

Subject: Greeley Water Board Report: Enhancing Water Efficiency Portfolio through Performance Analysis

Date: April 11, 2022

Project: Enhancing Water Efficiency Portfolio through Performance Analysis (Project Accelerator)

To: City of Greeley Water and Sewer Board

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Background

Greeley's leadership in water conservation began in 1907, with the City's first watering restrictions, and the City now has one of the most robust water conservation programs in the State of Colorado.¹ Given Greeley's location in a semi-arid environment, which receives an average of less than 13 inches of rainfall per year, these water conservation programs form an important strategy to ensure a reliable and sufficient water supply for city residents, now and into the future.²

In 2020, Greeley Water applied and was selected for WaterNow Alliance's (WaterNow) Project Accelerator program. The WaterNow Project Accelerator program is a vehicle to jumpstart sustainable water projects by providing professional hands-on support and technical assistance. Greeley's project focused on the capacity and expertise in optimizing its existing conservation programs through performance analysis and an equity-focused analysis of metrics such as socioeconomic status of participants, age and geographic distribution, and the value of each program to the City's residents. The resulting analysis, summarized in this board report and explored in much more detail in the Final Report, includes (1) key findings from a customer survey, (2) analysis on spatial trends in program participation, and (3) water use change and financial analysis for past program participants. These findings are intended to help guide the City's forthcoming Water Efficiency Plan update and inform its annual water conservation program budget and priorities.

Section 1 - Survey Findings

In early 2021, Greeley Water – with support from WaterNow Alliance (WaterNow) and Western Resource Advocates (WRA) – administered a survey to gain a better understanding of customer sentiments towards Greeley's Water Conservation Programs and interest in the four primary types of programs: Educational Programs, Water Audits, Water Efficiency Incentives, and Online Efficiency Tools. Questions included – but were not limited to – past participation, value derived from programs, actions taken to advance conservation, and interest in future participation. The questionnaire also included optional demographic questions derived from the 2020 U.S. Census. The online survey garnered 720 completed responses.

Across the board, the survey results indicate a high level of awareness, interest in, participation in, and value derived from Greeley's current portfolio of Water Conservation Programs. Data on the utilization

¹ City of Greeley, Colorado. (2016). Greeley Water Conservation Report 2016.

² City of Greeley, Colorado. (2020). Conservation. <https://greeleygov.com/services/ws/conservation/about/city-of-greeley-water-conservation-rebate-program#:~:text=In%20fact%2C%20Greeley%20offers%20one,must%20be%20used%20very%20wisely.>

of Greeley's Educational Programs and Online Efficiency Tools is particularly useful as these programs were not captured in the water use change analysis summarized in Section 3. Survey results should be considered in unison with the spatial trends in participation and water use change analysis sections described below.

From the survey, the key takeaways are highlighted below:

- **Importance of Conservation Programming:** Overwhelmingly, survey respondents found Greeley's Water Conservation program to be important, with 94% reporting that the programs are important or very important.
- **Motivation for Conserving Water:** Motivation in future water conservation programs varies slightly by demographics but is primarily based on saving money on water bills, protecting Greeley's limited water resources, reducing personal use, paying for a fixture or appliance, and supporting community values.
- **Ease of conserving water indoor versus outdoors:** More respondents (39%) felt that it would be easier to reduce the amount of water they now use for outdoor landscaping and gardening, compared to 31% that reported they could reduce both indoor and outdoor water use easily. 22% reported it would be easier to conserve water indoors.
- **Educational Programs:** The Landscape Lecture Series and Xeriscape Education were consistently the most common programs for respondents to have participated in the past and the programs that were rated as most helpful (indicated by rating programs a 4 (helpful) or 5 (very helpful) on a scale of 1-5). The most common programs for respondents to be interested in participating in within the next 3 years continue to be the Landscape Lecture Series and Xeriscape Education. Interestingly, there was a strong increase in interest for future participation in Tours of Greeley Water Facility tours, compared to those that had participated in the past (26% compared to 6%). Respondents in the lowest income bracket were slightly more interested in these tours than other income brackets (36% compared to 26%). The Annual Mayor's Water Challenge scored the lowest of the Educational Programs on interest in future participation and on how helpful the program was for past participants. However, respondents of Hispanic, Latino or Spanish origin expressed greater interest in the Mayor's Water Challenge than those of non-Hispanic, Latino, or Spanish origin (28% compared to 20%). The results suggest that Greeley Water should prioritize – and perhaps even expand – its Landscape Lecture Series and Xeriscape Education offerings and continue offering its other Educational Programs.
- **Water Audits:** The Residential Outdoor Irrigation Audit was consistently the most common program for respondents to have participated in within the past 5 years, the program that was rated as most helpful, and the most common program for respondents to be interested in participating in within the next 3 years (45%). Outdoor Irrigation Rebates, available to those that have participated in a Residential Outdoor Irrigation Audit, were also widely of interest to respondents for future participation (40%). Respondents of Hispanic, Latino or Spanish origin, expressed slightly more interest in outdoor irrigation rebates than those of non-Hispanic, Latino or Spanish origin (50% and 40%, respectively). Residential indoor audits were reported as slightly less popular for future participation, though 31% of respondents were still interested in participating in the future. Notably, since the survey, as Greeley has installed advanced metering infrastructure (AMI) that can easily detect leaks, demand for indoor irrigation audits has

increased.³ Across the board, the vast majority (95%) of past water audit participants reported that they had taken some kind of water saving action as a result of the audit (e.g., receiving and installing a low flow showerhead and/or faucet aerator or adjusting their irrigation watering schedule). Based on these findings, Greeley Water should continue to prioritize its Residential Audit program, particularly the Outdoor Irrigation Audit and associated Irrigation Rebates.

- Water Efficiency Incentives:** While the Free Low Flow Showerhead Exchange was the most common program for respondents to have participated in within the last five years, discounted Garden in a Box Kits (48%) and Life After Lawn turf replacement rebates (39%) rose to the top as the most popular incentive opportunities for future participation. The Free Low Flow Showerheads were reported as the least popular for future participation (19%). The vast majority of past participants (84%) found all programs to be very valuable, however the High Efficiency Toilet Rebate ranked the highest (94%), followed by the Garden in a Box program (92%). Respondents in the lowest income bracket expressed the most interest in Life After Lawn (32%) and High Efficiency Toilet Rebates (32%). Those of Hispanic, Latino or Spanish origin, expressed slightly more interest in efficiency incentives overall than those of non-Hispanic, Latino or Spanish origin, particularly the High Efficiency Toilet Rebate (52%) and the Life After Lawn program (46%). The results suggest that the Life After Lawn program, the Garden in a Box program, and the High Efficiency Toilet Rebate program (due in part to its interest among the lowest income bracket and respondents of Hispanic, Latino or Spanish origin) should be prioritized by Greeley Water moving forward. While the Low Flow Showerhead Exchange Program is less popular, it is also one of the more accessible programs to all Greeley residents, including renters. Greeley Water should continue to offer Showerhead Exchanges, but only when coupled with other water conservation programming, such as Xeriscape Education.
- Online Water Efficiency Tools:** Of the four main categories of programming, respondents were least aware of the Online Water Efficiency Tools compared to other programming categories, suggesting a potential benefit of increased outreach and communication efforts around these specific tools. The Online Plant Database scored consistently high for respondents that had used the tool in the past (20%), were interested in using it in the future (53%), and found the tool to be helpful or very helpful (92%). Compared to other income brackets, respondents in the lowest income bracket were most interested in Greeley's Water Conservation webpage (57%). Respondents of Hispanic, Latino or Spanish origin were more interested than those of non-Hispanic, Latino and Spanish origin in the Water Budget Portal (59% compared to 43%) and the WaterSmart customer portal (56% compared to 43%). Should limited capacity and resources exist for tool updates, the results suggest it may be most beneficial to prioritize the Online Plant Database.
- Preferred contact method:** Greeley Water can most effectively reach their customers through email updates and the monthly newsletter, bill inserts, and the Greeley's Water website.

Section 2 - Spatial Trends in Participation

To complement the information gathered on Greeley's Water Conservation Programs directly from participants through the survey, this project also analyzed geographic trends in participation among

³ For instance, in January – March of 2022, demand for indoor water audits averaged 20-30 per month. City of Greeley, Colorado. Water Budget: Metering. <https://greeleygov.com/services/ws/water-budget/metering>.

participants. As Figure 1 illustrates, participation in Greeley's water conservation programs is densest in the center of the City, and sparser in the outer sections of Greeley's service area, in the southwest quadrant of the city's center, and in the northeast quadrant of the city's center.

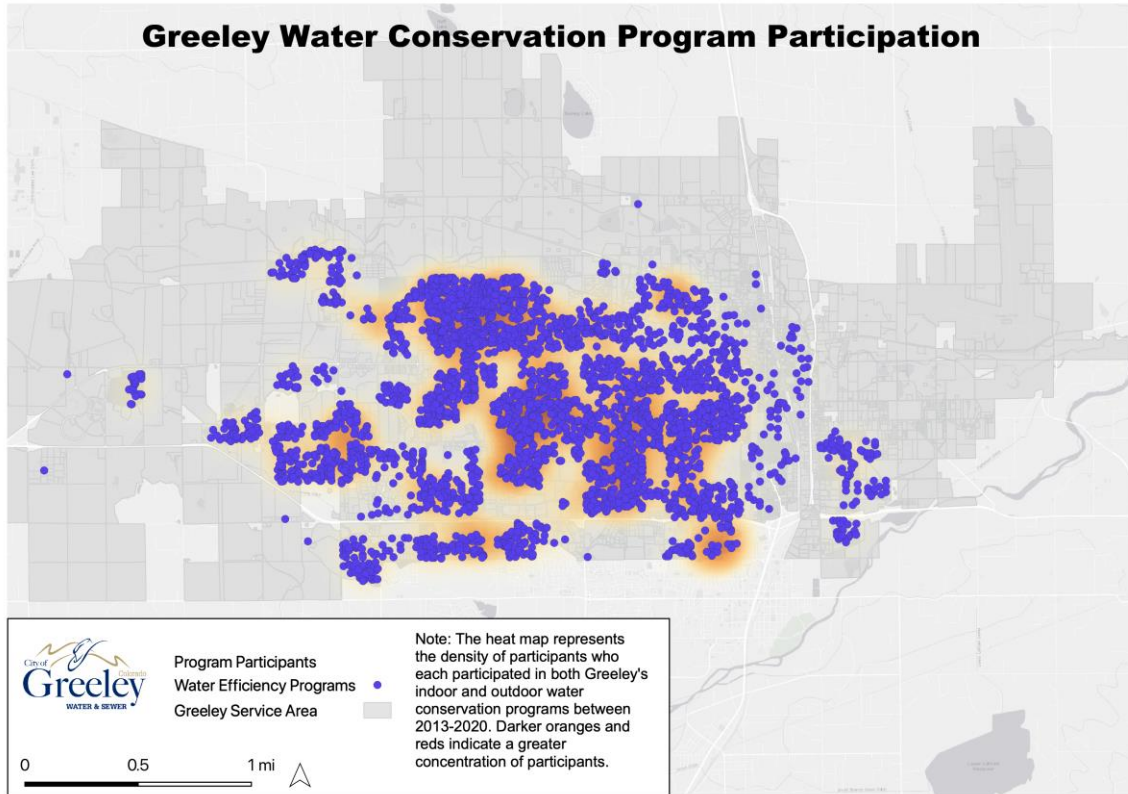


Figure 1. Greeley Water Conservation Program participation from 2013-2020.

The Project Team compared participation with different demographic characteristics, using the 2019 U.S. Census Bureau's American Community Survey (ACS) data.⁴ Detailed descriptions of this data and the resulting maps are available in the Final Report. While participation spans most parts of the City, lower participation in Greeley's Water Conservation Programs often coincides with areas that have higher percentages of renter-occupied housing; lower household income; and higher percentages of residents speaking Spanish, Asian American or Pacific Islander (AAPI) languages, or Indo-European languages.⁵ These trends are especially clear within the northeast and southwest areas of the City's center. Around the perimeter of Greeley's service area, participation is also sparser, in part reflecting a lower population density in these areas of the City. These perimeter areas also differ somewhat in their demographics, as they represent areas with greater median household income; lower percentages of residents speaking Spanish, an AAPI language, or Indo-European language; and lower percentages of renter-occupied housing.

⁴ The American Community Service (ACS) data reflects information gathered annually by the U.S. Census Bureau. The Bureau poses questions to randomly sampled addresses each year, and then uses this information to calculate community demographic information. This ACS data complements the Decennial Census the Bureau conducts every 10 years, which seeks responses from every resident. For information, see: <https://www.census.gov/programs-surveys/acs/about.html>.

⁵ A more detailed explanation of how the Census defines language categories is available at: <https://www.census.gov/topics/population/language-use/about.html>.

These trends suggest that increasing participation within the city's center might require strategies such as language translation (e.g., through partnerships with local community groups or non-profits) and a particular emphasis on programs that renters are eligible to participate in. In-person events may be especially helpful, providing the opportunity for in-person translation and avoiding the need for Internet access, which may be lower in areas with lower median incomes. Engaging the outer perimeter of the city, in contrast, might be most effectively done through other forms of outreach, such as direct mail, bill inserts, or email outreach, that target participants spread across a wider area, and include programs aimed at both renters and homeowners. In addition to these immediate trends, this data might inform specific strategies for different locations (e.g., by identifying the most common non-English languages spoken, or the number of past participants who might be able to share their participation and generate word of mouth, etc.)

Section 3 - Participation in and Changes in Water Use

In addition to analyzing geographic trends in participation, this project analyzed the water use change and cost of saved water resulting from participation in Greeley's Water Conservation Programs over six years, from 2013-2018,⁶ to shed light on the return on investment in these programs. This analysis also tracks how customer participation in each program has changed over time.

To conduct the analysis of water use change among participants in Greeley's Water Conservation Programs, we calculated the annual change in water use resulting from participation in a program, and then applied that annual savings to the years a participant was active in that program. A more detailed description of the methodology is available in the Final Report.

While each program shown in Table 1 generated water savings during the six years spanning 2013-2018, the amount of savings varies across different programs. Three programs resulted in especially large savings during the 2013-2018 time period: the Residential Audit (Indoor & Outdoor), followed closely by the Front Loading Washing Rebate⁷ and the Toilet Rebates. The programs with the largest water savings reflect high levels of participation in these programs, in addition to the water savings generated by these interventions. The Smart Controller Rebate, PRV Rebate, and Rotary Nozzles Rebates have relatively lower levels of total participation and total savings, but a high level of water savings for each individual participating account. If there is additional demand, expanding these programs could help scale their overall impact on water conservation.

⁶ Given the unusual factors – the COVID pandemic and resulting stay-at-home orders – affecting 2020 water use, 2020 water use is not included in these calculations, and the water use change for participation in programs during 2018 is analyzed using only 2019 water use data.

⁷ Note: the Front Loading Washing Rebate was discontinued in 2018 due to market trends over time that resulted in front loading washing being the standard for new purchases.

Conservation Program	Number of Accounts	6 Year Water Program Savings (AF)	Annual Water Savings (AF)	Annual ROI (\$/AF/Year)	Estimated Annual Savings Per Account (Gallons/Year)
Residential Audits (Indoor + Outdoor)	1294	116.8	19.5	\$341	4,903
Front Loading Washer Rebate	994	102.8	17.1	\$181	33,714
Toilet Rebates	756	87.3	14.7	\$625	6,271
Smart Controller Rebate	132	26.0	4.3	\$403	10,682
PRV Rebate	149	19.5	3.2	\$188	7,093
Rotary Nozzles	147	19.0	3.2	\$190	7,013
Commercial Audits (Indoor + Outdoor)	182	17.2	2.9	\$285	5,118

*For Residential and Commercial Audits, participants could select either or both the indoor and outdoor audits.

** The Toilet Rebate program encompasses the 0.8 GPF Toilet, Dual Flush Toilets, Low Flow Toilet, and Ultra Low Flow Toilet programs. See Appendix G for more details about these programs.

***Only accounts with sufficient water use data were included in these calculations, and only programs with at least 50 participants with sufficient water use data are presented in this table, according to the methodology of the report (see the Final Report for additional details).

****Average annual cost reflects the total cost divided by the number of years a program was active between 2013-2018.

Table 1. Estimated water savings achieved by selected water conservation programs from 2013-2018.

In terms of the return on investment (ROI) – or the cost invested for each acre-foot (AF) of water a program saves – the Front Loading Washer is cheapest, at \$181 per AF, followed closely by the PRV Rebate (\$188/AF), and the Rotary Nozzles Rebate (\$190/AF). Commercial Audits (\$285/AF) and Residential Audits (\$341/AF), along with the Smart Controller Rebate (\$403/AF) make up the middle of the pack. The Toilet Rebates (\$625/AF) are the most expensive program.

We do not recommend simply adding up the total water saved from all programs, as some double counting – e.g., customers who participated in multiple programs – is likely. However, this approach does give a rough estimate of the approximate savings across the selected programs, which is roughly 65 acre-feet per year, or 389 acre-feet over the six years spanning 2013-2018. It is also important to recognize that the number of participants included in this analysis is lower than the total number of program participants in Greeley's Water Conservation Programs. This reflects the fact that many participants did not have sufficient water use data⁸ to be included in the calculations. Also, a number of conservation programs had less than 50 accounts with sufficient data to be analyzed, and were thus

⁸ Defined as water use for two years prior to and following participation in a water conservation program; see the Final Report for additional details about the methodology.

excluded from the final calculations; their inclusion would increase the total AF of water saved through conservation programs.

Nevertheless, dividing the total cost of the included programs by the water savings realized by their participants yields a cost per acre foot of \$1,350 per AF, far below the current cost for Colorado Big-Thompson Project water shares (estimated to be \$62,500 per share as of July 2020, according to the *Loveland Reporter-Herald*).⁹ While the savings from water conservation do not continue into perpetuity, many have fairly long expected lifetimes of savings, ranging from 5 years (for audit programs) to 25 years (for toilet rebates). A more detailed description of the estimated duration of each program's water savings is available in the Final Report.

Recommendations

Across the board, Greeley's Water Conservation Programs have saved both water and money, and have been highly valued by program participants. During the six years spanning 2013-2018, they engaged nearly 5,000 participants, and achieved water savings ranging from 2.9 to 19.5 AF per year per program. These programs' average cost per acre foot savings is far below the current cost of water from the Colorado Big-Thompson Project. While the data analysis suggests that these programs are effective, it also provides insight into specific programs to expand or condense and how to most effectively conduct outreach to Greeley's target audiences.

Program Prioritization

- **Residential Audits:** The Residential Audits (Indoor and Outdoor) saved an estimated 19.5 AF per year, which is encouraging because the customer survey results suggest continued interest in further participation in this program, particularly the Outdoor Irrigation Audit. The quantitative analysis also shows that participation in the Residential Audit often overlaps with participation in other indoor and outdoor water conservation programs, suggesting that this program is an effective "gateway" to utilizing other water conservation tools and resources. Survey results support this finding in that 95% of Residential Audit participants reported taking some kind of water saving action as a result of their audit. Separate from this analysis, Greeley Water is experiencing a recent increase in demand for indoor audits due to AMI leak detection services.
- **Outdoor Efficiency Incentives:** The survey showed particularly large interest in outdoor water efficiency rebates and incentives. There may be an opportunity to expand participation in programs like the Smart Controller Rebate, PRV Rebate, and Rotary Nozzles Rebate. These programs have high water savings per account but have seen lower levels of overall participation, compared to other programs. The outdoor Life After Lawn and Garden in a Box programs – though not captured by the water use change analysis – were the most popular incentive opportunities for future participation according to the survey results.
- **Educational Programs & Online Efficiency Tools:** Per the survey results, Greeley's array of educational programs and online tools were, for the most part, well utilized by Greeley residents and of interest to respondents for future participation. Many past participants reported taking

⁹ Amundson, Ken. (17 June 2020). "NoCo Real Estate Summit: Water drives home prices, but can be controlled." *Loveland Reporter-Herald*. <https://www.reporterherald.com/2020/06/17/noco-real-estate-summit-water-drives-home-prices-but-can-be-controlled/>.

specific water savings actions as a result of participation in an educational program. While data on staff resources and cost for educational programs and online efficiency tools was not included in the scope for this project, one can assume that most of these programs and tools are less expensive and time intensive than residential audits and outdoor efficiency incentive programs.

Communications and Outreach

- In addition to the potential benefits of targeting outreach to specific neighborhoods and communities within the City, there may be opportunities to continue to harness synergies across conservation programs. Approximately 30% of residents were part of multiple conservation programs, suggesting there may be ways to further encourage participants to take advantage of other relevant programs. Strategies may include continuing to encourage participants to complete an audit as an entry point to other programs, as well as reaching out to past participants to suggest additional or complementary programs.
- Survey results suggest some differences in program preferences among Hispanic and Latino respondents. For example, respondents of Hispanic, Latino or Spanish origin expressed more interest in the High Efficiency Toilet rebate. These insights could help target outreach around specific programs in neighborhoods with larger percentages of Hispanic and Latino residents, as identified in the spatial analysis, or help prioritize the translation of specific program materials.
- Popular outreach methods, such as email updates and the monthly newsletters, offer ways to further promote and increase awareness of the conservation programs, specifically Greeley's online efficiency tools with which respondents were generally less familiar.
- Motivation to participate in future water conservation programs is primarily based on saving money on water bills, protecting Greeley's limited water resources, reducing personal use, paying for a fixture or appliance, and supporting community values. Community engagement messaging may focus on these key points for better marketing strategies.

Considerations for Future Water Conservation Program Analysis

It is recommended that Greeley Water complete a Water Conservation Customer Survey every 5-7 years to stay informed on customers' values and interests and to analyze trends and changes in respondent answers over time. Updating the quantitative analysis on an annual basis could also enable Greeley Water to follow trends in participation in real time and shed light on the impact of different outreach and communication strategies.

Conclusion

It is important to keep in mind that Greeley's substantial gains in water conservation – reducing water usage by 20% even as the City's population has grown – are not entirely captured by the water savings associated with the conservation programs analyzed for this project. Water demand in Greeley is also influenced by state and local water use policies and regulations, rates, and market trends. For instance, integrated water and land use planning approaches, such as conservation-oriented system development charges, plumbing codes, zoning standards, and landscaping ordinances, have likely resulted in significant water savings. Additionally, Greeley's water budget-based rate structure provides residential customers with a price signal to incentivize conservation. Finally, market trends and state regulations have led to the standardization of more water efficient appliances, fixtures, and equipment available for

purchase. Additionally, the introduction of AMI presents additional incentives and tools to enhance water conservation behavior and program participation. While comparing the value of policies and regulations with the impact of water conservation programs is beyond the scope of this project, it is important to recognize their importance to Greeley's water supply resiliency goals.

The City of Greeley should be very proud of its efforts to build a popular, impactful, and highly valued Water Conservation Program. This performance analysis – including the customer survey, spatial analysis on participation, and change in water use analysis – is intended to provide the City with new data and information to prioritize its Water Conservation Program spending and to inform its forthcoming Water Efficiency Plan update. Greeley may also elect to use the tools and methodologies established through this project in upcoming years to assess program performance over time.