

Chehalis WaterSmart Report

Prepared by:
Sofia Dreessen

University of Washington's Program on the Environment.

This project was completed as a senior capstone project for the Chehalis Basin Partnership.



March 2023



TABLE OF CONTENTS

INTRODUCTION	2
SECTION 1 – REDUCING USE DURING PEAK DEMAND	2
SECTION 2 – REDUCING INDOOR WATER-USE	5
SECTION 3 – PRICE OPTIONS	6
SECTION 4 – BROADER OUTREACH	6
SECTION 5 – LONG TERM GOALS	7
SECTION 6 – BUDGET/PRICE ESTIMATES AND NEXT STEPS	8
APPENDIX A – Plant Catalog	9
APPENDIX B – Survey	10

INTRODUCTION

This report was written by a University of Washington student, as a capstone project for the Program on the Environment. The project was completed in association with the Chehalis Basin Partnership, during the winter of 2023. Data was collected through literature review, case-study analysis, interviews, and a preliminary survey.

This WaterSmart report contains a collection of suggestions for the City of Chehalis in order to reduce municipal water use and promote some water conservation in affected ecosystems. While the City has enough water to provide for current services and future development, excessive water use at the wrong time of year can have negative impacts on downstream river ecosystems. Specifically, low summer flows can harm migration and population size of salmon (Mantua, 2010). Reducing municipal water-use at the city level can help maintain instream flows, particularly in the North Fork Newaukum. Further, there are impending changes to the hydrology in the Chehalis Basin due to climate change (Mauger, 2016). These include increased intensity of stream variability throughout the year: summer flows will become lower and winter stream flows will become much higher. Anticipating these changes and preparing for lower summer flows in the future can lead to more long-term, sustainable water-use plans that better provide for future development. In the face of development, reduction of water-use may help the City delay investment in new, costly infrastructure to provide for growth and better provide water for future generations.

This research project resulted in suggestions to reduce water-use including limiting water-use during peak demand, changes to water pricing, incentives for using low water-use appliances, and public outreach programs. These different conservation options are mere suggestions. It is not necessary for all of these ideas to be implemented together; the most plausible and applicable ideas can be selected. If implemented, these programs could potentially be funded through grant money from the Chehalis Generation Facility or another granting entity.

SECTION 1 – REDUCING USE DURING PEAK DEMAND

The surface water sources servicing the City of Chehalis are lowest during the summer, so maintaining water supplies for ecosystem and community needs is most important during this time. Water demand is much higher during these months, often due to outdoor irrigation needs. On residential properties, most irrigation is lawn watering. Reducing the amount of water used during this time of year can delay expensive investment in water-infrastructure that is not needed year round. Addressing irrigation habits during times of drought can be done through a number of measures.

1.1 – Low water use irrigation appliances and technologies

Providing homeowners with rebates for low-use irrigation systems, or using funds to hand out free outdoor water saving kits can limit the amount of water used for irrigation (City of Tumwater, 2022) (Columbia Basin Trust, 2016). Outdoor water saving kits include water efficient hose nozzles, flow meters, and rain gauges. Nozzles can prevent leakage from hoses, flow meters can allow residents to measure the amount of water they are using for irrigation, and rain gauges show residents how much water has fallen so they can accurately determine how much they should water their outdoor landscape. Irrigation system meters that use soil moisture sensors, or account for local weather conditions and

climate can be used to reduce outdoor water use (EPA WaterSense, 2023). Additionally, installation of drip irrigation systems can further reduce water use in outdoor landscapes. Using grant money, rebates can be provided to people that purchase and install such irrigation systems. If residents submit a form with receipts of low-use irrigation system (that complies with EPA WaterSense¹ guidelines) purchase and installation, they could receive a rebate from their municipality for a portion of the irrigation system's cost. Rebate prices can vary based on the price of the system. Local cities with similar projects have a maximum rebate of \$200, but will cover 50% of the cost for a smart irrigation controller. There are other specific technologies that could receive rebates. Rain barrels, irrigation rain sensors, sprinkler nozzles, and watering timers are included in similar local rebate programs.

To limit spending, the City can set a quota for the amount of grant money that they are willing to use for these specific rebates. For example, there can be a \$7,500 cap on rebate spending.

Outdoor appliance rebate offers

Smart irrigation systems (based off of weather or soil moisture)	50% of cost – up to \$200
Rain barrels	\$20 per barrel – up to 3 barrels
Sprinkler nozzles	\$10 per pack - one per residence
Drip irrigation systems	\$100 for up to 500 sq ft – up to 1,500 sq ft
Outdoor water saving kit	Free
Hose Water Timer	\$10 – one per residence

1.2 – Water-saving landscape

A combination of proper planning, native plant usage, and smart watering habits can reduce the amount of water needed to sustain plants in an outdoor landscape. In the process of replanting, it is best to start this process before summertime, to avoid stress on new plants. Taking a look at the outdoor landscape and evaluating the specific conditions of each area can help one choose *what* plants to put *where*. Each plant species has its own set of ideal conditions, some prefer different amounts of sunlight and water. Considering the ideal conditions for each plant in the landscape can help plants thrive (King County Native Plant Guide, 2022).

Native plants are adapted to the natural climatic conditions of the region and do not need as much supplemented water to survive (The Saving Water Partnership). Choosing from a selection of native plants can help reduce the needed amount of water to keep landscaping alive and thriving. Appendix A includes a short catalog of native plants that can survive dry weather conditions. More comprehensive lists made by other organizations (which are available in Appendix A), as well as resources to locate nurseries that carry native plants. These plants are also more beneficial to local wildlife. Switching to water-wise native plants can bring bees, hummingbirds, butterflies, and other beautiful animals to backyards.

¹ [EPA WaterSense](#) is a program that identifies low water-use appliances. There is a WaterSense label on these appliances to show customers specifically what appliances use less water. This program also provides myriad information on how to reduce water-use in a number of ways.

Further, there are a number of landscaping techniques that can reduce water use. Mulching the area around plants, usually around two to four inches deep, can help retain soil moisture. Additionally, this technique can reduce water-competition from weeds (Washington Association of Conservation Districts). Maintaining soil quality by making a compost pile and using it for one's soil can prevent evaporation, since organic material holds on to water. Composting has additional benefits, as it is better for plant health overall and can help reduce waste. Lastly, choosing the right material for walkways and patios that is porous can ensure that rainwater gets back into the soil to support the surrounding vegetation (Chelan PUD).



Landscape design using shrubs instead of lawns (Landscape Design For Small Spaces, 2015).

Reducing the amount of lawn coverage can significantly reduce water needs of one's outdoor landscape, since grass is a particularly thirsty plant. Up to 45% of water-use in one household can be used for lawn irrigation (Columbia Basin Trust, 2016). Replacing lawn space with low shrubs or native grasses, while not putting grass on hills or difficult places to water, can achieve this. However, there are certain methods of lawn maintenance that make them require less water. These methods include: mowing somewhat infrequently, removing last year's thatch, poking holes in the lawn, letting lawns go dormant during periods of

extreme heat, and supplementing lawns with other grass seeds (Chelan PUD).

1.3 –Recommendations to assist practice implementation

While there are many benefits of changing landscaping practices, it may be difficult to communicate these benefits to city residents. Beginning by implementing these landscaping methods (section 1.2) on City property may be a good start, in addition to purchasing low-use appliances (described in section 1.1) on public property. Limiting water used by the City does not reduce income from the water district, while promoting conservation.

Landscaping changes can also be implemented in schools. Classrooms can be given native plants that students can plant themselves for class. This achieves the goal of re-landscaping public property, while teaching students about native ecology and water conservation. Hopefully, students can discuss the benefits of native plant use and provide information to parents.

These methods can be supplemented with a small mail-in that can be sent out to residents connected to City water. This mail-in can include information about the goals of water conservation with a short list of methods. The back of the mail-in can include resources to learn about native plants, proper landscaping, and native-plant nursery locations. If the City decides to offer rebates, there can be a website page that includes information about low-use appliances that can be linked through a QR code on the mail-in.

SECTION 2 – REDUCING INDOOR WATER-USE

Unlike outdoor water-use, indoor water-use is fairly consistent year round (Columbia Basin Trust, 2016). Reducing indoor water demand can be an important step for water conservation, which can be beneficial in providing for development. This is often achieved through rebates for low use appliances, changes in personal behavior, and leak detection.

2.1 – Rebates for low-use appliances.

Indoor water-saving kits, which include faucet aerators, low-use shower heads, and toilet leak tablets, can be given out. Some local cities, such as Olympia and Tumwater, offer these kits on their website to be ordered for free. Faucet aerators are added to the end of faucets in kitchens and bathrooms, and have a “filter” that reduces the stream of water that comes out of faucets. Similarly, low-use shower heads can reduce the rate at which water is used while showering. Lastly, toilet leak tablets can be placed in the tank of a toilet. If a flapper is leaking, blue dye will enter the bowl. This can inform people when their toilets need to be fixed for a leak, which prevents extensive water waste. Installation instructions will be included in the kit. There is a limitation to this program, because no data is available on how many homeowners choose to make these installations. To address this, there can be a low-use showerhead exchange, where people can turn in their old shower heads for the low-use indoor appliance kit.

Partial rebates can be offered for low-use toilets and washing machines. Toilets are responsible for the most water-use for indoor appliances, on average 24% of total indoor use (EPA WaterSense, 2023). Further, they are prone to leaks (City of Tumwater, 2022). Eighty dollar rebates can be provided for toilets that use 1.6 gallons or less, that qualify for EPA’s WaterSense guidelines. Rebate programs in Tumwater and Olympia use MaP PREMIUM rated toilets that use 1.1 gallons per flush, which can be used as a qualification for the rebate as well. WaterSense does not label clothes washing machines, but EnergyStar does. A fifty dollar rebate can be offered for EnergyStar washing machines. Similar to the rebates for outdoor water appliances, residents should submit proof of purchase and installation of these appliances. They should also include an item number of their purchase, to ensure that it is a qualifying item.

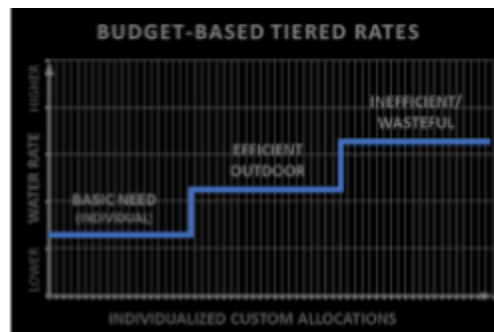
Lastly, Flume meters can be attached to meters. These connect to an online portal, so that residents can monitor their use and check for leaks.

Indoor appliance rebate offers

Toilets	\$80 – two per household
Washing Machines	\$100– one for single family home, 3 for multiple
Indoor water saving kit	Free
Flume water meters	\$60 rebate, one per household

SECTION 3 – PRICE OPTIONS

Water pricing can be a motivator for changes in water-use. Higher prices can incentivize citizens to reduce their water consumption, but this can be unpopular politically and impact lower-income people disproportionately (Ward, 2009). Water price should reflect the accurate value of water, so frequent assessments of water can be useful. To address the inequity of higher water prices, some Public Utility Districts (PUDs) have implemented a tiered water price that has been shown to address inequity (Hornberger, 2015). This has been done in some nearby PUDs, like in Tumwater. Tiered water pricing entails a differing rate structure, where residents or businesses that use a particularly high amount of water will be billed at slightly higher rates. This uses economic incentives to lessen personal water use, while supplementing income to the water district through higher prices. A more simple measure would be to maintain the same flat rate (\$100) while increasing the rate for water consumption.



Example of tiered pricing model (Riverside PUD, 2018)

Implementing tiered prices or higher consumption rates can be done when demand is the highest, in the summer. Water price for subsistence use should remain fairly low (Hornberger, 2015). Increased rates for particularly high use can prevent water being used for unnecessary purposes when it is in the greatest demand. This ties in with frequent assessment of water pricing. If water is assessed to determine an accurate value during the summer, it can reduce unnecessary use as well. However, survey data, collected as part of this report, from municipality employees shows that tiered water pricing is slightly unpopular as a conservation measure. Conversely, frequent assessment of water price received a lot of support. Tiered pricing is complicated, and can be a measure implemented to reduce water use if demand becomes concerningly high and used at specific times, as opposed to all year.

SECTION 4 – BROADER OUTREACH

4.1 – Program awareness

Having a page on the City Website that discusses water conservation goals is a good resource that other local cities have implemented. This page can be shaped to the conservation options that the City decides to use. Having an explanation on the web page stating:

- Saving water can be beneficial for residents by delaying expenditure for new infrastructure
- Stream ecosystems are damaged by extraction.

- Details about the available rebates, links to qualifying appliances, and pdf forms for rebate applications should be included.
- Landscaping options, and a QR code or link to the provided plant catalog (Appendix A).

4.2 – Mail-ins and pop-ups

Mail-ins and pop-ups can be used to provide information to citizens about conservation options and goals. Pop-ups, which are informational pages that appear on an online site, can be added to City water users billing portal. Mail-ins would be small informational fliers that can be mailed to city residents. Pop-ups and mail-ins can have background information on the benefits to water conservation for the City's benefit, as well as the environments. Depending on the goals of the City, different aspects of the WaterSmart program can be included. They should remain relatively simple: they can include simple lists that explain each program, and offer links to the City's webpage. Mail-ins can have a similar format, but have a QR code that links to the webpage. There are other options that can be explored, like creating ads on social media such as Facebook or Nextdoor and printing out fliers for public spaces. Other districts, like California's East Bay Mud, have also taken measures to include reports about individual homes that are customized for each homeowner (East Bay MUD, 2014). These include information on how much water the users have used compared to previous months, and compared to their neighbors. If someone uses excessive water, this can contextualize the amount of water they are using. It can also congratulate lower users. However, outreach programs that frame water as a public good have been shown to incentivize water conservation, even in places where the public is not concerned about drought (Otaki, 2022).

4.3 – Survey

Participation and public support for these programs are necessary for success, and therefore, conservation. Using grant money wisely by investing in programs that will be most supported will be more beneficial. To determine which programs will be the most supported, a survey can be offered to some members of the community that asks the level of support for individual programs. The research for this report included a similar survey (Appendix B) as a preliminary measure, with Chehalis Basin municipality employees as subjects. The survey can be edited or changed, but an example model is included in Appendix B. The survey can provide community members with information about conservation options and make any conservation plans more impactful.

SECTION 5 – LONG TERM GOALS

5.1 – New infrastructure

Old infrastructure has been shown to be the greatest cause of water loss at the municipal level. It can be responsible for up to 40% of water demand annually (Columbia Basin Trust, 2016). Some leakage is unavoidable but newer, advanced water infrastructure can prevent the instances of leaks. These usually occur in underground pipes. While this may be the most effective conservation option, it is also the most costly and complicated. Looking into infrastructure advances in the future could be

beneficial. Further, survey data of Chehalis Basin municipalities employees found that investment in new infrastructure was the most supported conservation option.

5.2 – Reclaimed water reuse

The use of non-potable reclaimed water for irrigation and other non-consumptive reasons is a popular discussion in municipalities (Cope, 2017). Reclaimed water is treated industrial or municipal wastewater that can be used for other purposes, such as irrigation. This type of new infrastructure encounters similar issues to other infrastructure updates – it is incredibly costly. Infrastructure that supplies reclaimed water to residents requires infrastructure directly from water treatment facilities to residents themselves. It can cost up to millions of dollars (Cope, 2017). However, it is a viable option for recycling water and reducing consumption overall. Reclaimed water infrastructure can be considered for new development because.....

5.3 – Storage

Since there is a significant amount of water that falls as rain in the winter, winter water supplies can be stored for later use in the summer. This allows water to come from storage supplies during peak demand, as opposed to coming solely from streams, which can better maintain instream flows and water rights. There can be expansion in residential water storage, in the form of rain water storage tanks. Increasing storage is one way to do this. Water tanks can also be built to maintain the storage capacity of the municipality. However, this option is expensive.

SECTION 6 – BUDGET/PRICE ESTIMATES AND NEXT STEPS

6.1 – Potential Budget

OUTDOOR REBATES:

- Cost of free items – Purchase roughly 30 outdoor water saving kits that would total **\$340**.
- Ceiling on rebate cost – Cap outdoor rebate spending at roughly **\$10,000**. Additional outdoor saving kits can be ordered if needed, and this price can be reduced from the cap.

INDOOR REBATES:

- Cost of free items – Purchase roughly 30 indoor water saving kits which are roughly **\$480**.
- Ceiling on rebate cost – Cap indoor rebate spending at roughly **\$6,000**. Additional saving kits can be ordered if needed, and this price can be considered in the cap.

PUBLIC LANDSCAPING

- Purchase of native plants for City property – **\$3,000**
- Installation/landscaping costs – **\$2,000**

OUTREACH COSTS

- Flier printouts and mailing – **\$1,000**

TOTAL: \$22,820

6.2 – Next Steps

Creating a page on the City’s website that contains information on water conservation and program options can make the program more accessible to the public. Designing outreach methods to promote conservation can involve the community in water-use reduction. Further, evaluating which programs would be most popular and effective through survey data can inform the City on how to best spend grant funding for municipal water conservation.

APPENDIX A – Plant Catalog

City of Chehalis Drought Resistant Landscape Catalog

This chart provides recommendations for drought resistant landscaping. This is part of a project to reduce municipal water use in the City of Chehalis, in partnership with the University of Washington’s Program on the Environment and the Chehalis Basin Partnership.

Information displayed here was gathered from the [Washington Association of Plant Districts Plant Materials Center](#), [King County’s Native Plant Guide](#), and [Washington Native Plant Society](#).

There are additional informational native landscaping guides from [King County](#) and [The Saving Water Partnership](#).

Nursery that carry native plants can be found [here](#), on the King County website. There are some notable locations in Longview, Onalaska, and Olympia. Seeds may also be ordered online. Washington Association of Plant Districts offers plants that can be ordered.

Type	Name	Latin Name	Description	Conditions
Shrub	Baldhip Rose	Rosa gymnocarpa	Attractive plant. Small pink flowers that fall in the early season.	Moist-dry. Sun or part shade.
Shrub	Golden Currant	Ribes aureum	Edible berries. Good for wildlife, such as hummingbirds.	Moist-dry. Sun or part-shade
Shrub	Nootka Rose	Rosa nutkana	Attractive large blossoms. Great for landscaping and restoration.	Moist-dry. Sun or part-shade
Scrub	Serviceberry	Amelanchier alnifolia	White flowers with small apples. Provides winter-browse for birds.	Moist-dry. Sun or part-shade.
Scrub	Silver Buffaloberry	Shepherdia argentea	Small white flowers. Provides food for wildlife. Drought-resistant.	Moist-dry. Full sun.
Scrub	Wood’s Rose	Rosa woodsii	Many branched native rose. Fantastic for honey bees.	Moist-dry. Part shade-full sun

Tree	Big Leaf Maple	Acer macrophyllum	Deciduous tree. Multi-stemmed.	Moist-dry. Partial shade.
Tree	Cascara	Rhamnus purshiana	Green-yellow flowers. Blue-black edible berries.	Moist-dry. Sun or partial shade.
Tree	Pacific Dogwood	Cornus nuttallii	Attractive white flowers and red fruit. Good for wildlife	Moist-Dry. Part shade-full sun.
Tree	Quaking Aspen	Populus tremuloides	Has flat leaf stalks. Good for landscapes. Likes moist areas.	Moist. Partial shade.
Tree	White Alder	Alnus rhombifolia	Fragrant, tolerates partial shade. Good for riparian areas	Moist. Partial shade to full sun
Tree	Peachleaf Willow	Salix ammygdaloides	Pale yellow leaves, weeping branches. Good near water.	Wet-Dry. Parital shade-full sun.
Conifer	Douglas Fir	Pseudotsuga menziesii	Flat needles, sharp buds, and small pollen cones.	Moist-dry. Part shade-full sun
Conifer	Grand fir	Pseudotsuga menziesii	Good restoration species.	Moist-dry. Part shade-full sun.
Conifer	Ponderosa Pine	Pinus ponderosa	Drought resistant. Likes inland sites	Moist-Dry. Full sun.
Grass-like	Dewey's sedge	Carex deweyana	Small perennial grass, with small seed heads.	Dry-wet. Sun-shade.
Grass-like	Meadow barley	Hordeum Brachyantherum	Makes compact narrow flowers. Mixes well with other meadow seeds	Moist-dry. Full sun

APPENDIX B – Survey

WaterSmart Program Implementation Survey

Winter, 2023

Hello, my name is Sofia Dreessen. I am an undergraduate student at the University of Washington, currently working on a senior thesis project for Environmental Studies. Part of my project includes a report on water conservation opportunities for the City of Chehalis. Efficient use of the City's water resources can maintain instream flows for river ecosystems, delay the City's investment in costly water infrastructure, provide sustainable water resources for future use, and reduce bill cost for citizens. To ensure that the water conservation program supports the community, I am conducting a preliminary survey to gain an insight on the efficacy of specific conservation actions. This survey will test the clarity and sense of the questions before distributing it to the wider community.

This qualitative survey is anonymous and voluntary. The data collected may be included in the final report for the city. You will be asked about your overall support and likelihood of participation in specific conservation actions. Feel free to skip any questions. This survey has ten questions, and should take approximately five minutes. If you have any questions, you can email me at sdrees@uw.edu.

The next set of questions will describe potential voluntary water conservation actions and ask you about your level of support for each individual action.

1) Get a free indoor or outdoor water saving kit.

This program would allow residents to get a free kit with low water-use items.

Very unsupportive Somewhat unsupportive Neutral Somewhat supportive Highly supportive

2) Rebates for low water-use appliances.

Someone who purchases a new appliance (like a washing machine or irrigation system) that is low-use would be able to get rebate for a portion of the cost for the appliance.

Very unsupportive Somewhat unsupportive Neutral Somewhat supportive Highly supportive

3) Changing outdoor landscape to require less water.

This process would include planting native species in outdoor landscapes to reduce the need for outdoor watering. Suggested plants will be provided.

Very unsupportive Somewhat unsupportive Neutral Somewhat supportive Highly supportive

4) Frequent assessment of water price.

Water price would be assessed more frequently, as to reflect an accurate price for water

Very unsupportive Somewhat unsupportive Neutral Somewhat supportive Highly supportive

5) Tiered water pricing during peak demand.

Water would be priced at a slightly higher rate for high water users during peak demand. This would likely impact larger industries, and not residential users.

Very unsupportive Somewhat unsupportive Neutral Somewhat supportive Highly supportive

6) Investment in newer water infrastructure by the City.

Outdated infrastructure causes increased leaks. Investing in newer infrastructure, including better storage, can reduce water loss

Very unsupportive Somewhat unsupportive Neutral Somewhat supportive Highly supportive

For this last set of questions, please use the space provided to write your opinion.

1) What are the most effective measures to promote conservation in your opinion? Why do you find this important?

2) In what ways could this survey be improved? Were the questions clear and sensible? Do you have concerns with any of the suggested conservation measures?

REFERENCES

- “Behavioral Water Efficiency: Report Cards Help East Bay MUD ...” *Association of Metropolitan Water Agencies*, April 2014,
<https://www.amwa.net/article/behavioral-water-efficiency-report-cards-help-east-bay-mud-reduce-water-use-five-percent-0>. Accessed 17 March 2023.
- Cope, K. (2017). Is Reclaimed Water the Future in Oregon? *Journal - American Water Works Association*, 109(5), 92–94. <https://doi.org/10.5942/jawwa.2017.109.0066>
- DeOreo, William B. “Residential End Uses of Water Version 2.” *Executive Report*, Water Research Foundation, 16 April 2016,
https://www.awwa.org/Portals/0/AWWA/ETS/Resources/WaterConservationResidential_End_Uses_of_Water.pdf. Accessed 4 March 2023.
- “For Homes.” *City of Tumwater*,
<https://www.ci.tumwater.wa.us/departments/water-resources-sustainability/water-resources/water-conservation/for-homes>. Accessed 13 March 2023.
- Hornberger, G. M., Hess, D. J., & Gilligan, J. (2015). Water conservation and hydrological transitions in cities in the United States: MUNICIPAL WATER CONSERVATION. *Water Resources Research*, 51(6), 4635–4649. <https://doi.org/10.1002/2015WR016943>
- Innovative Water Conservation Model proved successful*. Columbia Basin Trust. (2020, May 6). Retrieved November 16, 2022, from
<https://ourtrust.org/innovative-water-conservation-model-proved-successful/>
- Mauger, G., Lee, S. Y., Bandaragoda, C., Serra, Y., & Won, J., (2016). Effect of climate change on the Hydrology of the Chehalis Basin. *Seattle, WA: Climate Impacts Group, University of Washington*
- Mantua, N., Tohver, I., & Hamlet, A. (2010). Climate change impacts on streamflow extremes and summertime stream temperature and their possible consequences for freshwater salmon habitat in Washington State. *Climatic Change*, 102(1-2), 187–223. <https://doi.org/10.1007/s10584-010-9845-2>
- Otaki, Y., Iwatani, S., Honda, H., & Ueda, K. (2022). Using nudges for water demand management: A field experiment for water conservation. *PLOS Water*, 1(10), e0000057–.
<https://doi.org/10.1371/journal.pwat.0000057>
- “Plant Lists.” *Saving Water Partnership*, <https://www.savingwater.org/lawn-garden/plants/plant-lists/>. Accessed 13 March 2023.

- Riverside Board of Public Utilities. *Tiered and Seasonal Water Rates*. 18 January 2018,
<https://www.riversideca.gov/utilities/sites/riversideca.gov.utilities/files/pdf/rateplandocs/Tiered%20Seasonal%20Water%20Rates.pdf>.
- Ward, F. A., & Pulido-Velazquez, M. (2009). Incentive pricing and cost recovery at the basin scale. *Journal of Environmental Management*, 90(1), 293–313. <https://doi.org/10.1016/j.jenvman.2007.09.009>
- “Water Conservation.” *City of Olympia*,
https://www.olympiawa.gov/services/water_resources/drinking_water/water_conservation/index.php. Accessed 13 March 2023.
- “WaterSense Labeled Controllers | US EPA.” *EPA*, 24 June 2022,
<https://www.epa.gov/watersense/watersense-labeled-controllers>. Accessed 13 March 2023.
- “7 Tips for Saving Water in Your Landscape | asla.org.” *American Society of Landscape Architects*,
<https://www.asla.org/watersavingtips.aspx>. Accessed 13 March 2023.
- “25 Landscape Design For Small Spaces.” *Feed Inspiration* -, 15 April 2015,
<https://www.feedinspiration.com/25-landscape-design-for-small-spaces/>. Accessed 17 March 2023.

HYPERLINK REFERENCES, LISTED BY APPEARANCE IN THE REPORT.

Outdoor rebates

- <https://www.homedepot.com/p/Rachio-R3-Smart-Sprinkler-Irrigation-Controller-8-Zone-8ZULW-C/305970493>
 - Irrigation systems
- <https://www.homedepot.com/p/FreeGarden-RAIN-Rain-Barrel-Black-EWC-14/302439594>
 - Rain barrels
- <https://www.hunterindustries.com/product-line/MP%20Rotator>
 - Sprinkler nozzle
- <https://www.dripworks.com/drip-irrigation>
 - Drip irrigation
- <https://www.conservationmart.com/outdoor-water-conservation-value-kit/>
 - Outdoor water saving kit
- <https://www.homedepot.com/p/Orbit-1-Outlet-Hose-Faucet-Timer-56619/205585027#ratings-and-reviews>
 - Hose timer

EPA WaterSense

- <https://www.epa.gov/watersense>

Indoor Rebates

- <https://lookforwatersense.epa.gov/Product-Search-Results-Toilets.html>
 - Toilets
- <https://www.energystar.gov/productfinder/product/certified-clothes-washers/results>
 - Washing machines
- <https://www.conservationmart.com/ultra-low-flow-value-water-conservation-kit/>
 - Indoor water saving kit
- https://api.flumewater.com/orders/init-order?_ga=2.13161783.1017517507.1679117751-1215193374.1679117751&_gac=1.250019316.1679117751.Ci0KCQjwn9CgBhDjARIsAD15h0AcC2srfE0zccpGI14wN48xOfQmsyudmMzTmOfBVTrNmbAmKyBnP4aAg8LEALw_wcB
 - Flume meters

Plant Catalog

- <https://wacdpmc.org/plant-catalog>
 - Washington Association of Conservation Districts
- <https://green2.kingcounty.gov/gonative/Plant.aspx?Act=search>
 - King County Native Plant Guide
- <https://www.wnps.org/native-plant-directory>
 - Washington Native Plant Society
- <https://your.kingcounty.gov/dnrp/library/water-and-land/yard-and-garden/native-plant-guide-western-washington.pdf>
 - Saving Water Partnership
- <https://kingcounty.gov/services/environment/stewardship/nw-yard-and-garden/native-plant-nurseries-washington.aspx>
 - Native Plant Nursery locations.