4.2 Step 2 – Profile of Water Demands and Historical Demand Management

Step 2 involves an overview of the historical water demand trends as well as the influence of historical water demand management on water use and forecasted future water demands. Similar to Step 1, this demand-side assessment provides background information critical to developing effective water efficiency plans and should draw upon information obtained from other water supply planning efforts.

4.2.1 Demographics and Key Characteristics of the Service Area

The demographics of a community can influence water demands and the types of demand management activities that are most conducive for implementation. A broad assessment of the demographics in the service area should be conducted to identify key considerations to incorporate in later steps of the plan development. Key demographic data include:

- *Customer categories* – Providers have different ways of categorizing customer types. Typical categories include single-family, multi-family, commercial, municipal, and irrigation. These customer categories should correspond to the customer category demand data discussed in Section 4.2.2.

- *Service area population* – Current population residing within the service area. Estimates of employees commuting into the service area may also be included. Service areas that are influenced by tourism may also want to include tourist number estimates on a seasonal basis.

Additional information may also be provided if proven to be beneficial for later planning purposes. This information may be provided in Step 2 or deferred to other more appropriate sections of a plan. These data could include:

- *Ages of housing stock and/or of indoor appliances and fixtures* – As discussed in Sections 4.2.3 and 4.2.4, this information is useful for estimating passive water savings. Detailed information may be placed in an appendix.

- *Age of water distribution system infrastructure* – This may include pipelines, tanks, pumps, etc. Generally, older system components are less water efficient and yield greater water savings if replaced or repaired than newer components of water supply systems.

- *Demographics* – This may include income, age, ethnicity, and other information useful to developing a public outreach campaign. The majority of this information may be obtained from Census data.

- *Largest water users* – This may entail large commercial users such as breweries, manufacturers, college campuses, HOAs, and specific homeowners that use the greatest amount of water in the residential sector.

4.2.2 Historical Water Demands

Demand data commonly originate from water treatment plant production data and metered end-use billing records. There are several typical challenges that providers may face which can place limitations on the type of data available for analysis. Examples of such challenges include:

- Billing systems are traditionally designed for financial and accounting purposes and may neither distinguish between customer category nor display monthly water use data in a convenient manner.
- Portion(s) of the service area may not be metered and consequently data are not available.
- Billing systems are routinely updated and historical demand data can be lost during the update process.
- Portions of the service area may be metered but not read or put into the database.
- Errors in billing data.

Billing systems and metering are considered foundational water efficiency activities. Providers experiencing these challenges should consider ways to improve these activities during the Step 4 water efficiency activities selection process. See Section **Error! Reference source not found.** for additional information.

Water demands often vary on an annual basis, due to weather and other factors. Consequently, at a minimum, the previous five years of historical demand data should be provided for water efficiency planning purposes. There are many ways in which demand data can be presented in both graphical and tabular format. The remainder of this section provides a series of examples demonstrating how demands may be presented in plans.

Annual Treated Water

Table 2 and Figure 5 provide an example of how annual treated water may be presented. These data are commonly obtained from water treatment plant production data or the total amount of water delivered to the end user. Plans should clearly specify the raw data source (e.g. water treatment plant production data). Per C.R.S. 37-60-126 (4.5), delivered water or water production data are required for annual reporting purposes.

C.R.S. 37-60-126 (4.5) Reporting Requirement: Total annual treated water deliveries.

Table 2 Annual Treated Water Deliveries

Year	Annual Treated Water Deliveries (acre-feet)
2002	8,309
2003	7,853
2004	7,408
2005	7,763
2006	7,538
2007	7,448
2008	7,572
2009	6,912

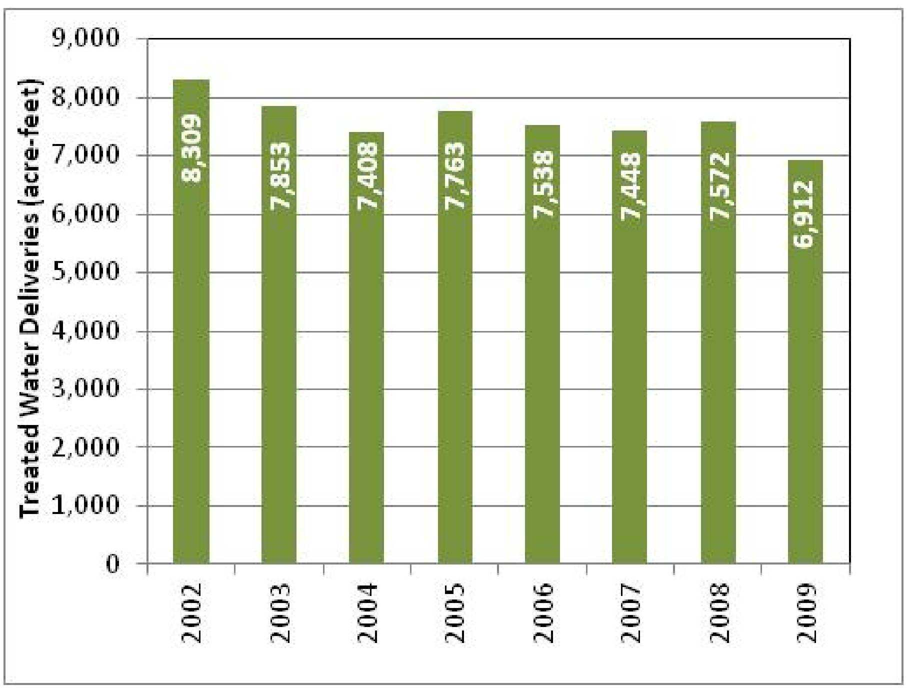

Figure 5 Annual Treated Water Deliveries

Monthly Treated Water Deliveries

Municipal water usage generally increases during the summer irrigation season in Colorado and consequently, is an important factor to account for in plans. For example, monthly demands can help identify when certain water efficiency activities should be implemented (e.g. public education on outdoor watering is most effective May through September). Table 3 and Figure 6 provide examples of monthly treated water deliveries.

Table 3 Average Monthly Treated Water Deliveries (2002-2009)

Month	Average Monthly Demands (acre-feet)	Non-Revenue Water (acre-feet)
January	404	28.3
February	387	27.1
March	419	29.3
April	507	35.5
May	750	52.5
June	935	65.4
July	1,144	80.1
August	955	66.9
September	790	55.3
October	508	35.5
November	403	28.2
December	398	27.9

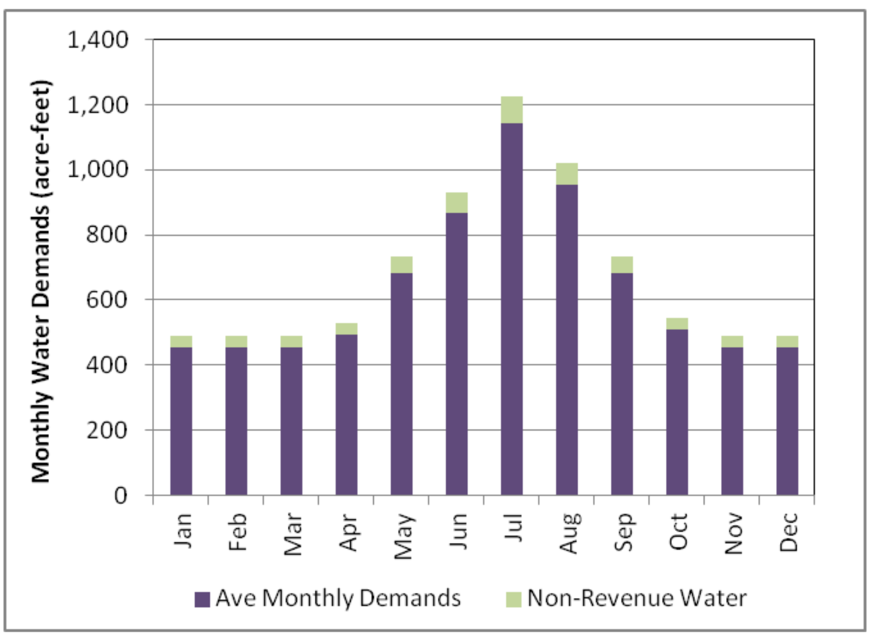

Figure 6 Average Monthly Treated Water Deliveries (2002-2009)

Dual Systems – Annual Raw Water and Reclaimed Water Deliveries

Many water providers have dual water supply systems where they rely on treated water deliveries for indoor and outdoor use, yet also rely on non-potable/raw water for some portion of outdoor irrigation. Non-potable water may consist of untreated groundwater, untreated ditch water rights, or reclaimed water. From a planning perspective, it is useful to distinguish the different types of usage in order to assess the future needs for each water type.[8] Table 4 and Figure 7 provide examples of how annual water deliveries may be presented for a dual water supply system by water type.

Table 4 Annual Water Deliveries for a Dual Water Supply System

Year	Treated Water (acre-feet)	Raw Ditch Water (acre-feet)	Reclaimed Water (acre-feet)
2002	8,309	2,493	831
2003	7,853	1,963	393
2004	7,408	1,482	556
2005	7,763	1,553	776
2006	7,538	1,508	377
2007	7,448	2,234	745
2008	7,572	1,514	681
2009	6,912	2,074	691

[8] Many raw water systems in Colorado are currently not metered. In these cases, historical raw water demand data may not be available and the plans should state that the raw water system is not metered and, consequently, raw water demand data are not available. The installation of a raw water metering system should be considered as a foundational water efficiency activity in Step 4. See Section 4.4.1 for further details.

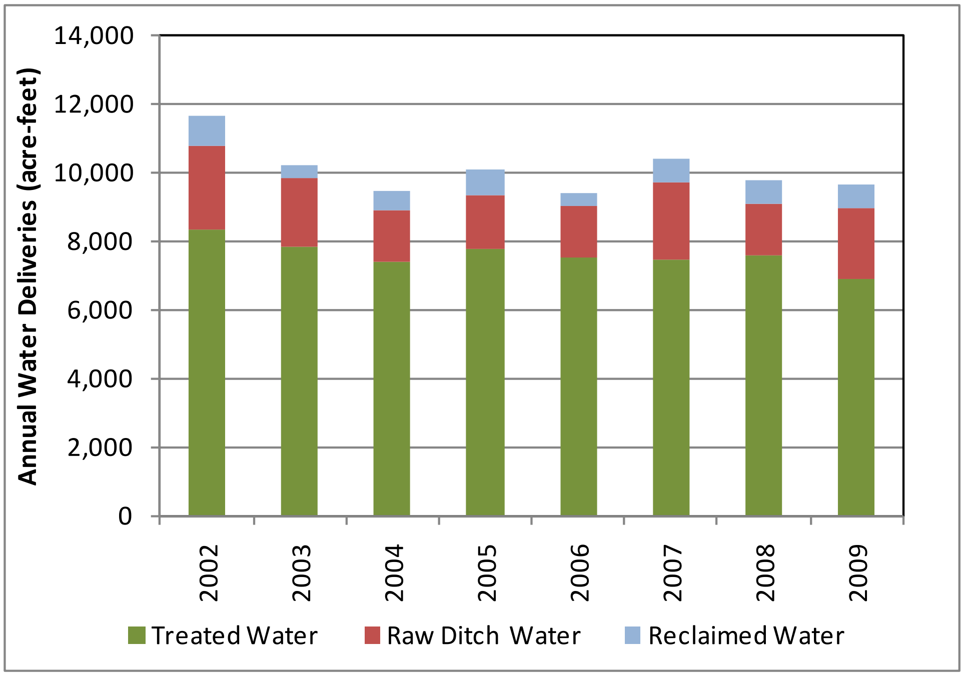

Figure 7 Annual Water Deliveries for a Dual Water Supply System

Raw water generally consists of untreated ditch or groundwater that is directly used for outdoor irrigation. In some special cases, raw water use could result in water savings. For instance, small amounts of water diverted from a generally full irrigation ditch with low seepage onto an adjacent park could be more efficient from a water savings perspective than using available treated water from the potable supply system that experiences significant conveyance losses. In these particular cases, State approved plans that claim a level of water savings through use of raw water should sufficiently demonstrate such water savings. In the example provided above, this would entail metered raw water diversion data and a detailed engineering comparison of the losses incurred through the raw water supply (e.g. ditch water losses) relative to the losses incurred through the potable system.

Despite these apparent efficiencies, many raw water systems serving municipal irrigation demands are not metered. Some of these systems could experience significant reductions in water use through metering the end users similar to treated water systems that regulate/inform the end users on how to conserve water. State approved plans may include raw water as a water efficiency activity as long as the raw water system is in itself metered and the end water use is used wisely (with little to no waste). Plans should clearly provide a description of the metering conducted for the raw water systems and activities implemented to promote wise water use by the end user.

Annual Non-Revenue Water

Annual non-revenue water (formerly referred to as unaccounted for water) consists of unbilled authorized uses (e.g. hydrant flushing), apparent losses, and real losses.[9] Real losses consist of

[9] Source: American Water Works Association. 2006. *Water Conservation Programs – A Planning Manual. Manual of Water Supply Practices M52. First Edition.*

leaks in the water distribution system that does not reach the end user. Apparent losses consist of unauthorized consumption, customer metering inaccuracies, and data handling errors.

Non-revenue water is commonly estimated as the difference between the water treatment plant production data and total billed water. Estimates may be further refined by conducting water distribution system audits and metering areas that traditionally were not metered. This is a foundational water efficiency activity discussed in Section 4.4.1. Per C.R.S. 37-60-126 (4.5), non-revenue water is required for annual reporting purposes to the State.

C.R.S. 37-60-126 (4.5) Annual Reporting Requirement: Non-revenue water.

Annual Treated Water Metered Use by Customer Category

It is essential to understand water demands among different categories of customers to develop an effective water efficiency plan. These data are important in understanding how demands are proportionately distributed among a water supply system. For instance, understanding which customer category makes up the highest percentage of water users can assist in selecting water efficiency activities that target those specific customers.

However, as previously mentioned, billing systems can limit the availability of customer category demand data. At a minimum, a basic breakdown into residential and non-residential customers is a key starting point. Further delineation into residential, commercial, municipal, and irrigation categories is highly recommended. Water usage by customer category also includes usage by the municipality on its parks, open spaces, and other facilities. Separate, more detailed evaluations may also be conducted, such as assessing the average unit amount of water applied to a square foot of irrigated turf on City-owned parks. This could be an important parameter in determining whether the City can improve its irrigation efficiency.

C.R.S. 37-60-126 (4.5) Annual Reporting Requirement: Annual Treated Water Deliveries by Customer Type.

Per C.R.S. 37-60-126 (4.5), annual treated water metered use by customer category is required for annual reporting purposes to the State. Figures 8 and 9 and Table 5 provide three methods for presenting water demands by customer category.

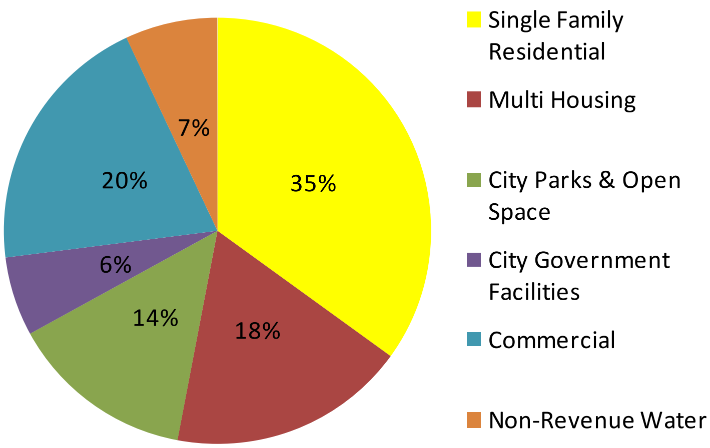

Figure 8 Average Treated Water Metered Use by Customer Category (2002 - 2009)

Table 5 Annual Treated Water Metered Use by Customer Category

Year	Single Family Residential	Multi-Housing	City Parks & Open Space	City Government Facilities	Commercial	Non-Revenue Water
2002	2,908	1,496	1,163	499	1,662	582
2003	2,749	1,414	1,099	471	1,571	550
2004	2,593	1,333	1,037	444	1,482	519
2005	2,717	1,397	1,087	466	1,553	543
2006	2,638	1,357	1,055	452	1,508	528
2007	2,607	1,341	1,043	447	1,490	521
2008	2,650	1,363	1,060	454	1,514	530
2009	2,419	1,244	968	415	1,382	484

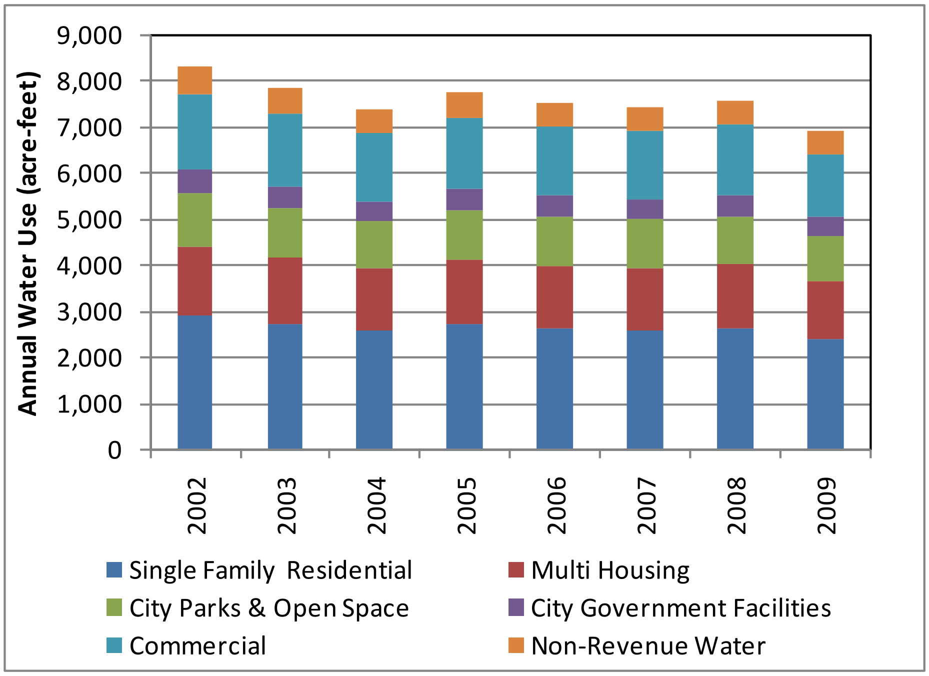

Figure 9 Annual Treated Water Metered Use by Customer Category

System-wide Per Capita Water Demands

Per capita water demand, typically expressed in gallons per capita/day (gpcd), is often calculated as the total water production divided by the population or as the sum of all metered end-use water deliveries divided by the population. The main difference between the two approaches is that the total production, or system-wide, approach includes non-revenue water while the metered end-use approach does not. Plans should clearly specify how system-wide per capita water demands are calculated. Table 6 and Figure 10 show examples of how to present system-wide per capita water demands.

Table 6 System-Wide Per Capita Water Demands

Year	System-wide Per Capita Demand
2002	161
2003	152
2004	143
2005	150
2006	145
2007	143
2008	145
2009	132

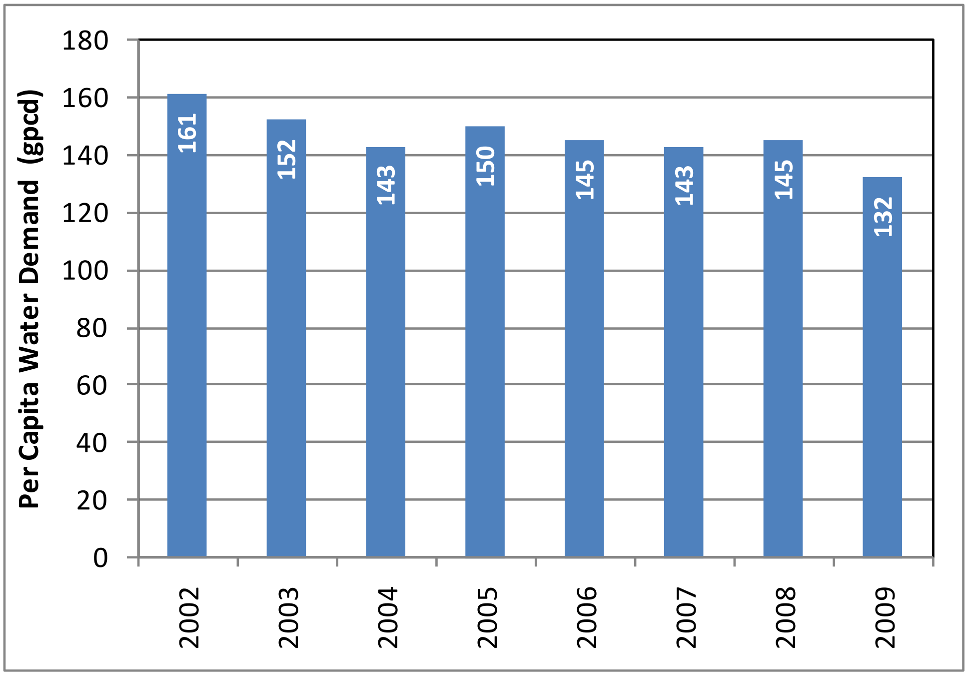

Figure 10 System-wide Per Capita Water Demands

System-wide per capita water demands are particularly useful for assessing trends and are incorporated into subsequent examples throughout this document. They are also commonly used to forecast future water demands as discussed in Section 4.2.4. However, while they can be very useful at an individual provider level, they should not be used as a means to compare water usage between other providers. This is partially attributed to the inconsistencies in the two calculation approaches discussed above, but also to the fact that there are many other factors that can skew the data, negating an "apples-to-apples" comparison. Such factors include large commercial and industrial sectors that can significantly influence system-wide per capita water demands. Additionally, resort communities can experience difficulties in developing representative annual per capita water demands. The numbers of visitors often vary seasonally (e.g. ski season) and are also impacted by economic conditions and weather.[10]

Unit Water Demands by Customer Type

Unit water demands by customer category are calculated by dividing the total metered use of a particular customer category by either population, number of accounts, number of irrigated acres for outdoor irrigation accounts, etc. Residential per capita water demands (residential water use divided by population) are commonly shown as well as water usage by account. Water usage by account is commonly used for non-residential accounts where the population may not be considered applicable. An example of residential per capita demands is provided in Table 7 and Figure 11.

[10] Annual weather patterns influence per capita demands. Wetter years often result in less outdoor water usage resulting in a lower per capita demand than in dry years when the outdoor water usage is higher. Water providers may implement methods to normalize their per capita demands and "tease out" such weather impacts. An example of this is provided in Section 4.2.3.

Table 7 Residential Per Capita Water Demands

Year	Residential Per Capita Demand (acre-feet)
2002	105
2003	99
2004	93
2005	97
2006	94
2007	93
2008	94
2009	86

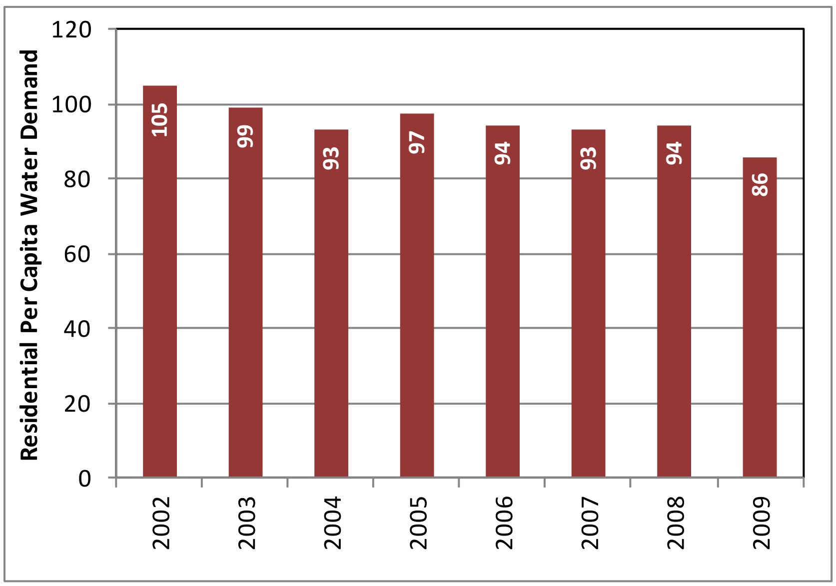

Figure 11 Residential Per Capita Water Demands

Large Water Users

In addition to the data provided above, demand data from the largest water users can provide valuable insight to assist with selecting water efficiency activities. As discussed in more detail in Section 4.4.1, activities focusing on the largest water users can be extremely cost-effective, providing the largest “bang for the buck” by targeting a small select group of customers who contribute to a significant proportion of total water usage.

Large water users may include industrial users such as breweries, factories, university campuses, or large commercial users. In addition, residential homes using a large amount of water may be flagged as high users for targeting certain water efficiency activities such as public education, free outdoor water audits, etc.

Customers who are inefficient with water usage (essentially wasting water), particularly with outdoor usage, may also be identified. One technique to do this is to determine unit water usage rates by dividing the water usage of individual customers by the area of irrigated turf on their property over a given time period (e.g. month(s) or season) as reflected in Equation 1. A general level of spatial analysis (e.g. remote sensing coupled with geographic information systems (GIS)) may be necessary to determine irrigated acres on individual properties.

Equation 1:

$$\text{Water Usage of Customer (gallons per acre/month)} = \frac{\text{Water Usage of Customer (gallons/month)}}{\text{Area of irrigated turf (acres)}}$$

Indoor and Outdoor Demands

Figure 12 provides an example of monthly indoor and outdoor water demands. Indoor and outdoor water demands are often estimated using monthly metered water use data. This may be calculated by assuming that monthly indoor water demands are generally the same throughout the year and that the total monthly demands from November through February consist solely of indoor water use. Based on these assumptions, the indoor water demands from March through October is equal to the average value of the monthly November through February demands. Outdoor demands during the irrigation months are estimated by subtracting the average November through February total demand from the respective total monthly demands. An example for the month of June is shown in Equation 2 below:

Equation 2:

$$\text{June outdoor demand=June total demand} - \left[\frac{\text{Nov + Dec + Jan + Feb Total Demands}}{4}\right]$$

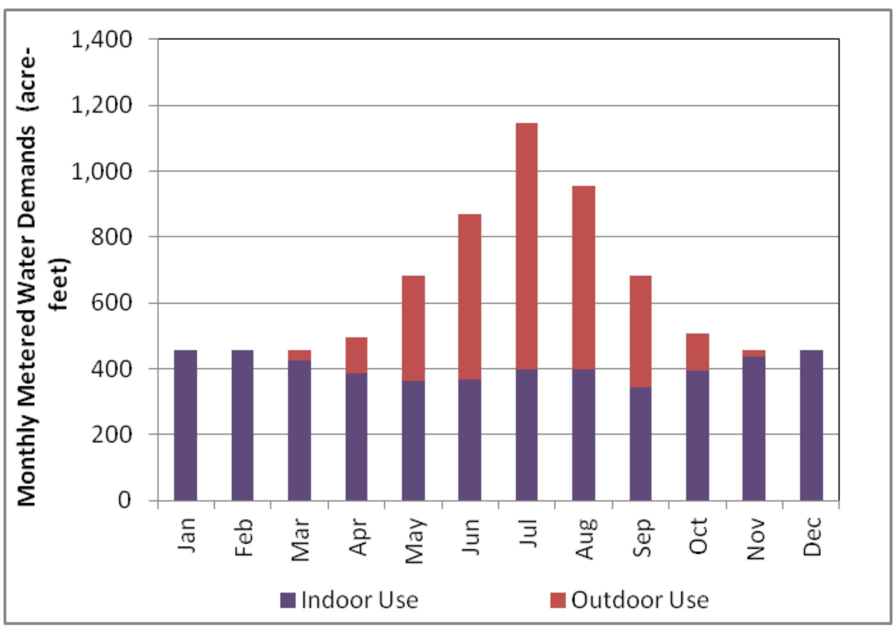

Figure 12 Average Indoor and Outdoor Monthly Metered Water Use (2002-2009)

Annual Peak Day Demands

Annual peak day demands are useful if a provider needs to control their daily peak flow rate during a high demand period in the summer due to capacity or energy constraints. Water efficiency activities such as regulating the days in which customers may irrigate can be used to manage peak day flows.

4.2.3 Past and Current Demand Management Activities and Impact to Demands

The overall quality and effectiveness of a water efficiency plan is enhanced by incorporating lessons learned from previously implemented water efficiency activities. Most providers in Colorado implement some level of a water efficiency program. This may vary from maintenance activities such as a leak repair program to a State approved water efficiency plan and diligent monitoring effort.

According to C.R.S. 37-60-126 (4), all State approved plans must include an estimate of the amount of water saved through previous demand management efforts as a percentage[11] or in acre-foot increments. These estimates should represent, at a minimum, the annual savings of each relevant SWSI Levels Framework level introduced in Section 4.1.1 or for at least the past five years of each individual activity.

C.R.S. 37-60-126 (4) Requirement: Either as a percentage or in acre-foot increments, an estimate of the amount of water that has been saved through a previously implemented conservation/water efficiency plan.

Along with water savings, it is essential to provide a list of the historical demand management activities and period in which they were implemented. A template that may be used to record this information is provided in Worksheet B which is organized according to the SWSI Level Framework discussed in detail in Section 4.4.

It is important to note that the level of effort necessary to estimate demand management water savings and the corresponding impact on total annual water demands is greatly reduced if the provider is monitoring water demands and demand management efforts on a regular basis. For instance, the majority of this information may be obtained directly from annual monitoring reports that include activities implemented that year, annual water saving estimates, supporting demand data and challenges/successes faced that year. If such an analysis is not being conducted, this exercise, in addition to the demand data collection addressed in Section 4.2, will be extremely helpful in developing a monitoring plan in Step 5.

Estimating water savings for demand management activities is a complex process that involves a certain degree of technical and analytical expertise and professional judgment. This section provides a general overview on two approaches for estimating savings: the estimation of water savings by individual activities; or estimations based on per capita water demand data. These approaches may be used individually or combined (estimates of individual activities could be used to ground truth the per capita demand based estimates or vice-versa).

[11] Although there is not a standard method, percentages may be expressed as the volume water saved divided by the total water demand prior to implementation of the water efficiency activity.

Water Saving Estimates of Individual Activities

Water savings may be estimated by reviewing each individual demand management activity and summing the savings to determine the total water savings. Worksheet B provides a format to record these savings for those who choose to use this approach. The water savings of some activities such as toilet rebates are relatively easy to estimate. For instance, a household's water savings achieved through the installation of a more water efficient toilet can be determined by multiplying the gallons saved per each flush of the new toilet by an assumed number of flushes per household. There are many resources available to estimate savings of individual activities. These include literature references, software applications, water efficiency plans from other providers that include how they did their estimates. Providers are encouraged to independently research and select technique(s) compatible with available data and resources. The CWCB also offers technical assistance through their website, and staff is also available to answer questions and provide assistance.

Despite the resources available to estimate water savings, the savings of some activities, such as those that are highly dependent on human behavior (e.g. public education programs, advertising and marketing), are much more difficult to quantify and, in many cases, cannot be estimated within reasonable accuracy. In the case of education activities, many times these activities support other water efficiency activities and enhance the savings for these activities.

According to the Guidebook of Best Practices for Municipal Water Conservation in Colorado:

> *Conservation outreach programs help establish a culture of wise water stewardship, which over time results in behavior change and effective action such as replacing inefficient fixtures and appliances. Conservation marketing efforts may also increase participation levels in other utility sponsored programs such as landscape audits and rebates. Don't determine the success of a water public outreach campaign based exclusively on measured changes in water use. Instead, focus on the campaign activities themselves.*

In these cases, historical demand data discussed in Section 4.2 can be helpful in estimating savings on a more cumulative level.

Water Saving Estimates Using Demand Data

One common approach to estimating water savings using demand data is to compare historical annual per capita water demands to before and after the implementation of demand management activities. An example of this is shown in Figure 13 where the annual historical per capita water demands are shown in relation to when key demand management activities were implemented. The data shown in Figure 13 suggest that each of the water efficiency activities enacted from 1995 to 2009 (installation of meters with volume billing system, change to a block rate structure, and public education campaign plus other measures) has contributed to the reduction of per capita demands.

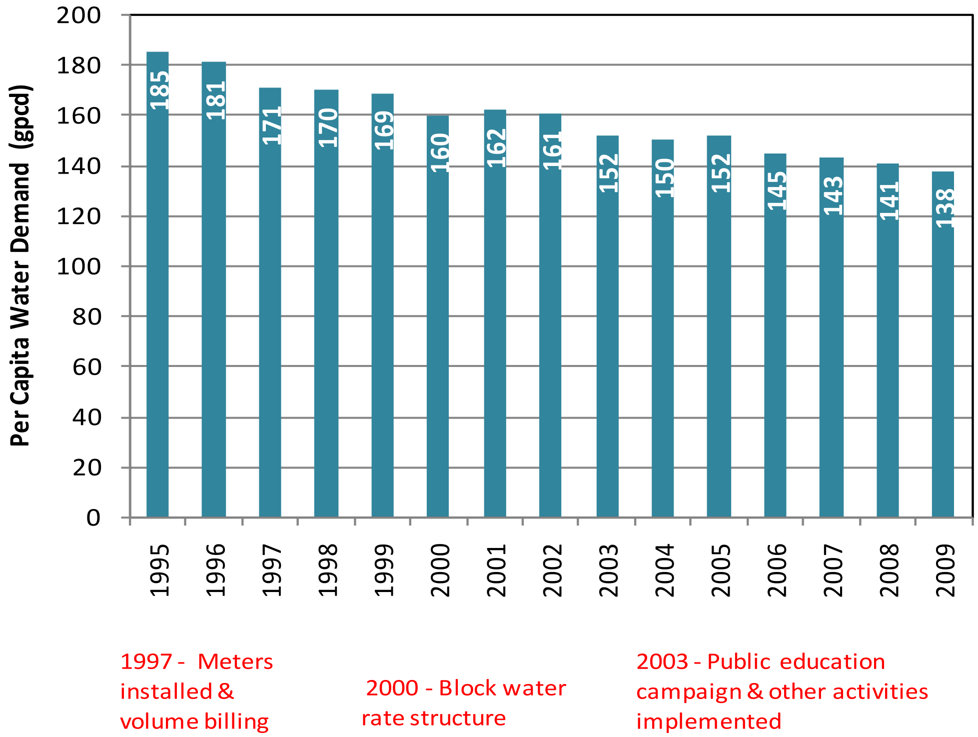

Figure 13 System-wide Per Capita Water Demands and Demand Management Savings

A similar approach may be used with per capita demand data by customer category to determine the savings for demand management activities that focus on targeted sectors. For instance, residential demand data may be used to assess the effectiveness of demand management activities in the residential sector. Indoor and outdoor demands are key to estimating savings for indoor and outdoor activities, respectively.

The shortcoming of strictly comparing per capita demands to the implementation of demand management activities is that it does not account for other factors that can influence water demands. For instance, drought restrictions can significantly lower water demands. Many water providers throughout Colorado experienced a significant reduction in per capita water demands following the 2002 drought which, as of 2010, had not returned to pre-2002 levels. High or low levels of precipitation during the summer irrigation season can also significantly reduce or increase demands. For some communities, economics and tourism can significantly impact demands. When the economy is good, the number of visiting tourists and consequent water demands significantly increase. This can add greater complexity when estimating water savings.

In order to understand the full extent of water savings, it is essential that providers consider and address the above factors when estimating water savings. For providers that do not have the data and/or resources to do an in depth analysis, this may simply involve a qualitative discussion of these elements entailing how they have historically influenced demands and contributed to the uncertainty of water saving estimates. Quantitative estimates based on more sophisticated techniques, such as statistical analyses, can be very useful when sorting through numerous variables and assigning water savings to particular measures.

Figure 14 provides a hypothetical example of a more sophisticated quantitative analysis showing actual historical per capita demands and normalized per capita demands independent of weather variables. These normalized per capita demands were based on a statistical analysis using 80 years of hydrology and weather data. In this case, the normalized per capita demands will provide a much more robust estimate of water savings than the actual historical per capita demands.[12]

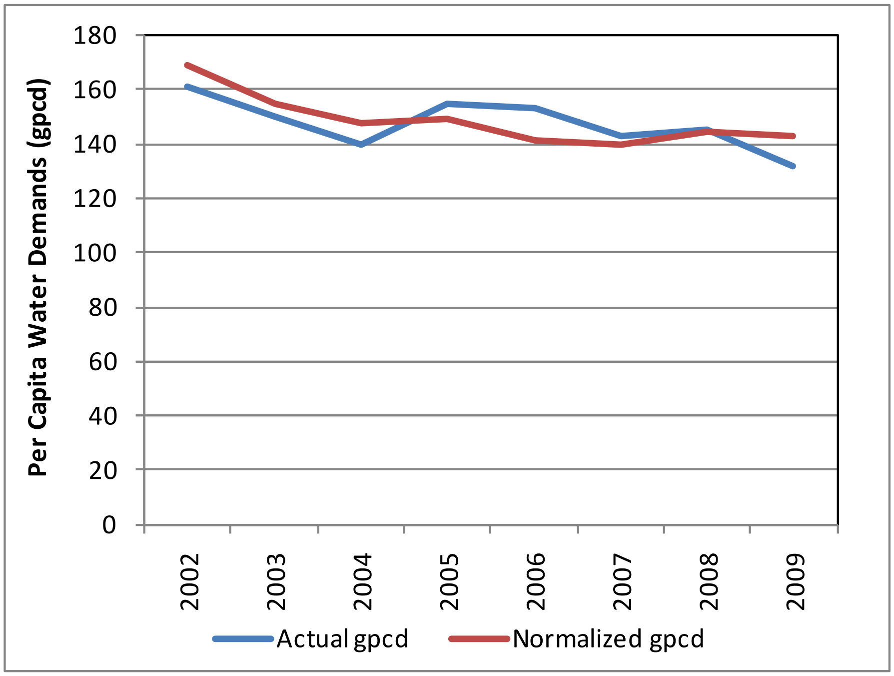

Figure 14 Actual and Normalized Per Capita Water Demands

Passive and Active Water Savings

Demand management water savings comprise active savings and passive savings. Passive savings are a result of replacing older less water efficient fixtures and appliances with newer more water efficient fixtures and appliances. This naturally occurs over time as fixtures age.[13] Demand management activities that promote the replacement of old inefficient indoor fixtures and appliances (e.g. toilet and washing machine rebates) essentially accelerate the timing of when the savings will occur. Active savings are a result of the implementation of demand management activities. Distinguishing active and passive historical water savings can provide valuable insight into the active water savings directly attributed to demand management activities.

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[12] It is worth noting that when sizing for facilities, providers often use peak demands (e.g. peak-day or peak-hour). In contrast to the normalization technique addressed above, peak demands should incorporate weather influences. In addition, while normalization techniques may be useful to differentiate water savings attributed to water efficiency activities relative to weather patterns, it is important to consider weather patterns when projecting future outdoor demands.

[13] Several key legislative acts have or will influence the rate and type of fixtures and appliances that will be replaced. These include the 1992 National Energy Policy Act, 2002 California Energy Commission (CEC) Water Efficiency Standards, 2007 California Assembly Bill 715, and the 2009 US Department of Energy State Energy Efficient Appliance Rebate Program.

Passive savings are dependent on the age of the housing stock, current and future per capita water use, and the timing of fixture and appliance replacement. There are many techniques to estimating historical passive savings and active savings ranging in levels of sophistication. For example, a statistically significant survey or data logging exercise could be conducted on residential homes to inventory the type and number of fixtures and appliances replaced in relation to the age of each home. Census data may be used to identify the ages of each home. This information could be combined with retrofit water saving estimates to develop passive water saving estimates for the residential sector.

An alternative, less sophisticated, approach is shown in Figure 15 where the downward trend in indoor per capita water demands is assumed to be a result of passive savings. In this example, per capita water demand decreased by 7.3 % from 2002 to 2009, resulting in an annual average passive water savings rate of 0.9%. This calculation is shown in Equation 3. This "annual indoor water demand trend" approach may be appropriate for providers who have experienced a decreasing trend in indoor per capita water usage.[14]

Equation 3:

$$\textit{Passive water savings rate } (0.9\%) = \frac{(55\ \textit{gpcd} - 50\ \textit{gpcd}) / 55\ \textit{gcpd}}{\textit{Number of years } (8\ \textit{years})} \times 100$$

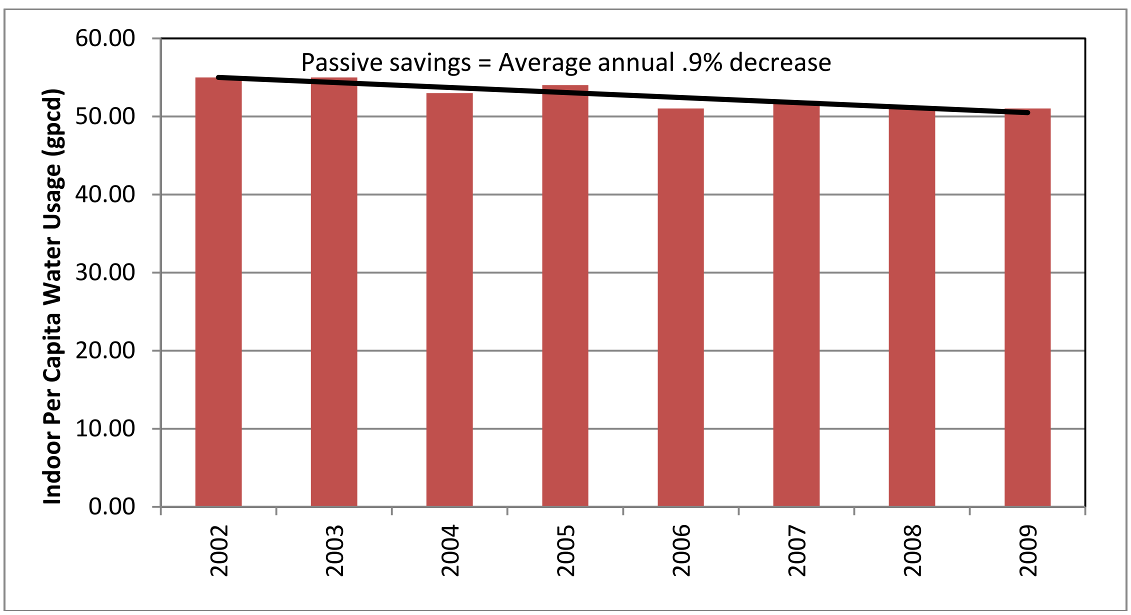

Figure 15 Indoor Per Capita Water Usage and Passive Savings Estimate

[14] This approach will not be applicable for all providers. Indoor demand data may or may not have a downward decreasing trend. Factors that influence demand data are complex and while a provider may be receiving the benefits of passive water savings, it may be counteracted by other factors. Additionally a downward trend can also reflect changes in customer behavior and other factors that are not directly related to passive savings.

4.2.4 Demand Forecasts

Forecasting future water demands is critical to ensuring that there are sufficient future reliable water supplies. An initial step to forecasting demands is to determine a planning horizon. Planning horizons should be of the duration where forecasted future demands can be estimated to a reasonable level[15] of certainty, while also capturing the anticipated timing of facility modifications and water supply purchases. These forecasted demands will be used in Step 3 to identify potential facility and water purchase changes as a result of water efficiency efforts.

While water efficiency planning uses a relatively short planning horizon, water supply planning and capital improvement project planning generally use a longer planning horizon. While these planning horizons are not usually directly comparable, water efficiency planning can be viewed within this longer time frame in terms of multiple planning periods fitting into the longer water supply view.

When deciding upon a planning horizon, it is helpful to also consider the timelines of when the water efficiency plan will be updated and the frequency of monitoring. Figure 16 provides an example of a plan that was developed in Year 1 with a planning horizon of ten years, an update in Year 7,[16] and an annual monitoring review. Changes to the demand forecasts and planning horizon can be made on a routine basis and should at a minimum be reviewed and considered for revision during the future plan update.

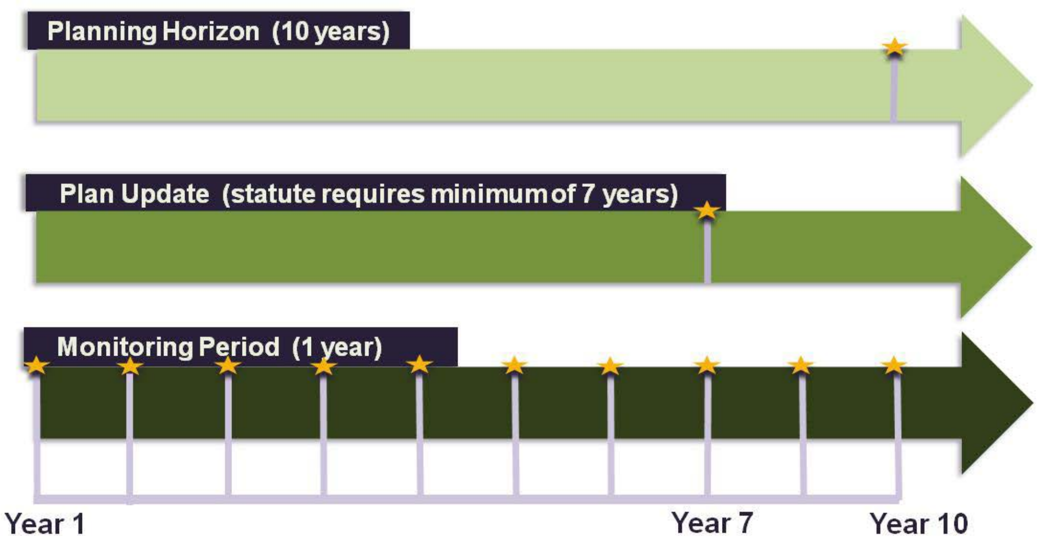

Figure 16 Example of Timelines for a Planning Horizon, Plan Update and Monitoring

Water demand forecasts can range from simple projections based on per capita water demands and anticipated population growth in the service area to complex models using population, land development data and other variables. Figure 17 provides a common approach to forecasting

[15] The longer the duration of the planning horizon, the greater the uncertainty. For instance, the uncertainty of forecasted demands within a 30-year planning horizon will be much higher than forecasted demands within a 10-year planning horizon.

[16] State Statute HB 04-1035 requires that all plans are updated at a minimum of every seven years. See Section 3.1 for additional information.

water demands, where a representative system-wide per capita water demand is selected (based on historical data and professional judgment) and applied to population projection data. It is important to note that factors such as economic conditions and climate change may also be considered when developing demand projections. Demand projections should be revisited on a regular basis to ensure that they are reflective of current available data. Providers who do not have a standard approach to forecasting demands are encouraged to research various methods to identify an approach suitable to meet their individual system water efficiency planning needs.[17] CWCB staff is available for technical assistance.

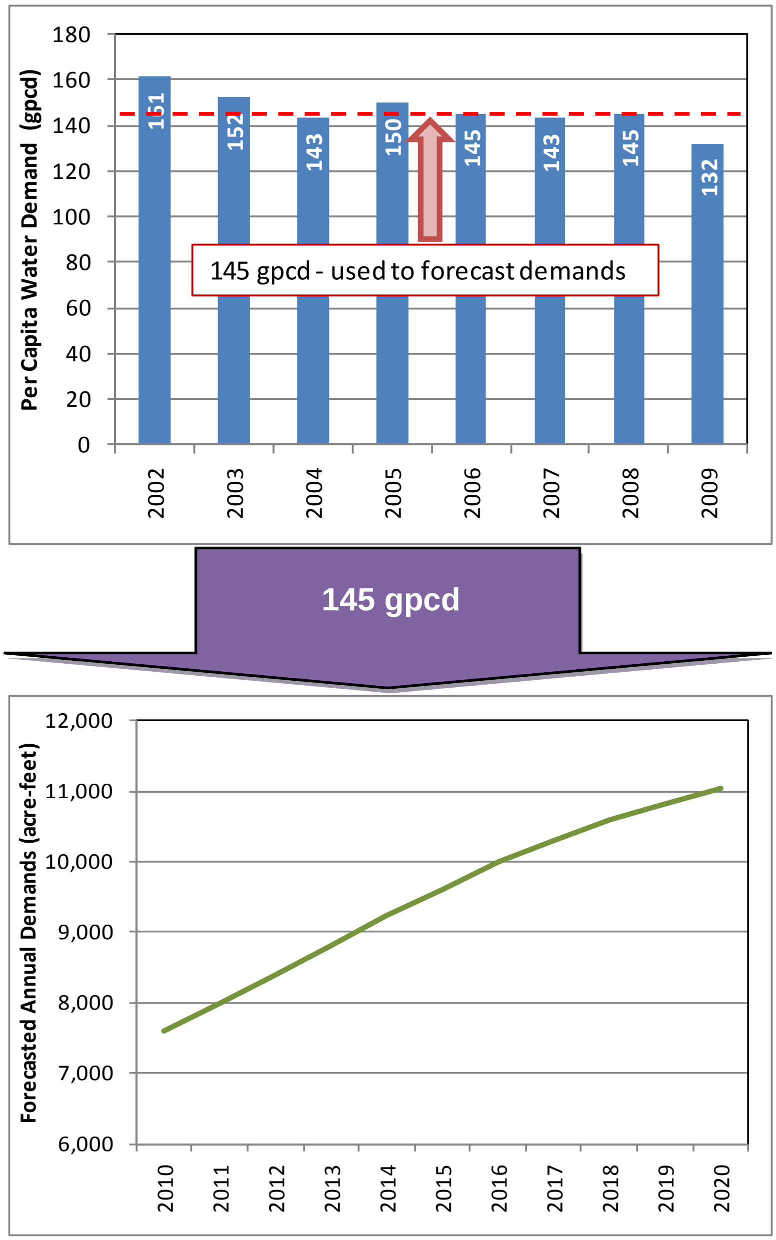

Figure 17 Demand Forecasts Using Per Capita Water Demand

[17] It is important to note that per capita demands are influenced by a variety of factors including weather, economic conditions and the number of vacancies. These factors should also be accounted for when projecting water demands.

The demands presented in this section are "unmodified" demands, meaning that they do not incorporate the new water efficiency activities selected in Step 4, yet reflect the existing "status quo" where the savings achieved through the current and existing water efficiency efforts are assumed to continue into the future. Essentially, this assumes that the provider does not make changes to its existing water efficiency efforts.

For dual water supply systems, it is important to not only consider the future demands of treated water supplies, but also for future non-potable supplies. 0 provides an example of unmodified forecasted demands for a dual water supply system. [11]

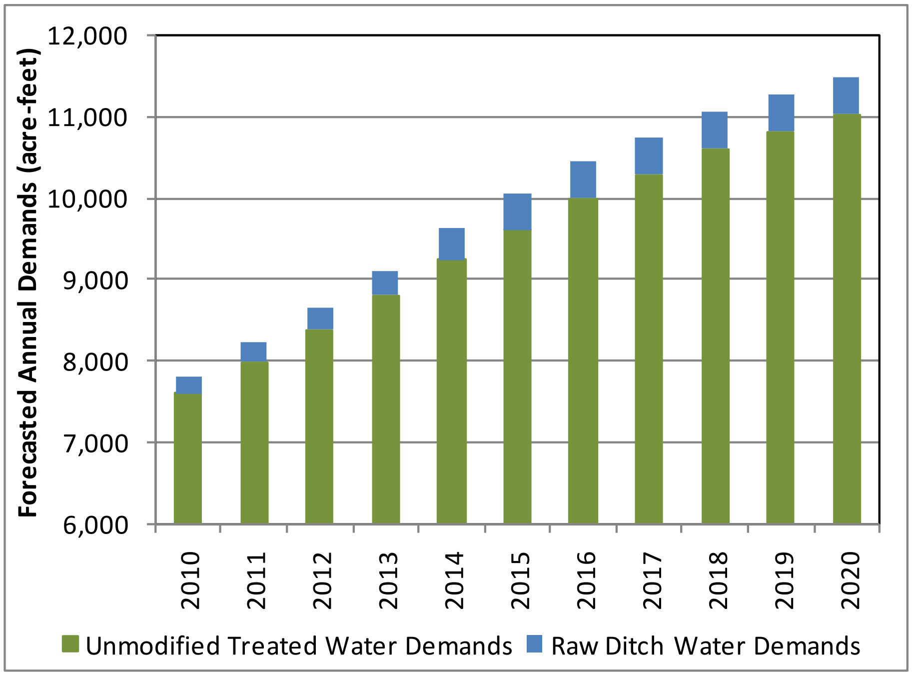

Figure 18 Unmodified Annual Forecasted Demands for a Dual Water Supply System

[11] Many raw water systems in Colorado are currently not metered. Prior to implementing water efficiency activities on raw water usage, it is recommended that the raw water system is sufficiently metered. This will enable the effectiveness of future water efficiency activities to be monitored. See Section **Error! Reference source not found.** for additional information.