



**Washington County
Water Conservancy District**

**10-Years of Water Conservation
1995-2005**

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Abbreviations & Acronyms

AF	Acre-feet
M&I	Municipal & Industrial
DXATC	Dixie Applied Technology College
ET	Evapotranspiration
gpcd	gallons per capita per day
IA	Irrigation Association
M&I	Municipal & Industrial
Plan	Water Conservation Plan
SWAT	Smart Water Applied Technologies
TMDLs	Total Maximum Daily Allowance
TSWS	Toquerville Secondary Water System
USU	Utah State University
WCWCD	Washington County Water Conservancy District

Introduction

The Washington County Water Conservancy District (WCWCD) has adopted a progressive stance in the efforts of water conservation since 1993. To begin with, in 1996, the WCWCD created, adopted and submitted its first Water Conservation Plan (Plan). Since implementation of the Plan, the county has experienced some dry years. Only one year in the past 10 years has had above normal snowpack, all the rest have been below average. However, regardless whether a year is wet or dry, the WCWCD has taken a proactive role in the demand for management of our water resources. “Let us continue to aggressively pursue a conservation mind set. We live in a desert and we will experience more dry periods than wet ones.”¹ With that in mind, WCWCD has prepared this report as an informational tool to let the community know the direction that is being taken to secure the *virtual reservoir* of water conservation in Washington County.

Evolution of WCWCD’s Water Conservation Plan and Conservation Ethic

Before proceeding any further, it is necessary to provide some background information concerning the initial steps taken to develop the initial water conservation plan. There were several factors that led WCWCD to realize the need for such a plan.

- Washington County has experienced tremendous increase in growth which, in turn, has created an obvious need for conservation practices to be developed and implemented in order to maintain quality of life.
- In August 1993, the WCWCD approved a Long Term Framework for Water Resource Management, Development, and Protection Plan which states, “The district (WCWCD) shall develop a water conservation plan which promotes public education and information dissemination concerning water conservation; and promotes the adoption of technologies, practices, and devices which will yield improvements in the efficiency and management of water use,”²
- Boyle Engineering completed a study³ in the 1990's for WCWCD that analyzed the demand for and potential supply of water. Part of the study’s scope identified water availability through current and future water projects. The study then endeavored to determine if the potential available water resources would be adequate for future population’s water demand. The result indicated that, with implementation of all future projects and a 25 percent decrease in water usage, an adequate water supply would be in place until the year 2050.

¹Ronald W. Thompson, “Manager’s Message.” *Water Line*, Winter 2005: 1.

²A Long Term Framework for Water Resources Management, Development and Protection. Washington County Water Conservancy District, August 1993.

³Water Supply Needs for Washington and Kane Counties & Lake Powell Pipeline. Boyle Engineering Corporation, December 1998.

These elements lead WCWCD to form a Water Conservation and Drought Management Committee in August 1993. Through this Committee, recommendations were made and the Water Management and Conservation Plan developed. Since then, the Plan has been updated twice. The recent revisions to the Plan have addressed the concerns of state water resource managers and current water issues facing the residents of the County. The revisions have not changed the recommendations of the original Committee only augmented them. WCWCD submitted the original Plan to the state in May 1996. A revision was completed on December 31, 2003, and submitted to the state in April 2005, after WCWCD's Board adopted the revised Plan.

In addition, WCWCD made a major change in its policy in 2005 to require all wholesale water buyers to have a water conservation plan in place. Significant strides have been made by the local municipalities to create, establish and maintain a water conservation plan.

Advancing a water conservation ethic throughout the State

In 1998, the Legislature passed a House Bill⁴ requiring all water retailers and water conservancy districts to prepare update or adopt a water conservation plan which was to be submitted to the Utah Division of Water Resources by April 1, 1999.

Since 1990, the State of Utah has emphasized water conservation in management of water. In July 2003, they published the first Municipal and Industrial (M&I) Water Conservation Plan clarifying the state's water conservation goal, how to progress toward it and how to monitor the achievements toward the goal. The plan will be evaluated and updated every five years.

In May 2006, the state designated the first Water Week in conjunction with National Drinking Water Week. Then in the 2007 legislative session, HB 20 passed which designates the first full week in May to be a State Water Week. The purpose of this designation is to promote a deeper understanding among Utahns of the value of water.

A look ten years ago...1995

You have to know where you have been to see where you are going.

Anon.

Looking at the past allows us to see where we have been, what we have done and where we should go. So, with that in mind, let's take a look at where we were at ten years ago and what has transpired through ten years.

The following is list of water facilities WCWCD had developed as well as water conservation programs that were in place in 1995.

Storage Facilities

Quail Creek Reservoir

Quail Creek Reservoir is located within the Hurricane City limits. It is approximately 15 miles northeast of St. George. The reservoir was completed in April 1985 at a cost of \$23,502,400. The reservoir is formed by two dams, covering a surface area of 620 acres. The

⁴Utah Code Ann.§ 73-10-32.

storage capacity is 40,000 acre-feet (AF), thus yielding approximately 20,000 AF of water per year.

Quail Creek Reservoir is an off-stream storage project owned and operated by the WCWCD. Water from the Virgin River is diverted and transported through a buried 66-inch pipeline to feed the reservoir. The project also contains two hydroelectric plants on the pipeline. This facility has been fully operational since 1987.

The primary purpose of Quail Creek Reservoir is to provide a source of water for M&I growth in the County. Currently, the project serves raw water to Hurricane, La Verkin, and Washington. St. George City built a Water Treatment Plant to process water from the reservoir. WCWCD took over the operation and management of the Quail Creek Regional Water Treatment Plant from St. George City in 2006. This plant is located just below Quail Creek's south dam. This treatment plant prepares the water for culinary distribution to the western county cities.

Kolob Reservoir

Kolob Reservoir is located 25 miles north of Virgin, Utah and 36 miles northeast of St. George, Utah. The reservoir was completed in 1957. At that time it was owned by Kolob Reservoir and Storage Association, Inc. and the Cedar City Corporation. When construction commenced on Quail Creek Reservoir, WCWCD entered into an agreement to acquire the water rights out of Kolob Reservoir. Since then, the 5,500 AF reservoir has been owned, managed and maintained by WCWCD. This project's annual yield is approximately 2,500 AF.

Culinary Systems

Anderson Junction Well & Pipeline Water System (Culinary, Wholesale)

The Anderson Junction System (also referred to as Cottam well) is located roughly 20 miles northeast of St. George. The first well in this system was drilled in February, 1994. A second well was drilled in 2000 and served as a backup source of supply. The pipeline extends from a 400,000 gallon water tank to the town of Virgin for a total of 6.22 miles. This system currently supplies wholesale water for the cities of Toquerville, La Verkin and Virgin.

Toquerville entered into a contract with WCWCD to provide water to a maximum number of 500 connections. Presently Toquerville is using 22 connections⁵.

WCWCD has a contract with Virgin for 1,000 connections. Presently, 226 of those connections are in use⁶. La Verkin has a maximum 1,000 connections and are currently using 247 of those connections⁷.

Water Conservation Programs

Annual Water Fair

WCWCD launched its annual Washington County Water Fair in March of 1995. The fair brought over 1,000 5th grade students to the local college campus. Each class participated in 3 of

⁵ Data collected as of 03/10/06.

⁶ Data collected as of 03/10/06.

⁷ Data collected as of 03/10/06.

the 19 presentations and a trivia contest. Co-sponsors and contributors such as Dixie State College, local cities and merchants, help to make this event a success each year.

What's been accomplished...

(Water Facilities and Conservation Programs 1996 to Present)

Storage Facilities

Sand Hollow Reservoir

This storage facility was completed in 2002. It is located approximately 5.5 miles southwest of Hurricane. Sand Hollow reservoir is enclosed by two dams known as the North Dam and West Dam. Water to fill the reservoir originates from the Virgin River at the existing Quail Creek Diversion Dam and is transported from the diversion in the existing pipeline serving the Quail Creek Reservoir. A 60-inch pipeline connects the pipeline at the Wayne Wilson Hydro Plant heading due south to the Sand Hollow Reservoir. The pipeline is designed so the water can be conveyed by gravity flow from Sand Hollow to Quail Creek Reservoir or pumped up gradient in the opposite direction. The pump station consists of five pumps.

This project serves both as a storage facility and a ground water recharge. The reservoir has a capacity storage of 50,000 AF of storage covering a surface area of approximately 1,300 acres. A 20,000 AF drought pool will act as a buffer in extreme droughts. The reservoir acts as a groundwater recharge facility for the Navajo Sandstone Aquifer. This recharge will provide an annual yield of approximately 20,000 AF to the aquifer. The yield of surface water is estimated at approximately 15,000 AF. This project has a total yield is 35,000 AF.

Culinary Water Sources

Sand Hollow Basin Wells

These wells are part of the recharge facility mentioned above. Currently, seven wells are operational (See Figure 1). It is currently proposed that the completed facility will contain a total of 16 wells. These wells harvest the recharge provided by the reservoir in the Navajo Sandstone Aquifer. There is an 18-inch line installed around the basin of the reservoir to connect current and future wells. There is a two million gallon storage tank and chlorination treatment included in the project. The water is treated as it comes out of the tank and distributed through 13,712 feet of an 18-inch line to the Regional Pipeline.

Hurricane Valley Water System (Culinary, Retail). Hurricane Valley Water System is located in the vicinity of the Hurricane Bench area, two miles northwest of Hurricane, Utah. The existing system was purchased by the WCWCD in August 1997 from a private water company for the Sky Ranch and Cliffdwellers developments. The system was built between 1980 and 1985. Since its purchase, this separate system has since been incorporated into the Sand Hollow System. Under WCWCD ownership, the water system has been upgraded. It has the capacity to serve 1,095 connections. 130 of those

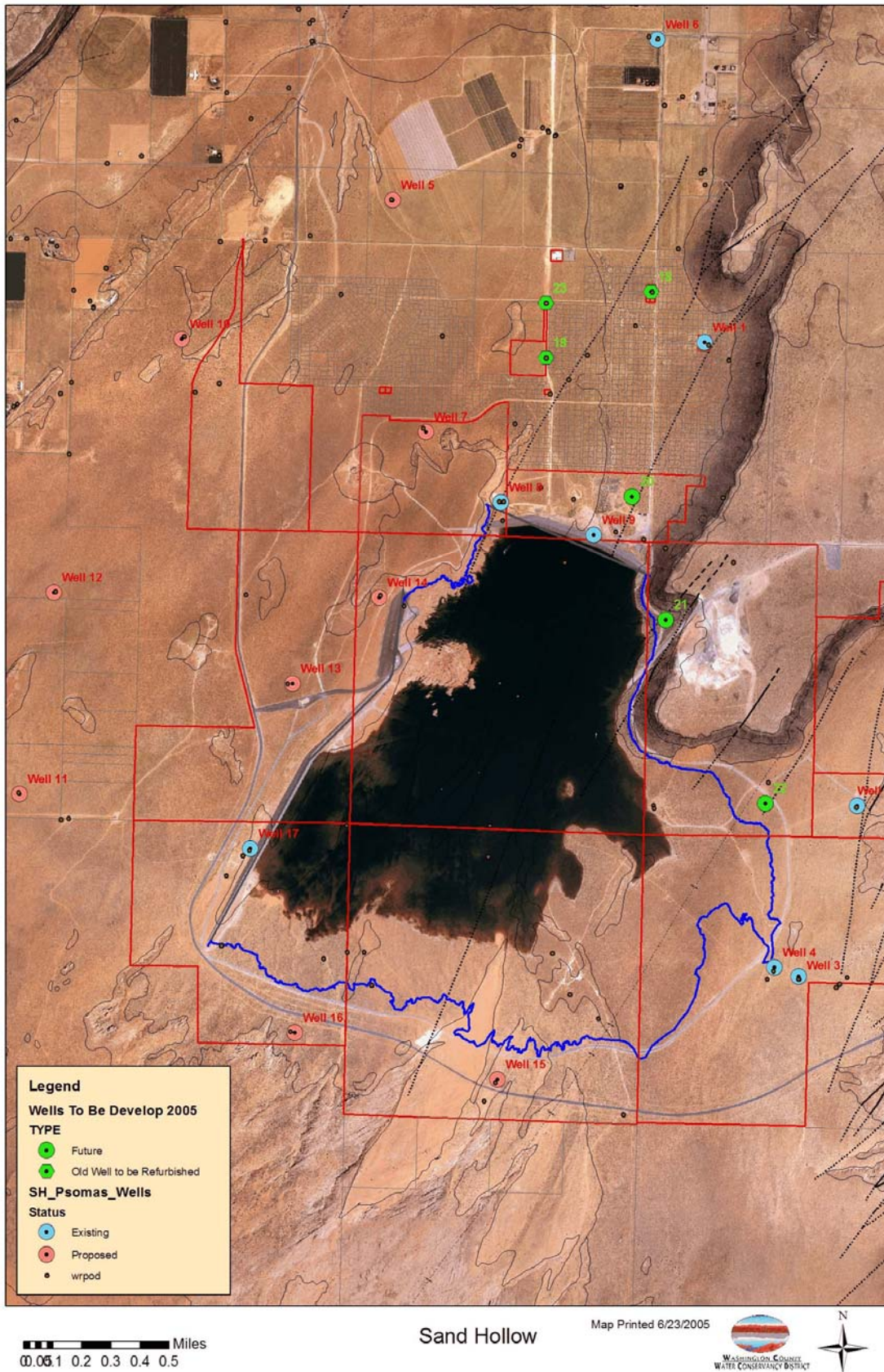


Figure 1--- Proposed and existing Sand Hollow Wells

connections are currently being served⁸.

The facility consists of two wells and two water tanks capable of storing 130,000 and 100,000 gallons. The facility wells and water tank are located two miles north of the actual development. These developments have landscaping restrictions that severely limit turf areas.

Kayenta) Water System (Culinary, Wholesale)

The Kayenta wells (aka Ence wells) were purchased by WCWCD in 1997. This system serves the residential community of Kayenta and the town of Ivins. It is located eight miles west of St. George within the city limits of Ivins. The system currently provides water to 247 homes with a total of 552 possible connections⁹. The Kayenta Water System consists of two wells. The distribution system is not owned by WCWCD. Well #1 was drilled in 1974 and was originally used for irrigation. In the fall of 2001, WCWCD completed drilling on a second well to serve as a supplemental source of culinary water for Ivins.

Sullivan Well

The Sullivan Well is located approximately two miles southeast of Leeds, Utah, and a mile north of Sandstone Mountain. The WCWCD acquired the well in 1997. The well was drilled to a depth of 700 feet where it hit the artesian flow. Both the volume and quality of the well water surpassed expectations. This well will eventually be linked to all other projects within the WCWCD's system.

Regional Pipeline (Distribution System)

This distribution system was constructed in cooperation with St. George, Santa Clara, Washington and Ivins cities. This pipeline distributes water from the Sand Hollow/Quail Creek System. The pipeline begins at the Quail Creek Water Treatment Plant and runs approximately 20 miles west to the Snow Canyon wells (Ivins area). The facility includes a 500,000 gallon tank and two pump stations. The purpose of this pipeline is three-fold: 1) to meet the water needs of a rapidly growing community; 2) to establish an efficient water delivery system from Quail Creek Reservoir to the west side of the County; and 3) to comply with the new federal arsenic standards by blending other water with the Snow Canyon wells. The project was completed in the spring of 2004.

Secondary Water Systems

Toquerville Secondary Water System (Retail)

A consortium between the WCWCD, Toquerville City and the Toquerville Irrigation Company, which promoted conservation and provided a convenient, efficient irrigation system to the water users, led the way in the realization of this project. Together, the partners created a new entity designated as the Toquerville Secondary Water System (TSWS). The agreement allowed the WCWCD to purchase water rights held by the irrigation company's shareholders and convert their open-ditch irrigation system to a pressurized system which distributes irrigation water to the

⁸ Data collected 03/10/06

⁹ Data collected 03/10/06

residents of the Toquerville area. This project was completed in the spring of 2000 and currently serves 332 connections¹⁰. A maximum number of 1,000 connections are allowed on this system.

The system consists of a new diversion structure at the west field ditch diversion location. From the diversion structure the water is piped approximately 1,100 feet to a 12 AF regulating reservoir. From the main regulating reservoir, water is pumped approximately 9,800 feet to a reservoir with a holding capacity of approximately 13 AF. There are various service connections along this main pipeline. The irrigation system was also designed to allow the WCWCD to gravity feed excess water during the winter months to downstream users. In 2003, the system adopted a 'time of day' watering restriction.

Gunlock to Santa Clara Pipeline (Wholesale)

This pipeline connects Gunlock Reservoir to Ivins Reservoir with a 24-inch pipeline. The alignment follows the "Gunlock Highway" and proceeds along an existing canal to the Ivins Reservoir for a length of 8.15 miles. This project replaced four existing diversions and converted the current flood irrigation over to a pressurized system. This pipeline delivers to the communities of Ivins, Santa Clara and the Shivwit's Tribe Reservation.

Water Conservation Programs

Since the completion of the original Plan in 1996, the WCWCD has spent over \$11.4 million towards promoting and implementing water conservation measures in the county. The WCWCD hired a part-time Water Conservation Coordinator in 1996 whose position went full-time in 2002. The water conservation coordinator not only implements water conservation programs county-wide, but also serves as a resource to the individual communities in the county. The following contains the conservation programs which have been implemented since 1996.

Water Conservation Demonstration Garden

The WCWCD, in partnership with other agencies, agreed that a demonstration garden would be an excellent tool in the education of water-efficient landscapes. Construction of "The Garden" began in the fall of 2002. The demonstration garden was built with the help of a grant from the Bureau of Reclamation under the direction of a committee with representatives from the WCWCD, St. George City, Utah State University (USU) Extension and the private landscape industry.. The disciplines demonstrated at The Garden include soil composition and fertilization; weather and climate; irrigation practices and technologies; plant design and plant selection. There are four landscape themes demonstrated at the Garden: 1) Desert Highlands, 2) Urban Desert, 3) Desert Shrublands, a Native Garden; and 4) Desert Oasis. The main structure in The Garden was complete in December 2003. Visitors to The Garden can utilize a self-guided tour through available pamphlets and kiosks. In 2005, a grant was received to acquire a part-time assistant. This assistant provides daily maintenance, design development and maintains the educational aspect of the garden.

Monthly Workshops - The WCWCD puts together monthly workshops appropriate to the season and community needs. These workshops are taught by community experts educated in

¹⁰ Data Collected 03/10/06

water-wise practices.

Washington County Water-wise Plant List

In conjunction with the demonstration garden, the WCWCD has partnered with USU Extension and established a list of water-wise plants. The list also indicates where the plant is demonstrated. The list includes plants from two other demonstration gardens: Santa Clara Arboretum, and Native Plant Society Garden at Three Falls Elementary in Hurricane.

Media Campaign

Local Media - A local media campaign was launched in 2000. The goal of the local media campaign is to reach residents county-wide through varying media formats to promote water conservation.

Governor's Conservation Team -The WCWCD participates in the Governor's Conservation Team media campaign. The campaign started in 2002, while in the fourth year of drought. The goal is to manage the state's water supply effectively and establish a long-term conservation ethic among Utahns. The Conservation Team looks at the media campaign as a way to unify the conservation message among the different agencies throughout the state. In 2002, the team reported there was an overall state-wide water use reduction of 10 percent in summer usage. Washington County averaged 7 percent. Since then, the state has found a 13 percent water use reduction and the county has seen a 24 percent decrease.

Printed Material - The WCWCD carries monthly ads among local direct mail publications. This ad provides information to the residents from current programs the WCWCD is offering to water saving tips. Also articles from time to time are printed in various publications. The WCWCD's quarterly publication of the *Water Line* dedicates an entire page to water conservation information and its annual *Operational Overview* reviews conservation efforts that have taken place within the period of one year.

Education and Outreach

Annual Water Fair - The WCWCD participates in several outreach and education programs. The major program is the continuation of the annual Water Fair. The fair was changed from 5th grade to 4th grade students to support the change in the state's core water curriculum. The Water Fair reaches approximately 1,800 students. The two-day event is held at Dixie State College. Currently each class attends four of the 35 presentations available and competes in a water jeopardy contest. The prizes for the winning class in the contest are contributed by local businesses. Some of the presentations include water education in water treatment, water properties, water infrastructure, habitat needs and water conservation.

School Outreach Program - WCWCD staff members serve as a resource to educators in elementary, secondary and higher education.

State Educational Programs - The WCWCD contributes \$1,000 yearly to the Utah State Division of Water Resources' education programs.

New Arrival Water Survival Kit

In 2005, the WCWCD began distributing water conservation information to the cities to hand out with their new water utility customers. The packet contains Local County and online water conservation resources, current programs offered, local water conservation specialist contact information and water-wise landscape principles and practices. The program is offered free of charge to each city.

Conservation Education and Certification

Hosted Irrigation Association Courses - From 2001 through 2003, the WCWCD hosted an annual Irrigation Association (IA) certification course. The courses have included Certified Landscape Irrigation Auditor and Irrigation System Design and Maintenance.

DXATC Courses - In 2003, the WCWCD, in partnership with Dixie Applied Technology College (DXATC), USU Extension and others created a program for the education of the landscape professional in water efficient landscape management. The program offered two courses: Water Efficient Turf Management and Planting for Success. Both classes received a great response. Although the class curriculum was geared to the landscape professional, homeowners also participated. DATC paid for and arranged the promotion of the courses and offered their facility for the classes. USU Extension agent, Rick Heflebower, arranged for the instructors and supervised the teaching of the courses.

The goals include the encouragement of professionalism; an increase in the landscape professional's knowledge of conservation measures and the promotion and implementation of best management practices county-wide for water-efficient landscapes.

Weather Station Link and Website

The WCWCD, USU and St. George City have worked with Irrisoft® to link existing weather stations in the County to one computer terminal. The computer terminal collects data from three weather stations and produces an evapotranspiration value known as ET. This ET value is then used by the landscape professional and homeowner to gauge the irrigation needs of the landscape. A website has been created to disseminate the ET value county-wide through a website at www.dixiegardner.org.

The goal of this program is to educate both the homeowner and landscape professional on the water needs of the landscape plants. The plan is to link available weather stations in various areas of the county.

SWAT Device Rebate Program

In 2005, the WCWCD began giving rebates to homeowners when they purchased a Smart Water Applied Technology (SWAT) device. These devices update the irrigation controller on the plants' water needs based on weather information or soil moisture sensors. This device eliminates the guess work on the part of the homeowner determining the irrigation needs of their landscape. In order to qualify for the rebate, the homeowner must also participate in a Water Check, which then educates the homeowner on how to manage their landscape water efficiently. This program is also open to large water users such as schools, cities and churches.

Water Checks

In 2005, the WCWCD began offering water checks in conjunction with the *Slow the Flow* program on the Wasatch front. These water checks are performed by a WCWCD intern. A water check consists of running several tests on the irrigation system. Through these tests, the homeowner receives a report that evaluates the system's efficiency and application rate. The tests also provide the homeowner with an appropriate irrigation schedule. The intern will give the homeowner suggestions on how to improve the system and manage the landscape to be more water efficient.

Study on High Salinity in Water

The WCWCD is working in conjunction with Dr. Frank Williams from Brigham Young

University's College of Biology and Agriculture to identify plants and irrigation practices that are tolerant to high salinity water. This study would evaluate the use of Virgin River water in the establishment of different suggested varieties of horticultural plants for the area. The plants selected will be those that are thought to be salt tolerant. This will not only establish the level of salt tolerance of the plant, it will also establish its ability to survive on low water consumption. These plants will then be suggested for use by residents in the Washington County area. The use of several different varieties of each of the suggested plants would allow for a wider range of selection of plants that could thrive on a secondary source of water high in salt content. Plants could be rated from sensitive to tolerant in their reaction to the level of salinity of the water.

Various planting methods and management practices will be evaluated. As these methods and practices improve, it will be shown how plants can be established with a considerable reduction in water usage. Common practices will also be developed for the use of the low quality water from the Virgin River.

Once the plants are established, they will continue to be evaluated on growth characteristics. The soil will also be monitored for accumulation of salts and management practices developed to produce the best results. Special attention will be given to the various species of grasses that are believed to be well adapted to this area. Trees, shrubs, and other landscape plants will also be evaluated.

With the criteria developed, homeowners and commercial landscapers can evaluate the varieties that will best be suited for the area, especially when using a secondary water source such as the Virgin River. A standard list of plants and best planting methods will be distributed to area residents indicating methods for planting that, if adhered to, will conserve water. It is also expected that, upon the development of proper planting methods, the loss of trees, shrubs and garden plants can be reduced from the 90 percent loss rate to a 5-10 percent loss rate. The project will be monitored for a period of 3-5 years in order to establish that the proper planting methods will continue to save water long after the establishment of the plants. At the conclusion of this study, the information collected will be beneficial in demonstrating how, with proper soil preparation, managed water use can be reduced and that water of lower quality can be successfully utilized. A short list of recommended plants and their tolerance for low quality water will be developed for the area.

Water Wise Plant List and Tagging (Financial contribution to a State Program)

Utah Water-wise Plant Tagging

The WCWCD contributed to the state's *Utah Water-wise Plant Tagging* program which began in 2002. Representatives from several government and local organizations worked together to organize a list of ornamental trees, shrubs, herbaceous perennials, ornamental grasses, and ground covers that would meet the criteria listed below:

- 1) water-wise, 2) adaptable to Utah's arid climate and cold winters, 3) available in the industry, 4) relatively easy to maintain in the landscape, and 5) have desirable landscape characteristics which remain desirable under limited water availability.

The tagging process establishes that the plant requires water *at most* once every two weeks *after establishment* in order to maintain its aesthetic characteristics. The plant is identified with a bright yellow tag in the shape of the state of Utah indicating to the consumer that the plant is a water-wise plant. Participating nurseries and garden centers throughout the state will have these tagged plants available.

The state developed a program which will assist Utah citizens in identifying water-wise plants for use in the region.

Watershed Management and Enhancement

The WCWCD has completed a Watershed Management Plan which will include Total Maximum Daily Loads (TMDLs) development for the Lower Colorado River Watershed and a Surface Protection Plan for the Virgin River Watershed. This project is a joint effort including the following entities or agencies: the WCWCD, United States Forest Service Dixie National Forest, Utah Department of Environmental Quality, Division of Water Quality, Bureau of Land Management, St. George City and the Town of Springdale. The Watershed Management Plan will use ongoing and previously completed watershed management-related studies and public input. The project is under the direction of the Virgin River Watershed Advisory Committee and chaired by the WCWCD. It is being completed as part of the Virgin River Management Plan.

The objective of the project is to address the health of the Virgin River watershed and meet the requirements of the TMDL as required by Section 303 of the Clean Water Act and the Utah Source Water Assessment Program Utah Source Protection Rule (@309-605).

Virgin River Recovery Program

The WCWCD has been an integral partner in the Virgin River Recovery Program (Program) since its inception and even prior, believing that the development of water resources should not jeopardize the presence of native species in the Virgin River. The WCWCD works with the Program to manage water to alleviate factors that limit populations. The WCWCD also serves as the Program's contracting agent as well as serving as the overseer for any projects that the Program needs to have constructed. The projects which have been constructed to date have been two fish barriers (State Line and Webb Hill) and the fish screens located at the St. George Washington Fields Diversion. These three construction projects have contributed to the effort to recover native fishes by aiding in the eradication of red shiner from the Virgin River as well as insuring that native fishes are not being taken into the St. George Washington Fields Canal were they are put out onto the fields with the water. It has been estimated that the screens have returned in excess of 20,000 native fish to the Virgin River since they began operating in 2004.

Enhancement of Underground Water Sources

With increasing costs of new water projects and the depletion of surface water supplies, a greater focus has been on the need for development of the groundwater supply in the county. The Virgin River Upper Basin total available groundwater supply has been estimated at 2.2 million AF. The Central Basin groundwater supply has been estimated at nearly 200 million AF.¹¹ While this total quantity of water may be accessible, wise-water management policy should dictate that long-term withdrawals which will not exceed the average annual recharge. It has been estimated that the average annual groundwater recharge equals approximately the discharge of 155,000 AF in the Virgin River Basin.¹² Historical estimates of flows from springs and wells vary from 40 percent of the average annual groundwater discharge in the Central basin to only 10

¹¹*Groundwater Resources of the Virgin River Basin in Utah*, Calvin G. Clyde, Utah Water Research Laboratory.

¹²*Utah State Water Plan*, Kanab Creek/Virgin River Basin; August, 1993.

percent in the Upper Basin.¹³ Currently, there are no indications that the groundwater aquifer is being over drafted; consequently, there exists a favorable potential for further development of high capacity wells at appropriate locations for M&I purposes. One project of groundwater enhancement has been implemented in the Sand Hollow Reservoir Project.

Water rates

All of the cities in the county have converted over to an increasing block rate structure since 1998. With the increasing block rate structure, the price of water increases as usage increases. Below is a chart of Washington County cities’ water rates ranked from the highest to lowest price.

Price of Water per 1,000 Gallons	
Springdale	\$4.07
Hurricane Valley	\$3.10
La Verkin	\$2.91
Ivins	\$2.24
Washington	\$1.85
Hurricane City	\$1.76
Santa Clara	\$1.73
St. George	\$1.64
Average Price	\$2.41
Enterprise	\$1.60
Toquerville	\$1.47
Leeds	\$1.33

Water Conservation Measures and Programs administered by the Cities

Information on water conservation programs have been collected on eight¹⁴ cities. Five of these eight cities have adopted a water conservation plan. St. George, Hurricane and La Verkin adopted a Conservation plan in 2002, Washington in 2004 and Santa Clara passed their plan in 2005.

As indicated in the prior section, rates of all the cities have an increasing block rate which promotes water conservation by having the higher water usage more costly. St. George also applies a higher rate, known as a conservation rate, during the spring and summer months to

¹³Groundwater Resources of the Virgin River Basin in Utah.

¹⁴The Cities are: Enterprise, Hurricane, Ivins, La Verkin, Santa Clara, St. George, Washington and Toquerville.

discourage outdoor water waste.

Three cities, Toquerville, Washington and Hurricane, have a time-of-day watering ordinance. All other cities' Stage 2 of the drought response plan has mandatory time-of-day watering restrictions.

A drought response plan designates certain responses at specified levels of water supply depletions. Except for Toquerville and Enterprise, all cities have a drought response plan. Each stage of this plan assigns what water conservation measures are enforced to restrict water usage.

St. George City has staffed a full-time Conservation Coordinator since 2003. In 2005, the city implemented an ultra low flow toilet rebate program and is contributing to the county-wide water check program.

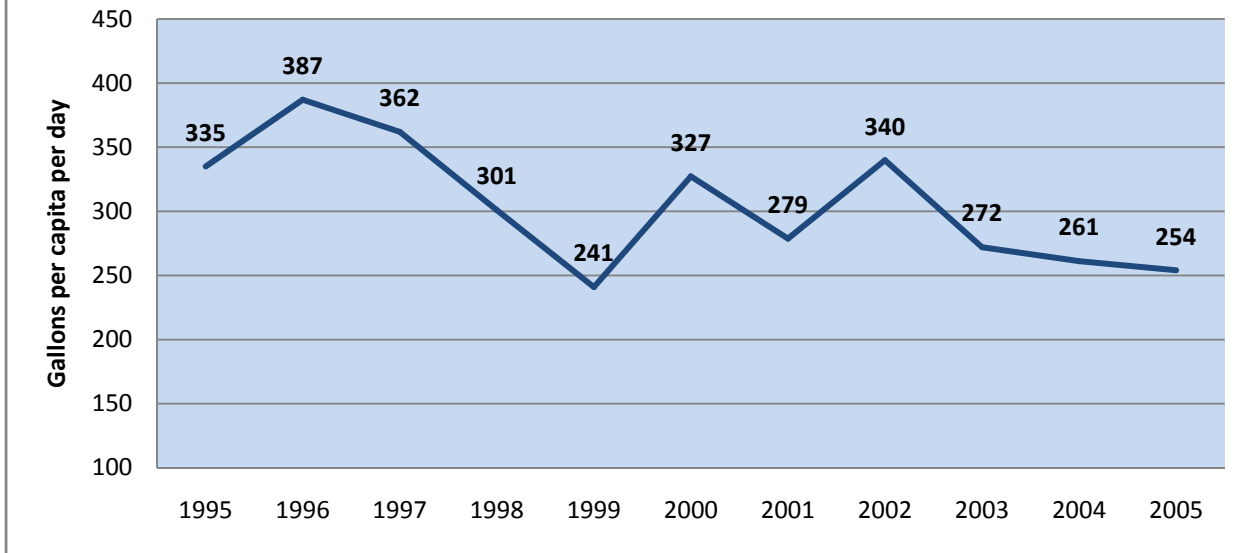
How have we done...

In order to find what water savings have been found throughout the county, the WCWCD has established the baseline water use of 335 gallons per capita per day (gpcd). This number was determined by Boyle Engineering in a study prepared for the WCWCD¹⁵ in 1995. Great strides have been taken in gathering, tracking, and analyzing water data. However, still some of the data has been hard to come by and unfortunately is incomplete. Explanations have been given as needed to indicate missing data.

As a result of the water use reduction, the six cities are using 24 percent less than in 1995. This calculates to over 19.2 billion gallons of water or 58,963 AF of a water savings.

¹⁵Water Supply Needs for Washington & Kane County & Lake Powell Pipeline Study, Boyle Engineering, December 1998.

6* Cities Gallons Per Capita Per Day Water Usage



Comparing 1995 to 2005 GPCD of 6 communities. A savings of 24 percent is found.

* Hurricane, Ivins, La Verkin, Santa Clara, St. George, Washington

PLEASE NOTE: Since 2000, monthly water usage has been tracked by the WCWCD from six cities (St. George, Washington, Santa Clara, Ivins, Hurricane, La Verkin). However, since this 10-year report includes years from 1995, this data for this graph came from a two different sources. For the years prior to 2000, the water usage numbers reported by each city to the state have been used. The billing numbers collected from each of the cities are used in the years from 2000. Also, please note that the years prior to 1998, Hurricane has not any water usage data available, but Hurricane's usage and population is included in the calculation when available.

How do we compare...

Recently, Washington County (St. George City in particular) has been compared to other communities who have achieved exceptional results in water conservation. Although assessing the county's gpcd usage is beneficial in tracking progress for water use reduction within its boundaries, there is no value in comparing gpcd among other communities. This is because of the differences in communities (i.e., climate, demographics, and cultures) and the differences each community has in even calculating gpcd. However, since groups insist on giving the comparison, the following tables attempt to give some clarity to the differences of the communities so that there may be some continuity in the comparisons.

Urban Cities Comparisons

City	Residential Water Use (gpcd)*	M & I Water Use (gpcd)*	2nd Homes	Elevation (ft.)	Average Annual Temperature (F)	Average Annual Precipitation (in.)	Sunny Days	Annual Evapotranspiration (in.)	Wettest Month	Population 2005	Growth Rate in past 5 years %	Population Density People per Sq mi	City Area Sq Miles	% of water use Residential	% of Water use CII
Albuquerque	110	174	Info not available	4,955	56.0	8.9	308	38.1	July	494,236	10.2	2736	180.6	48.7	51.3
Tucson	110	177	Info not available	2,491	68.4	12.0	300	58	July	515,526	5.9	2648	194.7	74	26
Las Vegas Valley	174	274	Info not available	2,000	68.0	4.5	320	74.8	Feb	545,147	13.9	4811	113.3	57.9	42.1
Washington County Area															
St. George	127	265	22.70%	2,624	62.0	8.0	300	55	Feb	64,201	29.3	997	64.4	47.8	52.2
Ivins	101	114	28.40%	3,074	62.0	8.0	300	55	Feb	6,738	51.0	661	10.2	88.2	11.8
Hurricane	125	219	29.10%	3,266	62.0	8.0	300	55	Feb	10,989	33.2	353	31.1	57.1	42.9
LaVerkin	225	266	23.20%	3,313	61.0	8.0	300	55	Feb	4,105	21.0	255	16.1	84.5	15.5
Washington	93	167	27.80%	2,624	62.0	8.0	300	55	Feb	13,669	67.0	434	31.5	55.7	44.3
	Weighted	Weighted	Avg	Avg	Avg	Avg	Avg	Avg		Total	Weighted	Weighted	Avg	Weighted	Weighted
Summary Of Washington Co	124	236	26%	2980	61.8	8	300	55		99,702	36	796	30.66	54	45.8
* Washington Co. area includes 2nd home population estimates in gpcd calculations															
Water Use Information was obtained from individual cities publications, staff or its website															
Other miscellaneous information was collected from city-data.com															
CII=Commercial, Industrial and Institutional water use															
gpcd=gallons per capita per day															
M & I=Municipal & Industrial															
Updated 07/2007															

Urban Cities Water Conservation Program Comparison

City	Albuquerque	Tucson	Las Vegas Valley	St. George	Ivins	Hurricane	LaVerkin	Washington
Residential Programs								
Residential Water Audits	Indoor	X	X	X				
	Outdoor	X	X		X	X	X	X
Landscape Retrofit Rebates*	X		X	X	X	X	X	X
SWAT Controller and/or Multi-setting Controller Rebates	X		X	X	X	X	X	X
ULF Toilet Rebates Or Replacement	X			X				
WaterSense Appliance Rebates	X			X				
School Education Programs	X	X	X	X	X	X	X	X
Rainwater Harvesting Barrel Rebate	X							
Car Wash Coupons			X					
Demonstration Gardens			X	X	X	X	X	X
Pool Cover Coupon			X					
Rain Sensor Coupon			X					
Landscape Workshops Or Helps	X	X	X	X	X	X	X	X
Large Water User's Programs (Commercial, HOA, Institutional..)								
Professional Landscaper Water-efficient Training				X	X	X	X	X
SWAT Controller Rebates				X	X	X	X	X
Large Water User's Workshops				X	X	X	X	X
Commercial Rebates			X					
Commercial Audits								
Restaurant-Water upon request signs			X					
Spray Rinse Valve Replacement				X				
Canal Conversions								
Converted open-ditch canal systems into pressurized irrigation systems				X	X	X	X	X
Ordinances								
Time-of-day Watering Restrictions **Indicates Restrictions are seasonal	X		X	X**	X**	X	X**	X
Water Waste Ordinance	X	X		X				
Landscape Ordinance		X						
* Washington County WCD collects an impact fee calculated by per square foot of irrigable landscape over 5,000 square feet. Information for programs of each city was collected from its website or the program manager. County-wide programs offered by WCWCD are indicated as a program offered by the individual city.								

Analyzing more information...

The state has set a standard in calculating gallons per capita per day (gpcd) by taking the community's population and dividing it by all water use (commercial, industrial and institutional as well as residential) of the public water system. As mentioned before, it is important to note that when comparing gpcd usage of cities from other states, this standard varies. Then there is a unique characteristic you will find in St. George (in all of Washington County for that matter) which you will not find in most other communities. One quarter of all the homes in St. George is second homes. The percentage of second homes can be as high as 29 percent in some communities. This means that the landscapes of these second homes are maintained year-round just as a primary residence, yet the owners of these homes claim residency elsewhere and so while *their* water usage is calculated in the gpcd their population count isn't. Although, calculating this fact brings water use in line with most communities in the nation, this is not to say there is no need for improvement, it only helps in understanding the number when being compared to other communities.

When analyzing water usage, there are other challenges to keep in mind. This county serves as a hotspot for tourist. As of April 5, 2006, there are 4,000 hotel rooms in the county and 1,031 RV and tent sites. Approximately 3.5 million visitors vacation in the county each year. And weather challenges include 300 sunny days a year with temperatures soaring to 115° in the summer months. This makes the growing season a long and hot one. Understandably, though, all these challenges make Washington County a popular a place to reside and visit.

Therefore, because of all these unique qualities, a compilation of this next set of data using Washington County Assessment records is used to determine primary and secondary homes in the six cities: La Verkin, Hurricane, Washington, St. George, Santa Clara and Ivins. Water usage numbers have been taken from the 2005 Annual Water Usage reports the cities submitted to the state. As the spreadsheet shows, through multiple data criteria a calculation of gallons per capita per day have been determined pertaining to the scenario.

HURRICANE CITY WATER USE		
In 2005 (estimated population)	10,849	
Water usage reported in 2005 Annual Water Use Report submitted to the State in Acre-Feet (AF)*	3,761.31	
Water Use Categories	Municipal & Industrial (M&I)	
	Residential	Commercial, Industrial & Institutional (CII)
Percentage of Water Use	57.1%	42.9%
AF of Water Use	2,147.71	1,613.60
	Primary Residence	2nd Residence
Percentage of Residential Population	70.9%	29.1%
Gallons per Capita per Day (GPCD)		
Residential Water Use (Local population only)	176.73	
Residential Water Use w/2nd Home estimated population	125.22	
M&I Water Use (Local population only)	309.51	
M&I Water Use w/2nd Home estimated population	219.30	
Percentage of Water Use Reduction since 1995	?	<i>1995 water use not available</i>
<i>*Based on Kennard 2002 State of Utah Report</i>		
Please Note:		
Population was estimated by using county's 2005 assessment for number of primary residential homes and multiplying it by 2000 Census Average per Household of 2.9.		
Based on County 2005 property tax assessment for Hurricane City, there are 5,280 Residential Homes. 3,741 are primary residences and 1,539 are secondary.		
According to Annual Water Usage reports submitted to the state, Hurricane used 3,761.31 AF of water in 2005.		
The State did not list a 1995 Annual Water Use report for Hurricane.		

IVINS CITY WATER USE		
In 2005 (estimated population)		6,995
Water usage reported in 2005 Annual Report submitted to the State in Acre-Feet (AF)*		1,255.68
Water Use Categories	Municipal & Industrial (M&I)	
	Residential	Commercial, Industrial & Institutional (CII)
Percentage of Water Use	88.2%	11.8%
AF of Water Use	1,107.51	148.17
	Primary Residence	2nd Residence
Percentage of Residential Population	28.4%	71.6%
Gallons per Capita per Day (GPCD)		
Residential Water Use (Local population only)	141.35	
Residential Water use w/2nd Home estimated population	101.17	
M&I Water Use (Local population only)	160.26	
GPCD of M&I Water Use w/2nd Home estimated population	114.70	
Percentage of Water Use Reduction since 1995	40.8%	
<i>*Based on Kennard 2002 State of Utah Report</i>		
Please Note:		
Population is estimated by using county's 2005 assessment for number of primary residential homes and multiplying it by 2000 Census Average per Household Of 2.9.		
Based on County 2005 property tax assessment for Ivins City, there are 3,370 Residential Homes. 2,412 are primary residences and 958 are secondary.		
According to 2005 Annual Water Usage reports submitted to the state, Ivins used 1,255.68 AF of water in 2005.		
WCWCD water supplied to Kayenta of 103.4 AF has been added in to Ivins' Annual Water Report.		
1995 water use is based on the Annual Water Usage report submitted to the state (194 gpcd).		

LA VERKIN CITY WATER USE			
In 2005 (estimated population)			3,413
Water usage reported in 2005 Annual Water Use Report submitted to the State in Acre-Feet (AF)*			1,326.50
Water Use Categories	Municipal & Industrial (M&I)		
	Residential		Commercial, Industrial & Institutional (CII)
Percentage of Water Use	84.5%		15.5%
Af of Water Use	1,120.89		205.61
	<i>Primary Residence</i>	<i>2nd Residence</i>	
Percentage of Residential Population	76.8%	23.2%	
Gallons per Capita per day (GPCD)			
Residential Water Use (Local population only)	293.17		
Residential Water Use w/2nd Home estimated population	225.09		
M&I Water Use (Local population only)	346.94		
M&I Water Use w/2nd Home estiamted population	266.37		
Percentage of Water Use Reduction since 1995	0.0%	No water savings found	
<i>*Based on Kennard 2002 State of Utah Report</i>			
Please Note:			
Population was estimated by using county's 2005 assessment number of primary residential homes and multiplying it by 2000 Census Average per Household of 2.9.			
Based on County 2005 property tax assessments for La Verkin City, there are 1,533 Residential Homes. 1,177 are primary residences and 356 are secondary.			
According to Annual Water Usage reports submitted to the state, La Verkin used 1,326.50 AF of water in 2005			
1995 water use is based on the Annual Water Usage report submitted to the state (163 gpcd)			

ST GEORGE CITY WATER USE

In 2005 (estimated population)		63,170.7
Water usage reported in 2005 Annual Water Use Report submitted to the State in Acre-Feet (AF)*		24,291.80
Water Use Categories	Municipal & Industrial (M&I)	
	Residential	Commercial, Industrial & Institutional (CII)
Percentage of Water Use	47.8%	52.2%
AF of Water Use	11,611.76	12,680.62
	Primary Residence	2nd Residence
Percentage of Residential Population	77.3%	22.7%
Gallons per Capita per Day (GPCD)		
Residential Water Use (Local population only)	164.10	
Residential Water Use w/2nd Home estimated population	126.84	
M&I Water Use (Local population only)	343.30	
M&I Water Use w/2nd Home estimated population	265.35	
Percentage of Water Use Reduction since 1995	0.0%	No water use reduction found
<i>*Based on Kennard 2002 State of Utah Report</i>		
Please Note:		
Population was estimated by using county's 2005 assessment for number of primary residential homes and multiplying it by 2000 Census Average per Household of 2.9.		
Based on county 2005 property tax assessment for St. George City, there are 28,182 Residential Homes. 21,783 are primary residences and 6,399 are secondary.		
According to Annual Water Usage reports submitted to the state, St. George used 24,291.8 AF of water in 2005.		
1995 water use based on 340 gpcd.		

SANTA CLARA CITY WATER USE			
In 2005 (estimated population)		5,191	
Water reported in 2005 Annual Water use Report submitted to the Sate in Acre-Feet (AF)*		1,431.90	
Water Use Categories	Municipal & Industrial (M&I)		
	Residential		Commercial, Industrial & Institutional (CII)
Percentage of Water Use	90.8%		10.2%
AF of Water Use	1,300.17		146.05
	<i>Primary Residence</i>	<i>2nd Residence</i>	
Percentage of Residential Population	71.6%	28.4%	
Gallons per Capita per Day (GPCD)			
Residential Water Use (Local population only)	223.60		
Residential Water Use w/2nd Home estimated population	181.11		
M&I Water Use (Local population only)	246.26		
M&I Water Use w/2nd Home estimated population	199.46		
Percentage of Water Use Reduction since 1995	44.7%		
<i>*Based on Kennard 2002 State of Utah Report</i>			
Please Note:			
Population was estimated using county's 2005 assessment for number of primary residential homes and multiplying it by 2000 Census Average per Household by 2.9.			
Based on County 2005 property tax assessments for Santa Clara City, there are 2,210 Residential Homes. 1,790 are primary residences and 420 are secondary.			
According to 2005 Annual Water Usage reports submitted to the state, Santa Clara used 1,431.9 AF of water in 2005			
1995 water use is based on the Annual Water Usage report submitted to the state (445 gpcd)			

WASHINGTON CITY WATER USAGE		
In 2005 (estimated population)	15,039	
Water usage reported in 2005 Annual Water Use Report submitted to the State in Acre-Feet (AF)*	3,890.70	
Water Use Categories	Municipal & Industrial (M&I)	
	RESIDENTIAL	Commercial, Industrial & Institutional (CII)
Percentage of Water Use	55.7%	44.3%
AF of Water Use	2,167.12	1,723.58
	Primary Residence	2nd Residence
Percentage of Residential Population	72.2%	27.8%
Gallons per Capita per Day (GPCD)		
Residential Water Use (Local population only)	128.64	
Residential Water Use w/2nd Home estimated population	92.94	
GPCD of M&I Water Use (Local population only)	230.95	
M&I Water Use w/2nd Home estimated population	166.86	
Percentage of Water Use Reduction since 1995	24.0%	
<i>*Based on Kennard 2002 State of Utah Report</i>		
Please Note:		
Population was estimated by using county's 2005 assessment for number of primary residential homes and multiplying it by 2000 Census Average per Household of 2.9		
Based on County 2005 property tax assessments for Washington City, there are 7,178 Residential Homes. 5,186 are primary residences and 1,992 are secondary.		
According to Annual Water Usage reports submitted to the state, Washington used 3,890.7 AF of water in 2005.		
1995 water use is based on the Annual Water Usage report submitted to the state (304 gpcd)		