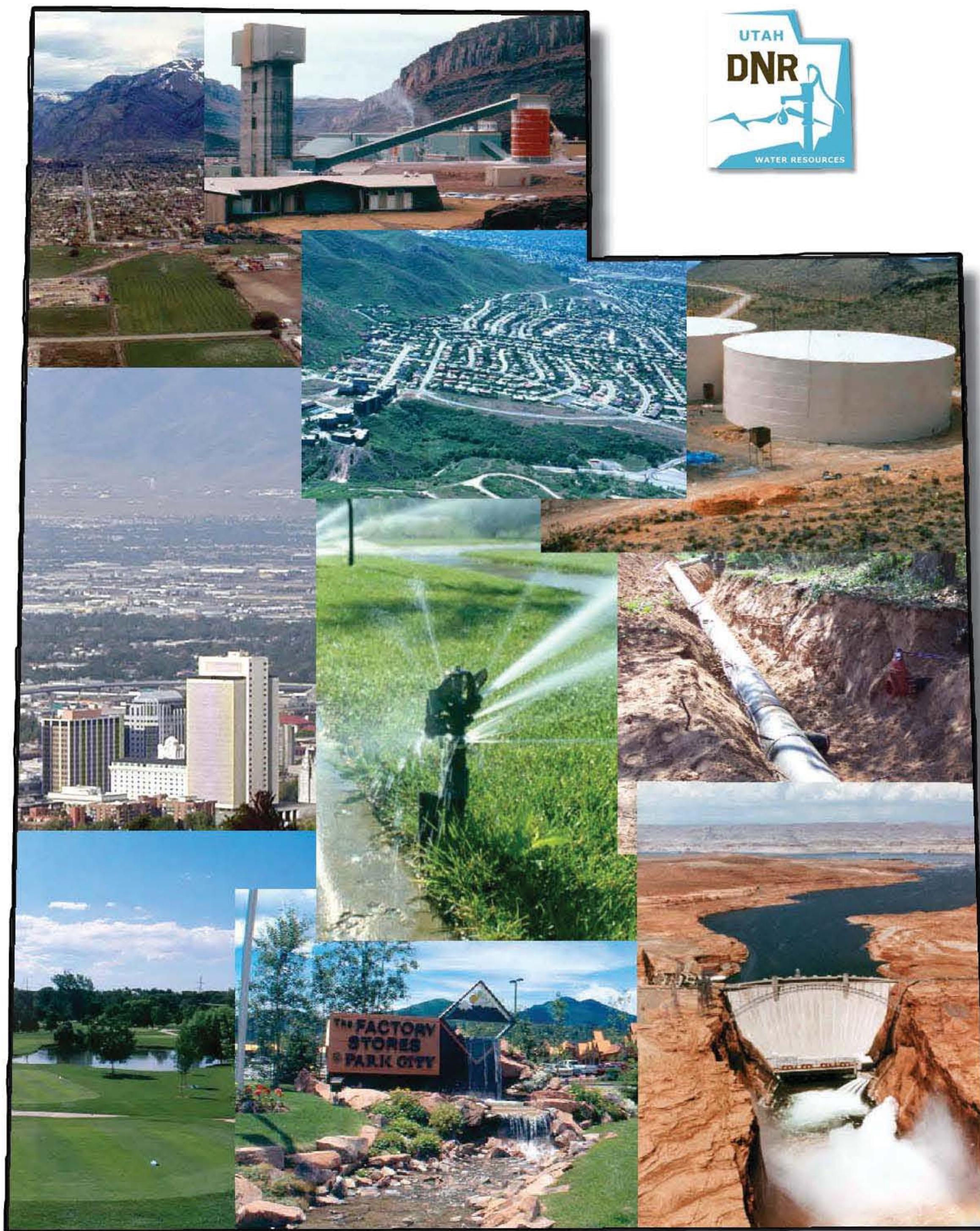
Municipal and Industrial Water Use in Utah

"Why do we use so much water, when we live in a desert?"



MUNICIPAL AND INDUSTRIAL
WATER USE IN UTAH

"Why do we use so much water when we live in a desert?"

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Dennis J. Strong, Director

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INTRODUCTION

Recent analyses by the Utah Division of Water Resources (DWRe) show that Utah's per capita water use continues to be among the highest in the nation. In 2005, Utah ranked second highest with a rate of 260 gallons per capita per day (gpcd) consumed (behind Nevada 280 gpcd) – this despite extensive success with water conservation over the past decade. Because of Utah's high water use rates, people often ask, "Why do we use so much water when we live in a desert?" This report seeks to answer this and other related questions.

Typical Wasatch Front neighborhood in the semi-arid climate of Utah

WATER USE IN UTAH

The DWRe has analyzed water use in Utah since 1947. Prior to the late 1960s, much of these efforts were directed towards agricultural water use. Since then, however, DWRe has been collecting, studying and publishing municipal and industrial (M&I) water use information for the entire state.

Currently water users in Utah divert, about 4,200,000 acre-feet of fresh water each year (af/yr) for agricultural purposes and about 952,000 af/yr for M&I purposes, totaling 5,152,000 af/yr. An acre-foot is a volumetric measurement equal to an acre of area covered by a foot of water, or approximately 326,000 gallons. Thus, agriculture diversions amount to 82 percent of the total, and M&I diversions the remaining 18 percent.

Water Use vs. Consumptive Use

In order to understand "water use" as presented in this report, an explanation of diversions and consumptive use (depletions) is needed. Each year Utah diverts about 5,152,000 af/yr, consumes (depletes) 2,671,000 af/yr, with the remainder (2,481,000 acre-feet) returning back to the environment (Table 1).

Table 1 Utah Water Use

	Agricultural (acre-feet/year)	Municipal and Industrial (acre-feet/year)	Total (acre-feet/year)
Diverted	4,200,000	952,000	**5,152,000**
Consumed	2,200,000	471,000	**2,671,000**
Returned to the Environment	2,000,000	481,000	**2,481,000**

Source: Data from DWRe State Water Plan: *Utah's Water Resources-Planning for the Future* May, 2001; *Municipal and Industrial Water Supply and Use Studies Summary*, 2005

A diversion, often referred to as a withdrawal, is the removal of water from the natural system. Diversions are typically accomplished through a canal, well, pipe or other conduit. Consumptive use is water use that is permanently removed from its source, or water that is no longer available locally because it has evaporated, been transpired by plants, incorporated into products or crops, consumed by people or livestock, or otherwise removed from the environment.

A fairly easy way to understand the difference between diversions and consumptive use is to visualize water use at a typical home. Indoor water use only consumes 5 percent of the metered water. The remaining 95 percent runs down the drains and is treated, then is returned back to the natural system. With lawn watering and agricultural irrigation, the concept is slightly different. Because of inefficiencies in our sprinkler systems and watering habits, some water runs off or down the street, some water percolates deep in the soil below the level that cannot be used by the landscape plant roots and some water is lost to leaks in the irrigation systems. However, much of the 'wasted' water returns back to the natural system (Figure 1).

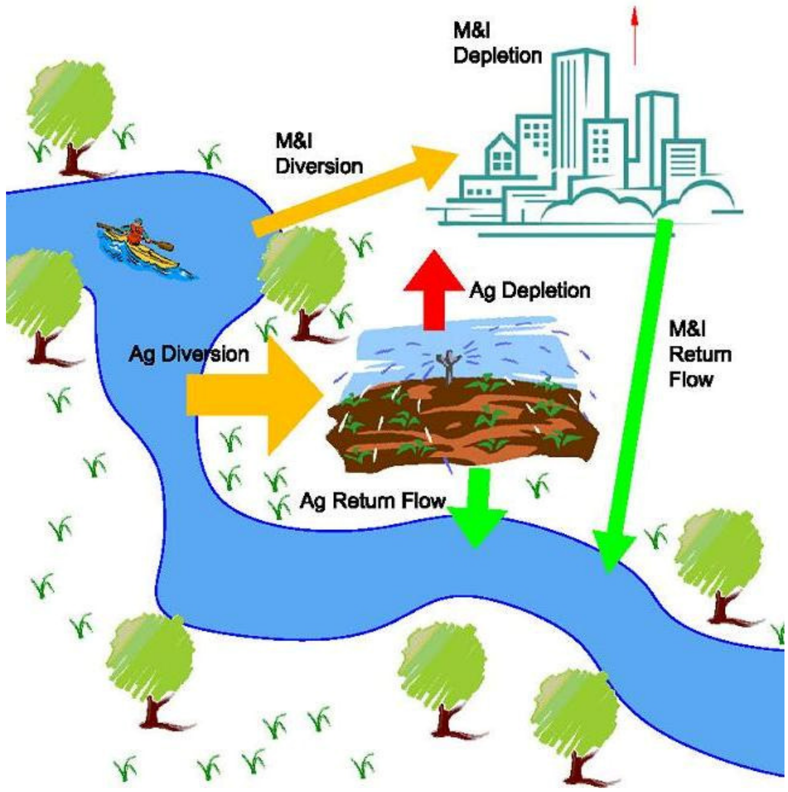


Figure 1 Diversion and Depletion diagram showing both agricultural and M&I diversions and depletions with return flows to the environment (Arrows are representative of actual quantities)

All of the water use presented in this report refers to diverted amounts, not actual consumptive use or depleted amount. This is the standard used throughout the country when comparing water use.

Water Use Categories

There are three types of systems in Utah that divert the nearly 952,000 ac-ft/yr of M&I water: (1) Public community systems that deliver water to at least 15 connections and 60 full-time residents, (2) public non-community systems – self-supplied industries, small businesses, small subdivisions and institutional uses not connected to any public community system and having their own water sources, and (3) domestic wells – wells owned by individual homeowners. Customers within public community systems use nearly 717,000 af/yr. Public non-community systems deliver about 220,000 af/yr (approximately 209,000 af/yr is used by self-supplied industries with the remaining 11,000 af/yr used by small subdivisions, small businesses and institutional users). Residents with private domestic wells use the remaining 15,000 af/yr (Figure 2).

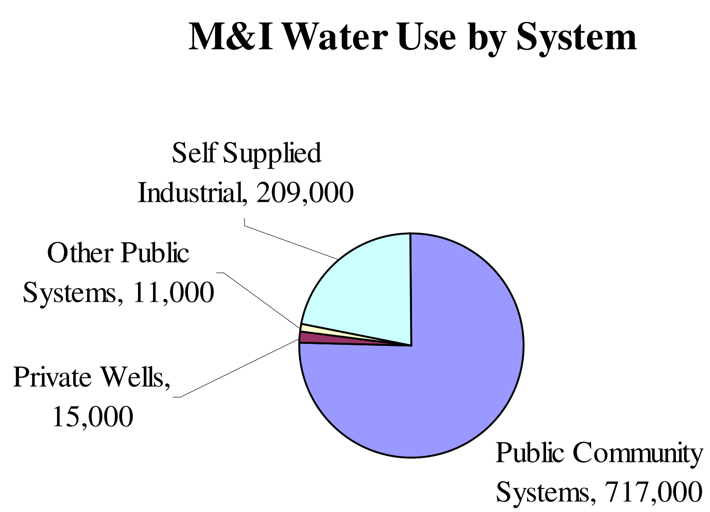


Figure 2 M&I water use by system (acre-feet/year)
Source: DWRe *Municipal and Industrial Water Supply and Use Studies Summary*, 2005

Water Use in Public Community Systems

Public community system water use is typically the value used for comparative purposes among different areas of the country. As can be seen above, in Figure 1, these types of systems deliver the bulk of the state's M&I water. In Utah these systems deliver water, for domestic uses, to 98% of the population. The water use within these systems can be further broken down into potable (treated) water and secondary (untreated) water (Figure 3). Of the 717,000 af/yr delivered to Utah customers of public community systems, potable or treated water deliveries account for about 528,000 af/yr and secondary water (non-potable) deliveries account for nearly 189,000 af/yr.

Public Community Water Use by Type

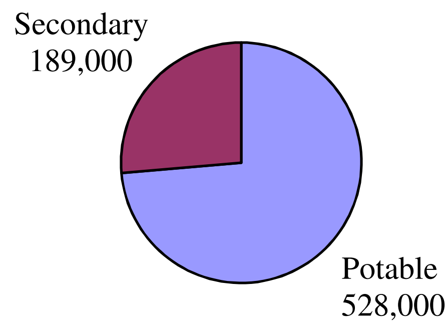
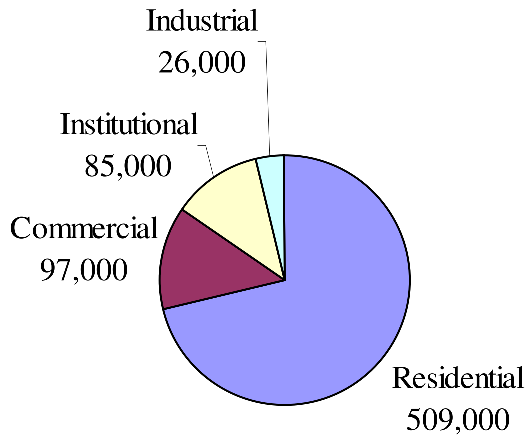


Figure 3 2005 Public Community System water use by type (acre-feet/year)
Source: DWRe *Municipal and Industrial Water Supply and Use Studies Summary*, 2005

Utah is unique in that many areas of the state have separate secondary water systems that deliver untreated water (non-potable) for the irrigation of lawns and gardens. In some cases, a public community water system delivers both potable and secondary water. However, in Utah, separate irrigation companies, special service districts or water conservancy districts deliver the vast majority of secondary water within the service boundaries of public community systems. These systems deliver water by pressurized pipes or through open ditches and provide many Utah communities with an economical means of preserving their potable water supply for indoor use and future growth.

Water use by public community systems can also be categorized by the type of user: residential, 509,000 af/yr; commercial, 97,000 af/yr; institutional, 85,000 af/yr; and industrial, 26,000 af/yr (Figure 4). All of these amounts include both potable and non-potable deliveries. The daily use of all these categories amounts to 260 gpcd (2005). When comparing M&I water use from one year to another, expressing it in terms of per capita use yields a meaningful comparison that already considers the change in population. Historically, DWRe numbers show an increase in per capita use from 1980 to 1990. After 1990, a major decline in per capita use has been observed (Figure 5). The DWRe feels that this is due to the substantial emphasis on M&I water conservation practices since 1990 throughout the state.

Public Community Systems Water Use



Category	Per Capita Use (gpcd)	Total Use (af/yr)
Residential	182	509,000
Commercial	37	97,000
Institutional	30	85,000
Industrial	11	26,000
Total	**260**	**717,000**

Figure 4 2005 Public community system water use including potable and non-potable water
Source: DWRe *Municipal and Industrial Water Supply and Use Studies Summary*, 2005

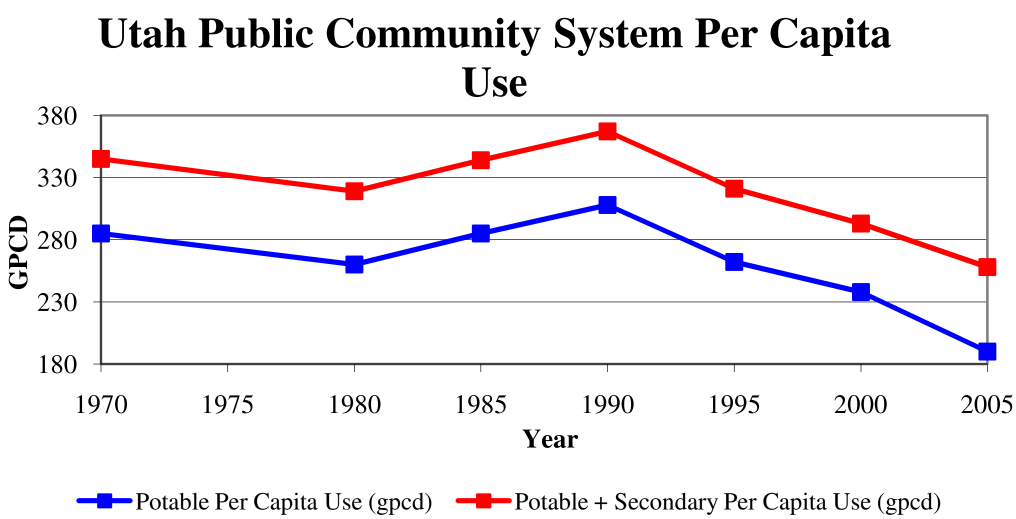


Figure 5 Utah public community systems per capita water use
Source: DWRe *Municipal and Industrial Water Supply and Use Studies Summary*, 2005. Division of Water Rights, Utah Water Use Data Reports, 1980 – 2000.

In 2010, DWRe published a report entitled *Residential Water Use Study*, which contains results of a detailed residential water use survey conducted in 2009. One of the most useful findings from this study is the correlation between residential indoor water use and the number of persons in a household. As Figure 6 shows indoor per capita use is a function of persons per household (PPH). The statewide average PPH is 3.17, which corresponds to 60 gpcd. This is down from a 2001 DWRe study that showed residential indoor use at 70 gpcd with a statewide average pph at 3.13.

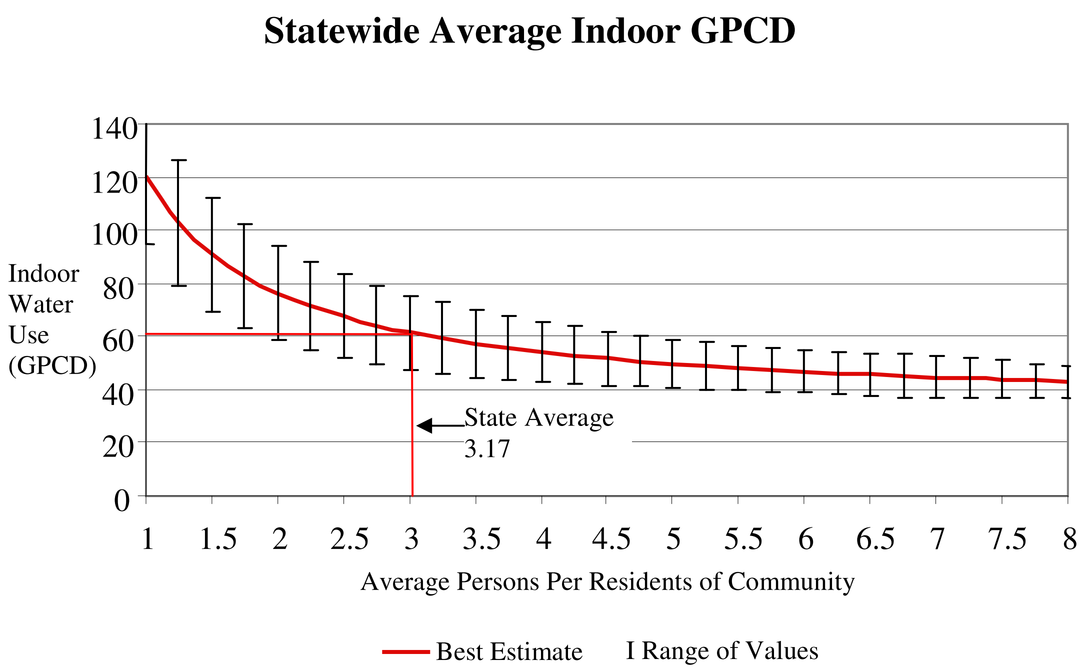


Figure 6 Residential Indoor Water Use
Source: DWRe, *Residential Water Use, 2010*

With these studies, DWRe has been able to better quantify indoor and outdoor residential water use from the 2005 Statewide Water Use Public Community Systems study. Currently, about 65% of Utah's residential water is used outdoors and 35% indoors. In terms of total public community system use, 60% is used outside and 40% indoors.

WATER USE IN OTHER STATES

The DWRe is continually updating water use data throughout the state. Much has been learned about water use in Utah and its comparison with other states. The standard report that is most often used to compare water use of various states is the United States Geological Survey's (USGS) *Estimated Use of Water in the United States*. This report evaluates water use every five years and the last reported data is from 2005. ***Again, it is important to note that all national water use comparisons deal with diverted or withdrawal amounts, not consumptive use or depleted amounts.***

USGS Water Use

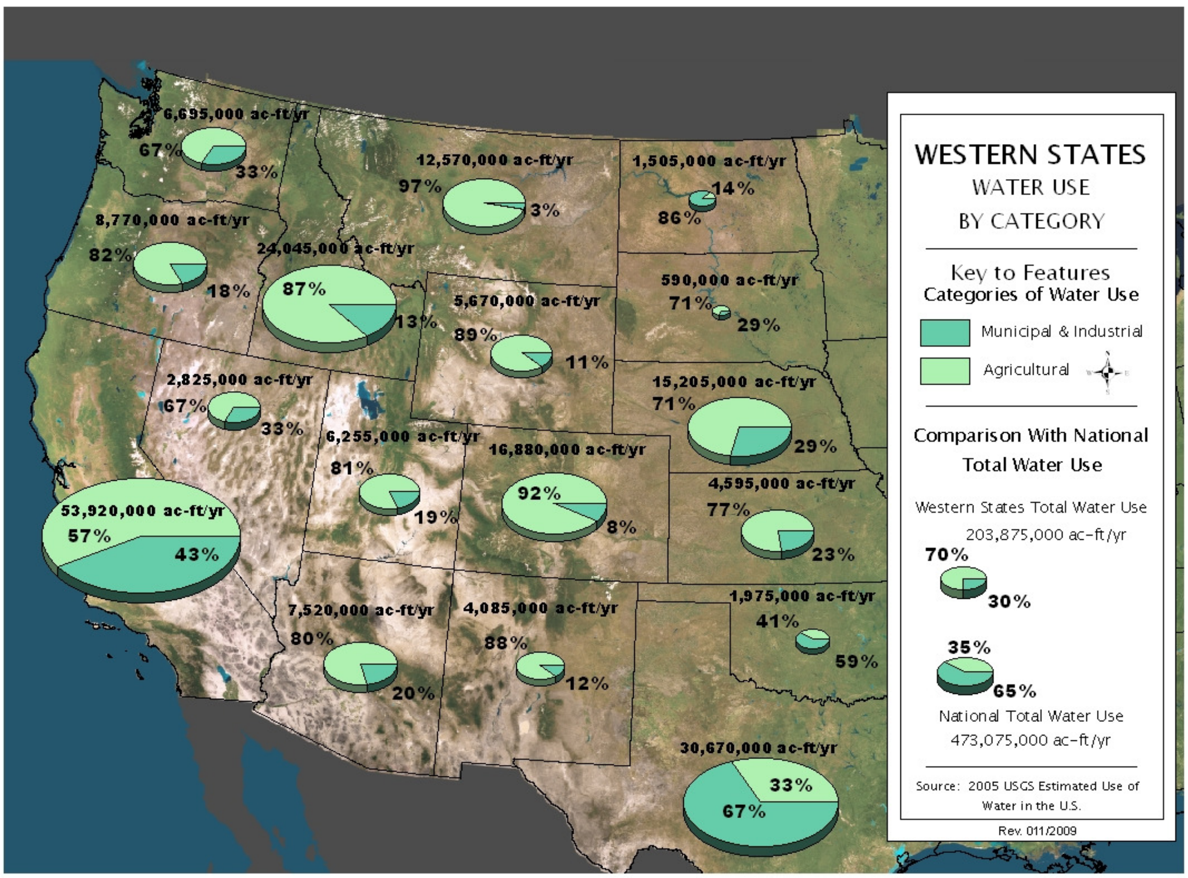


Figure 7 Comparison with National Total and Western States Water Use

The 2005 USGS report, states that the U.S. annually diverts 408 million acre-feet of fresh water. In comparing Utah's annual water use with the rest of the nation, Utah ranks 31st in total water (agricultural and M&I) diverted. California and Texas rank first and second, respectively.

In the west, Utah ranks 10th out of the 17 western continental states in total water use as seen in Figure 7. Utah's current agricultural water diversion is slightly more than 5 million af/yr, which makes it 10th in the nation and 9th in the west. Total M&I use in Utah is just over one million af/yr and is among the lowest in the nation, ranking 39th. Public community system use in Utah ranks 27th in the nation and 6th in the west. However, when the populations of each state are factored in, Utah's per capita public community system water use is second highest in the nation behind Nevada. On a positive note, since the last USGS report (2000) Utah has reduced its public community system per capita use by 15%, which is the third highest per capita reduction in the nation.

FACTORS AFFECTING UTAH'S HIGH WATER USE

It is often stated, or implied, that Utahns must waste water because Utah's per capita water use rate is the second highest in the country. DWRe has studied this issue extensively over the last several years. Through this effort, the division has found many factors that have led to the state's high per capita water use. These are discussed below.

Annual Precipitation

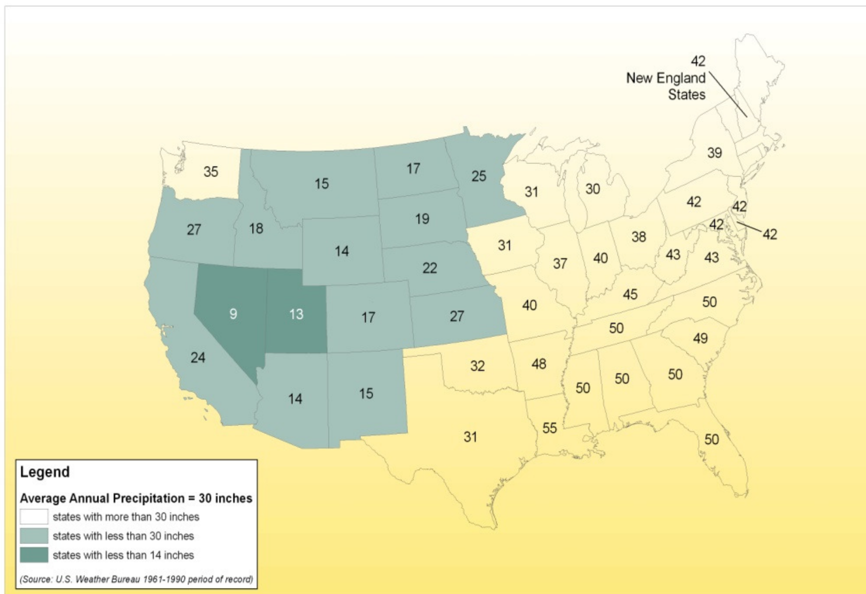


Figure 8 Average Annual Precipitation in the United States

Climate

Perhaps the most important factor behind Utah's higher per capita water use is climate. It is no coincidence Nevada and Utah rank first and second, respectively, in highest total per capita use since they are among the driest states. On average, Utah receives 13 inches of precipitation yearly (with only about six inches falling during the growing season, May through October). Only Nevada receives less precipitation at 9 inches per year (Figure 8). In most of the state's population centers, summer daytime temperatures average between 85 and 100 degrees throughout most of June, July, and August requiring more water for green landscapes. Lawns and gardens require about 30 inches of water a year to grow in this type of climate. Since rainfall provides about six inches each year, another 24 inches of water must be applied to lawns and gardens during the growing season.

Even more dramatic is the climate comparison of various cities around the country. It is difficult to compare every state's climatic data because of the variability within each state. However, comparing various cities around the country can help illustrate the unique character of the hot and dry climate of Utah and the West. This data also shows the need for supplemental irrigation of lawns and gardens. Table 2 shows a comparison of climate data of seven western cities and three eastern cities.

Table 2 City Climate Comparisons

Cities	Average June-August Mean Temperature (°F)	Average June-August Rainfall (inches)	Growing Season Turf Water Requirement (inches)	Growing Season Effective Rainfall (inches)	Growing Season Turf Irrigation Requirement (inches)
Western					
Phoenix, AZ	91.0	1.5	63	6	57
Las Vegas, NV	88.2	0.8	55	4	51
Albuquerque, NM	76.2	2.9	37	6	31
Salt Lake City, UT	**74.2**	**2.1**	**30**	**6**	**24**
Boise, ID	71.0	1.3	29	6	23
Denver, CO	70.6	4.2	29	10	19
Casper, WY	67.4	2.7	24	7	17
Los Angeles, CA	72.8	1.2	47	13	34
Eastern					
Albany, NY	69.4	8.2	28	17	11
Atlanta, GA	77.6	9.8	43	27	16
Detroit, MI	70.1	8.2	29	17	12

Source: *NOAA Weather Service Climate Data and DWRe Et Calculations (1999 – 2005)*

Table 3 shows residential per capita water use of each of these cities. It illustrates that residential per capita use is higher in the west than in the east, as expected from the climate data. It is simply dryer in the majority of the western states; therefore, requiring more outdoor watering. The western cities use more water because lawns and gardens in these states require more supplemental watering.

When examining the data from Table 2 and Table 3, Salt Lake City's residential per capita water use correlates well with the climate data. Boise, Idaho and Salt Lake City have very similar summertime climates and turf requirements. The resulting per capita residential water use is also similar.

Although climate is probably the greatest factor in determining water use habits, it is not the only one. The following pages discuss other factors that have contributed to Utah's high per capita water use.

Table 3 Residential Potable Use Comparisons

Cities	Residential Per Capita Use (gpcd)	Population
Western		
Phoenix, AZ	118	1,513,000
Las Vegas, NV	107	553,000
Albuquerque, NM	80	505,000
Salt Lake City, UT	**128**	**179,000**
Boise, ID	116	199,000
Denver, CO	132	567,000
Casper, WY	174	52,000
Los Angeles, CA	148	3,849,000
Eastern		
Albany, NY	106	94,000
Atlanta, GA	79	486,000
Detroit, MI	51	871,000

Source: *Respective Cities Division of Water*
Population Data from US Census Bureau (2006)

Traditions of Early Settlers and Unique Topography

The early Mormon pioneers, led by Brigham Young, settled much of the Salt Lake Valley in the mid 1800s. Their primary concern was bringing water from the nearest streams to irrigate desert farm land in order to plant crops. Brigham Young's proclamation to "make the desert blossom as a rose" was earnestly followed by the early pioneers. These pioneers had come from eastern, mid-western and English societies and were accustomed to the large, lush green landscapes of their homelands. Thus, it was natural for many to want large green lawns and fields when they arrived in Utah.

Because of this history, most Utah residents have planted large landscapes with grass. In this climate, this type of turf must be irrigated frequently during the hot summer months. In many parts of the eastern United States, where humidity levels are higher, lawns require considerably less water to keep them green. Also, rainfall amounts during the growing season in the East usually provide the required amount of water. Therefore, in the East, little additional water is required to maintain healthy landscapes. As Figure 8 shows, most states in the west receive less than 30 inches of yearly rainfall, and much less during the growing season. Therefore, lawns in these areas require supplemental irrigation. The less rainfall an area receives, the more M&I water is needed through supplemental irrigation to maintain lawns and gardens. Thus, Nevada and Utah, receiving the lowest rainfall amounts, must irrigate the most. This naturally leads to high per capita water use.

During the settlement of Utah, families were also directed to be self-sufficient. Large gardens were encouraged, and as a result lot sizes are generally larger than elsewhere in the west. To illustrate this point, Table 4 highlights the current average lot sizes and irrigated acreage of some western cities. It shows the average irrigated area of the average lot size in Salt Lake City is larger than the other cities listed. Thus more water is required by every household to maintain landscapes in Salt Lake City than these other western cities. This also might help to explain Las Vegas and Phoenix's lower residential per capita water use presented earlier in Table 3. The climate data presented in Table 2 would indicate that these two cities should have very high per capita water use. However, since the average irrigated landscape in these two cities is much smaller than Salt Lake City's, this could be one reason why their per capita water use is lower.

Table 4 City Lot Sizes

Cities	Average Lot Size (ft^2)	Average Irrigated Area (ft^2)	Percent Irrigated (%)
Phoenix, AZ	10,400	2,200	21
Las Vegas, NV	7,400	4,800	64
Salt Lake City, UT	**10,000**	**6,300**	**63**
Denver, CO	9,200	5,900	64

Source: *DWRe Salt Lake City Survey, DWRe Cities Lot Size Survey (2003)*

Here in Utah, critics have questioned the practicality of having such large lawn areas in a desert climate. They point to Utah's low yearly precipitation in questioning the wisdom of using large amounts of water to irrigate Kentucky Bluegrass lawns. They again point to the example of Las Vegas and Phoenix, which have much smaller landscape areas and utilize more desert type landscaping. However, Utah's unique topography and hydrological conditions further explain the differing settlement patterns and lot configurations when compared with other western regions.

While it is true that 13 inches of precipitation falls per year (six inches during the growing season) where the majority of Utah's population lives; the surrounding mountains receive an average of 40 to 60 inches of annual precipitation. This amount of precipitation is equal to or greater than the highest precipitation in the nation's south eastern states. The Wasatch Mountains (lying just east of Utah's most populated areas) receive significant amounts of snowfall, which after it melts each spring, flows, by gravity, to the majority of Utah's residents.

Brighton and Solitude ski resorts in Big Cottonwood Canyon, and Alta and Snowbird ski resorts in Little Cottonwood Canyon, all receive about 500 inches of snow in an average year. Similar snowfall amounts are recorded in other mountain ranges in Utah. It could be argued, that nowhere else in the world, so much snow falls so near major population centers. When the snow melts in the spring, it fills the state's storage reservoirs, recharges the ground water aquifers, and runs off into rivers and streams, becoming the primary source of water for both Utah's agricultural and M&I needs.

Therefore, unlike many other western cities, large quantities of water are naturally available in very close proximity to the urban areas in Utah. This is true throughout most of Utah because of the early settlement patterns. Brigham Young sent pioneers north and south of Salt Lake City, where they settled at the mouths of the many mountain streams and canyons. The pioneers built storage facilities and, in later years, dug wells to capture water. The close proximity of water and the topography also made it relatively easy and inexpensive to distribute the water because much less infrastructure was needed than in other parts of the west.

Today, Utah citizens enjoy irrigated green lawns on relatively large lots, primarily because of the large quantities of inexpensive water that are in close proximity to the majority of the population. This fact has given Utah an economic advantage over other western states in distributing water to its urban dwellers. Unlike other areas of the west, Utah's citizens have become accustomed to lush green landscapes because of these economic and topographic advantages. Phoenix does not have the luxury of such large naturally occurring quantities of nearby water as Salt Lake City does. Because of this, Phoenix residents developed a pattern of having smaller irrigated areas, and using more native plants that require less water. Thus, the residential per capita water use rate in Phoenix is lower than in Utah. Also, Las Vegas, fully utilizing their Colorado River allotment has now reached a point where they are forced to encourage residents to reduce their irrigated landscape acreage in order to meet the future water needs of their growing population. They too, find themselves with insufficient quantities of nearby water.

In summary, Utah's climate, settlement patterns, topography and large Kentucky bluegrass landscapes have had a significant influence on water use among the state's residents.

Over-Watering

Over-watering of landscapes is a problem among residents in Utah. This is partly because few people understand how much water turf grass and landscape plants actually need. When referring to water requirements, botanists use the term evapotranspiration (Et). Et is defined as the amount of water a plant and its environment loses from evaporation and transpiration. Simply put, transpiration is water the plant uses to grow and survive, and evaporation is water lost from the surrounding soil. The factors that affect Et are temperature, wind, precipitation, humidity and solar radiation. Et is usually expressed in inches of water over a certain time period; commonly, a day, week or month. By understanding Et, one can calculate the supplemental irrigation that lawns and gardens require for growth.

Watering at wrong time of day

Another factor contributing to over-watering is the lack of knowledge about sprinkler systems. Not only do people generally not know how many inches of water their lawn requires each week, but most are not aware how many inches they are applying with their sprinkler systems per application. A recent survey by DWRe indicated that less than one percent of Utah residents know how many inches of water they apply to their lawns.

Many water officials have indicated that Utahns apply twice the amount of water required by their lawns. The DWRe study, *Residential Water Use* (2010), indicated outdoor water use varied by the type of lawn watering technique. The study revealed that Utahns who water with a hose under-watered their lawns by 17 percent, based on Et requirements. People using non-automatic, in-ground sprinkler systems water at about Et requirements. However, those people using automatic sprinkler systems (with control timers) over-water by 30 percent of Et requirements. Based on the percentages of all types of irrigation practices (nearly two-thirds have automatic sprinkler systems), the study found that Utahns, on average, over-water their yards by nearly 20 percent (Figure 9). Even though Utah's climate requires substantial irrigation to maintain healthy turf grass, if residents were to practice more efficient irrigation principles outdoor residential water use could be reduced by a substantial amount.

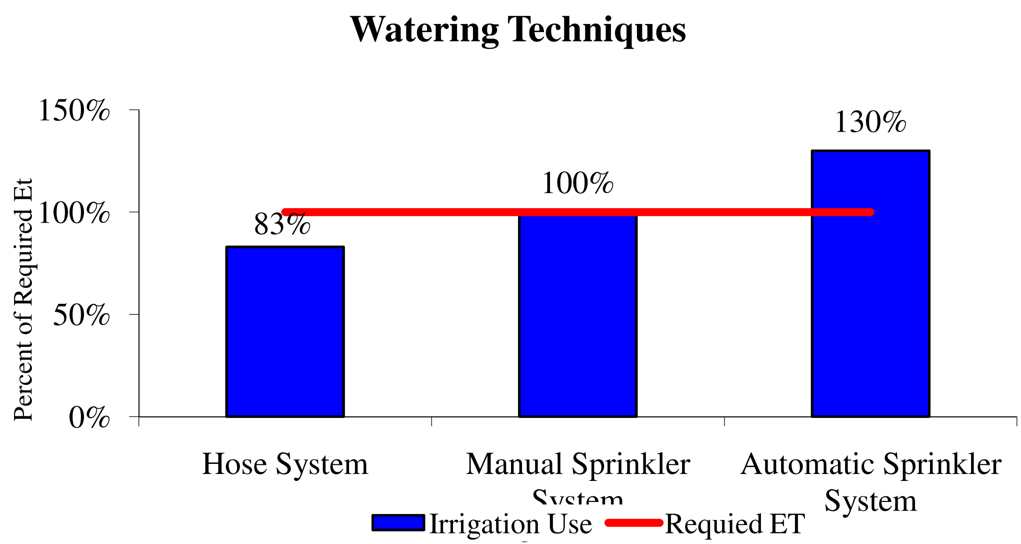


Figure 9 Three water techniques showing which technique is most water efficient
Source: DWRe *Residential Water Use,* 2010

Still another factor contributing to over-watering is the varying Et for lawns over the growing season. Since solar radiation and temperature are lower in the spring and fall than during summer months, lawns require less water in the spring and fall months. However, many people set their sprinkler (timers) in the spring for the maximum use period of July and never change them throughout the year. The Et for turf grass is lower in the spring and fall, and more precipitation occurs during those times, therefore the additional amount of water required in the spring and fall is much less than in the summer. Sprinklers should be adjusted throughout the season to correlate with the seasonal Et, rather than irrigating as if it were July. This means the number of days between applications should be greater in the spring and fall. Many people also fail to adjust their systems when there is rainfall. Therefore, water waste occurs because people are generally unaware of these basic irrigation principles. Because of this inefficient use of automatic sprinklers, excessive over-watering of lawns occurs mainly in the spring and fall each year. A recent DWRe analysis of current public community system total water use identified potential savings by adjusting irrigation practices to the seasonal Et. This analysis is shown in

Figure 10. Utahns need to improve their outdoor water use in order to reduce unnecessary consumption. The majority of the over consumption occurs in the spring and fall months.

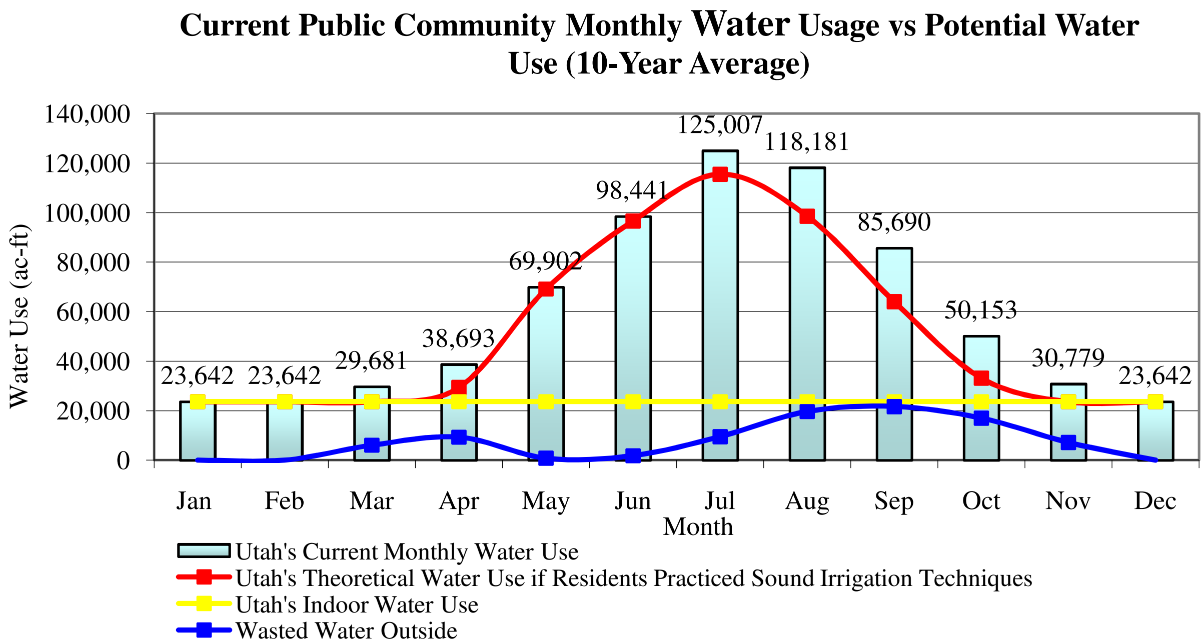


Figure 10 Statewide Public Water Suppliers Monthly Water Use (717,000 Total Acre Feet)
Source: DWRe *Municipal and Industrial Water Supply and Use Studies Summary, 2005*

Water Prices and Rate Structures

A recent analysis of an American Water Works Association (AWWA) database, by DWRe showed that although water costs vary greatly around the country, Utah water suppliers' water rates are below the western states and national averages. Information collected by DWRe indicates that this again, is mainly the result of large quantities of high quality water in close proximity to the urban areas of the state. Proximity translates to low distribution costs. High quality translates to low treatment costs. Low water costs equate to low rates. Low rates can substantially contribute to wasteful watering habits and higher per capita use. The DWRe has published the report *Water Costs in Utah* (2010) that explains these topics in more detail.

Because of the low cost of water in Utah, people are not as likely to be concerned with water losses due to problems with their sprinkler systems or leaks in their homes. The losses may not significantly raise their individual water bills. Hence, there has been less of a financial incentive for residents to adjust their outside watering practices or think of other ways to conserve.

Water rates were traditionally set in Utah through guidance by the AWWA. The AWWA has promoted setting rates to reflect the cost of providing service to each customer class: residential, commercial, industrial and institutional. In cases where there was an abundant water supply (such as in Utah), cost of service rates generally resulted in a flat fee or a decreasing rate schedule. That is, where more water is used, the lower the price becomes, which encourages higher usage.


Significant water losses during irrigation

Over the past 10-15 years, these types of rate structures have been slowly replaced with water conservation types of rate structures. In Utah today, approximately 31 percent of water providers have adopted increasing block rates where users pay progressively higher rates as their usage increases. Even with these changes in rate making, unit costs have still remained relatively low, rising only as the cost of service increases due to inflation and/or population growth. Thus, the state's low water costs and rate structures are another factor contributing to the relatively high per capita water use.

Secondary Water Systems

Utah is unique in that many communities have secondary water systems. These systems deliver untreated water for irrigating lawns and gardens. There are currently 462 public community systems that deliver potable residential water, of those, 281 (61%) contain secondary water systems delivering untreated water to many of their customers. Secondary systems exist in only a few communities of most other Western States. In Utah, they provide an economical and effective means of conserving higher-quality, potable water for indoor use. Statewide, nearly 44 percent of all outdoor residential water is delivered through these systems. Many of these systems began as agricultural irrigation systems decades ago and have since been converted to serve M&I needs as farmland was converted to urbanized areas.

While secondary systems preserve high quality treated water, DWRe studies show that users of these systems often use more water than those who receive only potable water for outdoor landscapes. The primary reason is that very few secondary systems in Utah are metered at the individual customer level. Secondary systems are not metered mainly because of the quality and chemistry of the untreated water can clog meters and through dewatering of these systems in the winter, this can reduce the life of the meters. Thus, most Utah secondary water providers do not meter their customers individually. Where meters are not used, a flat seasonal fee is typically charged no matter what quantity of water is used. This provides no price incentive to conserve water and has resulted in a higher percentage of over-watering landscapes by many secondary water consumers.

The residential water use comparison between Salt Lake, and Davis and Weber counties helps to illustrate this (Table 5). All three counties lie adjacent to each other and contain similar suburban communities and lot sizes. However, Davis and Weber County residents use 113 gpcd more. The main difference is the large secondary water usage in both of these counties. (About 70 percent of all residential households in Davis and Weber counties utilize secondary water.) Recent DWRe studies indicate that some secondary customers in Davis and Weber counties over-water their landscapes by more than 100 percent. Thus, secondary water systems, while an efficient means of conserving high-quality treated water, have resulted in additional over-watering by many secondary water users and contributed to the higher statewide total per capita water use.

Table 5 Comparison of Residential Water Use

Residential Water Use Category	Davis and Weber Counties (gpcd)	Salt Lake County (gpcd)
Potable		
Indoor	70	62
Outdoor	47	71
Subtotal	**117**	**133**
Non-Potable		
Outdoor	140	11
Total Residential	**257**	**144**

Source: DWRe *Municipal and Industrial Water Supply and Use Studies Summary*, 2005

WATER CONSERVATION

DWRe, through a comprehensive water conservation program, has set a statewide goal of reducing the total 2000 public community system per capita use rate of 295 gpcd to 220 gpcd by the year 2050. This is a 25 percent reduction and represents over 500,000 acre-feet that would not need to be developed to meet the need of the projected future population. This conservation effort will be more water than any single water development project yielded thus far in the state. As the latest numbers show, 260 gpcd in 2005 (about a 12% reduction), the state has a good start in achieving this goal (Figure 11). The dashed lines in Figure 11 indicate a uniform 25 percent reduction on an annual basis. The collected data shows that the state's residents are conserving water. The USGS data, from 2000 to 2005 indicates that a 12% reduction in water use has occurred statewide. This makes Utah the third highest reducer in the nation during that time period.

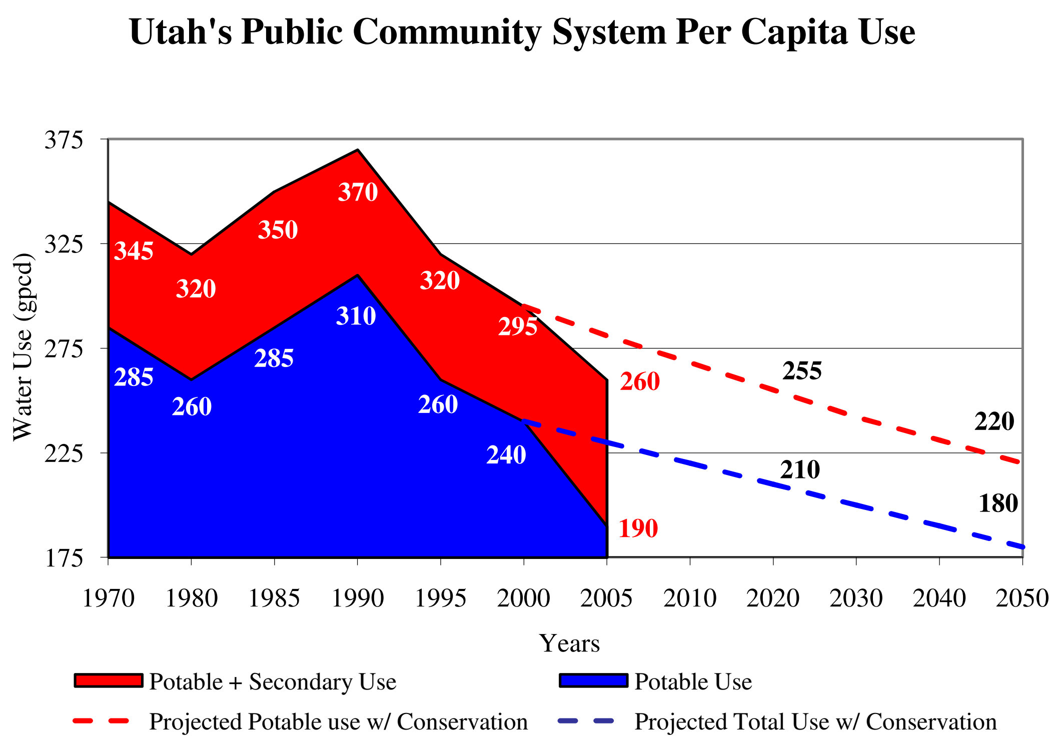


Figure 11 Utah's GPCD since 1970 with the projected goals for future GPCD
Source: DWRe *Municipal and Industrial Water Supply and Use Studies Summary*, 2005

The DWRe believes that the majority of Utahns understand the importance of conserving water because it is understood that like all natural resources, there isn't a limitless supply. This fact is demonstrated by Utah's residents, because today's water consumption is less than what it was in the past. This is shown in Figure 12. The amount of water use was habitually increasing with the state's population. However, since the efforts by the DWRe, the state's major public water suppliers, the establishment of the Governor's Water Conservation Team and the push for Utah residents to conserve water, total M&I water use no longer increases as the population grows. If Utah's M&I districts still consumed the same amount of water as they did in 2000 (295 gpcd) public community system water deliveries today would be approximately 820,000 ac-ft/yr. The latest data (2005) indicates that Utah's public community systems deliveries are just over 700,000 ac-ft/yr. This is a water savings of nearly 120,000 ac-ft/yr. An amount greater than the capacity of Pineview Reservoir (110,000 ac-ft). Utahns have responded well to the water conservation efforts; however there is still a significant amount of effort that needs to be accomplished in order to reach the state's goal of 220 gpcd by 2050.

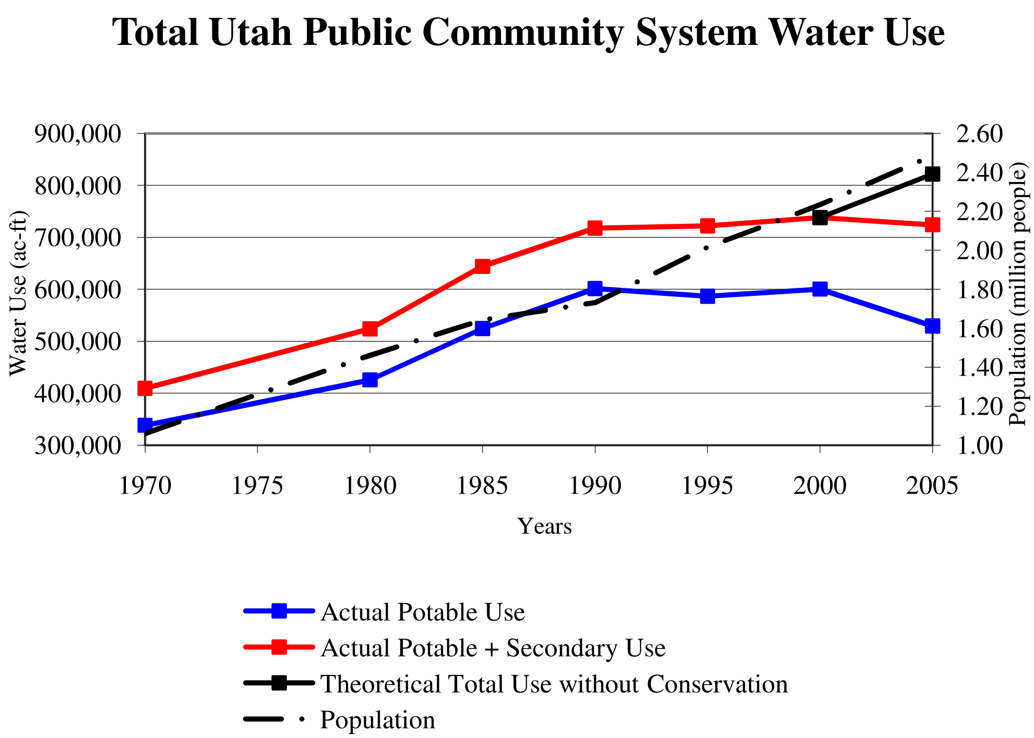


Figure 12 Total public community system water use with population increase since 1970 and theoretical water use without conservation
Source: DWRe *Municipal and Industrial Water Supply and Use Studies Summary*, 2005

It can be assumed that the Utah's precipitation will not change drastically enough, that outdoor water use will be minimized. Utah's climate will always require supplemental irrigation during the summer months to maintain landscapes. This, of course, will result in a per capita use that will continue to be higher than the national average. However, other factors affecting water use can be altered. DWRe's *M&I Water Conservation Plan* includes strategies and policies that intend to ensure that the conservation goal will be achieved. As these strategies are implemented, M&I water users will become much more efficient, turf grass acreages will be reduced, and rate structures will encourage efficient water use.

Water conservation efforts have not only focused on outdoor use. Utahns also have to apply conservation measures to their indoor water use habits to meet the projected per capita water savings. Indoor conservation measures include: installing low flow faucets, fixing leaks, and other water saving practices as specified in the DWRe's *M&I Water Conservation Plan*.

A recent DWRe study indicated statewide residential indoor use has decreased about 13 percent from 70 gpcd in 1999 to 61 gpcd in 2009. Figure 13 shows how much water could be saved if Utahns were to implement indoor water conservation practices, practice sound irrigation outdoors and if lot sizes reduce slightly as expected. The figure shows that this would amount to about 155,000 ac-ft/yr of the current public community system use of 717,000 ac-ft/yr. When the increase in population is taken into account these savings will be over 500,000 ac-ft/yr by 2050. As shown in Figure 13, the majority of the savings occur in spring months and late summer to fall months. These periods have been identified in various studies, indicating when much over watering of landscapes occurs.

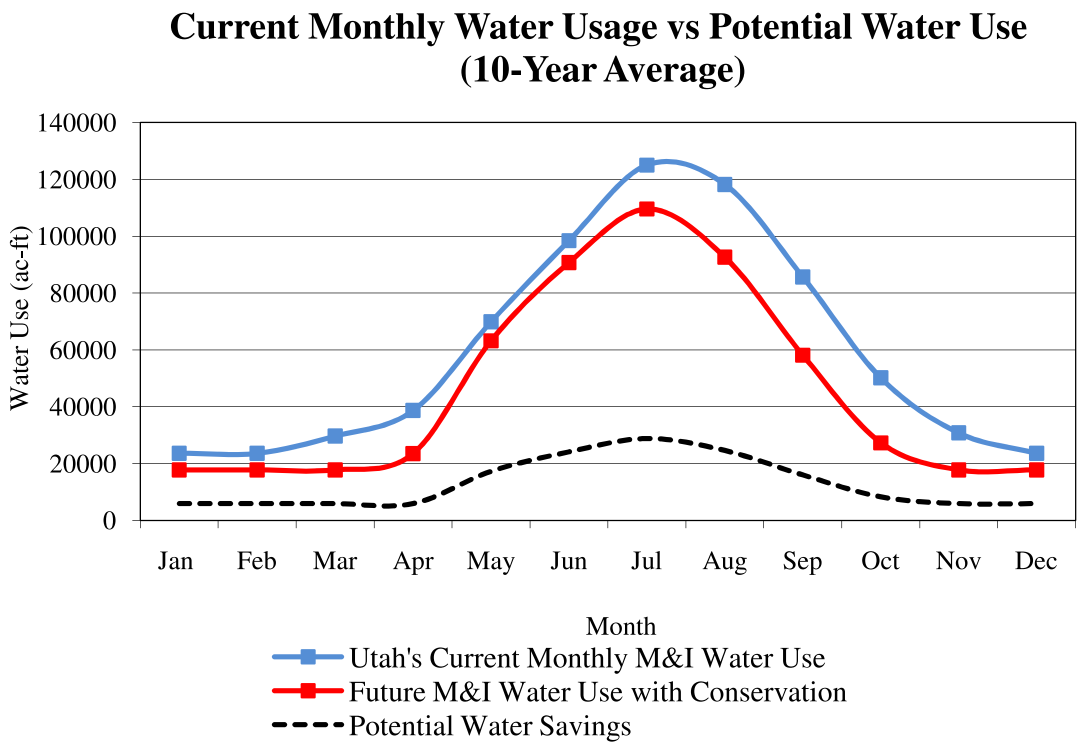


Figure 13 Potential Statewide Public Water Suppliers Monthly Water Use with Conservation (717,000 Total Acre Feet)
Source: DWRe *Municipal and Industrial Water Supply and Use Studies Summary, 2005*

CONCLUSIONS

Many factors affect the way Utah residents use M&I water. Utah diverts a relatively small amount of water when compared nationally; however residents divert large amounts of water on a per capita basis when compared nationally. The accessibility to high-quality water due to climate, topography, and settlement history of the state, as well as large landscapes, have been the main factors contributing to Utah's higher per capita use. Other factors, such as lack of understanding about proper irrigation practices, historical low water costs and rate structures that haven't encouraged conservation, and a high density of secondary water systems, have also contributed to high M&I water use per capita.

Because of the factors presented in this report, Utah will likely continue to have one of the nation's higher per capita use rates. However, water conservation efforts in the past 15 years have greatly reduced the state's per capita water use. The state's ongoing water conservation efforts call for additional reductions in per capita use. Water conservation and education efforts are working on creating a long term water conservation ethic. Because of this Utah's residents will continue to become more efficient in their water use habits. In time Utahns will align their water use with their water needs ensuring that the supply will meet the demand for future generations.

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