



# Enhancing Greeley's Water Efficiency **Portfolio** through Performance Analysis

September 2022

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## Executive Summary

The City of Greeley has one of the most robust and longest-standing water conservation programs in the State of Colorado. In 2020, the City applied for and was selected to WaterNow Alliance's Project Accelerator program for support in analyzing the performance of its water conservation program portfolio in order to inform future budgetary decisions, program priorities, and the City's forthcoming Water Efficiency Plan update. This report synthesizes key findings and methodologies from the conservation program performance analysis which included a customer survey, an equity-focused spatial analysis of past program participation, and a water use change analysis.

This analysis found that 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, selected programs 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. Based on the customer survey, 94% of respondents reported that Greeley's conservation programs were important or very important. 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

1. *Residential Audits:* Residential Audits (both 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.
2. *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.
3. *Educational Programs & Online Efficiency Tools:* 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 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 is beyond the scope of 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

1. *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.
2. *Create targeted outreach on specific programs to Hispanic and Latino customers.* 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.



3. *Take advantage of popular outreach methods.* Email updates and monthly e-newsletters were the most popular form of communication for most customers. These channels can be used to further promote and increase awareness of the conservation programs, specifically Greeley's online efficiency tools with which respondents were generally less familiar.
4. *Focus community engagement messaging on customers' key water conservation motivations.* 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.

The City of Greeley should be very proud of its efforts to build a popular, impactful, and highly valued Water Conservation Program. The report is intended to act as a tool for Greeley's Water Conservation team to make data-drive decisions, and to be a resource to Colorado's water conservation community in evaluating the impact of conservation programs and scaling-up future investments in water conservation.



## Introduction

The City of Greeley's leadership in water conservation began in 1907, with the City's first watering restrictions, and Greeley now has one of the most robust water conservation programs in the State of Colorado.<sup>1</sup> Given the City of Greeley's (Greeley, Greeley Water, or the City) semi-arid climate, receiving 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.<sup>2</sup> Greeley's extensive water conservation programs have been successful at reducing water demand and keeping water rates affordable. These programs included free irrigation audits, direct installation of smart irrigation controllers, a conservation lecture series, a water-budget based rate structure, and a Life After Lawn turf replacement program, among many others.

In 2020, Greeley Water applied for WaterNow Alliance's Project Accelerator program<sup>3</sup> for capacity and expertise in optimizing its existing conservation programs through data-driven, performance analysis and an equity-focused analysis of metrics such as socioeconomic status of

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<sup>1</sup> City of Greeley, Colorado. (2016). Greeley Water Conservation Report 2016.

<sup>2</sup> City of Greeley, Colorado. (2020). Conservation. <https://greeleygov.com/services/ws/conservation/>

<sup>3</sup> See: <https://waternow.org/our-work/our-work-projects/project-accelerator/>.



participants, age and geographic distribution, and the value of each program to the City's residents. The resulting analysis, shared in the below report, will drive the City's next Water Efficiency Plan and inform its annual water conservation program budget and priorities.

Through the Project Accelerator, WaterNow Alliance (WaterNow) and Western Resource Advocates (WRA) worked with Greeley Water, to evaluate the City's water efficiency program portfolio through several key phases:

- (1) Interviews on the program background and priorities with City staff and officials;
- (2) Background research on and review of the City's water efficiency program portfolio and available data;
- (3) A customer survey on Greeley's water conservation programs;
- (4) Quantitative analysis of Greeley's water conservation programs;

The report focuses on phases three and four of the project (customer survey and quantitative performance analysis) and synthesizes key findings on the City's water conservation program portfolio. The intent of this report is to support Greeley's water conservation team as they make important future decisions on programs and budgets. It is also intended to be shared with the broader Colorado water community as a resource for those that are interested in scaling up their investment in water conservation and evaluating the impact of their programs.



## Customer Survey Findings

In February and March 2021, the project team conducted a survey of Greeley Water & Sewer customers to gain a better understanding of customers' awareness of – and interest in – Greeley's water conservation programs. Questions included past participation rates, potential future participation, general sentiments, and personal actions taken to advance water conservation. The survey focused on four key categories of Greeley's conservation strategies, each with their own programs. The individual programs are listed below and more information on each program is provided in Appendix A.

### 1. *Educational Programs*

- a. Landscape Lecture Series – free lectures and workshops on landscape topics to improve water efficiency
- b. Xeriscape Education – literature, classes, and tours of Greeley's Xeriscape gardens
- c. Tours of Greeley water-related facilities
- d. Teacher Training on water conservation issues for local teachers
- e. Speakers Bureau – Greeley Water speakers visit classrooms, civic clubs, and other groups
- f. Annual Mayor's Water Challenge – water use reduction contest

### 2. *Water Audits*

- a. Residential Indoor Water Audits
- b. Residential Outdoor Irrigation Audits
- c. Commercial Audits (Indoor and/or Outdoor)
- d. Outdoor Irrigation Rebates – available to those that have completed an audit (e.g., smart irrigation controller, rotary sprinkler nozzles)
- e. Commercial Rebates – available to those that have completed an audit (e.g., water efficient appliances, irrigation hardware)



3. *Water Efficiency Incentive Programs*
  - a. Compost Bin or Discounted Rain Barrel Sale
  - b. Discounted Garden in a Box Kit
  - c. Free Low-Flow Showerhead Exchange
  - d. High Efficiency Toilet Rebate
  - e. Life After Lawn Turf Replacement Rebates
4. *Online Water Efficiency Tools*
  - a. Water Budget Resource
  - b. WaterSmart Customer Portal
  - c. Online Plant Database
  - d. Greeley Water Conservation Webpage

The survey was based on 45 questions, including optional demographic questions derived from the U.S. Census demographic questions. It was conducted using the Alchemer survey tool which allowed for advanced survey logic. The survey questions were derived based on past water conservation survey research conducted by the project team including San Diego County Water Authority's 2017 Water Issues Public Opinion Poll<sup>4</sup>, Seattle Public Utilities 2006 Residential Water Conservation Benchmarking Survey<sup>5</sup>, and Soquel Creek Water District's 2015 Voter Survey on Water Issues.<sup>6</sup> Questions were modified to suit Greeley's local context, priorities, and values. The full list of survey questions and survey logic is available in Appendix B.

Over the course of two months, Greeley Water staff advertised the survey through bill stuffers, emails to a listserv of approximately 600 people, social media, the WaterSmart portal, the water conservation webpage, and other outlets (see Appendix C for bill stuffer design). To promote survey participation, respondents were entered into a raffle to receive gift certificates for local restaurants. The survey, which took participants approximately 10-15 minutes to complete, garnered 720 completed responses.

Of note, based on the voluntary nature of this survey and the survey's findings on program participation, this pool of survey respondents is likely more engaged with Greeley's water conservation programming than the City of Greeley's broader public. While this may influence the survey results, importantly, the survey respondents are among Greeley's target audience, as they are those that are likely to engage and respond to outreach and opportunities presented by the utility in the future.

That being said, it is important to acknowledge that a shortcoming of this survey is that some segments of Greeley's population are under-represented when compared to 2020 census data. Perhaps most notably, 9% of survey respondents identified as Hispanic, Latino, or of Spanish origin, whereas, per Greeley's 2020 Census bureau data, 39% of the population identifies as

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<sup>4</sup> <https://www.sdcwa.org/sites/default/files/2017%20SDCWA%20Poll%20Complete%20Report.pdf>

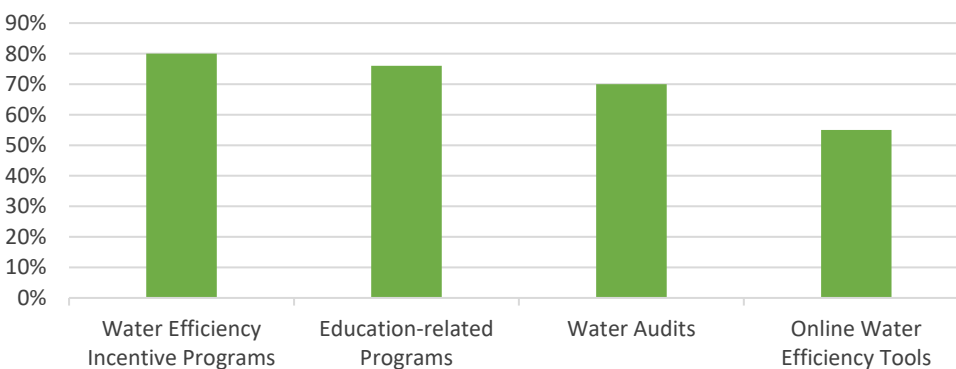
<sup>5</sup> <http://www.seattle.gov/Documents/Departments/SPU/Documents/2006WaterConservationSurvey.pdf>

<sup>6</sup> <https://www.soquelcreekwater.org/ArchiveCenter/ViewFile/Item/74>

Hispanic, Latino or Spanish origin. This discrepancy may be partially attributed to the fact that the survey was only offered in English. Additionally, 93% of survey respondents said they own their own homes. This suggests that renters are under-represented in this survey as – per the 2020 census data – Greeley is only 60% owner-occupied housing units. This discrepancy is unsurprising given renters are likely to be less attuned to water conservation incentives that their landlord would be more likely eligible for, and many renters (particularly in multi-family housing) do not pay their own water bill. When possible, survey results described below are analyzed based on demographic information. Additionally, demographic program participation information is represented in the quantitative Spatial Trends Section of this report. Results from the demographic survey questions are available in Appendix D. Opportunities for better targeting future outreach to reach a wider cross-section of Greeley’s community is provided in the Recommendations section.

### Awareness & Importance of Greeley Water Conservation Programming

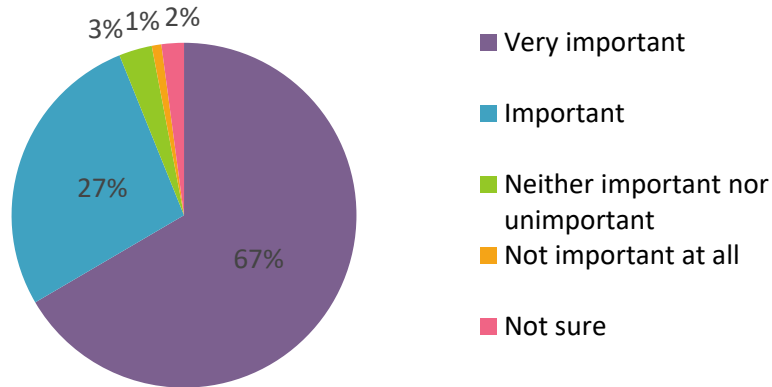
Survey respondents were asked if they were aware of each of the four primary types of Greeley Water programs: 1) education-related programs, 2) water efficiency incentive programs, 3) water audits, and 4) online water efficiency tools. Respondents were most aware of the water efficiency incentives and least aware of the online water efficiency tools. As illustrated in Figure 1, in order of awareness, 80% were aware of water efficiency incentive programs, 76% were aware of education-related programs, 70% were aware of water audits, and 55% were aware of online water efficiency tools.



**Figure 1.** Percentage of respondents aware of four primary categories of conservation programming among all participants.

Figure 2 indicates that across the board, survey respondents felt that Greeley’s water conservation programs were important, with a total of 94% of respondents reporting that the programs were important or very important. Notably, when the results were analyzed for those respondents that were completely *unaware* of Greeley’s four various conservation programs prior to completing the survey, the vast majority (approximately 90%) of these respondents still felt Greeley’s conservation programs were very important or important.



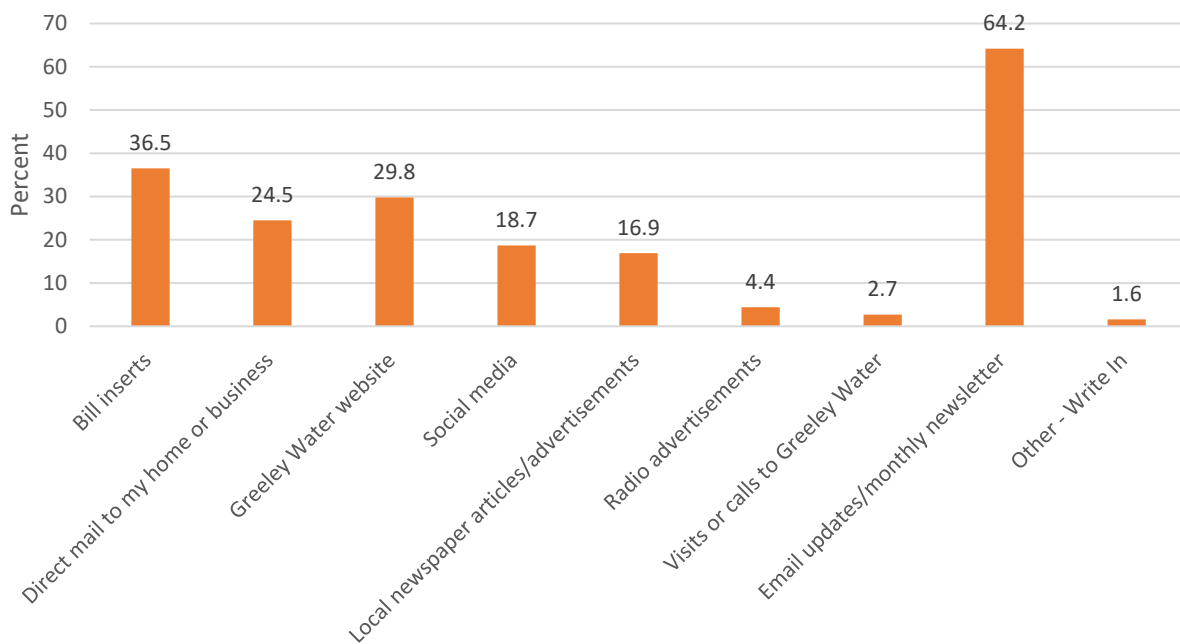


**Figure 2.** Importance of Greeley's Water Conservation Programs.

These results are a strong indication that Greeley's water conservation programs are valued amongst their customers and customers are largely aware of the various available programs. The exception to this high level of customer awareness is the online efficiency tools. There are benefits to continue additional outreach efforts, particularly since these education-based tools will practically cost the same to update and maintain regardless of how many customers utilize the tools.

## Outreach Strategies

Figure 3 captures how respondents prefer to receive information about Greeley's water conservation programs. Sixty-four percent (64%) indicated that they prefer email updates or updates through the monthly newsletter, followed by 37% that prefer bill inserts, and 30% that prefer the Greeley Water website. These results suggest that Greeley should continue – and perhaps increase – communications through email campaigns and the monthly newsletter, which is a relatively cost-effective and quick way to connect with customers.



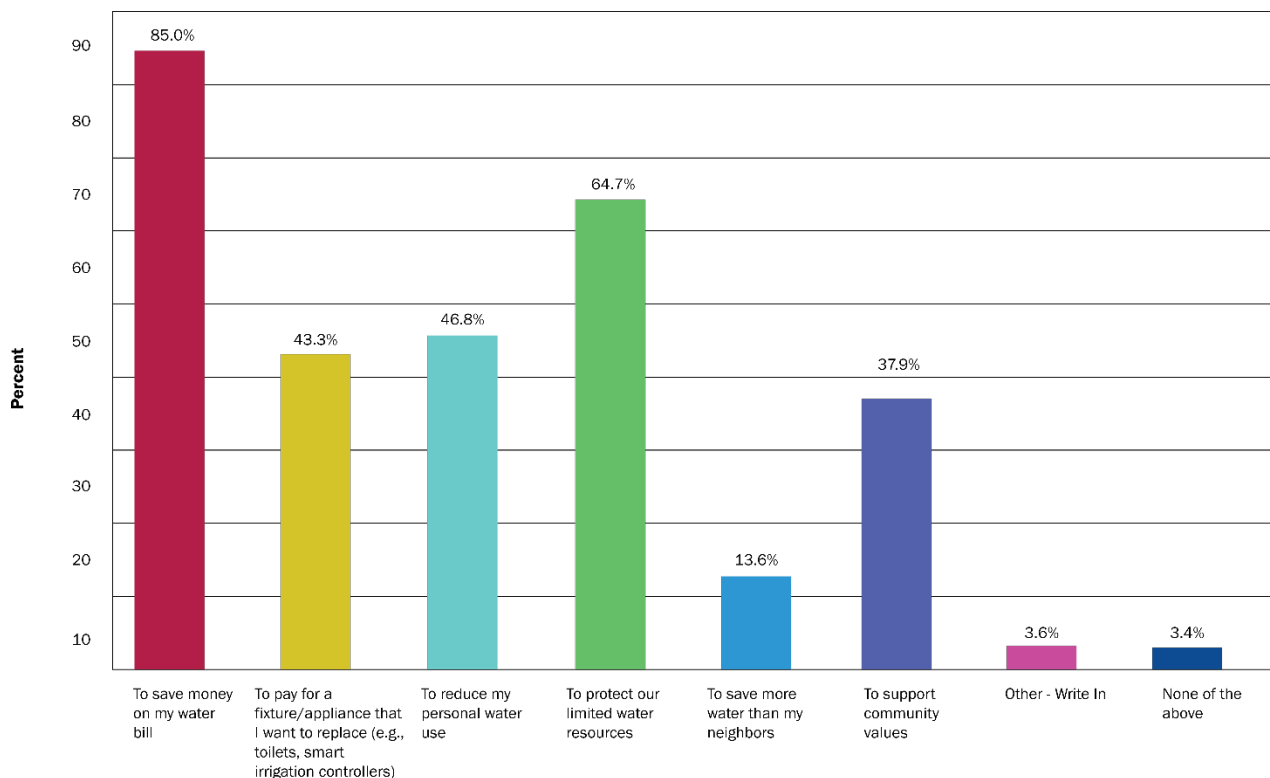
**Figure 3.** Preferred Contact Method for Greeley Water Conservation Information.

Communication through email updates and/or the monthly e-newsletters was the most popular for all age brackets except ages 18-24. For the 18-24 age bracket, social media was most preferred. If Greeley is interested in effectively reaching this target audience, investment in compelling and frequent social media content could be fruitful.



## Participant Motivations

As Figure 4 illustrates, when survey respondents were asked what would motivate them to participate in a Greeley water conservation program in the future, the most common response was to save money on water bills (85%), followed by protecting Greeley's limited water resources (65%), to reduce personal use (47%), and to support community values (38%). To save more water than my neighbors (14%) was the least frequently reported motivational values.

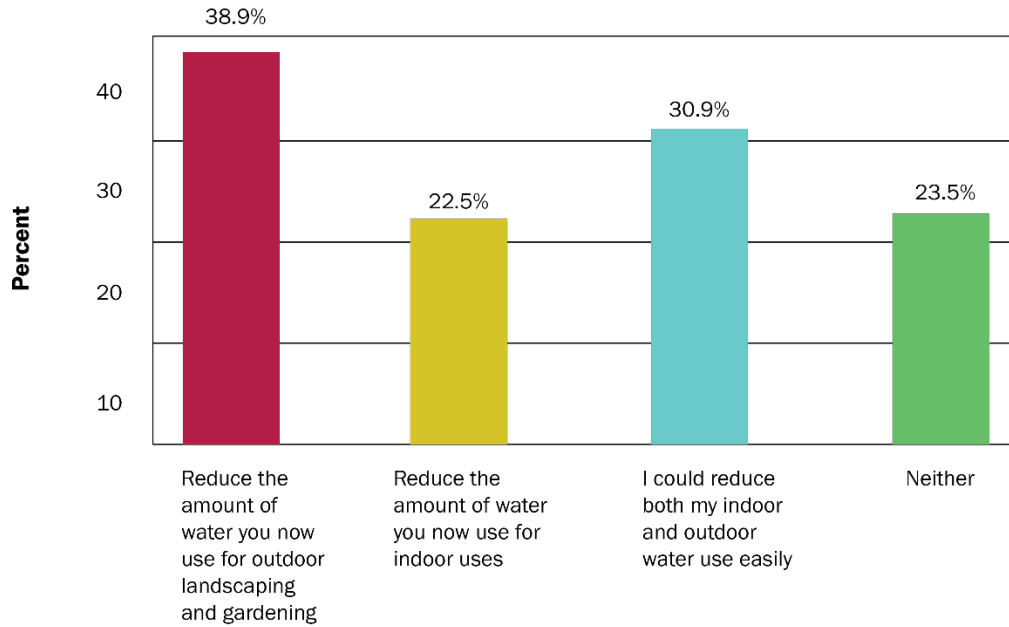


**Figure 4.** Motivation for participating in future water conservation programming.

Participant motivations remained consistent for both respondents that were unaware of Greeley's water conservation programs prior to the survey and for respondents of Hispanic, Latino or Spanish origin compared to other respondents. While saving money on water bills was consistently the top response across all income levels, individuals in the lowest income bracket chose supporting community values as the second most common motivator for participation (60%).

Additionally, Figure 5 shows that 31% of survey respondents reported that they could reduce both indoor and outdoor water use easily. A slightly greater percentage (39%) felt it would be easier to reduce the amount of water they now use for outdoor landscaping and gardening. Notably, only 24% of respondents felt they could neither reduce their indoor nor outdoor water

use easily. It's unclear from the results whether respondents felt they couldn't reduce their water use because they had already taken dramatic action to do so, they simply were unmotivated to reduce their use, or if they faced barriers that made it challenging to reduce their use (e.g. cost, expertise, labor, etc.).



**Figure 5.** *Ease of saving water indoors and outdoors.*



## Past & Future Program Participation

For each of the four primary categories of conservation programs (1) educational programs, 2) water audits, 3) water efficiency incentive programs, and 4) online water efficiency tools), respondents were asked:

- a. *Past Participation* - Which programs have you participated in over the past 5 years?
- b. *Water Savings Actions* - What water saving actions resulted from your program participation?
- c. *Rating* - How helpful did you find the the specific program on a scale of 1-5, with 1 being least helpful and 5 being most helpful?
- d. *Future Participation* - How likely are you to participate in the program within in the next 3 years?

Survey results are summarized below and additional information on past program participation can be found in the quantitative analysis results section.<sup>7</sup>

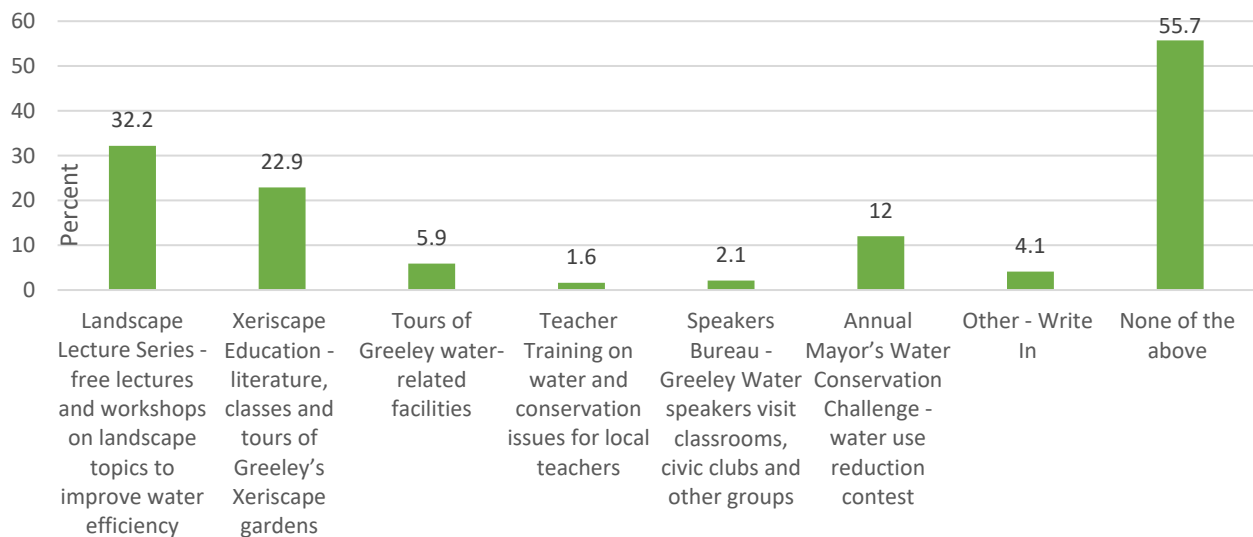
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<sup>7</sup> The following section summarizes results from the quantitative analysis of Greeley's water conservation programs and includes some – but not all – of Greeley's conservation programs. The quantitative analysis focuses on rebate and audit programs, rather than educational programming and online tools. The analysis also only includes programs with sufficient data that were active between 2013-2018, excluding some more recent program additions. Since the quantitative analysis results are not comprehensive of all Greeley conservation programs, the survey results can give us a comparative sense of participation levels. However, as noted above, it is clear from comparing survey results with actual participation numbers in the quantitative analysis that survey respondents were more likely to participate in conservation programming than Greeley's general public.

## 1. Educational Programs

### a. Past Participation

Illustrated in Figure 6, the landscape lecture series (32%) and Xeriscape education (23%) were the most common programs for respondents to have participated in within the past five years. 56% of respondents had not participated in any educational programs.

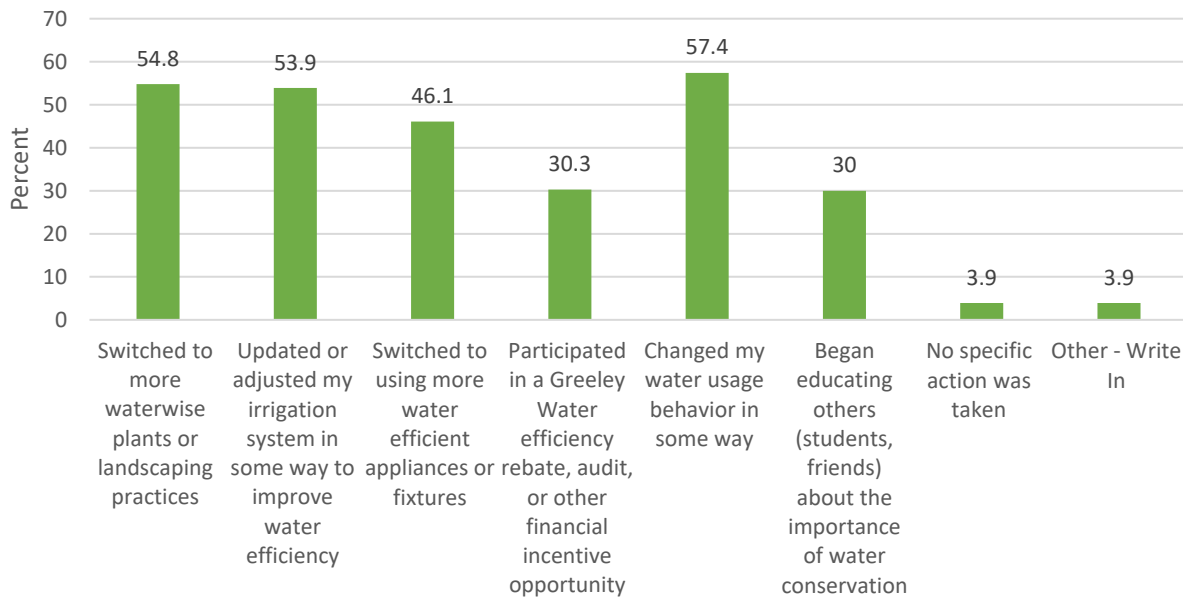


**Figure 6. Past Participation in Education-Related Programs.**

### b. Water Savings Actions

As Figure 7 shows, while water savings associated with educational programs can be challenging to quantify, when asked if respondents had taken some kind of water savings action after participating in an educational program, the vast majority affirmed that they had taken one or more actions that included, but were not limited to:

- Changing their water use behavior in some way (57%)
- Switching to more waterwise plants or landscaping practices (55%)
- Updating or adjusting their irrigation system to improve water efficiency (54%)



**Figure 7. Water saving action taken after participating in and Educational Program.**

### c. Rating

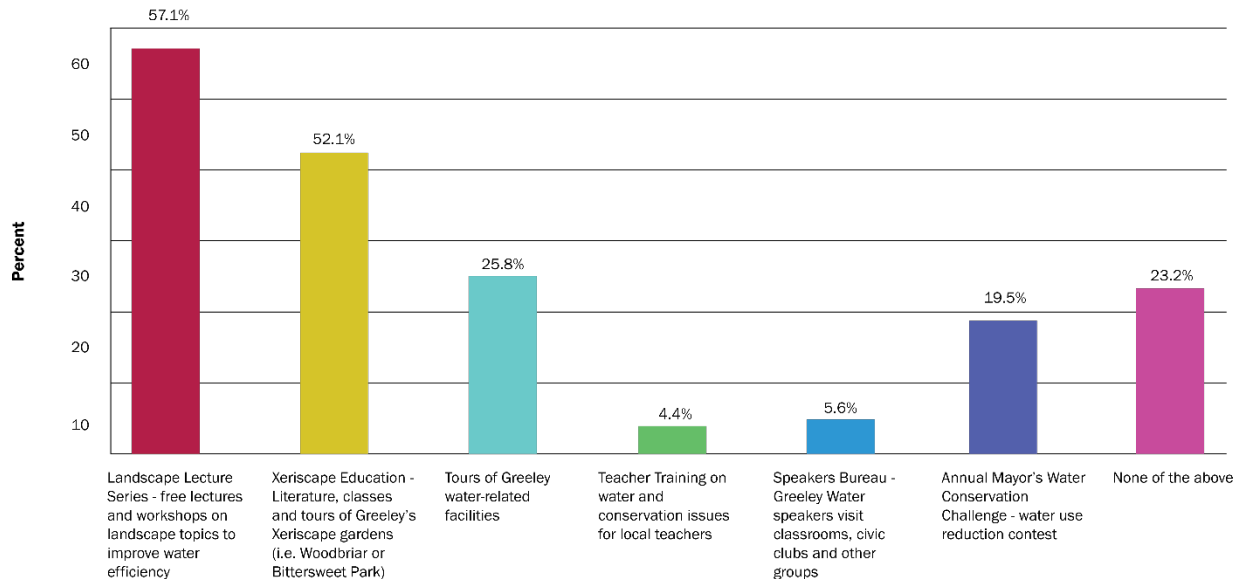
Most respondents found the education programs they participated in to be helpful or very helpful on a scale of 1-5 with one being the less helpful and five being very helpful. The most popular programs for past participation were also the highest scoring programs, using this metric. Ninety-one percent (91%) of respondents rated the Landscape Lecture Series as helpful or very helpful, followed by the Xeriscape Education/Tour (89%). Tours of Greeley Water Facilities and the Annual Mayor's Water Challenge had slightly lower responses, with 74% and 65% of respondents, respectively, ranking them as helpful or very helpful. Interestingly, while the Annual Mayor's Water Challenge had larger participation numbers than the Tours of Greeley Water Facilities, it was reported as slightly less helpful than the facility tours.

### d. Future Participation

Consistent with the past participation results, as Figure 8 illustrates, the Landscape Lecture Series (57%) and Xeriscape Education (53%) were the most common programs for respondents to express interest in participating in within the next 3 years. Interestingly, 26% of respondents were also interested in tours of Greeley water-related facilities, compared to just 6% of respondents who had participated in tours in the past (a 20-percentage point gap). Comparatively, while 12% of respondents had participated in the Mayor's Water Conservation Challenge in the past, only 20% of respondents expressed an interest in participating in the



future (an 8-percentage point gap). Seventy-seven percent (77%) of all respondents were interested in participating in future educational programs, far more than the 44% that had participated in any of these programs in the past, suggesting a strong amount of interest in exploring more education programs among survey respondents.



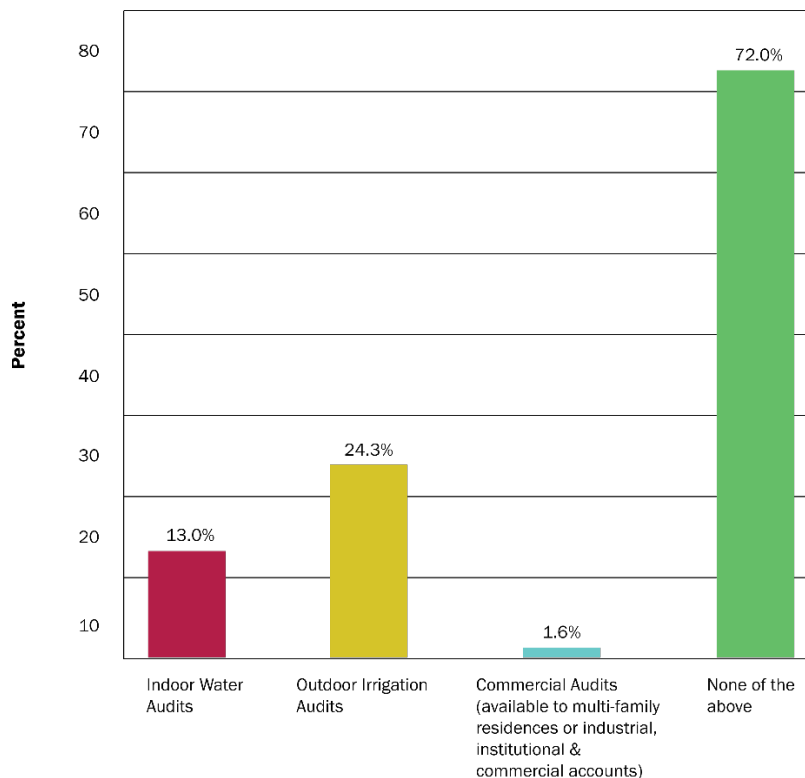
**Figure 8.** Participant interest in future participation in Educational Programs.

Future participation results remained consistent amongst those respondents who were unaware of the educational programs prior to the survey. However, as one might expect, a greater percentage – 40% of these respondents, compared to 23% of all survey respondents – were not interested in participating in education programs in the future. Amongst survey respondents in the lowest income bracket, a slightly smaller percent was interested in the Landscape Lecture Series (36%) and Xeriscape Education (44%), however, respondents in this income bracket were slightly more interested in Tours of Greeley Water facilities (36%). Amongst respondents of Hispanic, Latino or Spanish origin, results were fairly consistent with overall survey responses, however, respondents expressed more interest in the Annual Mayor's Water Challenge (28% compared to 20% for all respondents) and less interest in Xeriscape Education (44% compared to 53% for all respondents).

## 2. Water Audits

### a. Past Participation

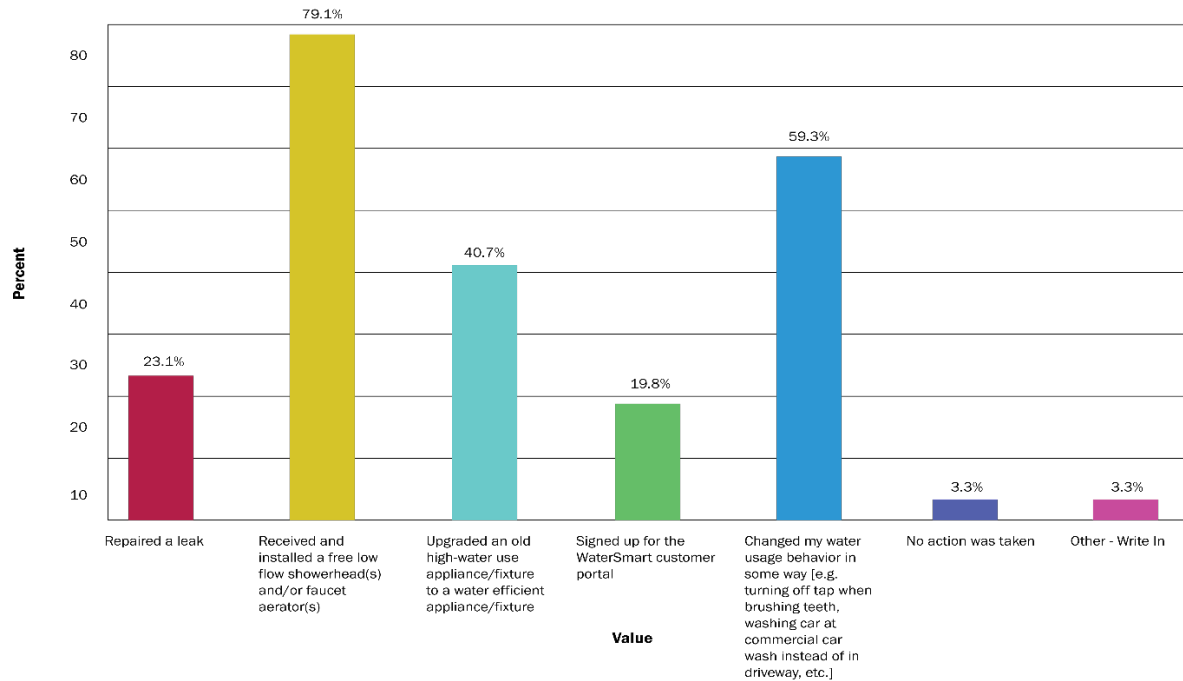
Figure 9 shows that of the survey respondents, 24% had participated in an outdoor irrigation audit, 13% had participated in an indoor water audit, and just 2% had participated in commercial audits. Seventy-two percent (72%) of respondents had not participated in any water audit programs.



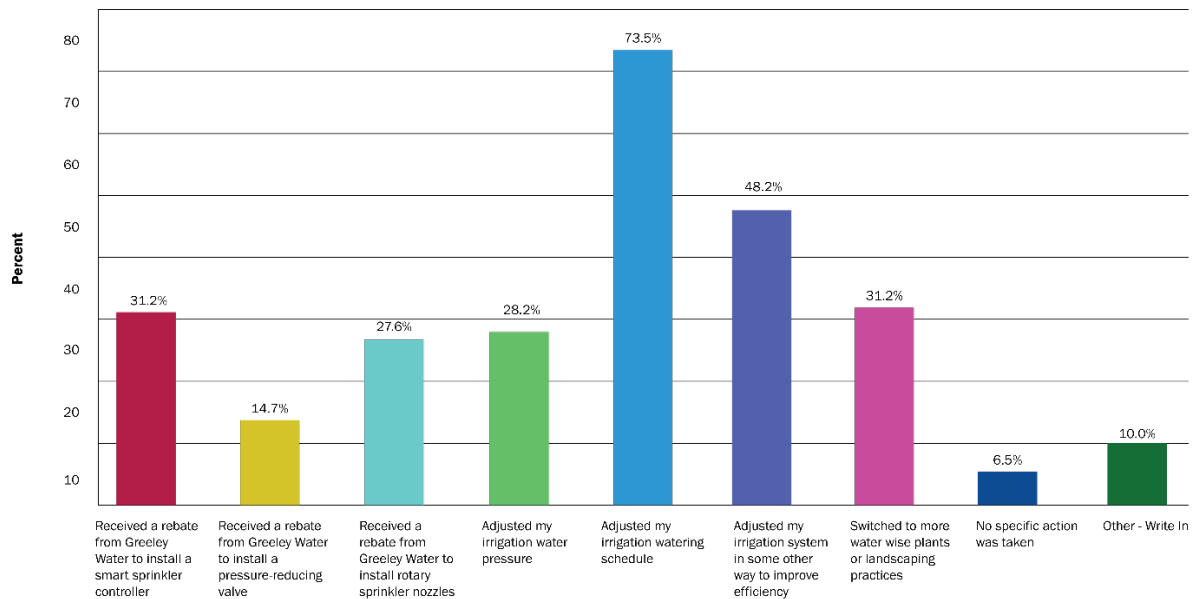
**Figure 9. Past Participation in Water Audits.**

### b. Water Savings Action

After completing a water audit, most respondents took some type of water saving action. Captured in Figure 10, for indoor audits, such actions included: receiving and installing a free low flow showerhead(s) and/or faucet aerator(s) (79%), changing their water use behavior in some way (59%), and upgrading an old high-water use appliances/fixture to a water efficient appliance/fixture (41%). For outdoor irrigation audits, captured in Figure 11, common actions included: adjusting their irrigation watering schedule (74%), adjusting their irrigation system to improve water efficiency (48%), receiving a rebate from Greeley Water to install a smart sprinkler controller (31%), and switching to more water wise plants or landscaping practices (31%).



**Figure 10.** Water savings actions taken as a result of indoor water audit.



**Figure 11.** Water savings action taken as a result of outdoor water audit.

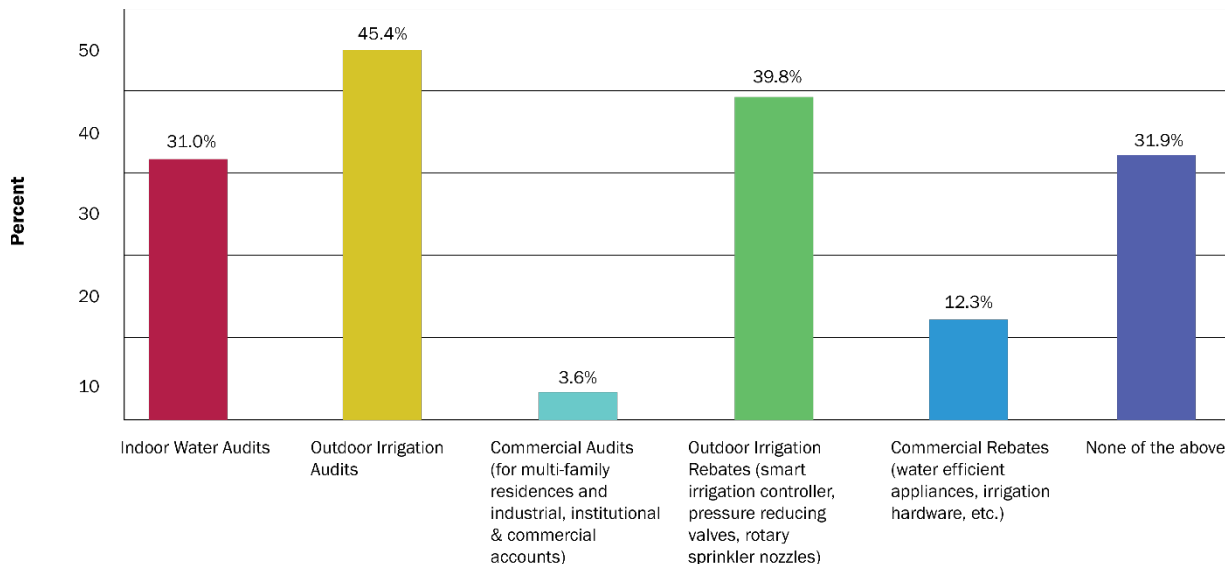


### c. Rating

The vast majority of survey respondents who participated in a water audit found the program to be helpful or very helpful (i.e., scoring them a 4 or 5 on a scale of 1-5 with 5 being very helpful). Residential Outdoor Irrigation Audits scored the highest (86% of respondents who participated ranking them as helpful or very helpful), followed closely by Commercial Audits (Indoor and/or Outdoor) (83%) and Residential Indoor Audits (81%). Additionally, 89% of respondents that received an outdoor irrigation rebate following their irrigation audit found that rebate to be helpful or very helpful (i.e., scoring them a 4 or 5 on a scale of 1-5).

### d. Future Participation

Consistent with the past participation results, Figure 12 shows that the Residential Outdoor Irrigation Audit (45%) was the program that respondents expressed the most interest in participating in in the future. Forty percent (40%) of respondents were also interested in taking advantage of Outdoor Irrigation Rebates, available to those that have participated in a Residential Outdoor Irrigation Audit. Thirty-one (31%) of respondents were interested in participating in Residential Indoor Water Audits in the future.



**Figure 12.** Participant interest in future participation in Water Audits.

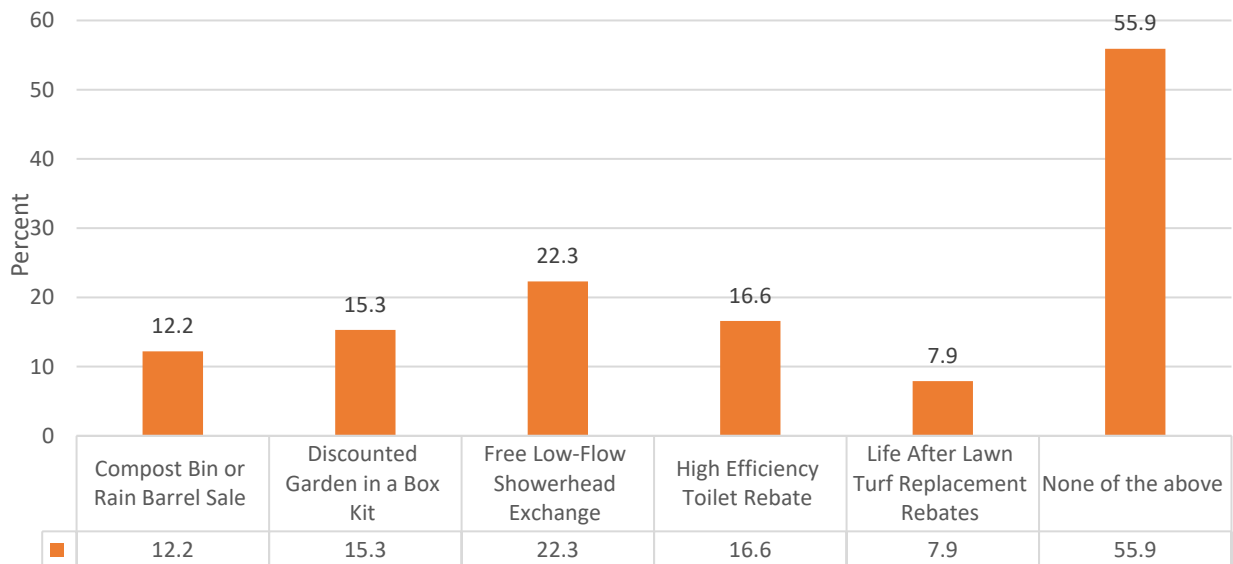
For those that were unaware of Greeley’s audit program prior to this survey, outdoor irrigation rebates (36%) and residential irrigation audits (32%) remained the most popular opportunities for future participation. Survey respondents in the lowest income bracket expressed less interest in all audits compared to higher income respondents. Whereas respondents of Hispanic, Latino or Spanish origin expressed slightly more interest in outdoor irrigation rebates

(50% compared to 26% for those of non-Hispanic, Latino or Spanish origin) and more interest in commercial rebates (26% compared to 11% for those of non-Hispanic, Latino or Spanish origin).

### 3. Water Efficiency Incentives

#### *a. Past Participation*

Captured in Figure 13, the Free Low-Flow Showerhead Exchange was the most common water efficiency program for survey respondents to have participated in (22% of respondents), followed by the High Efficiency Toilet Rebate (17%), and the discounted Garden in a Box Kit (15%). The Showerhead Exchange and Garden in a Box program, in particular, are perhaps most well-utilized since they have very low barriers to entry as they are open to both homeowners and renters and only require having a shower or a space to grow a garden. On the other hand, the Life After Lawn Program was the least common for past participation (8%) perhaps due to the fact that this program only launched in 2020 during the COVID pandemic and requires a more significant investment of time and funding from the participant.



**Figure 13.** Past participation in Water Efficiency Incentives.

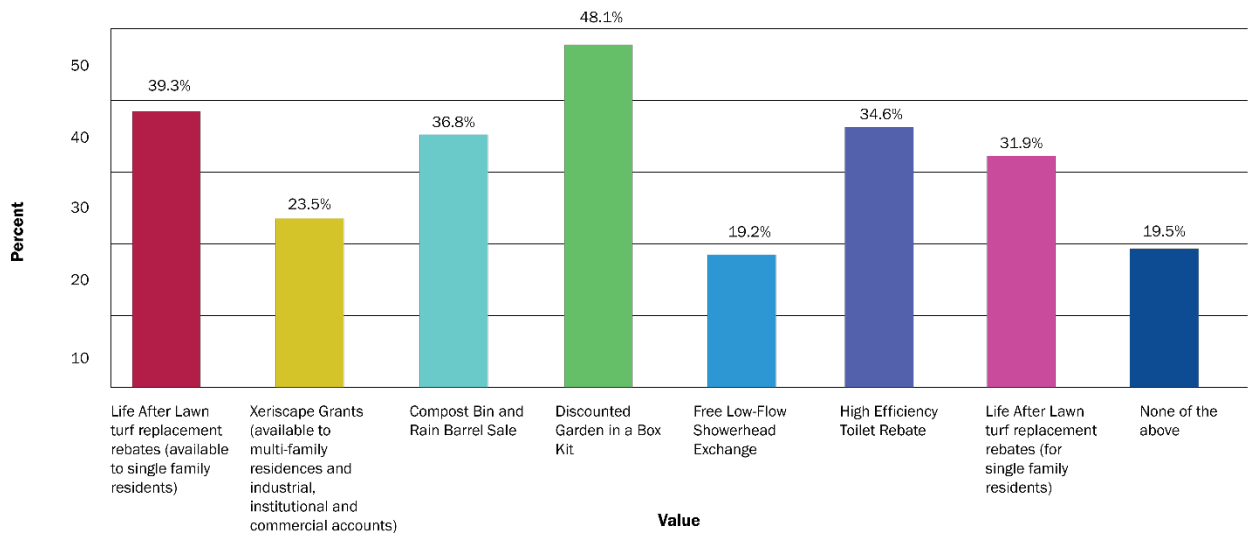
#### *b. Rating*

The vast majority of participants – at least 84% of participants for all programs – found the Water Efficiency Incentive to be valuable or very valuable (indicated by rating programs a 4 (valuable) or 5 (very valuable) on a scale of 1-5. The high efficiency toilet rebate ranked the highest at 94%, followed by the Garden in a Box program at 92%. The program that the most

respondents had participated in – the Low-Flow Showerhead Exchange – was rated as slightly less valuable (88%).

### c. Future Participation

Figure 14 shows that 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. Free Low-Flow Showerheads were less popular (19%), perhaps due in part to community saturation, given the greatest percentage of survey respondents had participated in showerhead exchanges in the past (22%) and the perceived economic value (cost is approximately \$20-\$40). Only 19% were not interested in any efficiency incentive programs.



**Figure 14.** Participant interest in future participation in Water Efficiency Incentives.

For those that were unaware of efficiency incentive programs, respondents were most interested in high efficiency toilet rebates (38%), followed closely by compost bin and rain barrel sales (36%) and discounted Garden in a Box kits (36%). For respondents in the lowest income bracket, a larger percent (43%) expressed that they were not interested in any of the incentive programs, compared to 19% for all survey respondents. However, for those in the lowest income bracket that *were* interested in incentive programs, respondents expressed the most interest in Life After Lawn (32%) and High Efficiency Toilet Rebates (32%).

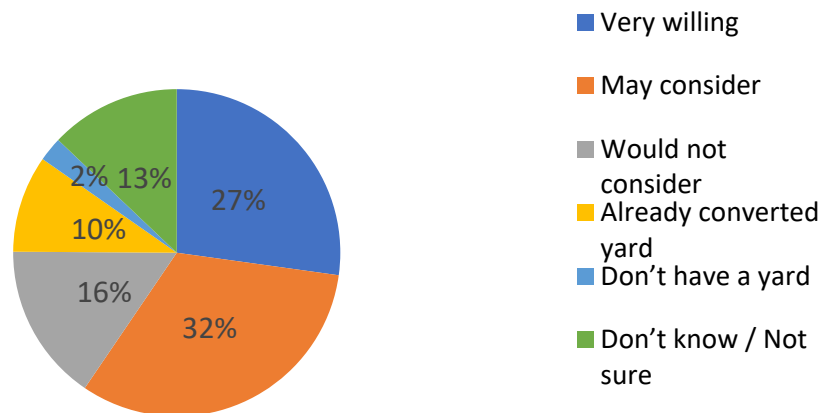
For most programs, respondents of Hispanic, Latino or Spanish origin, expressed slightly more interest in efficiency incentives than those of non-Hispanic, Latino or Spanish origin, particularly the High Efficiency Toilet Rebate (52% compared to 34% for non-Hispanic, Latino or Spanish Origin) and the Life After Lawn program (46% compared to 39% for those of non-Hispanic, Latino or Spanish origin). The reverse was true for the Compost Bin and Rain Barrel Sale in

which just 24% of respondents of Hispanic, Latino or Spanish origin were interested in participating in the future, versus 38% of non-Hispanic, Latino or Spanish origin respondents.

#### *d. Life After Lawn Results*

In conversation between the Project Team and Greeley Water staff, Greeley staff expressed a targeted interest in potentially expanding its existing Life After Lawn Program. Thus, the survey included several questions specific to this program. Encouragingly, Figure 15 shows 59% of survey respondents said they would be “very willing” or “may consider” removing grass from their front yard, while only 16% said they would not consider this. Figure 16 shows that when asked what the primary barriers keeping them from replacing grass with low water landscaping were, the most common responses were cost (62%) and physical labor involved (52%), both barriers that can be mitigated, in part, through expanded Life After Lawn Program funding opportunities.

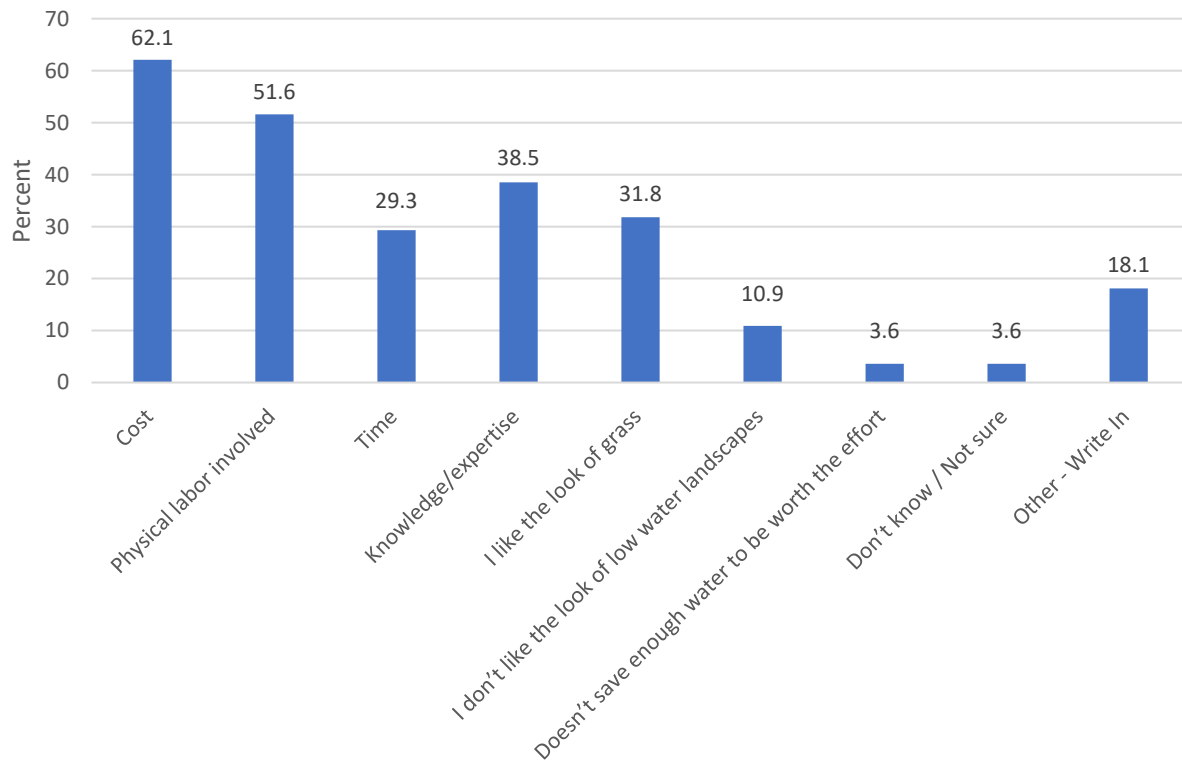
Interestingly, 28 individual respondents wrote-in under the “Other” category that HOA rules and restrictions were their biggest barrier to replacing some or all of their grass. In Colorado, as of 2021, HB 21-1229 increases protections for property owners in HOA-guided communities and does not allow for HOAs to mandate turf grass or prohibit water wise landscaping.<sup>8</sup> It’s most likely that these respondents were not aware of this policy change and it may be fruitful for Greeley Water to conduct a targeted outreach campaign to both homeowners and HOA governing bodies to update them on this change.



**Figure 15.** Participant willingness to remove grass from their front yard.

<sup>8</sup> <https://leg.colorado.gov/bills/hb21-1229>



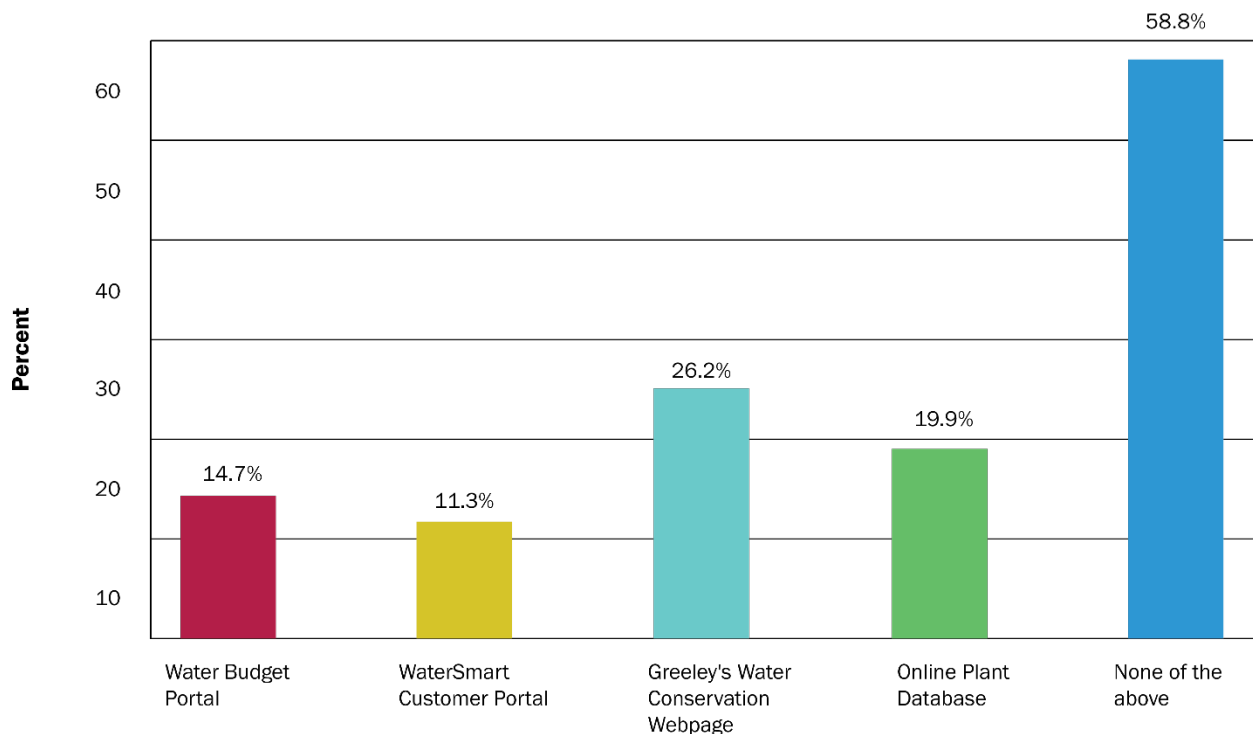


**Figure 16.** Primary barriers to replacing turf.

## 4. Online Water Efficiency Tools

### *a. Past Utilization*

Figure 17 shows that of those respondents that had used Greeley's online tools, Greeley's Water Conservation webpage was most common (26%) followed by the Online Plant Database (20%). The Water Budget Portal (15%) and WaterSmart Customer Portal (11%) were less commonly used. 59% of respondents had not used any of Greeley Water's online tools.



**Figure 17.** Past Utilization of Greeley Water Online Water Efficiency Tools.

### *b. Rating*

The majority of respondents who had used Greeley's Online Water Efficiency Tools found them to be helpful or very helpful (i.e., scoring them a 4 or 5 on a scale of 1-5). The Online Plant Database scored the highest (92%), followed by the Water Conservation Webpage (86%), the WaterSmart Customer Portal (76%) and the Water Budget Portal (76%).

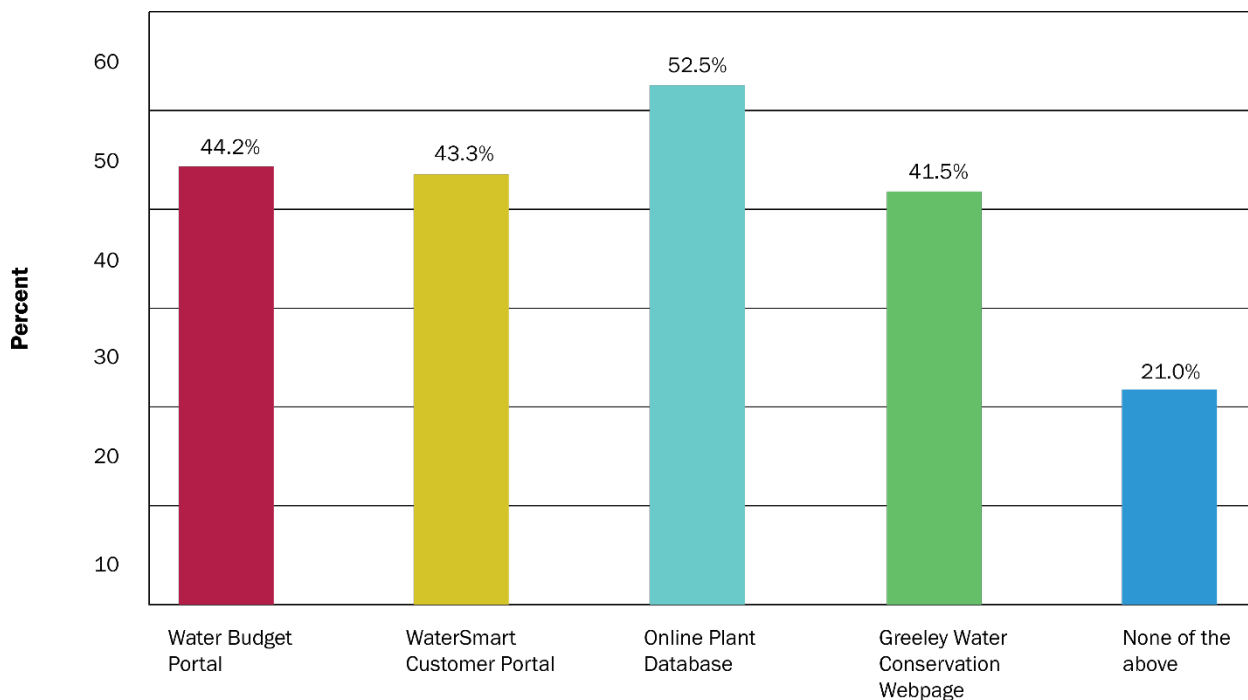
### *c. Motivation for using WaterSmart Portal*

The WaterSmart Portal was of particular interest to Greeley staff as this is a relatively new tool and staff have been conducting a significant outreach effort around the tool. Thus, an additional question was asked to determine why respondents were utilizing the WaterSmart Portal. Of those that utilized the customer portal, most respondents used it to learn more

about their water use (73%) and to find out what the water budget was and better understand the portal (71%).

#### *d. Future Utilization*

Unlike past participation results, Figure 18 illustrates that respondents were most interested in using the Online Plant Database in the future (53%) compared to the Water Budget Portal (44%), WaterSMART Customer Portal (43.3%), and Water Conservation Webpage (42%). The results remained consistent for respondents that were unaware of Greeley's Online Water Efficiency Tools prior to the survey, with the largest percentage interested in using the Online Plant Database (44%). Since the Online Plant Database, in particular, was less likely to have been used in the past, these results suggest that participants may be more interested in utilizing this resource once they are reminded of it or made aware of it.



**Figure 18.** Participant interest in future participation in Online Efficiency Tools.

Compared to other income brackets, the lowest income bracket was most interested in Greeley's Water Conservation Webpage (57% compared to 42% for all survey respondents). Respondents of Hispanic, Latino or Spanish origin were more interested in the Water Budget Portal (59% compared to 43% of those of non-Hispanic, Latino or Spanish origin) and the WaterSMART customer portal (56% compared to 43% of those of non-Hispanic, Latino or Spanish origin). Those of Hispanic, Latino, or Spanish origin were less interested in using the Online Plant Database (43% compared to 54% of those of non-Hispanic, Latino or Spanish origin).



## Key Findings from the Customer Survey

### *Importance & Effectiveness of Conservation Programming*

Survey results demonstrate that Greeley's Water Conservation Program is popular, impactful, and highly valued. Overwhelmingly, survey respondents found Greeley's Water Conservation program to be important, with 94% reporting that the programs are important or very important. This finding is perhaps even better exemplified by the numerous respondents that chose to write-in on the survey with positive feedback on the various programs. For example, one respondent said, "I'm impressed by the efforts the water education program is making and their foresight given our growing population in a dry climate. Programs are very accessible for residents." Another wrote, "Please continue to offer these types of programs. Conserving water is critical here in the West." Still another noted, "It does not matter how many times I interact with a Greeley water official. They are always very informative and willing to help." In fact, several Greeley Water Conservation staff members were even mentioned by name in these positive comments.

Across the board, the survey results indicate a strong degree of awareness of, interest in, participation in, and value derived from Greeley's current portfolio of Water Conservation Programs, as demonstrated in the analysis below. Compared to those that had participated in programming in the past, for almost all programs the percentages increased when asked whether respondents wanted to participate in programming in the future.

### *Outreach Strategies*

Greeley Water can most effectively reach their customers with conservation opportunities through email updates and the monthly newsletter, bill inserts, and the Greeley Water website. It should be noted that for younger demographics, ages 18-24, investment in compelling and frequent social media content could be fruitful. Messages that may resonate with Greeley



Water customers, based on survey participants water conservation motivations, include: saving money on water bills, protecting Greeley's limited water resources, reducing personal use, paying for a fixture or appliance, and supporting community values.

### *Educational Programs*

The Landscape Lecture Series and Xeriscape Education were consistently the most common programs for respondents to have participated in the past, the programs that were rated as most helpful and the most common programs for respondents to be interested in participating in within the next 3 years. Interestingly, there was a strong increase in interest for future participation in tours of Greeley Water Facilities, compared to those that had participated in the past (26% compared to 6%). And 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, on the other hand, scored the lowest of the Educational Programs on interest in future participation and the rating of how helpful the program was for those that had participated in the past. 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%).

While the water savings benefits associated with educational programs can be challenging to quantify, the vast majority of respondents affirmed that they had taken some kind of water savings action as a result of participating in an educational program, including switching to more waterwise plants or landscaping practices and updating or adjusting their irrigation system to improve water efficiency, among other actions.

The Educational Program results suggest that Greeley Water should prioritize – and perhaps even expand – its Landscape Lecture Series and Xeriscape Education offerings. There's also a strong interest in participation in tours of Greeley Water facilities. The Annual Mayor's Water Challenge was slightly less popular. However, given the relatively low cost of participation in the program by the City and Greeley's history of scoring consistent high for resident participation compared to other cities in the region, it is likely worthwhile to continue this annual tradition.

### *Water Audits*

The Residential Outdoor Irrigation Audit was consistently the most common program for respondents to have participated in in the past, 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%). The Outdoor Irrigation Rebates, available to those that have participated in an Outdoor Irrigation Audit, were also widely of interest to respondents for future participation (40%). Respondents of Hispanic, Latino or Spanish origin, in particular, 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 less popular, though 31% of respondents were still interested in participating in the future. Notably, since this survey was administered, Greeley Water has seen a significant increase in sign-ups for Residential Indoor Audits related to the City's roll-out of Advanced Metering Infrastructure and leak detection notifications.

Commercial Audits and Rebates were more challenging to compare in this survey as 96% of respondents identified as Greeley residents and only 4% identified as Greeley business/commercial customers. Thus, the relatively low Commercial Audit program interest is directly correlated to the low number of overall commercial customers that participated in the survey.

Across the board, the majority 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 Outdoor Irrigation Audit program and associated Irrigation Rebates. The results do not suggest that the City should discontinue any of its water audit offerings at this time.

#### *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 (22%), 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 found all programs to be very valuable (at least 84%), however the high efficiency toilet rebate ranked the highest (94%) followed by the Garden in a Box program (92%).

Respondents that were unaware of efficiency incentive programs prior to taking the survey expressed more interest in high efficiency toilet rebates (38%), followed closely by compost bin and rain barrel sales (36%) and discounted Garden in a Box kits (36%). Respondents in the lowest income bracket, expressed the most interest in Life After Lawn (32%) and High Efficiency Toilet Rebates (32%). And those of Hispanic, Latino or Spanish origin, expressed slightly more interest in efficiency incentives than those of non-Hispanic, Latino or Spanish origin, particularly the High Efficiency Toilet Rebate (52%) and the Life After Lawn program (46%).

The majority of respondents (59%) also expressed a willingness to replace all or some of their lawns with water efficient landscaping and indicated that cost and physical labor were the primary barriers keeping them from taking this step. One could expect that participation in the Life After Lawn Program and Garden in a Box Program would help to negate these barriers.

The results suggest that the Life After Lawn program, the Garden in a Box program, and the High Efficiency Toilet Rebate program (due to its interest among the lowest income bracket and

those unaware of conservation programming) should be prioritized by Greeley Water moving forward. Greeley Water may wish to assess participation at upcoming events in its Low Flow Showerhead Exchange Program to determine, as this survey suggests, whether this program may have reached community saturation at this time. Still, the Low Flow Showerhead Exchange Program is one of the more accessible programs to all Greeley residents, including renters, and can readily be “coupled” with other conservation program offerings (e.g. giveaways at a Landscape Lecture Series).

#### *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, however, 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%) and the WaterSmart customer portal (56%).

The results do not suggest that any of Greeley’s Online Water Efficiency Tools should be discontinued, however, should limited capacity and resources exist for tool updates, it may be most beneficial to prioritize the Online Plant Database. Outreach and communication efforts should expand, to the extent possible, for all the online tools.

#### *Future Water Conservation Programming Opportunities*

Some respondents also chose to write-in recommendations for additions or modifications to Greeley Water Conservation programming. Some common themes included:

- Expand the Life After Lawn program to provide financial incentives for back yards, not just front yards.
- Provide graywater kits.
- Encourage and provide rebates for residents to do more mulching.
- Provide brochures on various water conservation programming to real estate agents.
- Provide yards signs to individuals participating in Outdoor Irrigation Audits and Life After Lawn.

#### *Considerations for Future Surveys*

Greeley’s Water Conservation Program should endeavor to 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. To the extent feasible, the

majority of the questions should remain fairly consistent between surveys to demonstrate any changes or trends over time. However, questions will likely be adjusted based on changes to the Water Conservation Program Portfolio and Greeley Water priorities.

Without asking specific questions on new programming or recommendations, this survey garnered a number of written responses with suggestions for updates to Greeley's Water Conservation Program portfolio. Because of this, in the future, Greeley may also consider adding questions about potential conservation programs under consideration by the City. For example, if the City adopted a graywater ordinance and wanted to consider providing free Laundry-to-Landscape parts kits, they could ask respondents about their interest in this program and what resources they would need to make their participation feasible.

Additionally, while the survey garnered 720 completed responses, it also had a 21% abandonment rate (meaning 191 additional people started the survey and did not complete it). This abandonment rate is typical for longer questionnaires and since respondents did not drop-off at a particular question or questions, we can deduce that the drop-offs were not due to survey design or technical issues and instead were primarily due to survey length.<sup>9</sup> Survey abandonment both reduces a survey's sample size for analysis and can result in a less representative sample. While the project team was aware of the abandonment challenges of a longer survey from the outset, it was determined that asking all questions in this initial survey would be important to determining what data might be most significant. Given the outcomes of the survey, the project team would like to make the following recommendations for scaling-back this survey in future iterations:

- *Remove awareness questions* – Respondents were asked at the beginning of the survey which specific Greeley Water Conservation program they were “aware of” prior to completing the survey. These questions were primarily included in order to analyze results alongside interest in future programming (i.e. of those customers that Greeley Water hasn't effectively been reaching, how many are now interested in participating in a given program in the future once they're made aware of that program). However, in almost all cases, the future participation results remained consistent between those that were aware of the program prior to the survey, and those that weren't.
- *Remove most written response boxes* – Past participants of the four main categories of conservation programs were provided an optional write-in box to share more about their participation. While many respondents took advantage of providing feedback and positive comments, a single write-in box for additional comments at the end of the survey would likely be sufficient to garner these responses while moving respondents more quickly through the survey.
- *Remove Life After Lawn Questions* – Specific Life After Lawn questions were included in the survey since this is a new Greeley Water Program and thus, more limited

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<sup>9</sup> Industry research shows that on average 15% will abandon a survey at 10 minutes and 20% will abandon at 60 questions: [https://issuu.com/marymala/docs/survey\\_abandonment\\_rates](https://issuu.com/marymala/docs/survey_abandonment_rates)



information would be gathered under the past participation and awareness results. While the findings may support program outreach efforts, the specific questions will likely not need to be included in future surveys as sufficient information will be gleaned from responses related to future participation.

Finally, given the City's interest in connecting with Hard-to-Reach populations, Greeley should consider translating the survey, and associated outreach materials, into Spanish and offering the survey bilingually.<sup>10</sup> If this approach is taken, the City could analyze results based on those that participated in the survey in Spanish and determine which, if any, Water Conservation Programming might be most impactful to offer bilingually.

### *Survey Conclusion*

The City of Greeley should be very proud of its efforts to build an extensive and valuable Water Conservation Program. The customer survey results will allow the City to expand on the success of its existing program and further hone in on how to reach their target audience. The survey results should be considered in unison with the quantitative analysis sections described below.

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<sup>10</sup> According to the National Library of Medicine, "Hard-to-Reach is a term used to describe those sub-groups of the population that are difficult to reach or involve in research or public health program due to their physical and geographical location . . . or their social and economic situation":  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3963617/#:~:text=Introduction-,%20Hard%20to%20reach'%20is%20a%20term%20used%20to,and%20economic%20situation%20%5B1%5D.>



## Quantitative Analysis of Greeley's Water Conservation Programs

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 participants and quantified the water savings that resulted from participation in these programs. The following sections describe each of these approaches in greater detail.

### Spatial Trends in Water Conservation Program Participation

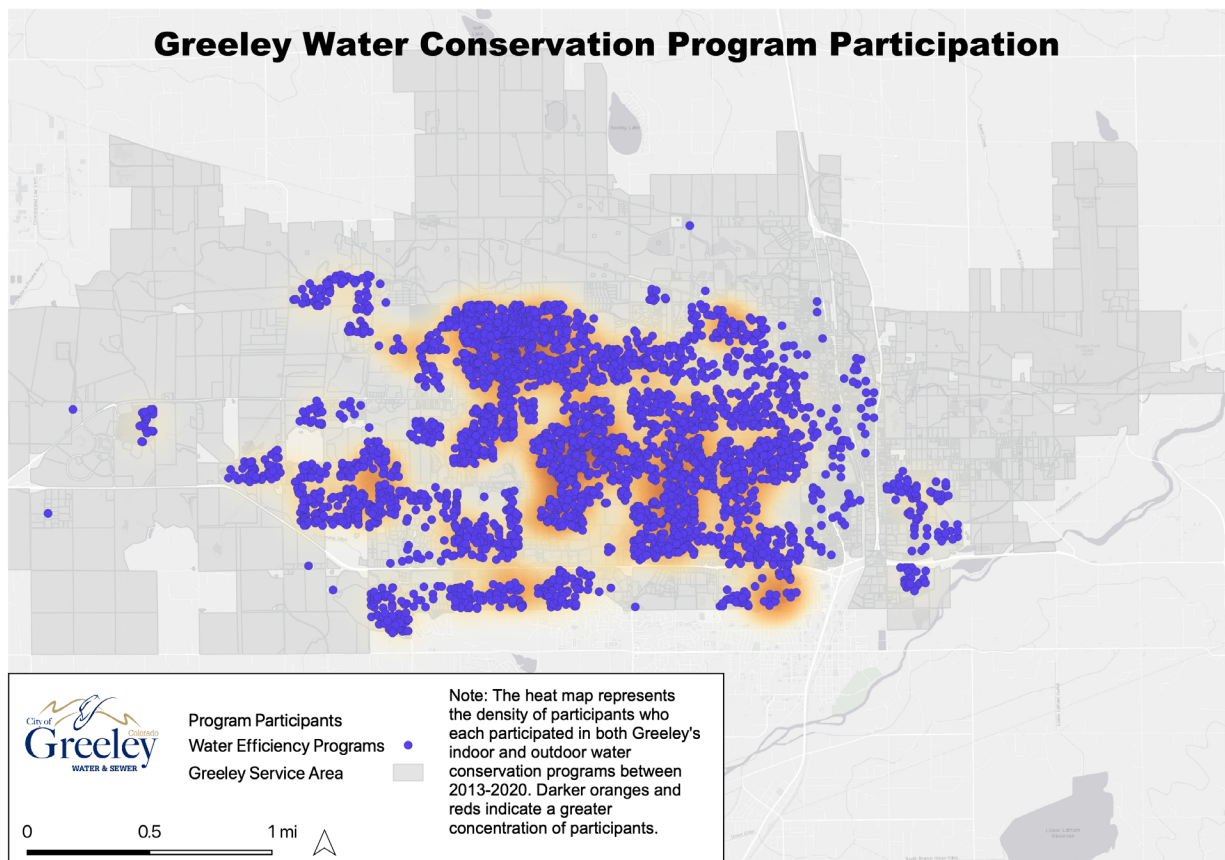
This analysis used the 2019 U.S. Census Bureau's American Community Survey (ACS) data,<sup>11</sup> combined with data tracking participation in Greeley's water conservation programs, to explore if and how participation varies according to demographic characteristics, such as community members' preferred language, identification as Hispanic or Latino by race and/or by origin, home ownership status, median household income, and internet access, among other characteristics. The goal of this analysis is to identify any trends or patterns in participation that could help to inform future outreach.

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<sup>11</sup> 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>.

Participation in Greeley's water conservation programs was compared to key demographic data from the US Census Bureau's American Community Survey (ACS) dataset. For more details and descriptions of each data source included in this analysis, please see Appendix E.

This data was analyzed at the block group scale. Block groups are statistical divisions of census tracts, generally defined to contain between 600 and 3,000 people.<sup>12</sup> Block groups are the smallest geographical unit for which the US Census Bureau publishes sample data (data which is sampled from a portion of all households, rather than collected for each household). The analysis used block groups since they represented the most recent and most granular census data available at the time of the analysis.



**Figure 19.** Greeley Water Conservation Program participation from 2013-2020.

As Figure 19 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.

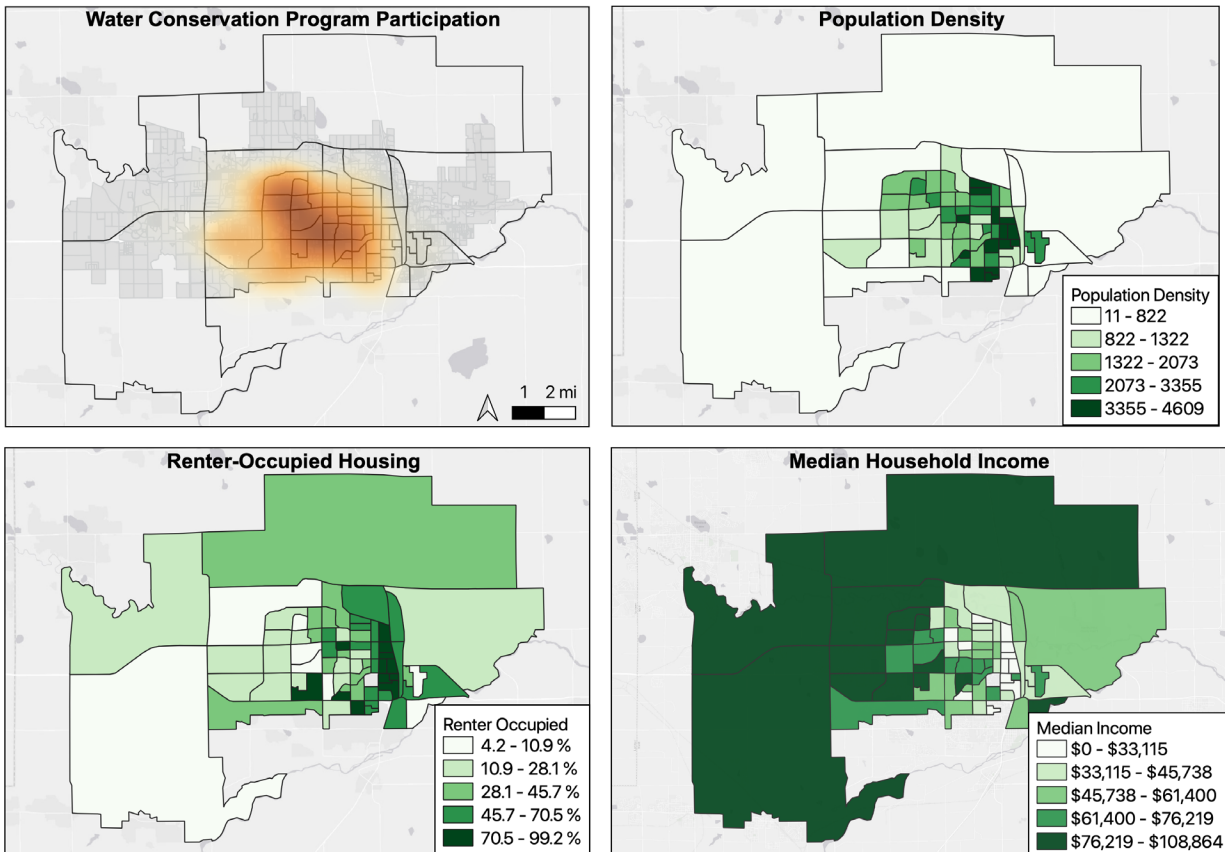
<sup>12</sup> U.S. Census Bureau. (2021). "Glossary." Available: [https://www.census.gov/programs-surveys/geography/about/glossary.html#par\\_textimage\\_4](https://www.census.gov/programs-surveys/geography/about/glossary.html#par_textimage_4).

Figures 20 and 21 compare these geographic patterns in participation with different demographic characteristics. In the northeast and southwest quadrants of the City's center, areas of sparser water conservation program participation are also areas with higher percentages of renter-occupied housing; with lower household income; and (particularly in the northeast section of the city's center) with high percentages of residents speaking Spanish, Asian American or Pacific Islander (AAPI) languages, or Indo-European languages.

Around the perimeter of Greeley's service area, water conservation program participation is also sparser, in part reflecting a lower population density in these areas of the City. New builds typically occur in the perimeter of the City, and are therefore likely to be water efficient indoors; however, there may still be opportunities for these customers to reduce their water use further, particularly through outdoor water conservation. 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, or Indo-European language. The percentage of renter-occupied housing in these neighborhoods is lower overall, though it varies by block group. In general, the northern edge of the service area has larger percentages of renter-occupied housing, and the southwest corner of the service area has lower percentages of renter-occupied housing.

These demographic trends suggest that strategies for increasing participation within the City's core might require strategies such as language translation (e.g., through partnerships with local community groups or non-profit organizations) 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 to occur in a face-to-face setting 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. This outreach might also highlight programs aimed at both renters and homeowners and include a focus on outdoor water use (reflecting the fact that outdoor water use may be higher in higher income, more sparsely populated areas).





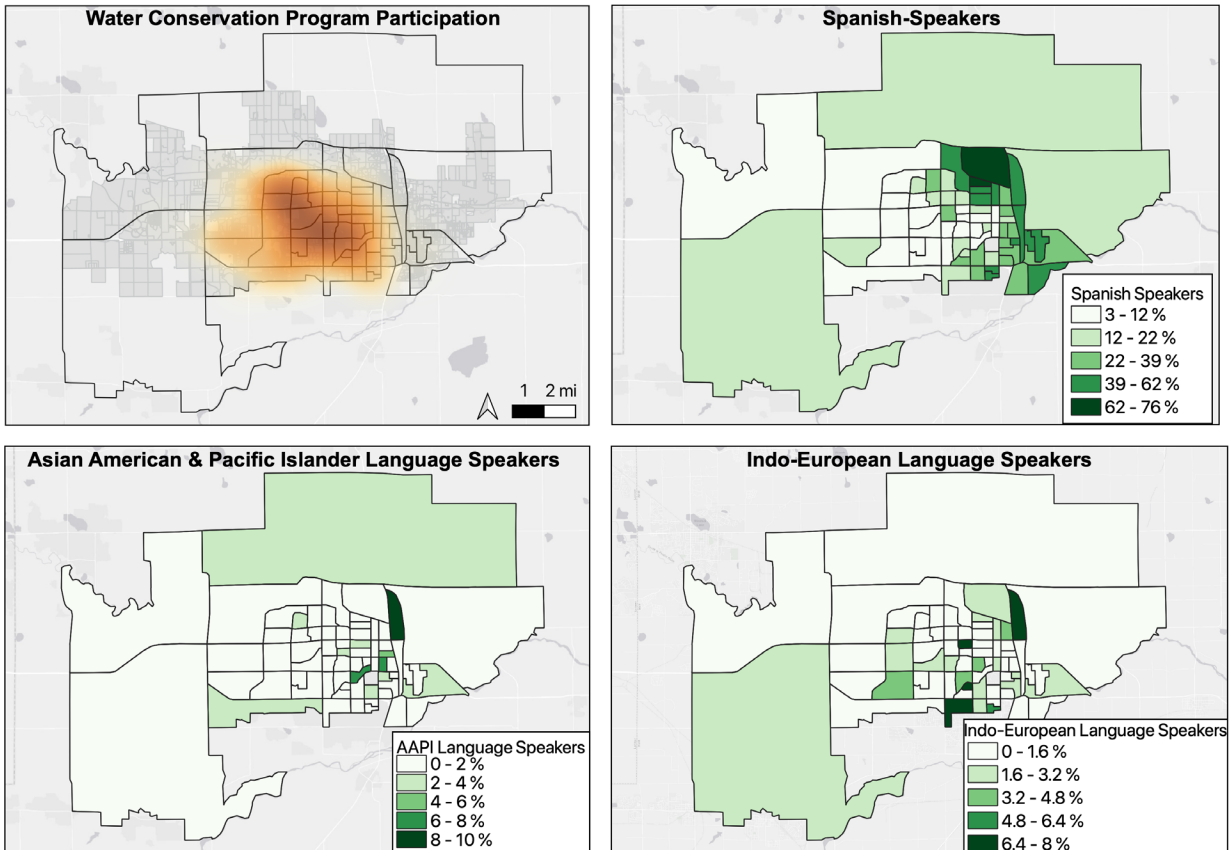
**Figure 20.** Greeley Water Conservation Program participation (top left), compared with population density, percentage of renter-occupied housing, and median household income for US Census block groups in Greeley's service area.

Unsurprisingly, many trends in these demographic characteristics correspond with each other. For instance, areas with lower median income often have higher percentages of renter-occupied housing. The trends in residents speaking languages other than English also offer some interesting points of comparison. Spanish is the language, aside from English, that is most commonly spoken in Greeley, ranging from 3-76% of residents in a block group, compared to a maximum of 10% of residents in a block group speaking an AAPI language, and a maximum of 8% speaking an Indo-European language. Figure 22 shows the neighborhoods with the highest percentages of each language spoken across the City. Many neighborhoods have distinct languages that are especially prominent, but the neighborhood shown in orange, in the City's northwest corner, has high percentages of residents speaking all three languages, suggesting that approaches that provide translation or engagement in a number of different languages might be most effective here.

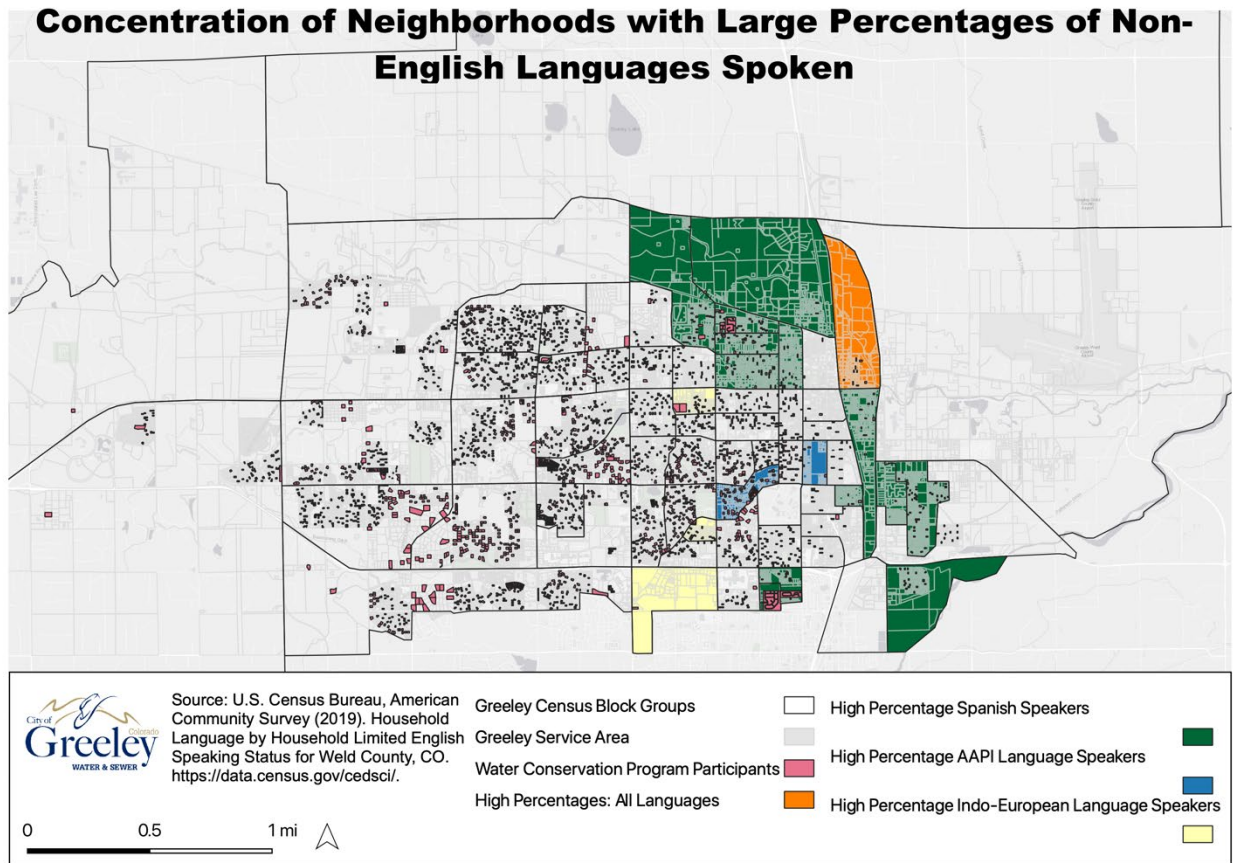
As Figures 22 and 23 illustrate, participation in water conservation programs is lower in neighborhoods where more residents speak Spanish. However, it's important to note that water conservation program participation is not low in all neighborhoods with high percentages



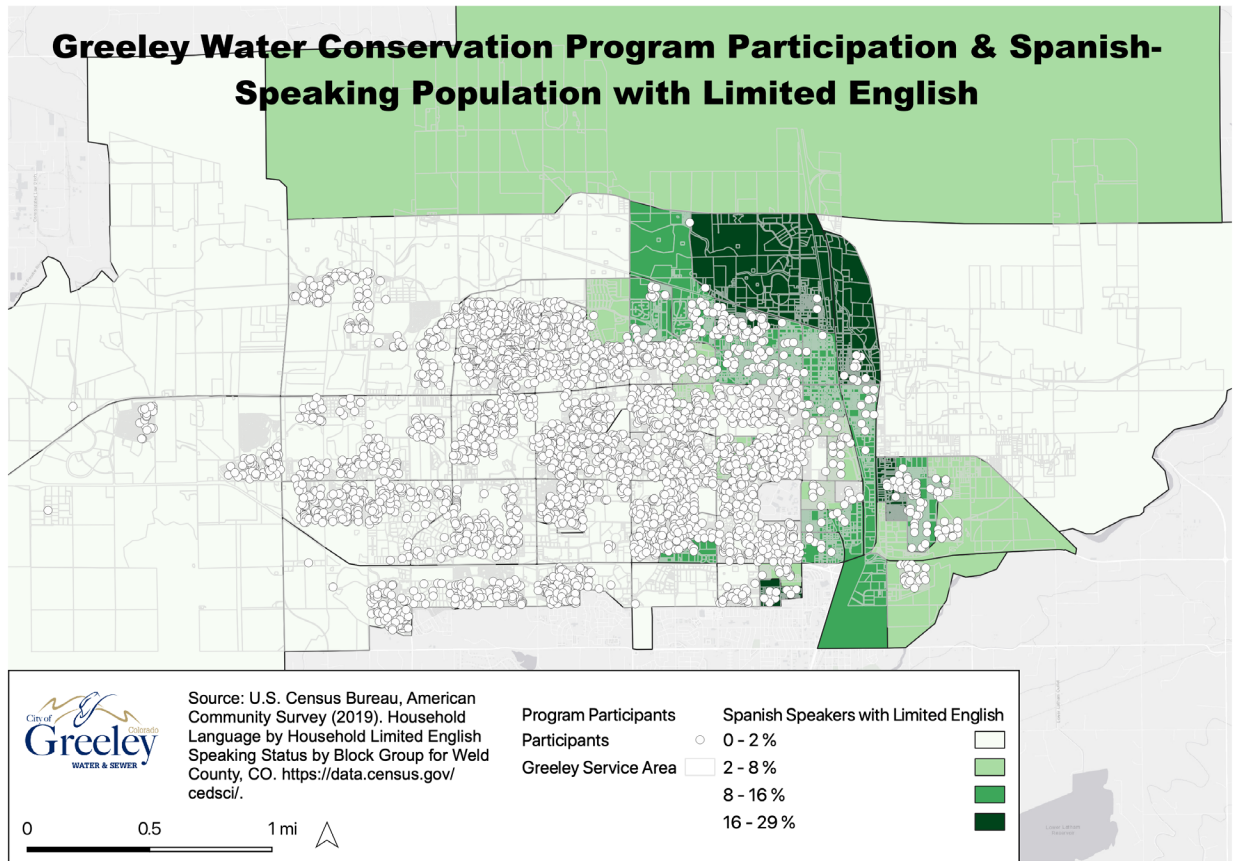
of Spanish-speaking residents. For instance, water conservation participation is fairly high in the southern-most dark green neighborhood (showing large percentages of Spanish speakers) in Figure 22. Understanding what contributed to higher levels of participation here could offer insights into strategies that could be replicated in demographically similar neighborhoods.



**Figure 21.** Greeley Water Conservation Program participation (top left, shown in terms of population density), compared with percentage of Spanish, Asian American and Pacific Islander, and Indo-European speakers for US Census block groups in Greeley's service area.



**Figure 22.** This map shows the block groups or neighborhoods with the largest concentrations of residents speaking languages other than English, including Asian American and Pacific Islander (AAPI) Languages (shown in blue), Indo-European Languages (shown in yellow), and Spanish (shown in green). The legend indicates what percentage of residents in block group speak each language. The orange neighborhood has high percentages of residents speaking each of these languages.



**Figure 23.** Greeley Water Conservation Program participation compared with the percentage of Spanish speakers with limited English in a US Census block group.

## Water Use Change Resulting from Water Conservation Programs

In addition to analyzing geographic trends, this project analyzed the water use change resulting from participation in a subset Greeley’s water conservation programs, focusing in particular on incentive and audit programs. Measuring the water efficiencies resulting from participation in one of Greeley’s water conservation program sheds light on the return on investment in these programs and provides relevant business impact metrics. Also through this analysis, customers’ participation in each water conservation program is tracked over time.

Table 1 captures the water programs included in this analysis. The programs included in the water savings analysis were limited to programs that had at least 50 participants with sufficient data to calculate the change in water use resulting from their participation in this program (for more details about this approach, see the following Methodology section).

Program	Participation Analysis	Water Savings Analysis
Life After Lawn (formally Cash for Grass)	√	
Commercial Audits (Indoor + Outdoor)	√	√
ET Sensor Rebate	√	
Front Loading Washer Rebate	√	√
Irrigation Controller Rebate	√	
PRV Rebate	√	√
Residential Audits (Indoor + Outdoor)	√	√
Rotary Nozzles Rebate	√	√
Showerhead Exchange	√	
Smart Controller Rebate	√	√
Spray Head Sprinkler Exchange	√	
Toilet Rebates	√	√

**Table 1.** A list of programs included in this report’s analysis of participation trends and water use changes. See Appendix G for more detailed descriptions of each program.

The methodology followed approaches from other Colorado municipalities on water efficiency program studies. To better understand the methodology used in conducting these water efficiency program analyses, interviews with other Colorado agencies were conducted, and reviewed materials and reports from similar studies. A review of the key findings from this research and these conversations is provided in the Appendix F.

### Methodology

In consultation with Greeley, WaterNow and WRA focused a subset of Greeley’s water conservation programs, which were primarily audit and rebate programs. Please see Appendix G for more detailed descriptions of each program.

This study covers participation in water efficiency programs during the years 2013-2018. Given the unusual factors such as the COVID19 pandemic and stay-at-home orders, 2020 water use is not included in these calculations. The water use change for participation in programs during 2018 is analyzed using only 2019 water use data.

The first step conducted was to calculate the change in annual water use resulting from a customer account’s participation in a water conservation program. To do this, we compared customers’ average annual water use pre- and post- participation in a water conservation program. Water consumption comparisons of pre- and post- participation were based on two-year averages. For example, if a water audit was conducted in 2016, the average from 2014 and 2015 consumption was compared to 2017 and 2018 water consumption. This average annual water savings was then applied to each year a customer was active in a program (e.g., if a

customer participated in a program 2014, we applied the average annual water savings to the years 2014-2018). For some programs, specifically the Commercial and Residential Audits, we applied a five-year limit on water savings and a 20% annual discount on savings, based on the literature review reflected in the AWE Water Conservation Tracking Tool.<sup>13</sup> This same tool indicated lifetime savings for other programs that went beyond the six years included in this analysis (see Appendix H for more details).

This approach was applied to programs, focusing on a customer's indoor and/or outdoor water use depending on the type of water use addressed by the program. Indoor water use was determined as the total water use during the months of January, February, March, November, and December. Outdoor water use was defined as water use during the months of April through October, that was greater than the average indoor monthly water use for that year. Outdoor water consumption was normalized for changing weather conditions using Greeley's annual Irrigation Water Requirement (IWR). A more detailed description of this methodology is included in Appendix F.

Customer accounts were filtered if sufficient data were present and if participation in a program was greater than 50 accounts. For example, the Spray Head Sprinkler Exchange was removed from the analysis because there were only 6 past participants in this program between 2013-2018. The cost of each program reflects both the cost of equipment and rebate, in addition to an estimated cost for the staff time needed to implement the program (see Appendix G for more details on cost calculations).

While many other methodologies could also provide helpful insight into the change in water use resulting from water conservation program participation, this approach was determined to be the best match for Greeley's existing data and data format.

## *Results and Discussion*

### *Water Use Change*

Results are represented in Table 2 and compared to literature and the Alliance for Water Efficiency's Water Conservation Tracking Tool's model default values.

While each program shown in Table 2 generated water savings during the 2013-2018 time period, the amount of savings varies significantly across different programs. Three programs resulted in especially large savings for the period of the study: the Residential Audit (19.5

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<sup>13</sup> The AWE Water Conservation Tracking Tool is an Excel-based spreadsheet tool for evaluating the water savings, costs, and benefits of urban water conservation programs and for projecting future water demands. The tool includes a review of literature assessing the anticipated average water savings, savings duration, and annual savings decay rate of a different conservation programs. See: Alliance for Water Efficiency (AWE). Water Conservation Tracking Tool. Available: <https://www.allianceforwaterefficiency.org/resources/topic/water-conservation-tracking-tool>.



AF/year), the Front Loading Washing Rebate (17.1 AF/year), and the Toilet Rebates (14.7 AF/year). The programs with the largest water savings reflect high levels of interest and participation in these programs, in addition to the water savings generated by these interventions. Water savings were also generated by the following water conservation programs: Smart Controller Rebates (4.3 AF/year); the Pressure Reducing Valve (PRV) Rebate and Rotary Nozzles Rebate (3.2 AF/year) and the Commercial Audits (2.9 AF/year).

Programs' overall water savings are heavily influenced by the number of customers who participate in a program. The Front Loading Washer Rebate, for instance, has both high total savings and high levels of water savings per customer account. The Smart Controller Rebate, PRV Rebate, and Rotary Nozzles Rebates have comparatively lower levels of total participation, but a high level of water savings for each participating account. In other words, despite their low cumulative savings, it may be worth maintaining or exploring the additional demand for these programs – to determine if additional outreach could grow participation and expand the programs' overall water savings beyond individual customers' water savings. Additionally, an important consideration is that the number of participants included in this analysis is lower than the total number of program participants in Greeley's water conservation programs. Many participants simply did not have sufficient water use data to be included in the calculations. Using a conservative approach, if a conservation program had less than 50 customer accounts with sufficient data, those accounts were excluded from the final calculations. Bear in mind, their inclusion would also increase the total AF of water saved through conservation programs.

In terms of the return on investment (ROI) or the cost invested for each AF of water a program saves, all individual water conservation cost less than \$625 per acre-foot. The Front Loading Washer Rebate is cheapest (\$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. The analysis defined costs as the raw cost of providing a rebate in addition to the staff time needed to review a rebate or administer an audit. Additional costs – such as the cost to advertise or create programs – are not reflected in this analysis.

Please note it is not recommended to simply sum the total saved water from all programs. For a single customer account, there may have been times when the account participated in multiple programs; combining water savings values would lead to potential double-counting. A summation 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 between 2013-2018. Dividing the total cost of the included programs by the water savings realized by their participants estimates a cost per acre foot of \$1,350 per AF. Water conservation programs far exceed the cost per acre foot when compared to water right acquisitions from the Colorado Big-Thompson Project (estimated to be \$62,500 per share as of July 2020, according to the

*Loveland Reporter-Herald*).<sup>14</sup> While the savings from water conservation do not continue into perpetuity, many have a fairly long expected lifetime of savings, ranging from 5 years (for audit programs) to 25 years (for toilet rebates). For a more detailed description of the estimated duration of each program's water savings, see Appendix H.

To ensure Greeley's estimated water savings were reasonable, the results were compared to published values found in the AWE Water Conservation Tracking Tool (see Appendix H). For most programs, the results are similar. The most notable exceptions are the Commercial and Residential Audit programs, where the values found through the analysis are lower than what would be expected based on the AWE model default values. However, participation in audits includes a wide range of variables, such as individual behavior change and different weather conditions. For example, even while normalizing for weather by using IWR, conditions may still affect resident's behavior and attitudes towards water use. For the Commercial Audit program, it is also possible that participants are overall using water more efficiently, but the water demand is higher because their business grew. Participation in these audits is an educational opportunity which may also lead to participation in other rebates, playing a role in generating the larger individual savings seen in some of the other programs.

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

<sup>14</sup> 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/>.

\*\*\*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.

**Table 2.** *Estimated water savings achieved by selected water conservation programs. Study period from 2013-2018.*

### *Participation in Water Conservation Programs*

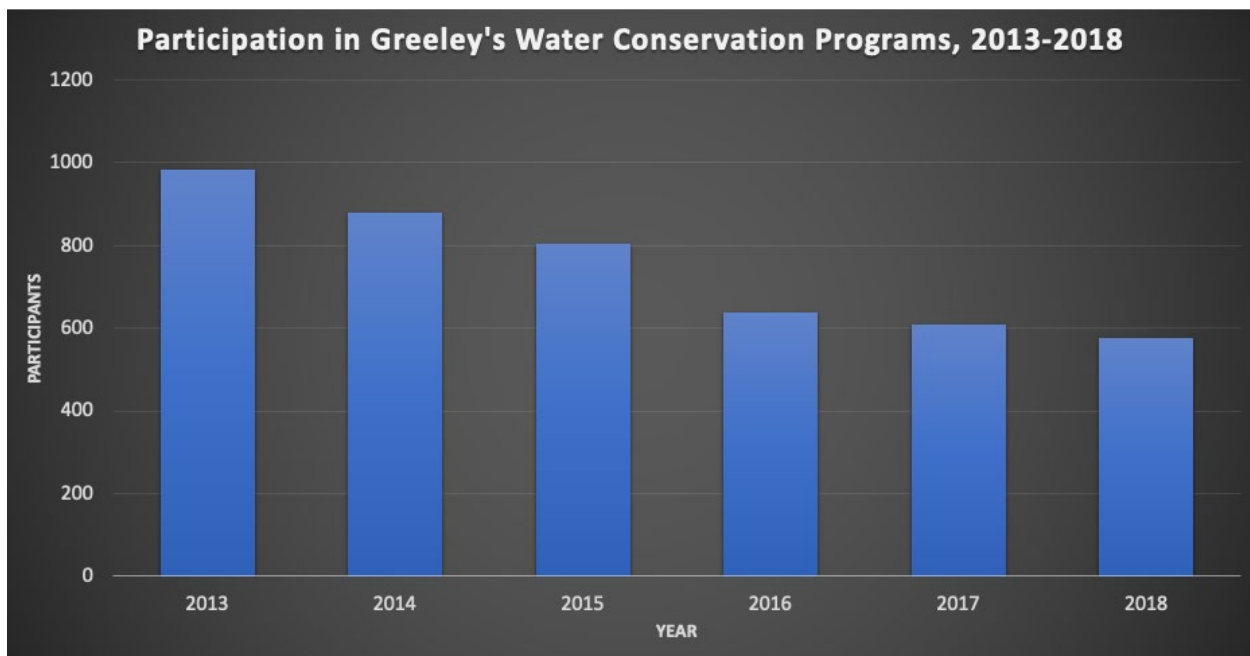
Total program participation from 2013-2018 is shown in Figures 24-26. During the study's time period, there is a noted rate of decay along with a period of stabilization in the total participation. This fluctuation may have occurred based on multiple independent factors, including the following:

1. Weather conditions: the 2012 drought may have caused an increase in participation in Water Conservation Programs that waned over time.
2. Marketing campaigns: outreach can spark interest that fades over time.
3. Staffing levels: Greeley's ability to conduct audits is dependent on staffing levels, which have fluctuated over the years.
4. Change in programs: Program fluctuation is a key component of participation. For instance, if a new program is initiated there may be a surge in participation or a sense of urgency to alter behaviors.
5. Rates: Increasing rates may affect program participation; similarly, as customers take control of their own water budgets, their behavior and interest in conservation programs may change.
6. Natural saturation: Programs focused on fixtures and appliances will have a saturation period.
7. Local, state, or federal changes: Regulatory changes have occurred, and have focused on limiting water use for fixtures and appliances. As a result, new builds within a community naturally would have more water efficient products.

Figure 26 breaks down the program participation according to each program during the study period. The highest total participation was in the Residential Audit Program (1,670), followed by the Front-loading Washer Rebate (1,050), and Toilet Rebates (770). These programs are followed by the Showerhead Exchange and Commercial Audit Programs (220 each), the PRV Rebate (175), and the Rotary Nozzles Rebate (160), the Smart Controller Rebate (140), the ET Sensor Rebate (55), and the Irrigation Controller Rebate (15).<sup>15</sup> Note the Cash for Grass program, now referred to Life After Lawn, started as a pilot project in 2018. The relatively low participation in Cash for Grass (7 participants in 2018) reflects the earlier stage of the pilot project. Participation in the Spray Head Sprinkler Exchange Program started off very low, with just 6 participants in the program when it was getting started during 2016-2018, but increased significantly in 2019, jumping to over 50 participants.

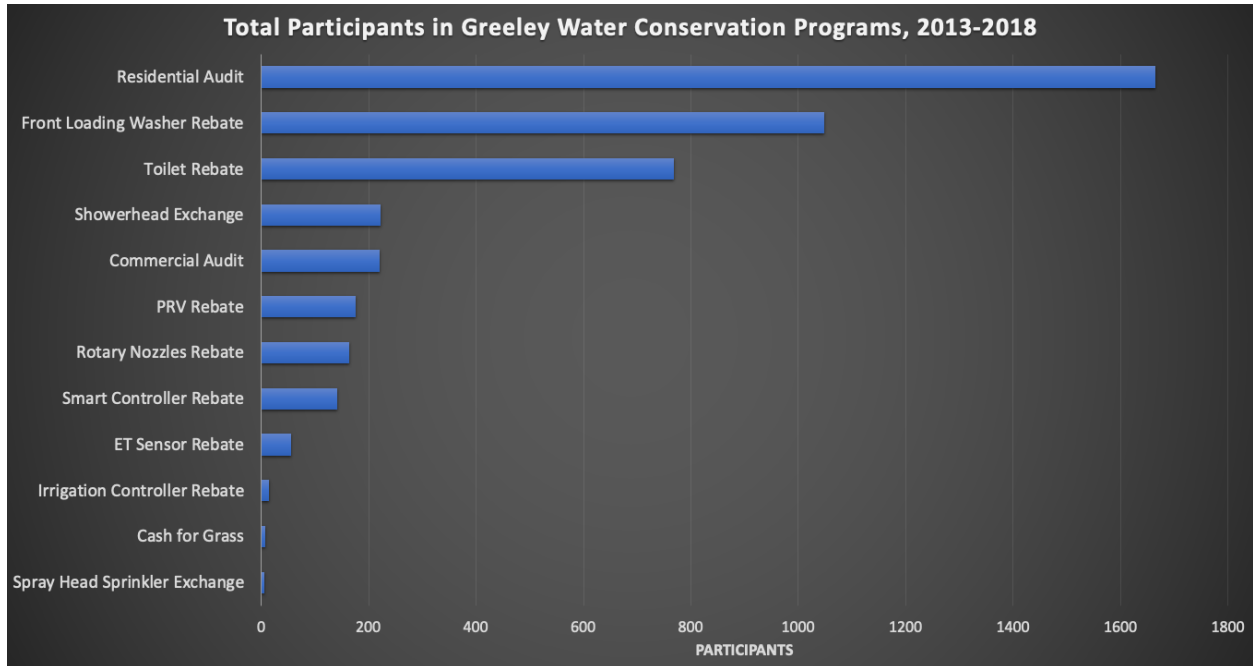
<sup>15</sup> The Smart Controller Rebate Program included the installation of these devices by Greeley Water Conservation Specialists; the Irrigation Controller Rebate was installed by participating customers.

The trends in participation within each program can shed light on future outreach and engagement decisions. Other independent factors as mentioned above (such as weather conditions, marketing campaigns, and staffing levels, etc.) do influence trends. It is important to note that though trends should be monitored and considered for water conservation program management. Specifically, as Figure 26 shows, demand for many programs including the Residential Audit, Commercial Audit, Smart Controller Rebate, Rotary Nozzles Rebate, and PRV Rebate, remained relatively consistent from 2013-2018, suggesting a continued interest in and need for these programs. For the Audit programs, which have an estimated water savings lifetime of five years, water demands may be renewed as new business managers or homeowners take over water management on an account, and as water use appliances and behaviors change and shift over time. The decline in some programs may reflect a natural saturation of customer needs, or other shifts in customer demand. For instance, the Front Loading Washer Program was phased out by Greeley in response to market changes. The Toilet Rebate program shifted to support only hyper-efficient toilets in the wake of updated state regulations mandating the sale of water-efficient toilets.<sup>16</sup>



**Figure 24.** Participation in Greeley's water conservation programs from 2013-2018.

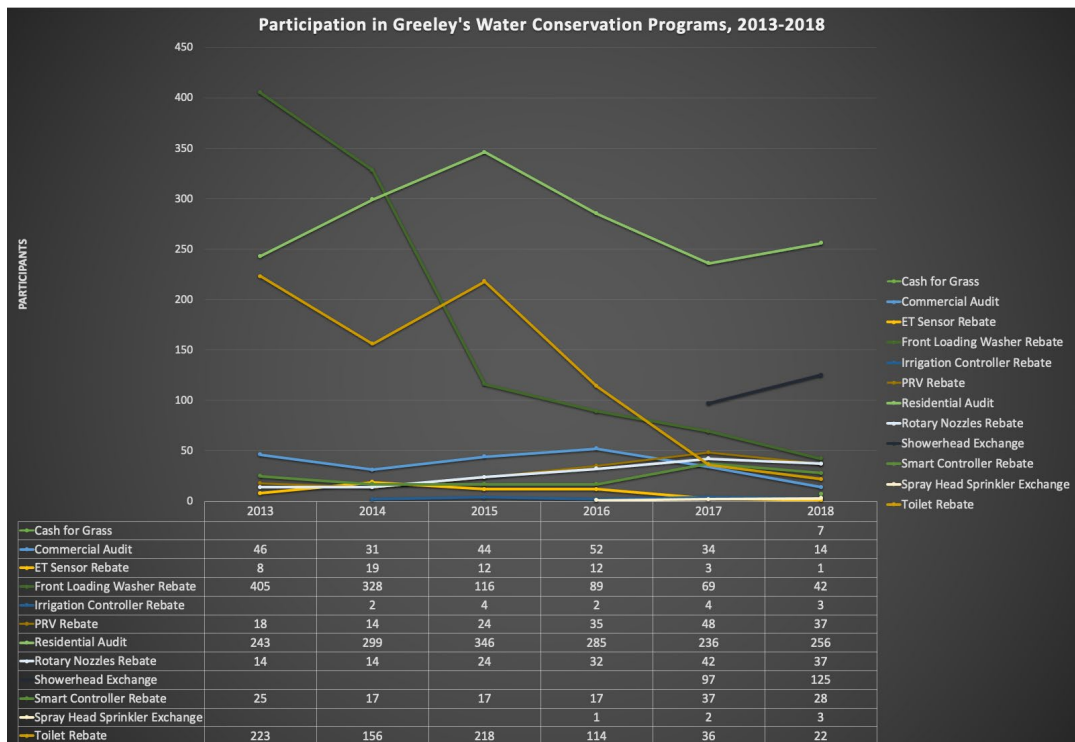
<sup>16</sup> Senate Bill 14-103, which took effect in 2016, requires all new applicable fixtures (including lavatory faucets, toilets, urinals and showerheads) sold in Colorado to be in compliance with federal WaterSense standards. For toilets, this means using 1.28 gallons of water or less per flush, as opposed to the federally mandated maximum of 1.6 gallons per flush. (See: Concerning the Phase-out of the Sale of Certain Low-Efficiency Plumbing Fixtures, SB 14-103, (2014). Available: [https://www.statebillinfo.com/bills/bills/14/103\\_rev.pdf](https://www.statebillinfo.com/bills/bills/14/103_rev.pdf)).



\*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.

**Figure 25.** Participation in Greeley's water conservation programs from 2013-2018.





\*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.

**Figure 26.** Program-specific trends in participation in Greeley’s water conservation programs from 2013-2018.

Table 3 captures the amount of overlap, among customers participating in multiple programs. Highlighted values in Table 3 represent the highest participation overlap. Approximately 30% of all participants in water conservation programs between 2013-2018 participated in multiple programs. Unsurprisingly, participants in the Residential Audit overlap with many other conservation programs targeting both indoor water use (e.g., the Front Loading Washer Rebate, Showerhead Exchange, and Toilet Rebate) and outdoor water use (e.g., the Smart Controller Rebate, PRV Rebate, Rotary Nozzles Rebate). The low number of overlaps between the Commercial Audit and other programs makes it difficult to draw firm conclusions. Most overlaps occur in programs focused on indoor water use, including the Toilet Rebate, Front Loading Washer Rebate, and Showerhead Exchange. This might reflect the primary water uses of participating businesses; it could also suggest an opportunity to engage more commercial, industrial, and institutional (CII) customers in outdoor water efficiency programs.

Many of the customer accounts that participated in the Toilet Rebate also participated in the Front Loading Washer Rebate, suggesting multiple appliances were replaced simultaneously (e.g., as part of a larger home renovation or construction project). There is also a fair amount of overlap on outdoor water efficiency rebates, including the ET Sensor Rebate, Smart Controller Rebate, and Rotary Nozzles Rebate, and PRV Rebate, with especially high levels of overlap between the PRV Rebate and Rotary Nozzles Rebate. This suggests these residents may be either be participating in a holistic upgrade to their irrigation systems, or incrementally adding improvements over time. In either case, the results suggest that there are opportunities to engage participants in one program in additional conservation activities.

	Cash for Grass	Commercial Audit	ET Sensor Rebate	Front Loading Washer Rebate	Irrigation Controller Rebate	PRV Rebate	Residential Audit	Rotary Nozzles Rebate	Showerhead Exchange	Smart Controller Rebate	Spray Head Sprinkler Exchange	Toilet Rebate
Cash for Grass	NA	0	0	0	0	0	2	1	0	1	0	1
Commercial Audit		NA	2	8	1	3	1	4	6	2	0	10
ET Sensor Rebate			NA	7	3	27	36	22	1	44	0	9
Front Loading Washer Rebate				NA	1	12	150	17	18	15	0	76
Irrigation Controller Rebate					NA	2	7	2	0	1	1	2
PRV Rebate						NA	104	127	11	45	3	24
Residential Audit							NA	103	129	84	3	143
Rotary Nozzles Rebate								NA	11	45	1	26
Showerhead Exchange									NA	8	1	21
Smart Controller Rebate										NA	1	21
Spray Head Sprinkler Exchange											NA	0
Toilet Rebate												NA

\*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.

**Table 3.** *Overlap between participations in Greeley's Water Conservation Programs, 2013-2018.*



## Recommendations

### *Effectiveness of Water Conservation Programs*

Across the board, Greeley's Water Conservation Programs have saved both water and money, engaging nearly 5,000 participants between 2013 to 2018, and saving water ranging from 2.9 to 19.5 AF per year per program. These programs' average cost per acre foot savings is \$1,350, far below the current cost for Colorado Big-Thompson Project water shares. While the data analysis suggests that these programs are effective, it also provides insight into the projects it may make sense to expand or condense.

### *Program Prioritization*

1. **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.

2. *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.
3. *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 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. Recommended steps are listed below:

4. 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. The primary areas of these populations are located in the northeast and southwest areas of the City’s center. 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.
5. 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 neighborhoods tend to have larger median household income; lower percentages of residents speaking Spanish, AAPI, or Indo-European languages; and lower percentages of renter-occupied housing. Engaging these perimeter neighborhoods 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.

6. 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.
7. 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.
8. 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.
9. Motivation in future water conservation programs is primary based on saving money on water bills, protecting Greeley's limited water resources, reducing personal use, 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 for the Greeley's Water Conservation Program to 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. Keeping the questionnaire consistent (See Appendix B) is key for comparing results.

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. Documenting factors that may affect participation, such the number of program staff, outreach and communications activities, and introduction of AMI technology, could help interpret changes in participation over time. If resources allow, future analyses could also combine the spatial and water use change analyses, to visualize and showcase water use changes by neighborhoods and potentially foster friendly competition among different locations in the City.





## Conclusion

It is important to keep in mind that Greeley's substantial gains in water conservation – reducing water usage by 20% from 2007-2018 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. 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. Greeley's water budget-based rate structure also provides residential customers with a price signal to incentivize conservation. And market trends and state regulations have led to the standardization of more water efficient appliances, fixtures, and equipment available for purchase. Finally, 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.



## Appendix

### Attachment A – Summary of Greeley’s Water Efficiency Portfolio from 2013-2020

The following section provides an overview of Greeley’s four primary categories of conservation programming: 1) Education programs, 2) Water Efficiency Incentives, 3) Water Audits, and 4) Online Efficiency Tools.

#### *1. Education Programs*

**Landscape Lecture Series:** Free lectures and workshops are offered January through September on a variety of landscape topics to improve water efficiency outdoors.

**Xeriscape Education:** Literature and tours of Greeley’s Xeriscape garden provide tools and resources to help residents implement water-wise landscaping principles and reduce water use.

**Tours:** Tours of Greeley’s water-related facilities are offered seasonally, for groups of 10 or more.

**Teacher Training:** Greeley sponsors training programs on water and conservation issues for local teachers (e.g., Project WET provides water resource education materials that are

appropriate for many different age groups and cultures and offer comprehensive coverage of the broad topic of water.<sup>17)</sup>

**Speakers Bureau:** Speakers for classrooms, civic clubs, and other groups are available upon request. Presentations can be tailored to a specific age group, topic or learning objective (e.g., watersheds, water conservation, water law, water quality, water sources, xeriscape).

**Mayor's Challenge for Water Conservation:** The annual, national Mayor's Challenge for Water Conservation runs from April 1- 30. This non-profit national community service campaign encourages leaders to inspire their residents to make a series of simple pledges at [mywaterpledge.com](http://mywaterpledge.com) to use water more efficiently, reduce pollution and save energy.

## *2. Water Efficiency Incentives*

### **Irrigation Rebates (Residential and Commercial)**

Customers who have completed an irrigation audit can qualify for rebates that reduce the cost of -irrigation equipment – including smart sprinkler controllers, pressure-reducing valves, and rotary sprinkler nozzles – by up to 50 percent of the cost.

#### *Pressure-Reducing Valves*

A pressure-reducing valve reduces misting – a fine spray that results from irrigation systems that apply water at a very high pressure, resulting in excessive evaporation and water drifting away from the intended irrigation area. By regulating water pressure and preventing misting, these valves make irrigation systems more efficient.<sup>18</sup>

#### *Rotary Nozzles*

Rotary nozzles increase uniformity and reduce overspray in irrigation systems. They operate by rotating a stream of water over the landscape, in contrast to the mist produced by spray-head sprinklers.<sup>19</sup>

#### *Smart Controllers*

Smart controllers (also called ET Controllers) use information about site conditions (rain, wind, slope, soil, plant type, etc.) to apply the right amount of water to maintain healthy growing conditions. Because smart controllers can be more efficient than traditional time-based irrigation controllers, they often reduce use by at least 25 percent, saving both money and water. Rebates for smart controllers cover half of the cost with customers pay the remaining \$300.<sup>20</sup>

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<sup>17</sup> Project WET (Water Education Today). (2020). <https://www.projectwet.org/>.

<sup>18</sup> City of Greeley, CO. "Water Conservation Rebates." Available: <https://greeleygov.com/services/ws/conservation/water-conservation-rebates>.

<sup>19</sup> Ibid.

<sup>20</sup> Ibid.



Typically, a Greeley Water employee will conduct an irrigation audit, and share the report with participants within a few days. In the past, once the participant had purchased any irrigation equipment, a Greeley Water employee would return to the site to help the participant set up the new equipment (e.g., schedule a new smart sprinkler controller) and to teach the participant how to use it. (This direct installation component has been phased out in 2022, but was a part of the program during the years included in the quantitative analysis.)

**Commercial Rebates** (available to multi-family residences and industrial, institutional and commercial accounts)

Rebates are available for a variety of indoor and outdoor water-using devices, including: bathroom fixtures; kitchen and restaurant equipment; laundry appliances (including washing machines); industrial devices; and irrigation hardware.<sup>21</sup> Free commercial audits help customers determine which products may be appropriate for their facility. Customers are strongly encouraged - but not required - to go through a commercial audit before receiving any rebates.

**Front Loading Washer Rebates** (available single-family residences, multi-family residences and industrial, institutional, and commercial accounts)

Rebates are available for a variety for high-efficiency front loading clothes washers which used less water and energy than standard top loading clothes washers. For each eligible washers purchased, a customer can receive a \$100 rebate. In 2018, the residential front-loading washer rebates stopped.

**Professional Landscape Certification** (available to landscape contractors)

Rebates are available to landscape contractors who work in Greeley to obtain training and continuing education to obtain their Certified Landscape Technician certification.

**Showerhead Exchanges** (available to all customers)

At showerhead exchanges, which are held periodically at events, customers can exchange their old showerheads for new low-flow models at no cost. New showerheads are also available through Greeley's Indoor Water Audits.

## Toilets

Toilets that use 0.8 gallons per flush or less are eligible for rebates from the City of Greeley. For each eligible toilet purchased, a household can receive a \$50 rebate, with a two-toilet rebate per household limit. An additional \$25 is given for recycling the old toilet in conjunction with the rebate. To participate, residents need only a receipt and a completed application.<sup>22</sup>

<sup>21</sup> For a detailed list of possible commercial rebates, please see: City of Greeley, CO. "Water Conservation Rebates." Available: <https://greeleygov.com/services/ws/conservation/water-conservation-rebates>.

<sup>22</sup> City of Greeley, CO. "Water Conservation Rebates." Available: <https://greeleygov.com/services/ws/conservation/water-conservation-rebates>.

### *Lawn Replacement Incentives*

#### **Cash for Grass Rebates/Life After Lawn Bluegrass Replacement Program<sup>23</sup>**

Greeley water customers can get cash for replacing their lawn with low water use plants. This pilot program aims to replace lawns with more sustainable landscapes, including Xeriscape, rain gardens, and pollinator plants. The program provides rebates – of up to \$2 per square foot – for 500 to 2,000 square feet of lawn removed per single-family residence, and 5,000 to 20,000 square feet at a non-residential or HOA property. The converted Xeriscape area must be irrigated using drip irrigation, micro spray irrigation or hand watering. While in theory this program seeks to target users who are exceeding their outdoor water budget, in practice these types of customers make up a small minority of participants in this program. Most participants are single-family residents, but this program also includes larger customers, such as HOAs, churches and other commercial properties.

This pilot grew out of a 2018 pilot study.<sup>24</sup> While the program was mostly dormant in 2019, approximately 30 customers participated in 2020.

**Xeriscape Grants** (available to multi-family residences and industrial, institutional, and commercial accounts)

Matching grants (of up to \$2,500 per year) are available to replace turf with Xeric plantings that require little or no water. This program can also install Xeric plantings in locations that did not previously have any landscaping in place. Multi-phase projects can receive additional funding in subsequent years. These grants can fund smaller HOA projects, small businesses, schools, places of worship, and other areas that have a maintenance plan in place. Many churches have been particularly interested in this program.

### *Seasonal Offerings*

**Compost Bin and Rain Barrel Sale** (available to all customers)

Greeley periodically offers its customers discounted compost bins, which helps with soil drainage, and rain barrels, that capture water to be used for watering the customer's landscape.

**Garden in a Box** (available to all customers)

During the spring and fall, Greeley offers discounted Garden In A Box kits that enable customers to plant low water-use gardens at home. Kit options vary to fit different sizes and levels of sun exposure, and include low-water plants; a professionally designed plant-by-number map; and plant care instructions.

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<sup>23</sup> City of Greeley, Colorado. (2020). "Life After Lawn: Bluegrass Replacement Program." Available: <https://greeleygov.com/services/ws/home/blog/water/2020/01/16/life-after-lawn-turf-replacement-program>.

<sup>24</sup> City of Greeley, Colorado. (2020). "Life After Lawn: Bluegrass Replacement Program." Available: <https://greeleygov.com/services/ws/home/blog/water/2020/01/16/life-after-lawn-turf-replacement-program>.



### *3. Water Audits*

Greeley's free, voluntary water audits help customers identify ways to conserve water, and are targeted to indoor, outdoor, and commercial water use.

#### **Indoor Water Audits (available to all customers)**

A Greeley Water Auditor will come to a property to:

- Look for leaks and other sources of water waste
- Check high water use appliances
- Provide low-flow showerheads and faucet aerators at no cost
- Make recommendations for repairs and upgrades

#### **Outdoor (Irrigation) Audits (available to all customers)**

From the months of April through October, Greeley Water specialists will come to a property to:

- Inspect watering zones and identify problems
- Measure how much water is being applied
- Check water pressure and recommend adjustments
- Develop a custom watering schedule

Typically, a Greeley Water employee will conduct the audit, and share the report with participants within a few days. The participant will often then participate in Greeley's rebate program for, e.g., a smart sprinkler controller.

#### **Commercial Water Audits (available to multi-family residences and industrial, institutional and commercial accounts)**

During a commercial water audit, a Greeley Water specialist will:

- Review how a facility is using water
- Identify areas of water waste
- Provide recommendations and custom water use targets

The specifics of an audit often depend on the industry the customer is working in, but typically includes an examination of any water heaters, laundry rooms, toilets, or leaks

### *4. Online Water Efficiency Tools*

#### **Water Budget Portal (available to those customers on a water budget)**

Greeley calculates water rates for single-family homes using water budgets (the amount of water a single-family residence needs each billing period, as determined by persons per household, landscape size, and real-time weather conditions). On the Water Budget Portal,<sup>25</sup>

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<sup>25</sup> Available at: [efficiencyrewarded.com](http://efficiencyrewarded.com).

customers can change their indoor water use profile, view their outdoor map, and get answers to common questions.

**WaterSmart Customer Portal** (available to all customers)

The WaterSmart Program is an online portal<sup>26</sup> that allows customers to view and understand their home water use. Using the portal, it's possible to see when and where a customer is using the most water, and how their water usage compares to similar households in the area. This offers a starting point for identifying ways to be more efficient.

**Online Plant Database** (available to all customers)

This online plant database<sup>27</sup> helps customers select low water-use plants that are well-suited to Greeley's semi-arid climate. It includes over 350 plants along with photos, descriptions, and planting tips.

**Water Conservation Webpage** (available to the public)

Greeley's water conservation webpage contains a wide variety of resources, tools, and tips for indoor and outdoor water conservation, including the City's available rebates, audits, and educational programs.

*Other*

In 2020, Greeley started implementing advanced metering infrastructure (AMI), and sharing data gathered through AMI with participating customers. This is worth noting AMI was not used for analyses in this report but may be a tool to assist in future efficiency analyses.

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<sup>26</sup> Available at: [greeleygov.com/watersmart](http://greeleygov.com/watersmart).

<sup>27</sup> Available at: [plantsforgreeley.com](http://plantsforgreeley.com).

## Appendix B – Customer Survey Questionnaire: Water Efficiency Program Performance

*Description in beginning:* The City of Greeley is currently evaluating its Water Conservation Program to determine what programs are most beneficial to the City’s water conservation goals and of most value to Greeley Water customers. Your feedback will help the City update its conservation programs to best serve Greeley Water customers. This survey will take approximately 10-15 minutes. As a token of appreciation, you will be entered into a raffle to receive a \$50-\$100 gift card to a local restaurant.

1. Please tell us who you are [check all that apply]
  - a. Greeley resident
  - b. Greeley business/commercial customer
  - c. Other [Please specify]

*Note: This survey is intended for **Greeley Water Customers only**.*

2. The City of Greeley currently offers all of the following water efficiency programs, tools and incentives to customers. Prior to this survey, which of the following programs were you aware that Greeley Water offered to their customers? Note: This question is asking only if you are aware of these programs, not if you have participated in them. [Mark all that apply or “None”]

### *Education Programs:*

- a. Landscape Lecture Series - free lectures and workshops on landscape topics to improve water efficiency
- b. Xeriscape Education - Literature, classes and tours of Greeley’s Xeriscape gardens (I.e. Woodbriar or Bittersweet Park)
- c. Tours of Greeley water-related facilities
- d. Teacher Training on water and conservation issues for local teachers
- e. Speakers Bureau - Greeley Water speakers visit classrooms, civic clubs and other groups
- f. Annual Mayor’s Water Conservation Challenge –water use reduction contest
- g. None, I was not aware that Greeley Water offered any of the above programs

### *Water Audits:*

- h. Indoor Water Audits
- i. Outdoor Irrigation Audits
- j. Commercial Audits (for multi-family residences and industrial, institutional & commercial accounts)
- k. Outdoor Irrigation Rebates (smart irrigation controller, pressure reducing valves, rotary sprinkler nozzles)
- l. Commercial Rebates (water efficient appliances, irrigation hardware, etc.)
- m. None, I was not aware that Greeley Water offered any of the above programs

### *Other Efficiency Incentives:*

- n. Life After Lawn turf replacement rebates (available to single family residents)
- o. Xeriscape Grants (available to multi-family residences and industrial, institutional and commercial accounts)

- p. Compost Bin and Rain Barrel Sale
- q. Discounted Garden in a Box Kit
- r. Free Low-Flow Showerhead Exchange
- s. High Efficiency Toilet Rebate
- t. Life After Lawn turf replacement rebates (for single family residents)
- u. None, I was not aware that Greeley Water offered any of the above efficiency incentives

*Online Water Efficiency Tools:*

- v. Water Budget Portal
- w. WaterSmart Customer Portal
- x. Online Plant Database
- y. Greeley Water Conservation webpage
- z. None, I was not aware that Greeley Water offered any of the above water efficiency tools.

- *In Section 1, respondents will automatically skip over each of the programs which they replied "None" to*

**SECTION 1: CURRENT PROGRAMS (Customers who have participated)**

**A. EDUCATION PROGRAMS**

3. **Education Programs:** In the past 5 years, which of the following Greeley water efficiency education-related programs have you participated in? [Please select all that apply, or "None" if you haven't participated in any of these programs]
  - a. Landscape Lecture Series - free lectures and workshops on landscape topics to improve water efficiency
  - b. Xeriscape Education - Literature, classes and tours of Greeley's Xeriscape gardens (I.e. Woodbriar or Bittersweet Park)
  - c. Tours of Greeley water-related facilities
  - d. Teacher Training on water and conservation issues for local teachers
  - e. Speakers Bureau - Greeley Water speakers visit classrooms, civic clubs and other groups
  - f. Annual Mayor's Water Conservation Challenge - water use reduction contest
  - g. None
  - h. Other [Please specify]
- *If none, page skip to Water Audits section*
- *If they marked any of these programs move to Q#4 which will present **only** the education program(s) they selected*
4. **Education Programs:** On a scale of 1-5, how helpful did you find the specific Water Efficiency Education Program(s) indicated below. (1 = not helpful at all, 5 = very helpful)

	1 (not helpful)	2	3	4	5 (very helpful)	Not sure
Landscape Lecture Series						
Xeriscape Education/Tour						
Tours of Greeley Water facilities						
Teacher Training						
Speakers Bureau						
Annual Mayor's Water Conservation Challenge						
[Other]						

5. **Education Programs:** What type of action, if any, was taken as a result of participating in \_\_\_\_\_?

*[Mark all that apply]*

- Switched to more waterwise plants or landscaping practices (e.g. replaced turf grass with native plants)
- Updated or adjusted my irrigation system in some way to improve water efficiency
- Switched to using more water efficient appliances or fixtures (e.g. faucet aerators, low-flow showerhead, low-flow toilet)
- Participated in a Greeley Water efficiency rebate, audit, or other financial incentive opportunity
- Changed my water usage behavior in some way (e.g. turning off tap when brushing teeth, washing car at commercial car wash instead of in driveway, etc.)
- Began educating others (students, friends) about the importance of water conservation
- No specific action was taken
- Other [Please specify]

*Blank is the specific program(s) they indicated in Q3. Repeat question if they indicated a change associated with more than one Education Program*

6. **Education Program:** Is there anything else you'd like to share with us about your participation in a Greeley Water Education Program? *[Optional]*

## **WATER AUDITS**

7. **Water Audits:** Greeley's free, voluntary water audits help customers identify ways to conserve water, and are targeted to indoor, outdoor, and commercial water use. In the past 5 years, which of the following Greeley Water Audit programs have you participated in? *[Mark all that apply]*



- a. Indoor Water Audits
- b. Outdoor Irrigation Audits
- c. Commercial Audits (available to multi-family residences, industrial, institutional & commercial accounts)
- d. None

- *If none, page skip to Other Efficiency Programs*

8. **Water Audits:** On a scale of 1-5, how helpful did you find the water audit program indicated below? (1 = not helpful at all, 5 = very helpful)

	1	2	3	4	5	Not sure
Indoor Water Audits						
Outdoor Irrigation Audits						
Commercial Audits						

*Include only the audits they indicated participating in in Q8*

9. **Indoor Water Audits:** What type of action, if any, was taken as a result of participating in an **Indoor Water Audit**? [Select all that apply]
- a. Repaired a leak
  - b. Received and installed a free low flow showerhead(s) and/or faucet aerator(s)
  - c. Upgraded an old high-water use appliance/fixture to a water efficient appliance/fixture
  - d. Signed up for the WaterSmart customer portal
  - e. Changed my water usage behavior in some way *[e.g. turning off tap when brushing teeth, washing car at commercial car wash instead of in driveway, etc.]*
  - f. No action was taken
  - g. Other [please specify]

*Only for those who indicated in #8 that they had participated in an indoor audit*

12. **Water Audits:** Do you have any recommendations for Greeley Water on improving the indoor audit program? [Optional]

13. **Outdoor Water Audits:** What type of action, if any, was taken as a result of participating in an Outdoor Irrigation Audit? [Select all that apply]

- a. Received a rebate from Greeley Water to install a smart sprinkler controller
- b. Received a rebate from Greeley Water to install a pressure-reducing valve
- c. Received a rebate from Greeley Water to install rotary sprinkler nozzles
- d. Adjusted my irrigation water pressure
- e. Adjusted my irrigation watering schedule

- f. Adjusted my irrigation system in some other way to improve efficiency
- g. Switched to more water wise plants or landscaping practices
- h. No specific action was taken
- i. Other [please specify]

14. **Water Audits:** On a scale of 1-5, how valuable did you find Greeley Water's Outdoor Irrigation Rebate? (1 = not valuable, 5 = valuable)

	1	2	3	4	5	Not sure
Outdoor Irrigation Rebate						

- Only if respondents received a rebate, identified in Q13

15. **Water Audits:** Do you have any recommendations for Greeley Water on improving the irrigation audit and/or associated irrigation rebate program? [Optional]

16. **Water Audits:** What type of action, if any, was taken as a result of participating in a Commercial Water Audit? [Select all that apply]

- h. Repaired a leak
  - i. Received and installed a free low flow showerhead(s) and/or faucet aerator(s)
  - j. Received a pre-rinse spray nozzle
  - k. Received a rebate from Greeley Water for bathroom fixtures, kitchen/restaurant equipment, laundry appliances (including washing machines), industrial devices, and/or irrigation hardware, etc.
  - l. Upgraded an old high-water use appliance to a water efficient appliance
  - m. Changed water usage behavior in some way
  - n. Created a policy on water conservation or some other educational event for employees
  - o. No specific action was taken
  - p. Other [please specify]
17. **Water Audits:** On a scale of 1-5, how valuable did you find Greeley Water's Commercial Rebate? (1 = not valuable, 5 = valuable)

	1	2	3	4	5	Not sure
Commercial Rebate						

- Only if they received a rebate

17. **Water Audits:** Do you have any recommendations for Greeley Water on improving the commercial audit and/or rebate program? [Optional]

18. **Water Audits:** Is there anything else you'd like to share with us about your participation in a Greeley Water Audit? [Optional]

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#### **OTHER EFFICIENCY INCENTIVE PROGRAMS**

19. In the past 5 years, which of the following Greeley Water Efficiency Incentive programs have you participated in? [Select all that apply]

- a. Compost Bin and Rain Barrel Sale
- b. Discounted Garden in a Box Kit
- c. Free Low-Flow Showerhead Exchange
- d. High Efficiency Toilet Rebate
- e. Turf Retrofit: Life After Lawn
- f. None

*If none, Skip to Online Efficiency Tools*

20. **Efficiency Incentive Programs:** On a scale of 1-5, how valuable did you find the specific Water Efficiency Education Program(s) indicated below. (1 = not valuable at all, 5 = very valuable)

- *Only list the programs they indicated participating in*

Efficiency Incentive Program	1	2	3	4	5	Not sure
Compost Bin & Rain Barrel Sale						
Discounted Garden in a Box Kit						
Free Low Flow Showerhead Exchange						
High Efficiency Toilet Rebate						
Turf Retrofit: Life After Lawn						

22. **Efficiency Incentive Programs:** Do you have any recommendations for Greeley Water on improving the \_\_\_\_\_ program? [Optional]

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- *Only the program(s) they indicated participated in in Q #19*

#### **ONLINE WATER EFFICIENCY TOOLS**

23. In the past 5 years, which of the following Greeley Water Online Water Efficiency Tools have you utilized? [Select all that apply]

- a. Water Budget Portal
- b. WaterSmart Customer Portal
- c. Greeley's Water Conservation Webpage
- d. Online Plant Database
- e. None

*If none, Skip ahead to next section*

**24. Online Water Efficiency Tools:** On a scale of 1-5, how helpful did you find the specific Water Efficiency Education Program(s) indicated below. (1 = not valuable at all, 5 = very valuable)

- *Only list the programs they indicated participating in*

	1	2	3	4	5	Not sure
Water Budget Portal						
WaterSmart Customer Portal						
Greeley's Water Conservation Webpage						
Online Plant Database						

**25. Why did you choose to utilize the water budget portal?** *[Select all that apply in order of importance]*

- a. To find out what the water budget was and better understand it
- b. To update my household information (e.g. people in my household, irrigable area)
- c. To learn more about my water use
- d. To save money on my water bill
- e. To reduce my personal water use
- f. To protect our limited water resources
- g. To save more water than my neighbors
- h. To support community values
- i. Other

- *Only if they used the water budget portal*

**26. Why did you choose to utilize the WaterSmart customer portal?** *[Select all that apply in order of importance]*

- j. To review my water bill
- k. Because I had a large bill or a leak
- l. To update my household profile
- m. To learn more about my water use
- n. To save money on my water bill
- o. To reduce my personal water use
- p. To protect our limited water resources
- q. To save more water than my neighbors

- r. To support community values
- s. Other
- *Only if they used the WaterSmart portal*

## **SECTION 2: WATER EFFICIENCY BEYOND GREELEY PROGRAMS**

1. The following is a list of possible water saving actions for your home or business. What actions – if any – have you taken in the last 5 years (2015 – 2020) to reduce your water use? *[Select as many as apply]*

### *Outdoor Activities*

- a. Adjusted irrigation system and timers
- b. Installed a rain sensor to shut off irrigation system
- c. Installed a smart irrigation controller
- d. Reduced/skipped watering
- e. Replaced lawn or garden with low water plants or other material (e.g. vegetable garden, rock, mulch, hardscape)
- f. Upgraded irrigation system with high-efficiency equipment
- g. Installed a rain barrel/cistern
- h. Started a compost bin or pile
- i. Began tracking rainfall on my site
- j. Began running my irrigation system manually
- k. Used a broom instead of a hose to clean paved areas
- l. Fixed outdoor leaks (sprinkler, spas, etc.)

### *Indoor Activities*

- m. Purchased a high-efficiency clothes washer
  - n. Installed faucet aerators
  - o. Installed low flow showerheads
  - p. Installed a water efficient toilet(s)
  - q. Washed only full loads of clothes or dishes
  - r. Took shorter showers
  - s. Fixed indoor leaks (toilet, faucet, etc.)
  - t. I don't let the water run unnecessarily
  - u. Other [please specify]
  - v. None
2. Which of the following would be easier for you to do?
    - a. Reduce the amount of water you now use for outdoor landscaping and gardening
    - b. Reduce the amount of water you now use for indoor uses
    - c. I could reduce both my indoor and outdoor water use easily
    - d. Neither

## **SECTION 3: LOOKING FORWARD / FUTURE PARTICIPATION & IMPROVEMENTS**

1. What would motivate you to participate in Greeley's water conservation program? *[Select all that apply in order of importance]*



- a. To save money on my water bill
  - b. To pay for a fixture/appliance that I want to replace (e.g toilets, smart irrigation controllers)
  - c. To reduce my personal water use
  - d. To protect our limited water resources
  - e. To save more water than my neighbors
  - f. To support community values
  - g. Not applicable, I'm not motivated to participate
  - h. Other [please specify]
2. The City of Greeley currently offers all of the following water efficiency programs, tools and incentives to customers. What water efficiency programs, if any, are you most interested in participating in in the next 3 years, using a scale of 1 to 5, with 1 being not interested and 5 being very interested. *[Mark all that apply, if you have already participated or are not eligible for this specific rebate mark N/A]*

**Education Programs:**

- a. Landscape Lecture Series - free lectures and workshops on landscape topics to improve water efficiency
- b. Xeriscape Education - Literature, classes and tours of Greeley's Xeriscape gardens (I.e. Woodbriar or Bittersweet Park)
- c. Tours of Greeley water-related facilities
- d. Teacher Training on water and conservation issues for local teachers
- e. Speakers Bureau - Greeley Water speakers visit classrooms, civic clubs and other groups
- f. Annual Mayor's Water Conservation Challenge –water use reduction contest

**Water Audits:**

- g. Indoor Water Audits
- h. Outdoor Irrigation Audits
- i. Commercial Audits (for multi-family residences and industrial, institutional & commercial accounts)
- j. Outdoor Irrigation Rebates (smart irrigation controller, pressure reducing valves, rotary sprinkler nozzles)
- k. Commercial Rebates (water efficient appliances, irrigation hardware, etc.)

**Other Efficiency Incentives:**

- l. Life After Lawn turf replacement rebates (available to single family residents)
- m. Xeriscape Grants (available to multi-family residences and industrial, institutional and commercial accounts)
- n. Compost Bin and Rain Barrel Sale
- o. Discounted Garden in a Box Kit
- p. Free Low-Flow Showerhead Exchange
- q. High Efficiency Toilet Rebate
- r. Life After Lawn turf replacement rebates (for single family residents)

*Online Water Efficiency Tools:*

- s. Water Budget Portal
- t. WaterSmart Customer Portal
- u. Online Plant Database
- v. Greeley Water Conservation webpage

*Only if they selected a program in Q1 of Sec. 3*

3. How important do you feel the City of Greeley's water efficiency programs are?
  - a. Very important
  - b. Important
  - c. Neither important nor unimportant
  - d. Not important
4. How do you prefer to receive information about saving water and Greeley Water's efficiency programs?  
*[Select all that apply]*
  - a. Bill inserts
  - b. Direct mail to my home or business
  - c. Greeley Water website
  - d. Social media
  - e. Local newspaper articles/advertisements
  - f. Radio advertisements
  - g. Visits or calls to Greeley Water
  - h. Email updates/monthly newsletter
5. How willing, if at all, would you be to adopt a low water use landscape by removing turf grass from your front yard?
  - a. Very willing
  - b. May consider
  - c. Would not consider
  - d. Already converted yard (skip ahead)
  - e. Don't have yard (skip ahead)
  - f. Don't know / Not sure (skip ahead)
6. What are the primary barriers keeping you from replacing some or all of your grass with low water use landscaping? *[Select as many as apply]*
  - a. Cost
  - b. Physical labor involved
  - c. Time
  - d. Knowledge/expertise
  - e. I like the look of grass
  - f. I don't like the look of low water landscapes
  - g. Doesn't save enough water to be worth the effort
  - h. Other [Specify]
  - i. Don't know / Not sure

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#### **SECTION 4: DEMOGRAPHICS**

*You may select prefer not to answer for any of the following questions*

1. Do you own or rent your current place of residence?
  - a. Own
  - b. Rent
  - c. Other [Write in]
  - d. I do not live in Greeley
  - e. Prefer not to answer
  
2. What type of residence do you live in?
  - a. Apartment
  - b. Condo/townhome
  - c. Patio home
  - d. Duplex
  - e. Mobile home
  - f. Single-family detached
  - g. Other
  - h. I do not live in Greeley
  - i. Prefer not to answer
  
3. Which of the following best describes your age?
  - a. 18-24
  - b. 25-34
  - c. 35-54
  - d. 55-64
  - e. 65+
  - f. Prefer not to answer
  
4. Are you of Hispanic, Latino or Spanish origin?
  - a. Yes
  - b. No
  - c. Prefer not to answer
  
5. How would you describe yourself? *[Select all that apply]*
  - a. Black or African American
  - b. Asian
  - c. Native Hawaiian or Pacific Islander
  - d. Native American or Alaska Native
  - e. White
  - f. Other [Write in]
  - g. Prefer not to answer

6. Which of the following categories best describes your household income, that is from all persons in your household before all taxes?
- a. Under \$25,000
  - b. \$25,000 - \$49,000
  - c. \$50,000 - \$75,000
  - d. \$75,000 - \$99,999
  - e. \$100,000 - \$149,999
  - f. \$150,000 - \$249,999
  - g. \$250,000 and above
  - h. Prefer not to answer

**FINAL**

7. Thank you so much for completing this questionnaire. To be entered into the raffle, please provide your name and email (preferred) or phone number. *Note: your contact details will not be correlated with your survey responses.*
- a. Name
  - b. Email
  - c. Phone

To learn more about Greeley's water efficiency programs, please visit  
<https://greeleygov.com/services/ws/conservation/about>.

## Appendix C – Greeley Water Conservation Bill Stuffer



*Greeley is looking for your opinion!*  
*Turn over to learn more.*  
[Greeleygov.com/conserve](http://Greeleygov.com/conserve)



### *Your opinions on Greeley's water conservation efforts matter!*

The City of Greeley is conducting an evaluation of its water conservation programs to determine which programs are most effective in helping the city meet its conservation goals.

Your feedback on these programs, regardless if you have participated or not, will help ensure that we can continue to improve our conservation programs and help you *save water and money*.

For participating in this 5-15 minute survey, you will be entered to win a \$100 gift card to a local restaurant and other prizes!

Type the URL below into a web browser or use the QR code with your smartphone camera to access the survey.

<http://bit.ly/GreeleyWater>

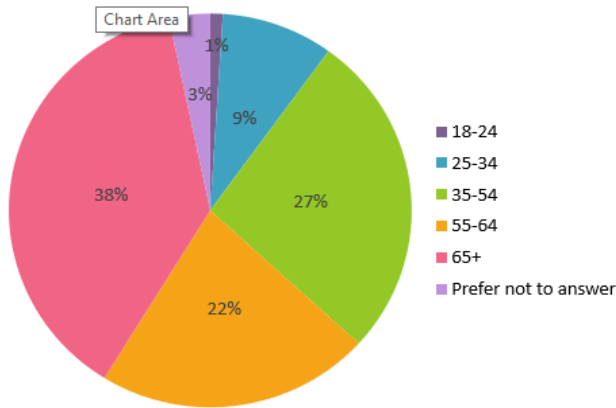


*Thank you!*

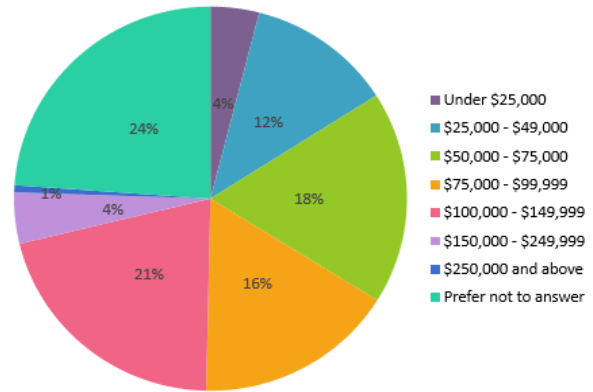


## Appendix D – Demographic Survey Results

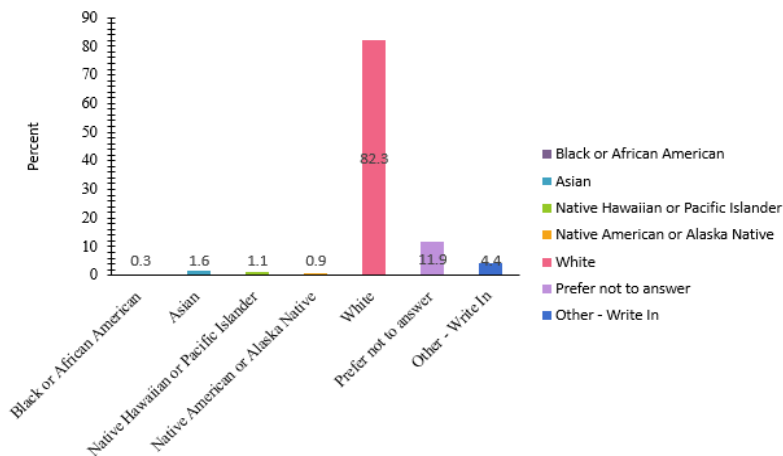
Which of the following best describes your age?



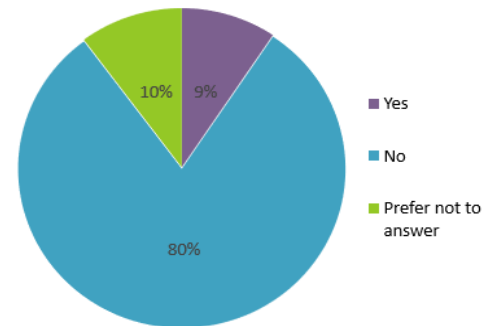
Which of the following categories best describes your household income, that is from all persons in your household before all taxes?



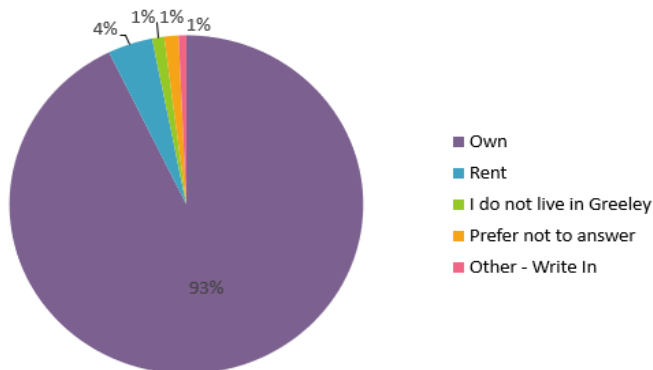
How would you describe yourself?



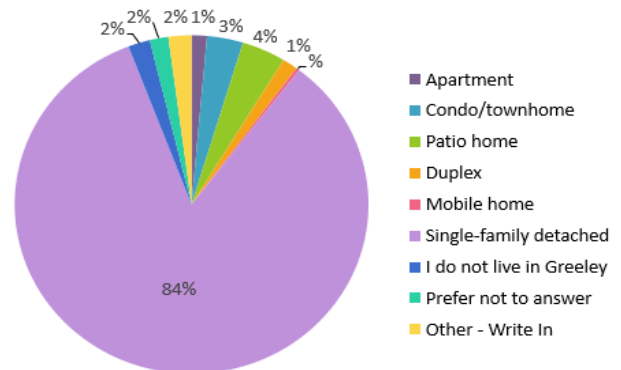
Are you of Hispanic, Latino, or Spanish origin?



Do you own or rent your current residence?



What type of residence do you live in?



## Appendix E – Spatial Trends in Water Conservation Program Participation: Analysis and Data Sources

Additional details and maps visualizing the spatial analysis of participation in Greeley’s water conservation programs are available [here](#).

A detailed description of the U.S. Census Bureau’s American Community Survey (ACS) data underlying the analysis is summarized in Table A-1 below.<sup>28</sup>

Demographics Visualized in Maps	Data Source
Percentage of Renter-Occupied Housing	US Census Bureau. (2020). 2015-2019 American Community Survey 5-Year Estimates. Total Population in Occupied Housing by Tenure by Units in Structure. <a href="https://data.census.gov/cedsci/">https://data.census.gov/cedsci/</a> .
Population speaking an Asian American and Pacific Islander language	US Census Bureau. (2020). 2015-2019 American Community Survey 5-Year Estimates. Household Language by Household Limited English Speaking Status. <a href="https://data.census.gov/cedsci/">https://data.census.gov/cedsci/</a> .  <i>Asian American and Pacific Islander languages are defined by the US Census Bureau as including Chinese (incl. Mandarin, Cantonese), Japanese, Korean, Hmong, Vietnamese, Khmer, Thai, Lao, or other Tai-Kadai languages, Tagalog (incl. Filipino), Ilocano, Samoan, Hawaiian, or other Austronesian languages, and other languages of Asia.</i>  <i>Indo-European languages are defined by the US Census Bureau as languages spoken over the greater part of Europe and Asia as far as northern India (e.g., French, Armenian, Bengali, Nepali, Marathi, Telugu, Tamil, etc.).</i>  <i>Spanish-Speaking Population includes all residents who speak Spanish (but may also, e.g., speak another language, such as English). Spanish-Speaking Population with Limited English includes residents who speak Spanish and who have limited fluency in English.<sup>29</sup></i>
Population speaking an Indo-European language	
Spanish-Speaking Population	
Spanish-Speaking Population with Limited English	
Percent of Population that Identifies as Hispanic or Latino by Race	US Census Bureau. (2020). 2015-2019 American Community Survey 5-Year Estimates. Hispanic or Latino Origin by Race. <a href="https://data.census.gov/cedsci/">https://data.census.gov/cedsci/</a> .  <i>U.S. federal government agencies adhere to standards issued by the Office of Management and Budget, which specify that race and Hispanic</i>

<sup>28</sup> 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>.

<sup>29</sup> A more detailed explanation of how the US Census defines language categories is available at: <https://www.census.gov/topics/population/language-use/about.html>.

	<p><i>origin (also known as ethnicity) are two separate and distinct concepts. The question underlying this data asks respondents if they view themselves as having racial identity that is Hispanic or Latino (which does not preclude also having additional racial identities).</i><sup>30 31</sup></p>
Percent of Population that Identifies as Hispanic or Latino by Origin	<p>US Census Bureau. (2020). 2015-2019 American Community Survey 5-Year Estimates. Hispanic or Latino Origin. <a href="https://data.census.gov/cedsci/">https://data.census.gov/cedsci/</a>.</p> <p><i>U.S. federal government agencies adhere to standards issued by the Office of Management and Budget (OMB), which specify that race and Hispanic origin (also known as ethnicity) are two separate and distinct concepts. Hispanic origin can be viewed as the heritage, nationality, lineage, or country of birth of the person or the person's parents or ancestors before arriving in the United States. OMB defines "Hispanic or Latino" as a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin regardless of race. People who identify as Hispanic, Latino, or Spanish may be any race.</i><sup>32 33 34</sup></p>
Median Household Income	US Census Bureau. (2020). 2015-2019 American Community Survey 5-Year Estimates. Median Household Income in the Past 12 Months (in 2019 Inflation-Adjusted Dollars). <a href="https://data.census.gov/cedsci/">https://data.census.gov/cedsci/</a> .
Total Population	US Census Bureau. (2020). 2015-2019 American Community Survey 5-Year Estimates. Total Population. <a href="https://data.census.gov/cedsci/">https://data.census.gov/cedsci/</a> .
Population Density	

**Table A-1.** 2020 U.S. Census Bureau American Community Survey (ACS) data included in the analysis of Greeley's water conservation programs.

<sup>30</sup> U.S. Census Bureau. (2021). "About the Hispanic Population and its Origin." Available: <https://www.census.gov/topics/population/hispanic-origin/about.html>.

<sup>31</sup> U.S. Census Bureau. (2010). *Overview of Race and Hispanic Origin: 2010*. Available: <https://www.census.gov/content/dam/Census/library/publications/2011/dec/c2010br-02.pdf>.

<sup>32</sup> U.S. Census Bureau. (2021). "About the Hispanic Population and it's Origin." Available: <https://www.census.gov/topics/population/hispanic-origin/about.html>.

<sup>33</sup> U.S. Census Bureau. (2021). "Hispanic Origin." Available: <https://www.census.gov/topics/population/hispanic-origin.html>.

<sup>34</sup> For additional context about this Census question and the nuances of how Hispanic and Latino race and origin are interpreted in the Census, please see: Pew Research Center. (23 September 2021). "Who is Hispanic?" Available: <https://www.pewresearch.org/fact-tank/2021/09/23/who-is-hispanic/>.

## Appendix F – Review of Water Efficiency Program Analyses

The review of water efficiency program analyses highlighted several core elements in approaches to methodologies for calculating water use changes resulting from water conservation and water efficiency programs. These elements are listed here and described in greater detail in the sections below.

1. Data Included
2. Water Savings Methodologies
3. Baselines and Control Groups
4. Metrics Tracking Program Costs, Benefits, and Return on Investment
5. Methodologies for Understanding Participation in Conservation Programs
6. Analysis Applications & Key Findings

### *1. Data Included*

The data underlying water efficiency program analyses often included:

- Water demand numbers/consumption data from billing information
- Population numbers
- Rebate program participation and available program details (number and type of dishwashers, toilets, clothes washers installed, etc.)
- Educational program participation details (monthly classes held, number of Garden in a Box kits distributed, etc.)
- Program costs

### *2. Methodologies: Water Savings*

Analyses of water use change or water savings take a number of different forms. The sections below describe two approaches representative of different styles of conducting this analysis.

#### **A. Example One: Program Performance Analysis**

One study used R/R Studio to conduct its water efficiency program analysis; this software was chosen because of its free open-source nature, and because it enables the creation of replicable codes. The analysis team pulled water consumption data from customers' billing information, and combined (or joined) this with data on participation in water efficiency programs. This data informs two key sets of calculations around indoor water use and outdoor water use.

The general methodology applies the formula below:

**Water use change** = Water use the year prior to participating in program – water use the year after participating

To calculate **indoor water use**, the study uses the formula below:

**Indoor water use** = (Total use for Dec-Mar) + (WQA if month's use exceeds WQA, otherwise total use for Apr-Nov)

Where WQA (Winter Quarterly Average) = Average use December, January and February.

- This approach defines the winter quarter as including the billing data from January, February, and March. December billing data is excluded because, given the way Aurora's billing cycle is timed, January billing data encompasses most of the water use in December. March billing data is included to encompass water use in February.
- This approach calculates the winter quarter's average water use (WQA) and multiplies this by 12, to estimate water use in: (a) the year before and (b) the year after participation in a water efficiency program.
- This approach compares water use across years, rather than across months.

To calculate **outdoor water use**, the study uses the formula below:

**Outdoor water use** = Apr – Oct water use greater than WQA. Outdoor water use is normalized for weather.

- This approach calculates the total water consumption during the year's outdoor months (April through November<sup>35</sup>) and subtracts the average indoor water use (described above as the average water use during the winter quarter or WQA). The average indoor water use average was applied to all months of the year before it was subtracted from the total water consumption during the year's outdoor months.
- This approach normalizes the data based on weather conditions: specifically, Plant Water Requirements (PWR). The PWR of the year in question was compared to PWR in the year before, and to a 10-year rolling average. If PWR was higher in the year before, compared to the 10-year rolling average, a ratio was created to adjust consumption down to account for this.

Several additional steps also help prepare the data for analysis:

- Any outliers were removed from the analysis before it was conducted.
- Households in behavior-oriented programs were only included if the account was not transferred from a previously participating customer.
- Customers that had a leak or break investigation from field services were not included in the analysis.

<sup>35</sup> November meter reads are used to completely capture October water use data.



## **B. Example Two: Water Conservation Program Evaluation**

In another example, a community partnered with and used a company's proprietary Sustainability Information Management System (SIMS) software to develop a spatial dataset including each customer's account and account number, address, customer class, and program participation. They focused their water savings analysis on a subset of customers: single-family households with data going back to at least 2005. This reflected the fact that single family households made up the majority (over 95%) of water efficiency participants. Monthly data from 2005 was necessary to pre-date customer involvement in water efficiency programs, though this criteria did limit the number of customers included in the analysis. Customers that met both criteria accounted for 38-69 percent of program participants.

This study's general methodology involved calculating the average daily water use/connection for each month, using the following approach for all customers included in the analysis:

**Average daily water use for [month]** = Sum of daily water use for all participants in the program of interest/number of available records for a particular month

The sum of participant's daily water use was divided by the number of available records, since not all participants had complete water records for the entire period of interest.

This data was used to estimate both (1) the annual water savings of water efficiency programs and (2) the accumulated water savings from January 2005 to January 2011.

To calculate the water savings of **indoor water use** programs, this study calculated the wintertime daily average water use:

**Indoor water use** = Average daily water use from December through March

Winter use was defined as December through March for all years except for 2005 (which used January - March) and 2020 (which used December and January).

This calculation measures changes in daily wintertime use per connection (units: gallons/day).

To calculate the water savings of **outdoor water use** programs, the analysis calculated the total summertime outdoor water use:

**Outdoor water use** = Sum of all customer daily water use from April through October - (estimated daily wintertime water use from the preceding winter \* 214 days)

This calculation measures changes in seasonal water use per connection (units: gallons).

To account for the variable seasonal impact of wind, precipitation, and temperature, the summertime water use was compared to summertime water use in the previous year. Based on this comparison, a ratio was applied to normalize water use across different years. For instance, evaluations of one conservation program's participants summertime water use for each of the years between 2006 - 2011 were normalized to the summertime water use in the year 2005.

### **C. Additional Questions and Considerations**

There are many different approaches to calculating the water savings from water use efficiency programs. Key questions include:

- How to **define “indoor” and “outdoor” water use** (for instance, what months are used to determine when outdoor water use is likely to occur).
- How to **adjust data to calculate indoor water use** (some programs, for instance, have meter reads that separate indoor and outdoor water use, making the calculations to distinguish between indoor and outdoor water use unnecessary).
- How to account for **variable temperature, wind and precipitation rates** and their impact on outdoor water use over time. For instance, while one city calculates the PWR from year to year, and uses this ratio to normalize outdoor water use across years, another used the ratio of water usage from year to year as the basis of a similar calculation.

**Time frames:** It can be challenging to account for the impacts of a particular program over time. One report took the approach of calculating savings on a one-time basis (rather than tracking them over the long term). This analysis is branded as a “change analysis” – rather than a water savings analysis – as the impacts of programs often vary widely across different years, and do not always result in water savings.

Another analysis, in comparison, calculates both the annual and the accumulated savings over the implementation of a water efficiency program. Its assessment also notes a wide range of savings across different years, which may reflect both variability in meter reading and billing across different time periods, as well as larger-scale water use trends.

**Risk of Double-Counting:** There is often a risk of “double-counting” water savings from participants who participate in multiple programs. Isolating program-specific savings was described as often very challenging across our informational interviews. Possible approaches to addressing this risk include:

- Using a hierarchy model. One approach involves assigning a different weight to different water conservation programs, to estimate how much each contributed to overall water savings, and to avoid double counting.
- Including a very clear disclaimer when presenting water savings numbers across different program types, noting that program-specific savings cannot simply be added up to get an overall total without a risk of double-counting and additional uncertainty.

### *3. Baselines and Control Groups*

There are several different approaches to determine a reference point to measure the impact of water efficiency programs from.

One approach is to establish a control group, a group of customers with similar (1) water use and (2) seasonal variation in water use as customers participating in water efficiency programs.

An analysis by one community, for instance, mirrored the indoor and outdoor water use calculations for water efficiency programs for a group of 1,000 customers who did not participate in water efficiency programs, and had water usage data going back to 2005. Three-year rolling averages of water use were calculated across all control group participants, to smooth out some variability in gallons of water use/day/connection, due to variation in the dates of meter reads, among other factors. Outdoor water use data among control participants was also normalized according to the same method as treatment group participants (based on a ratio comparing current seasonal water use to seasonal water use in a control year).

Another approach is to measure changes in participating customers, prior to, during, and after their participation in water efficiency programs.

We found a number of analyses that took this approach. This methodology includes the caveat that many sources of variability – from the dates of meter reads and billing, to changes in weather conditions, to other larger trends in water use – can influence this data.

These approaches are not mutually exclusive; conducting both can offer complementary insights into the impact of different programs.

### *4. Metrics tracking program costs, benefits, and return on investment*

A brief summary of common metrics used to calculate and communicate the costs, benefits and returns on investment for various programs follows below.

- Total annual program costs
- Water savings (gallons per day per unit or connection)
- Water savings (estimated gallons saved annually by a program)
- Water savings (estimated gallons saved over project lifetime)
- Water savings (total acre feet saved per year)
- Water savings (cumulative water savings across several years)
- Cost/AF (according to year, to indoor/outdoor water use, and to program)
- Rebate efficiency (AF/rebate)
- Average savings/customer per program
- For indoor rebates, years before the customer saved enough money to realize a return on their investment
- Deep dives into case studies of high-volume users

## *5. Methodologies for understanding participation in conservation programs (indoor, outdoor)*

### *A. Spatial analysis*

Cities often used spatial analysis to explore participation across different neighborhoods.

Several reports, for instance, display maps that visualize participation indoor and outdoor water efficiency programs across different neighborhoods.

Key visualizations include:

- The **rate of participation in indoor and outdoor water efficiency programs by neighborhood**. This can include neighborhood-by-neighborhood analyses, and/or a hot spot analysis of participation in indoor and outdoor water efficiency programs across the city.
- The **change in water use by neighborhood**. One community has displayed maps highlighting the 10-15 neighborhoods with the largest savings. The visualizations take the approach of celebrating savings, rather than naming and shaming neighborhoods with high water consumption. These maps explore water savings in terms of both aggregate and average water use changes.

These analyses only include customers who have several years of data available. It's also important to note that turnover and new developments can significantly affect neighborhood water use levels from year to year.

### *B. Customer and market segmentation analysis*

In addition to mapping participation, one community has explored using U.S. Census data to develop customer and market segmentation. For instance, based on statistical analyses, it is possible to identify what kinds of distinct customer groups exist, based on

considerations such as infrastructure, demographics, and water use levels and patterns. This kind of analysis can support targeted marketing; for instance, identifying different water use patterns across different cultures and targeting marketing towards specific water uses. It's important to have a way to flag changes in who lives at a property and to filter the analysis for this, when conducting this kind of analysis.

A number of analyses also track participation by customer category, such as: combined, commercial, irrigation class, multi-family, and residential, or more detailed categories such as: auto dealership, church, condo, cross-listed, duplex/triplex, manufactured home, hotel/motel, multifamily (4-8), multifamily (9+), office, other, recreational, retail, single family, warehouse, and undefined. For instance, one city found that their Slow the Flow program, which provides free irrigation consultations, efficiency tests, and customized irrigation schedules, initially had high levels of residential demand, necessitating budget increases for the program. Currently, however, the program mostly attracts larger customers, such as HOAs.

#### *Analysis Applications and Key Findings*

For the communities we spoke to, water efficiency analyses serve both internal and external purposes. These analyses help inform planning for future infrastructure and supply needs. Internally, they also help justify the use of staff time to implement efficiency programs, and benchmark the performance of different efficiency programs, to guide internal decisions about the future evolution and prioritization of different efficiency programs. For instance, one community found that while its toilet rebate program offered a strong return on investment initially, once the program had replaced most of the older toilets, it had a diminishing impact on water savings, unless it started to target larger customers (e.g., schools, apartment complexes).

#### *Additional Advice and Best Management Practices*

Several cross-cutting themes and best practices – described in greater detail below – emerged through interviews with communities who conducted a water use change analysis.

##### *A. Starting points and scoping the analysis*

The communities suggested considering several key points when developing an analysis, including:

- The future goals for data collection and analysis. Ideally, these considerations can also feed into the monitoring process – by starting with the question “how will we track this?” at the beginning of a program.
- Keeping analyses “simple but defensible,” and “only as complex as they have to be.” One respondent noted that while it’s easy to make evaluations of water use quite complicated, often in response to input from internal experts, it’s important to also take into account the considerations around maintaining the data and repeating analyses across different years, potentially under the direction of different team



- members. It's also helpful to keep the intended audiences for the analysis in mind, and to consider what types of metrics will be most effectively communicated. Often, these are the most straightforward indicators.
- Updating analyses across different years. One respondent noted that they have worked to find a balance between updating methodology – to reflect lessons learned and to try new analytical approaches – and consistency with past methodologies, which makes it possible to easily compare program performance across different years.

### *B. Data Management*

The interviews uncovered several recommendations around data management:

- Standardizing the process for entering, and cleaning and processed data is very helpful. It is ideal to devote some time to thinking through data input, data use, and the data infrastructure plan as part of the larger analysis process.
- It is vital to ensure the presence of joiner IDs (e.g., names, customer IDs, etc.) to match and combine information across different data sources.
- In terms of sharing data across analysts, it's helpful when all analysts use the same program (e.g., Excel, R Studio, ArcGIS) to ensure consistency across different analyses and any data sets that feed into the analysis. Sometimes combining or manipulating information from different systems (e.g., accessing and analyzing data from a system tracking customer water use) creates challenges.

### *C. Communicating the Results*

In terms of communicating the results, several overarching suggestions included:

- Tailoring the findings for different audiences; some metrics may be more interesting to internal planners or analysts who are most familiar with implementing water efficiency programs; other metrics may resonate more with public or policy-focused audiences.
- One City has branded its analysis as a “change analysis” rather than “water savings analysis,” since they do not always see water savings in the yearly analysis. Providing clear context to help viewers interpret the results and to understand what types of information they draw from is crucial.

## Resources and Reports

Report	Description
<a href="#">Aurora Water. (2015). Aurora Water Conservation: 2015 Annual Report.</a>	Summary of results of water efficiency analysis, in terms of both water savings and community participation in water efficiency programs.
<a href="#">Aurora Water. (2015). 2015 Municipal Water Efficiency Plan.</a>	Summary of water efficiency programs, and calculation of water savings by program from 2002-2012. This memo references Aurora's more recent methodology (which has been updated significantly since 2015), and also provides a detailed description of the program's earlier approaches to measuring water savings from efficiency programs.
<a href="#">Alliance for Water Efficiency (AWE) Water Conservation Tracking Tool</a>	The Alliance for Water Efficiency (AWE) has developed an Excel-based Water Conservation Tracking Tool <sup>36</sup> that evaluates water savings, costs, and benefits for a water utility's conservation programs, using a standardized methodology for water savings and cost-benefit accounting. It includes a list of pre-defined conservation activities users can select to guide their analysis. The program also estimates reduction in greenhouse gas emissions resulting from changes to plumbing and/or energy codes and conservation program activity.
<a href="#">City of Longmont, CH2MHill and Great Western Institute. (January 2013). Water Conservation Program Evaluation.</a>	Assesses the effectiveness of water conservation programs supported by the City of Longmont, and recommends adjustments to make those programs more cost effective. Includes a detailed description of the methodology behind the assessment of water conservation programs.
<a href="#">City of Longmont, CH2MHill and WaterDM. (September 2017). Water Efficiency Master Plan: Update to the 2008 Water Conservation Plan.</a>	Section 4, "Current and Future Water Efficiency Efforts," summarizes the history and intended future for Longmont's water efficiency programs. It describes trends in gross and per capita residential water use and estimates future water savings from water efficiency programs.
<a href="#">Feinglas, S., Gray, C., and Mayer, P. (November 2013).</a>	This study examines the long-term impact of water conservation on water rates and tap fees in the City of

<sup>36</sup> For more details, visit: <https://www.allianceforwaterefficiency.org/resources/topic/water-conservation-tracking-tool>.

<a href="#"><u>Conservation Limits Rate Increases for a Colorado Utility. Alliance for Water Efficiency.</u></a>	Westminster, Colorado and finds that rates would be substantially higher today if not for water savings achieved since 1980. Analysis draws on water demand records, water rates, tap fees, and capital project costs from 1980 through 2010.
<a href="#"><u>Resource Central. (2020). 2019 Annual Report: Water Conservation Impact.</u></a>	Overview of quantitative and qualitative metrics for different water conservation programs, including many educational programs.
<a href="#"><u>Water Research Foundation. (April 2016). Residential End Uses of Water, Version 2: Executive Report.</u></a>	The study identifies variations in water use by fixture or appliance (updating a 1999 study) and evaluates future conservation potential. It also includes predictive models to forecast residential demand.

## Appendix G – Water Use Change Analysis: Detailed Methodology

In consultation with Greeley, WaterNow and WRA identified a subset of Greeley’s water conservation programs to focus the participation and water use analysis on (the full list of these programs is described in greater detail in Table A-2 below).

The analysis covers participation in water efficiency programs during the years 2013-2018. 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.

To conduct the analysis, we compared customers’ average water use two years prior to participation in Greeley’s water conservation programs, with their average water use two for two years following their participation in a water use program. While many other methodologies could provide helpful insight into the change in water use resulting from water conservation program participation (see the *Resources and Reports* section in Appendix F for a more detailed description of methodological approaches and related studies), this approach was determined to be the best match for Greeley’s existing data and data format.

Specifically, we applied the following calculation to participants in evaluated programs:

**Water use change** = Average water use for the two years prior to participating in program – average water use for the two years after participating

This approach was applied to programs targeting indoor and outdoor water use. Indoor water use was calculated as the total water use during the months of January, February March, November, and December. For the remaining seven months of the year, it was assumed that indoor water use was the average monthly during these five winter months. A customer’s annual indoor water use was calculated using the approach below:

**Indoor water use** = (Total use in Jan., Feb., March, Nov., Dec.) + (WQA\*7)

WQA (Winter Quarterly Average) = Average water use in Jan., Feb., March, Nov., Dec.

Outdoor water use was defined as water using during the months of April through October, that was greater than the average indoor water use. Outdoor water use was calculated using the approach below:

**Outdoor water use** = Apr. – Oct. water use, greater than WQA

Outdoor water use between years was normalized for weather, by using Greeley’s annual Irrigation Water Requirement (IWR).

Once participants' indoor or outdoor water use (depending on the conservation program being evaluated) was calculated, the average water use change was first calculated, and then applied to the years that a participant was active in the program (e.g., if a customer participated in 2014, the average annual water savings was applied to the years 2015-2018). We referenced the default lifetime savings and annual savings decay rates cited in the AWE Water Conservation Tracking Tool; based on these values, only the Commercial and Residential Indoor and Outdoor Programs had a savings decay rate (of 20 percent annually) and a lifetime savings rate (of five years) that applied to the analyzed programs. The toilet rebates, for instance, had an estimated 25-years of savings – far beyond the six years included in this analysis (see Table A-3 for more details).

The cost calculations used for each program typically included both the cost of a rebate along with administrative costs. It is important to note that the estimates around staff time are limited to the installation of a particular program or rebate (e.g., the process of reviewing an application). Longer, more overarching processes – such as developing programs, transportation, equipment, or advertising to increase participation in a program – are not captured in this analysis's cost calculations.



## Appendix G, Table A-2

Program Name	Description	Indoor/Outdoor Water Use	Customer Types	Years Analyzed
<b>Commercial and Residential Audits</b>				
<b>Commercial 2013-2018 Use: Commercial Audits 2013-2018</b>	Indoor Water Audits: Greeley Water Specialists come to a property to: <ul style="list-style-type: none"> <li>• Review how a customer is using water</li> <li>• Identify areas of water waste</li> <li>• Provide recommendations and custom water use targets</li> </ul>	Indoor and/or Outdoor	CII, MFR	2013-2018
<b>Residential 2013-2018 Use: Residential Audits 2013-2018</b>	Outdoor (Irrigation) Audits: Greeley Water Specialists come to a property to: <ul style="list-style-type: none"> <li>• Inspect watering zones and identify problems</li> <li>• Measure how much water is being applied</li> <li>• Check water pressure and recommend adjustments</li> <li>• Develop a custom watering schedule</li> </ul>	Indoor and/or Outdoor	SFR	2013-2018
<b>Indoor Conservation Programs</b>				
<b>0.8 GPF Toilet Rebate</b>	Toilets that use 0.8 gallons per flush or less are eligible for rebates (with a two-toilet rebate per household limit).	Indoor	CII, MFR, SFR	2014-2018
<b>Dual Flush Toilet Rebate</b>	Greeley provided rebates for dual flush toilets, a variation of the flush toilet that uses two buttons or a handle mechanism to flush different amounts of water.	Indoor	CII, MFR, SFR	2013-2018
<b>Low Flow Toilet Rebate</b>		Indoor	CII, MFR, SFR	2016-2018

<b>Ultra Low Flow Toilet Rebate</b>	A low-flush toilet (or low-flow toilet or high-efficiency toilet) is a flush toilet that uses significantly less water than traditional high-flow toilets	Indoor	CII, MFR, SFR	2013-2018
<b>Toilet Rebates</b>	Includes and summarizes the four programs listed above: an 0.8 GPF Toilet (2014-2018); a Dual Flush Toilet (2013-2018); a Low Flow Toilet Rebate (2016-2018); and an Ultra Low Flow Toilet Rebate (2013-2018).	Indoor	CII, MFR, SFR	2013-2018
<b>Front Loading Washer Rebate</b>	Greeley provided rebates for high-efficiency front loading clothes washers, which use less water and energy than standard top loading clothes washers. This program ended in 2018.	Indoor	CII, MFR, SFR	2013-2018
<b>Showerhead Exchange</b>	At showerhead exchanges, which are held periodically at events, customers can exchange their old showerheads for new low-flow models at no cost.	Indoor	CII, MFR, SFR	2017-2018
<b>Outdoor Conservation Programs</b>				
<b>ET Sensor Rebate</b>	An ET Sensor uses factors such as solar radiation, air temperature, relative humidity, and wind to calculate evapotranspiration and communicate it to the central software (e.g., to an irrigation controller) via the host controller's communication.	Outdoor	CII, MFR, SFR	2013-2018
<b>Spray Head Sprinkler Exchange</b>	Greeley enabled customers can exchange their old spray heads for more efficient models.	Outdoor	CII, MFR, SFR	2016-2018
<b>Rotary Nozzles Rebate</b>	Rotary nozzles increase uniformity and reduce overspray in irrigation systems. They operate by rotating a stream of water over the landscape, in contrast to the mist produced by spray-head sprinklers.	Outdoor	CII, MFR, SFR	2013-2018
<b>Smart Controller Rebate</b>	Smart controllers are automatic timing devices with nonvolatile memory used to remotely control valves that operate an irrigation system that is contractor grade quality. Smart controllers are able to self-adjust	Outdoor	CII, MFR, SFR	2013-2018
<b>Irrigation Controller Rebate</b>		Outdoor	CII, MFR, SFR	2014-2018

	<p>and reschedule irrigation events based on integrated instrumentation that measures evapotranspiration (weather-based) or soil moisture or flow or a combination.</p> <p>Smart Controller Rebates were installed by Greeley's Water Conservation Specialists, while Irrigation Controller Rebates were installed by the customer.</p>			
<b>Pressure Reducing Valve (PRV) Rebate</b>	A pressure-reducing valve reduces misting, a fine spray that results from irrigation systems that apply water at a very high pressure, resulting in excessive evaporation and water drifting away from the intended irrigation area.	Outdoor	CII, MFR, SFR	2013-2018
<b>Cash for Grass Rebate</b>	Greeley water customers who are exceeding their outdoor water budget can get cash for replacing their lawn with low water use plants. This 2018 pilot program aims to replace lawns with more sustainable landscapes, including Xeriscape, rain gardens, and pollinator plants.	Outdoor	CII, MFR, SFR	2018

**Table A-2.** A summary of programs included in the analysis of program participation and water use savings. This list was narrowed down, and the final results only include programs if the number of customers with sufficient water use data was larger than 50. Year analyzed include all years that the program was active during the 2013-2018 window the analysis considers.

## Appendix H – Comparison of Results to Reference Values

Greeley Water Conservation Program	AWE Conservation Program	AWE Model Values (gpd/unit)	AWE Model Values: Estimated Annual Savings Per Account (gpy/unit)	AWE Model Values: Estimated Annual Water Savings (AF)	Life of Savings (years)	Savings Decay (%/year)
Residential Audits (Indoor + Outdoor)	SFR Water Use Audit	33.9 gpd/unit	12,374	23	5	20
Front Loading Washer Rebate	SFR Washer Rebate	19.3gpd/unit	7,044.5	17.11	15	0
Toilet Rebates	SFR ULFT Replacement, SFR HET Replacement	20.9 gpd/unit - 27.8 gpd/unit	7,628.5 – 10,147	16.26	25	0
Smart Controller Rebate	SFR Smart Irrigation Controller Rebate	26.1 gpd/unit	9,527	3	10	0
PRV Rebate	ND	ND	ND	ND	ND	ND
Rotary Nozzles	SFR Irrigation Nozzle Replacement	1.6 gpd/unit	584	3.37	10	0
Commercial Audits (Indoor + Outdoor)	CII Large Landscape Water Audit	893 gpd/unit	325,945	87	5	20

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

\*\* The Greeley 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.

\*\*\*\*For the columns labeled “AWE Model Values: Estimated 6 Year Water Program Savings (AF)” and “AWE Model Values: Estimated Annual Water Savings (AF)” the AWE model values were substituted for the calculated average annual water savings, to compare the study’s results to the results that would have been realized using model values.

**Table A-3.** *Estimates of water savings for included programs using the default values from the AWE Water Conservation Tracking Tool.*

Table A-3 compares the values found in this analysis with the default model values used in the AWE Water Conservation Tracking Tool. For most programs, the results are similar, with a few exceptions, notably the Commercial and Residential Audit programs, where the values found through the analysis are lower than what would be expected based from the AWE model default values. However, participation in these programs includes an especially wide range of variables, such as individual behavior change and different weather conditions (even while normalizing for weather by using IWR, conditions may still affect resident’s behavior and attitudes towards water use). For the Commercial Audit program, in particular, it is also possible that while participants are using water more efficiently, their overall water use still increases (for instance, their customer base or production grows, increasing their total water use). Participation in these Audits may also lead to participation in other rebates, as seen in the especially high level of overlap between the Residential Audit and other conservation programs, playing a role in generating the larger individual savings seen in some of the other programs.