.7	Future systems should specify multi-pass, closed loop, or air-cooled equipment options			X	

10	***Best Management Practice 10 - Cooling Tower Management***				
10.1	Perform a visual/audible leak detection survey of the primary cooling tower water distribution pipes	X			
10.2	Identify the location of all leaks and record relative severity (serious or minor)	X			
10.3	Repair all leaks as feasible, otherwise verify that all non-repairable leaks are adequately documented in maintenance management logs and databases	X			
10.4	Identify, modify or establish procedures to eliminate once-through/single pass cooling, or for reusing water elsewhere in the facility	X			

Activity	Water Management and Conservation Best Practice	Current practice	New practice	Evaluate	Not applicable
10.5	Identify, modify or establish procedures to use air cooling where feasible	X			
10.6	Identify, modify or establish procedures for water treatment to maximize cycles of concentration; Cooling tower chemical contracts must specify the cycles of concentration to be achieved. The cycles of concentration should be set to match local water chemistry but shall exceed at least four cycles unless the blowdown is being reused for landscape irrigation or other water conserving uses	X			
10.7	Identify, modify or establish procedures to reuse cooling tower effluent where possible			X	
10.8	Identify, modify or establish procedures to reuse treated waste water or other non-potable water sources for cooling tower make-up			X	
10.9	Cooling tower side stream filtration should be installed when new systems are purchased			X	

11	***Best Management Practice 11 - Commercial Kitchen Equipment***				
11.1	Perform a visual/audible leak detection survey of all kitchen devices using water	X			
11.2	Identify the location of all leaks and record relative severity (serious or minor)	X			
11.3	Repair all leaks as feasible, otherwise verify that all non-repairable leaks are adequately documented in maintenance management logs and databases	X			
11.4	Clean or replace high pressure pre-rinse spray valves	X			
11.5	Identify, modify or establish procedures to eliminate wasteful water use	X			
	Examples:				
	Do not use running water to melt ice				X
	Operate dishwashing equipment only when needed	X			
	Wash only full loads	X			
11.6	Identify, modify or establish procedures to reuse final rinse water for garbage disposal and pre-wash functions			X	
11.7	Limit garbage disposal use - hand scrape food trays, receptacles and utensils into garbage containers or equip sinks with strainers or mesh screens to divert food waste from the garbage disposal			X	

12	***Best Management Practice 12 - Laboratory/Medical Equipment***				
12.1	Perform visual/audible leak detection surveys of all water use or distribution systems	X			
12.2	Identify the location of all leaks and record relative severity (serious or minor)	X			
12.3	Repair all leaks as feasible, otherwise verify that all non-repairable leaks are adequately documented in maintenance management logs and databases	X			
12.4	Identify, modify or establish procedures to turn off any equipment not in use	X			

Activity	Water Management and Conservation Best Practice	Current practice	New practice	Evaluate	Not applicable
12.5	Inspect solenoids and automatic shut-off valves for proper function and repair or replace as feasible	X			
12.6	Verify that all equipment is set to minimum manufacturer pressure and flow rates	X			

13	***Best Management Practice 13 - Laundry***				
13.1	Identify, modify or establish procedures to evaluate wash cycles and detergent/chemical formulation for maximum efficiency			X	
13.2	Identify, modify or establish procedures to avoid excess filter and softener back flush			X	
13.3	Identify, modify or establish procedures to restrict use of equipment to only full loads			X	
13.4	Identify, modify or establish procedures to minimize use of stand-alone washing machines			X	

14	***Best Management Practice 14 - Vehicle Washing***				
14.1	Identify, modify or establish procedures to keep records of water used per vehicle washed	X			
14.2	Determine the effects of eliminating vehicle washing activities	X			
14.3	Verify all solenoids, valves, nozzles and other equipment are adjusted for minimum manufacturer pressure and flow rates				X
14.4	Inspect jets and hose parts, replace as necessary				X
14.5	Identify, modify or establish procedures to reduce foam and the resulting need for rinse water				X
14.6	Identify, modify or establish procedures to use higher pressure rinses instead of flood arches				X
14.7	Identify, modify or establish procedures to use environmentally preferable and chemically compatible washing solutions and waxes to enable recycling	X			

Chapter 4. Water Efficiency Projects

ACCOMPLISHMENTS TO DATE and ONGOING ACTIVITIES

By adopting and implementing applicable best management water use practices for all campus operations, CSULB has implemented numerous water conservation projects including transitioning landscape areas to drought tolerant plantings and drip irrigation, using reclaimed water for irrigation, and installing low-flow urinals, touch free automatic faucets with low flow restrictors. Specific accomplishments are discussed below based on the Water Action Plan objectives listed in Chapter 1.

1. **Perform a comprehensive water use audit**. The *Water Usage and Conservation Study* was completed in 2015 by P2S Engineering.

2. **Adopt and implement applicable best management water use practices for all campus operations**. See Chapter 3 for a complete list.

3. **Identify opportunities to use reclaimed in place of potable water.** Examples include irrigation for landscaping on lower campus, plans for a new recycled water line, and replacing cooling water for the Central Plant with reclaimed water.

4. **Implement low cost quick payback projects immediately.** Examples: Housing took advantage of LBWD's rebate program to replace more than 100 toilets/showerheads at no cost to CSULB. Associated Students, Inc. has retrofit showers at the Students Wellness & Recreation Center with lower-flow showerheads. They have also adopted requirements to consistently use their pool cover which will reduce evaporation and heat loss, saving both water and energy use.

5. **Identify, plan, and phase implementation of high cost capital projects.** Examples: Lawn Conversion Project – Phase 1: 90,000 sq. ft. of turf converted to drought tolerant landscaping in 2015 covering six areas on the perimeter of campus.
6. **Develop a communication plan to encourage campus wide water conservation.** A communication campaign was developed for Phase 1 of the landscape conversion including signage on campus and media articles explaining the project goals. Another outreach effort is needed to promote conservation awareness whenever this Water Action Plan is updated.

7. **Collaborate with faculty and students on water related courses and projects.** Students assisted in preparation of a benefit and cost analysis of the SWRC pool cover and showerhead retrofits. There are ongoing efforts to involve students in the Water Efficiency & Conservation Working Group and on-campus conservation initiatives.

8. **Share best practice with campus auxiliaries and provide technical support to help develop water and implement conservation projects.** Many of the retrofit projects implemented to date (e.g. ASI, Housing) were done in cooperation with Facilities Management and LBWD.

9. **Strengthen partnerships and increase collaboration with local water utility and regional water agencies to support CSULB water initiatives.** We are fortunate to have the support of LBWD in planning and identifying funding opportunities for many on-campus projects. A staff member with expertise in water utilities and conservation, Mr. Dean Wang, also sits on the Water Efficiency & Conservation Working Group. The CSU's WRPI is another avenue for partnerships both regionally and statewide.

10. **Plan future campus development for water resiliency.** This is an ongoing activity. As an example, the new CCPE building, although not incorporating recycled or graywater use, will implement state-of-the-art low water use fixtures (faucets, toilets and urinals) and drought tolerant landscaping with a reclaimed water irrigation system. Future construction projects, such as the Alumni Center, PH2 renovation, and Sustainability Center will incorporate water efficiency measures that meet or exceed those incorporated into the new CCPE building. Our long-term goal is to implement graywater systems for toilet flushing and urinals in all new construction, housing expansion and building renovations. We will also investigate other opportunities for capturing water for reuse, such as air conditioning condensate.

The accomplishments described above do not imply that our goals have been met. CSULB will continue to further our water conservation activities to meet the long-term objectives.

TIMELINE AND STATUS OF PROPOSED PROJECTS

The tables below summarize recently completed and proposed water conservation projects. Some of those recommended in the *Water Use Study* (2015) are incorporated in the campus plan.

Table 1. Campus Water Conservation Action Plan Projects

1 = Complete 2 = In Construction 3 = Planning/ Unfunded	Title	Description	Cost Estimate	Water Saving Estimate (CCF)	Annual Cost Savings ($)	NOTES
1	Install low flow urinals	Install (221) 0.25 GPF urinals - campus wide	$ 151,457	7386	$ 21,419	
1	Install low flow faucet aerators	Install 0.5 GPM faucet aerators - campus wide	$ 5,930	1139	$ 3,303	
1	Install low flow shower heads	Install low flow shower heads - Pyramid	$ 12,530	3425	$ 9,933	
1	Housing Water Conservation Project 2014	Retrofit toilets and install water saving shower heads and faucet aerators in (80) bathrooms	$ 18,000	2274	$ 6,595	
1	Comprehensive Water Audit	Perform comprehensive water audit to establish water budgets and to identify water conservation opportunities	$ 53,000	TBD	TBD	
1	Replace water filtration system at Japanese Garden	Replace existing sand filters with high efficient bio-mechanical filters to reduce backwash cycles	$ 75,000	2400	$ 6,960	
1	Replace Swimming Pool Covers Kinesiology	Replace aging pool covers and mechanical reels	$ 65,000	590	$ 1,711	
1	Convert Lawn to Drought Tolerant Ground Cover - Phase 1 (90K SF)	Convert existing lawn to drought tolerant ground cover and rotator sprinkler heads - multiple campus location	$ 594,509	4364	$ 12,656	

1 = Complete 2 = In Construction 3 = Planning/ Unfunded	Title	Description	Cost Estimate	Water Saving Estimate (CCF)	Annual Cost Savings ($)	NOTES
1	Convert Lawn to Drought Tolerant Ground Cover - Parking Office North	Convert existing lawn to drought tolerant ground cover and install drip irrigation - multiple campus location	$ 10,000	74	$ 215	
2	Extend reclaimed water service to central plant and convert cooling tower to reclaimed	Convert central plant cooling tower potable water source to reclaimed water service	$ 413,000	15629	$ 23,444	Savings is based on potable to reclaimed water conversion
3	Convert Lawn to Drought Tolerant Ground Cover Phase 2 Campus wide (SWA)	Convert existing lawn to drought tolerant ground cover and install drip upgrade irrigation in multiple campus location	TBD	TBD	TBD	
3	Install low flow toilets	Replace all 3 GPF toilets to 1.28 GPF - campus wide	$ 600,100	980	$ 2,842	
3	Install low flow urinals	Replace standard urinals with 0.25 GPF urinals - campus wide	$ 75,729	3693	$ 10,710	
3	Remove steam boilers and install sterilizers	Remove existing steam boilers and install electric point of use sterilizers	$ 30,000	240	$ 696	
3	Transition to water recovery and recycling pressure washing system	Eliminate direct water pressure washing of sidewalks and driveways and transition to recovery/recycling process and system	TBD	TBD	TBD	
3	Xeros Bead Laundry System Pilot Project	Replace one standard commercial washer with Xeros polymer bead laundry system for onsite testing	$ 12,000	1843	$ 12,185	
3	Install Weather Based Irrigation Controller/Stations	Convert standard irrigation timeclock to weather based controller/station	TBD	TBD	TBD	

1 = Complete 2 = In Construction 3 = Planning/ Unfunded	Title	Description	Cost Estimate	Water Saving Estimate (CCF)	Annual Cost Savings ($)	NOTES
3	Convert Spray Irrigation to Drip Irrigation, Central Plant Planters	Convert Spray Irrigation to Drip Irrigation, Central Plant Planters	$ 10,500	414	$ 1,201	
3	Convert Lawn to Drought Tolerant Ground Cover - Parking Structure 1 North	Convert existing lawn to drought tolerant ground cover and install drip irrigation	$ 5,000	54	$ 157	
3	Convert Lawn to Drought Tolerant Ground Cover - Student Health Center	Convert existing lawn to drought tolerant ground cover and install drip irrigation - multiple campus location	TBD	365	$ 1,059	
1	Replace Showerheads in Student Rec and Wellness Center	Replace showerheads with low flow showerheads	TBD	336	$ 26, 623	Cost savings include water & energy
3	Install pool covers in Student Rec and Wellness Center	Install energy and water saving pool cover for SRWC pool and spa	TBD	870	$ 31,080	Pool cover in use. Cost savings include water & energy.

Table 2. CAMPUSWIDE WATER AUDIT CONSERVATION MEASURES

Building type	Retrofit measure	Annual water saving (M Gal)	Annual cost saving from reduced water usage	LBWD rebate	Retrofit cost	ROI	STATUS
Rec center	Low flow showers	2.84	$ 5,800		$ 7,400	1	complete
Academic	Low flow urinals	3.83	$ 16,373	$ 32,400	$ 95,580	4	Planning
	Low flow water closets	8.91	$ 24,395	$ 66,000	$ 511,500	18	Planning
	Low flow faucets	3.44	$ 4,620	-	$ 31,200	7	Planning
Residential	Water efficient Washing machines	2.92	$ 12,475	$ 14,000	$ 52,800	3	Evaluating
Labs	Low flow urinals	0.90	$ 3,841	$7,600	$ 22,420	4	Planning
	Low flow water closets	1.22	$ 3,327	$9,000	$ 69,750	18	Planning
	Low flow faucet fixtures	0.51	$ 2,483	-	$ 10,750	7	Planning
	Low flow lab equipment	1.9	$ 7,002	-	$ 294,000		Planning
Central plant make- up water	Extending reclaimed water lines to South campus	14	$ 14,973	-	$ 400,126	7	In progress
Irrigation system – Reclaimed water	Extending reclaimed water lines to South and partial North	40	$ 45,781	-	[included in Central Plant estimate above]	7	In progress
Irrigation system- Utilize automatic weather based controls	Calibrate and utilize existing weather-based controls	10	$25,401	-	$100,000	4	On-going
Irrigation system- Leak detection and repair	Irrigation distribution system audit and repair	10	$25,401	-	$200,000	8	On-going
Swimming Pools	Pool Covers	1.0	$3,610	-	$29,535	6	Complete
Blackwater retrofit- Living Machine	Living Machine- 30,000 gal/day system	11	$39,700	-	$1,200,000	30	Evaluating

Chapter 5. Water Resilience

In April 2016, CSULB President Jane Conoley signed the Second Nature Climate Commitment, expanding the university's existing climate action efforts, previously focused primarily on mitigation of greenhouse gas (GHG) emissions, to include a focus on climate resilience and adaptation. In this context, resilience is defined as "increasing the ability to survive disruption and to anticipate, adapt, and flourish in the face of change" (Second Nature, 2016). The Climate Commitment includes a Carbon Commitment and a Resilience Commitment, setting forth dual goals of achieving climate neutrality (i.e. reducing university GHG emissions to zero) and building adaptive capacity to withstand future climate shocks, such as increased air temperature, reduced water availability, worsening air pollution, and sea level rise. Thus, effective climate action depends on the integration of joint planning, implementation, monitoring, and evaluation through partnerships across campus and campus-community coalition building with diverse stakeholders. Introducing the goal of climate resilience requires new sustained focus on determining tangible and achievable capacity building efforts, adaptation planning and implementation, and the identification and monitoring of critical thresholds, beyond which campus sustainability would be threatened and our ability to carry out our university mission may be compromised.

The focus on resilience emphasizes planning and anticipation for both short-term disruption and long-term trends of change, through developing adaptive capacity, so that the university cannot only survive and bounce back from climate shocks and disruptions, but rather thrive in an era of climate change. Second Nature, the organization responsible for Climate Commitment, describes a resilient community as follows "A resilient community is one that isn't just capable of absorbing impacts and change, but using those changes to develop more positive and regenerative capacity. In other words, it has the ability to self-renew even as it becomes better able to prevent disruption." Guided by these lofty goals and findings from the resilience scholarship, CSULB's resilience plan aims to integrate several principles of good resilience planning: diversity, inclusiveness, flexibility, learning, prevention, and management.

How does this apply to water? Water resilience, stated simply, means knowing where to cut back if needed and being as efficient as possible. For CSULB to become water resilient, continued efforts to promote water efficiency and conservation are critical. In the event of another drought emergency or similar event, the campus would focus in these areas:

- Outreach campaign to campus community to reduce overall use:
- Reduce landscape irrigation in areas still using potable water
- Cut discretionary operations such as pressure washing paved areas and washing vehicles
- Cut off water to decorative fountains

Chapter 6. Future Goals and Development

Although the current drought is officially over, the state of California will continue to experience water shortages due to drought for many years to come. CSULB is taking action now and will ramp up water conservation and efficiency efforts over the next few years. The majority of these projects require significant financial resources to implement and CSULB will seek all available funding from internal and external sources for phased implementation of future water conservation projects. Additionally, CSULB will continue to work with the Long Beach Water Department and regional water agencies and leverage water conservation incentives and grants to reduce the overall project cost to the campus. Water and energy efficiency must also be included in the University's strategic planning activities.

Saving water is a simple concept that most people understand; the changes we need to make in our physical infrastructure and the changes in ways we use water around campus will be more of a challenge. CSULB is determined to take on these challenges and take the necessary action to reduce campus water consumption.

Appendix 1: Chancellor's Office California Drought Emergency Memoranda

CSU The California State University
OFFICE OF THE CHANCELLOR

Business and Finance
401 Golden Shore, 5th Floor
Long Beach, CA 90802-4210

www.calstate.edu

Sally F. Roush
Interim Vice Chancellor

562-951-4600
Fax 562-951-4970
sroush@calstate.edu

MEMORANDUM

DATE: February 4, 2014

TO: CSU Presidents

FROM: Sally F. Roush
Interim Vice Chancellor

SUBJECT: State of California, Drought Emergency

On January 17th 2013, Governor Brown declared a State of Emergency saying "the State of California is experiencing record dry conditions, with 2014 projected to become the driest year on record" and he has asked for "*all Californians to conserve water in every way possible*." The governor has directed all state agencies to immediately implement water use reduction plans for all state facilities. These plans will include immediate water conservation actions, and a moratorium will be placed on new, non-essential landscaping projects. He has also expanded his water conservation public awareness campaign (www.saveourh2o.org) and calls on all Californians to reduce their water usage by 20 percent.

As one of the state's largest institutions, the CSU is supportive of the governor's efforts to conserve water across the state. The Office of the Chancellor is participating by reducing water usage where possible and reviewing campus water consumption reporting. CSU campuses already actively track, report and implement strategies to conserve our natural resources and have for many years. However, this state of emergency is an opportunity for all CSU campuses to reevaluate water usage and reduce where possible throughout the declared drought. Campus leadership is encouraged to support Governor Brown's public awareness campaign to have a 20 percent reduction in personal consumption.

Under current Executive Order 987, campuses report water consumption monthly. To assist in tracking our water reduction activities campuses should evaluate their current reporting of water to ensure all sources are captured and reported in a timely manner. Data submitted is used to report to the Board of Trustees regarding our progress on utility reduction goals.

Thank you for your diligence and continued efforts to conserve the natural resources of California. Your campus participation will help us all get through this emergency.

SFR: ESJ

CSU The California State University
OFFICE OF THE CHANCELLOR

MEMORANDUM

To: Vice Presidents, Administration and Finance
Vice Presidents, Student Affairs

From: Elvyra F. San Juan
Assistant Vice Chancellor
Capital Planning, Design and Construction

c: Executive Facilities Officers
Directors of Facilities Operations
Energy Managers
Public Information Officers
Laurie Weidner, Assistant Vice Chancellor, Public Affairs
Erik Fallis, Senior Manager of Operations, University Relations and Advancement
CPDC Managers

Date: March 13, 2014

Re: State of California Drought Emergency and Water Conservation Action Plans

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On February 4, 2013, your campus president received a memorandum from Interim Vice Chancellor Sally F. Roush asking you to reevaluate water usage, implement water reduction strategies and target a 20 percent personal consumption reduction goal. This memo is to follow-up on campus action plans and request campuses: 1) review and confirm baseline water consumption data; 2) provide information on water conservation projects; and 3) actively participate in drought response messaging.

Review of Water Consumption and Cost Data

Based on the data provided by your campus, we have compiled the following historical water consumption and cost information in the enclosed Campus Water Workbook including:

- Campus Total Water Consumption (Consumption Data tab)
- Campus Total Water Cost (Cost Data tab)
- Campus Water Consumption graphs are also included in the workbook

Please review the enclosed Excel workbook data tabs to confirm accuracy of data, or correct data as needed. Where applicable, identify water supply categories such as utility potable water, utility reclaimed water, and/or well water. Also review water usage categories such as domestic water, irrigation water, industrial and fire protection water, etc. The data has been collected from the campus Monthly Energy Reports. Please specifically review the data that corresponds to any abnormally high campus peaks or gaps in the data as one method to check the data.

Water Conservation Action Plans

To assist you in developing or updating your existing water usage plans, a toolkit and checklist can be found under Useful Links at http://www.calstate.edu/cpdc/sustainability as a guide for your consideration. Using Campus Projects tab of the workbook, assign each project with a number corresponding to its status:

1) *Completed* : Any recently implemented water conservation projects (project title/location, brief description, cost estimate, estimated water and cost savings);
2) *Planned*: The list of any planned campus funded conservation measures. The campus is encouraged to promote conservation projects in all academic buildings, and in particular high use areas like student housing and food service. The installation of low flow fixtures has been very successful and the discontinued use of food service trays in the dining commons have resulted in less food waste and reduce water use.
3) *Requested*: The list of additional water conservation project(s) that would support the governor's reduction goal that can be used by the Chancellor's Office in soliciting available state funding. Please identify projects in both state and non-state supported buildings that can contribute to the savings goal.

Drought Response Messaging

We would like assistance in CSU drought response messaging and want to support the governor's messaging efforts as well. Therefore, please do the following:

1) Provide the Chancellor's Office Public Affairs unit copies of campus articles, awards, and/or best practices that highlight campus conservation efforts for our use in providing to the governor. Send this information to Elizabeth Chapin, Public Affairs Assistant at echapin@calstate.edu.
2) Incorporate the state water conservation logos and slogans in messaging to the campus community.
3) Regularly publish consumption usage to help the campus community track performance to reduction goals. The CPDC website will be updated to add systemwide performance.
4) Identify any adverse economic impacts that the drought is having on the campus and quantify as best possible. Share this information with my office, your campus Public Affairs office and Elizabeth Chapin.

The CSU is committed to helping the state and western region during this emergency. The draft sustainability policy update on conservation and sustainable practices currently includes a 20 percent water reduction goal by 2020. In light of the severe drought, interim goals are proposed in order to achieve this goal sooner. It is recognized that funding for conservation measures will help make a significant reduction in consumption, but we hope increased and improved messaging will also prompt changes in individual behavior.

Thank you in advance for your response and assistance. Should you have any questions regarding the Excel workbook, please call Michael Clemson, Associate Energy Analyst at (562) 951-4291, mclemson@calstate.edu. Len Pettis, Chief of Plant, Energy and Utilities and I can also be reached should you have any other questions or comments.

ESJ:LP:jdes

Attachment: *Campus Water Workbook*

Appendix 2: Water Efficiency & Conservation Working Group Work Plan

Sustainability Task Force Working Group - Work Plan

Water Efficiency and Conservation	**Paul Wingco and Suzanne Dallman (Co-chairs)**
The Water Efficiency and Conservation working group will develop a water action plan to address the following: **1. Reduce our reliance on potable water.** **2. Reduce overall campus water use.** **3. Comply with Governor's executive order B29-15 and meet 25% reduction goal as soon as possible.**	
1. Develop a new Water Action Plan	**WG Draft 4/28/17; STF Draft fall 2017; final 12/15/17**
2. Identify and implement low cost water conservation measures that can be implemented right away	**9/1/2016**
3. Develop a water communication and marketing plan to encourage efficient water use (with Outreach Working Group)	**10/15/17**
Review the current Water Action Plan	
• Identify areas needing updates or more detailed information	
Identify goals and develop content for the new Water Action Plan	
• Update current water use statistics	
• Identify opportunities for more efficiency measures	
• Develop communication/outreach plan	
Research opportunities for student involvement	
• Communication/outreach plan	
• Water Action Plan updates	
Seek collaboration on conservation & efficiency efforts with other entities	
• Contact WRPI and local CSUs ("CSU 5") to discuss ways to leverage actions	
• Contact cities of Long Beach and Seal Beach for collaboration opportunities	

How will WG's efforts help CSULB achieve the goals outlined in Climate Action Plan (achieving climate neutrality by 2030 and promoting climate action and literacy through curriculum, research, and community engagement)?					
Although not directly tied to the Climate Action Initiative, water efficiency and conservation are important elements of campus sustainability. Water is a valuable resource and water scarcity due to increased frequency of droughts in our region due to climate change will mean less water for everyone. Water also contains an embedded energy component in treatment and delivery that contributes to GHG emissions. Therefore, it is the goal of this working group to find ways to reduce water use in all campus operations by recommending water efficiency and conservation measures including ways to recycle and re-use water if and where possible. The working group will develop a comprehensive Water Action Plan that will 1) acknowledge water conservation & efficiency measures already in place, 2) identify short and long-term measures to increase conservation & efficiency, and 3) promote water conservation & efficiency through outreach and communication efforts to the entire campus community and the City at large.					
List of WG Members					
List of WG Members					
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