Southern Nevada
Water Authority

Conservation Plan
2009-2013

May 2009

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OVERVIEW OF THE SOUTHERN NEVADA WATER AUTHORITY

The Southern Nevada Water Authority (SNWA) was formed in 1991 by a cooperative agreement among seven water and wastewater agencies in Southern Nevada:

- Big Bend Water District
- City of Boulder City
- City of Henderson
- City of Las Vegas
- City of North Las Vegas
- Clark County Water Reclamation District
- Las Vegas Valley Water District

Collectively, these agencies provide water and wastewater services to nearly 2 million citizens in Las Vegas, North Las Vegas, Henderson, Boulder City, Laughlin and portions of unincorporated Clark County.

As the wholesale-water provider to Southern Nevada's municipal water agencies, the SNWA is responsible for managing the region's current and future water resources. This includes managing all water supplies available to Southern Nevada through an approved water budget; managing regional water resources and conservation programs; ensuring regional water quality meets or exceeds state and federal standards; water-resource planning; and building and operating regional facilities.

Although the SNWA plays a critical role in managing water, it does not regulate water use by end users or establish customer rates. Such policies, codes and regulations are implemented through its member agencies. In terms of regulatory issues, the SNWA's role is to facilitate information sharing and collaboration. In recent years, this has resulted in the creation of successful community-wide water-efficiency policies, such as permanent mandatory watering restrictions and limitations on lawn installation in new construction. Education, outreach and incentive programs are largely managed by the SNWA through committed involvement from its member agencies, community stakeholders and the public.

THE ROLE OF CONSERVATION IN RESOURCE PLANNING

Water conservation plays a critical role in water-resource planning and management. The ability to increase efficient water use and reduce water waste has a direct impact on the amount of resources that will be needed in the future. The more successful a community's conservation, the lower the community's projected demand for water (relative to levels that would have occurred in the absence of conservation) becomes.

To support its water planning and management responsibilities, the SNWA developed and maintains a Water Resource Plan. The 2009 Water Resource Plan (Plan) projects demands and identifies a portfolio of existing and planned water supply options available to meet those demands over time. The Plan, first developed in 1996, is reviewed annually and updated as needed. As demonstrated in past revisions, adjustments to the Plan are made to account for various uncertainties such as drought, conservation achievements, resource availability and changes in population and demand projections.

The SNWA has worked to develop and manage a flexible portfolio of diverse water resource options. This approach is commonly used in the field of resource planning and is essential in responding to future conditions that may result from drought or other conditions that may limit the availability of resources. The portfolio approach allows the SNWA to assess its overall resource options and make appropriate decisions regarding what resources to bring on-line when necessary. The 2009 Water Resource Plan includes water conservation, water recycling, Colorado River water and groundwater in its portfolio of current and future resources that will be used to meet demands as needed.

Water conservation is a key resource in the SNWA Water Resource Plan, helping to lower projected demands and extend the availability of current and future water resources. The 2009 Plan projects an estimated saving of 276,000 acre-feet of water in 2035 by achieving its current water conservation goal. Gradual savings increases are estimated to occur in following years.

While conservation is an important water management tool, the more aggressive and responsive a community is to calls for conservation, the more difficult it becomes to realize additional conservation gains. This phenomenon of diminishing returns is referred to as “demand hardening.” For communities where a majority of the water supply comes from one source (such as Southern Nevada), the prospect of demand hardening requires development of additional alternative water supplies regardless of conservation levels achieved.

This concept has become increasingly important in recent years. The Colorado River, which provides approximately 90 percent of Southern Nevada’s water supply, continues to experience serious and sustained drought conditions. As a result, Lake Mead’s water levels have dropped more than 100 feet in the past ten years, and Lake Mead is at about half of capacity in early 2009. Mandatory water shortages and critical infrastructure outages are possible should these conditions persist. As a result, the SNWA continues to aggressively pursue development of non-Colorado River resources, work with the Colorado River Basin States on management strategies and initiate construction of a new Lake Mead intake to preserve system capacity.

CONSERVATION ACHIEVEMENTS

Since 1991, the SNWA has developed and implemented one of the most progressive and comprehensive water conservation programs in the nation. Success is measured through the implementation and achievement of regional conversation goals. Over time, these goals have been adjusted to induce higher levels of conservation. An overview of past SNWA conservation efforts is outlined below.

In the mid-1990s and using 1990 as a base year, the SNWA established a goal of 25 percent conservation by 2010. This is equivalent to roughly 280 gallons per capita per day (GPCD).

During the mid-1990s, the SNWA purveyor members also agreed to follow a series of conservation "best management practices" published by the Bureau of Reclamation. The agreement was an important first step in implementing more consistent conservation measures across the service boundaries of SNWA purveyor member agencies. The agreement was updated in 1999 and a comprehensive five-year conservation plan was approved by the SNWA Board of Directors. An update to the conservation plan was submitted to and approved by the Bureau of Reclamation in 2004.

Southern Nevada made consistent progress towards its conservation goal throughout the 1990s. However, beginning in 2000, levels of conservation began to decline, falling short of the interim goals needed to reach a 25 percent conservation goal by 2010. In response, the SNWA and its member agencies launched a conservation strategic planning process in 2001. In 2002, as drought conditions in the Colorado River Basin became more severe, the SNWA member agencies recognized that a more immediate and actionable community response was necessary. As a result, the conservation strategic planning effort evolved to address drought conditions and ultimately set the stage for development of the SNWA Drought Plan. The Drought Plan was approved by the SNWA Board of Directors in February 2003 and implemented thereafter by SNWA's member agencies.

What is GPCD? GPCD is a metric used by some communities to measure water consumption. For the SNWA, it provides a general means of monitoring water-use trends and for tracking conservation progress. A variety of factors influence GPCD including climate, demographics, water-use accounting practices and economic conditions. SNWA calculates total system GPCD by first totaling water use for its member agencies, adjusting that water use to account for weather variations, and then dividing by the estimated SNWA population within the SNWA's member agencies' jurisdictions. That number is then divided by the days in a year (weather adjusted total use/total population/365 days).

Following the implementation of the Drought Plan in 2003, conservation and drought savings rebounded with a 23.1 percent savings for that year. A year later, the community surpassed the 25 percent conservation goal set in 1996 – six years ahead of schedule.

In an effort to maintain and build upon this success, a citizens advisory committee recommended that the SNWA pursue a strategy to decrease total water demand from 2004 levels to 250 GPCD by 2010 and to 245 GPCD by 2035. The SNWA Board of Directors adopted this goal in 2005.

The following years witnessed extraordinary conservation achievements. Participation in the SNWA's rebate programs realized record-breaking results, including peak participation levels in almost every area. A summary of key SNWA conservation accomplishments is provided in **Appendix A**.

These efforts resulted in a reduction of Southern Nevada's annual water consumption by nearly 21 billion gallons (between 2002 and 2008), despite a population increase of 400,000 people during that span. Available data indicate that in 2008 the SNWA achieved its 2005 conservation goal of 250 GPCD – two years ahead of schedule.

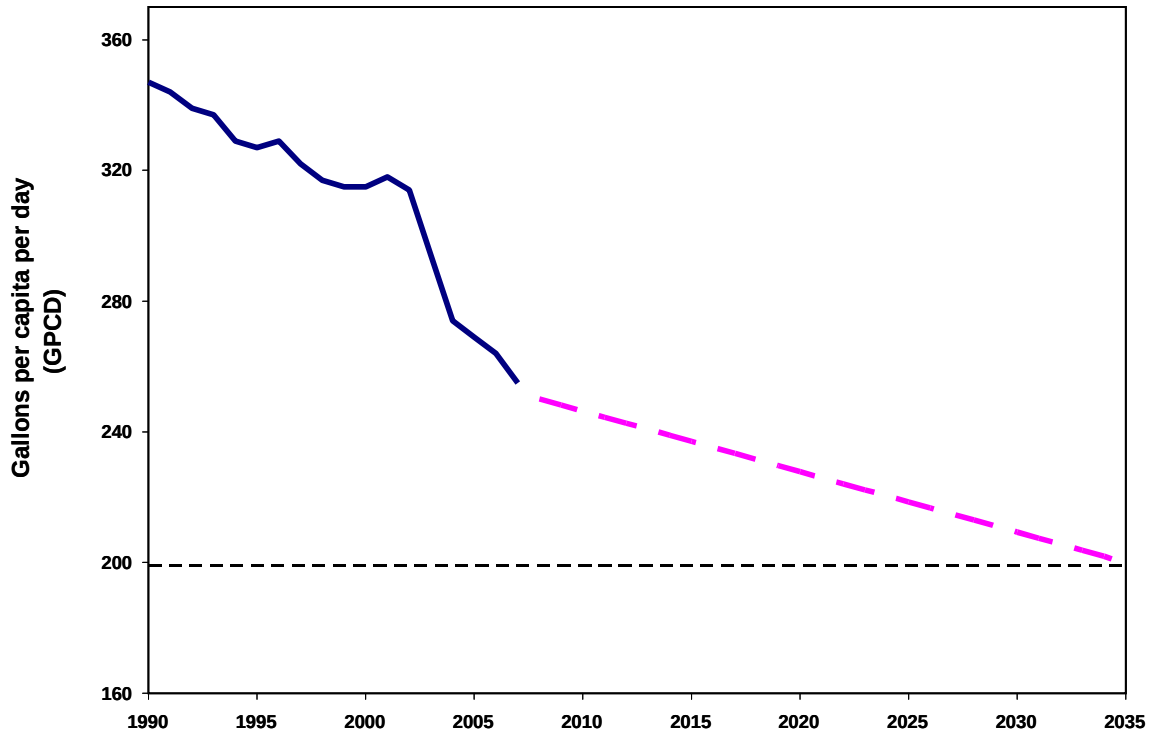
These past achievements provide the basis for current efforts. The following sections provide an overview of the SNWA's current conservation goal and a description of how the SNWA will make progress toward this goal during the 5-year planning period. A table with discussion and analysis also is provided in **Appendix B**.

The 2009-2014 Conservation Plan will be submitted to the U.S. Bureau of Reclamation in fulfillment of the requirements for Section 210(b) of the Reclamation Reform Act of 1982 and to the State of Nevada Department of Conservation and Natural Resources, Division of Water Resources in fulfillment of the requirements for Nevada Revised Statutes Chapter 540.

CONSERVATION GOALS

Building upon previous success, the SNWA Board of Directors in 2009 adopted a new conservation goal of 199 GPCD by 2035 for the community. Figure 1 outlines the SNWA's previous conservation achievements (described above) and provides projected achievements through the year 2035.

Figure 1 – Conservation Achievements (1990-2007) and Projections (2008-2035)



The SNWA estimates that more aggressive conservation outreach and education, and continuance of incentive programs, rate setting and regulation will yield these additional GPCD savings. Figures 2 and 3 compare the estimated volume of water that would be saved by conservation pre- and post-adoption of the SNWA's current conservation goal. A table with projected annual GPCD reductions for the 2009-2014 planning period is provided in **Appendix C**.

FIGURE 2 – SNWA Water Demands and Conservation (250 GPCD by 2010 and 245 GPCD by 2035 Conservation Goals)

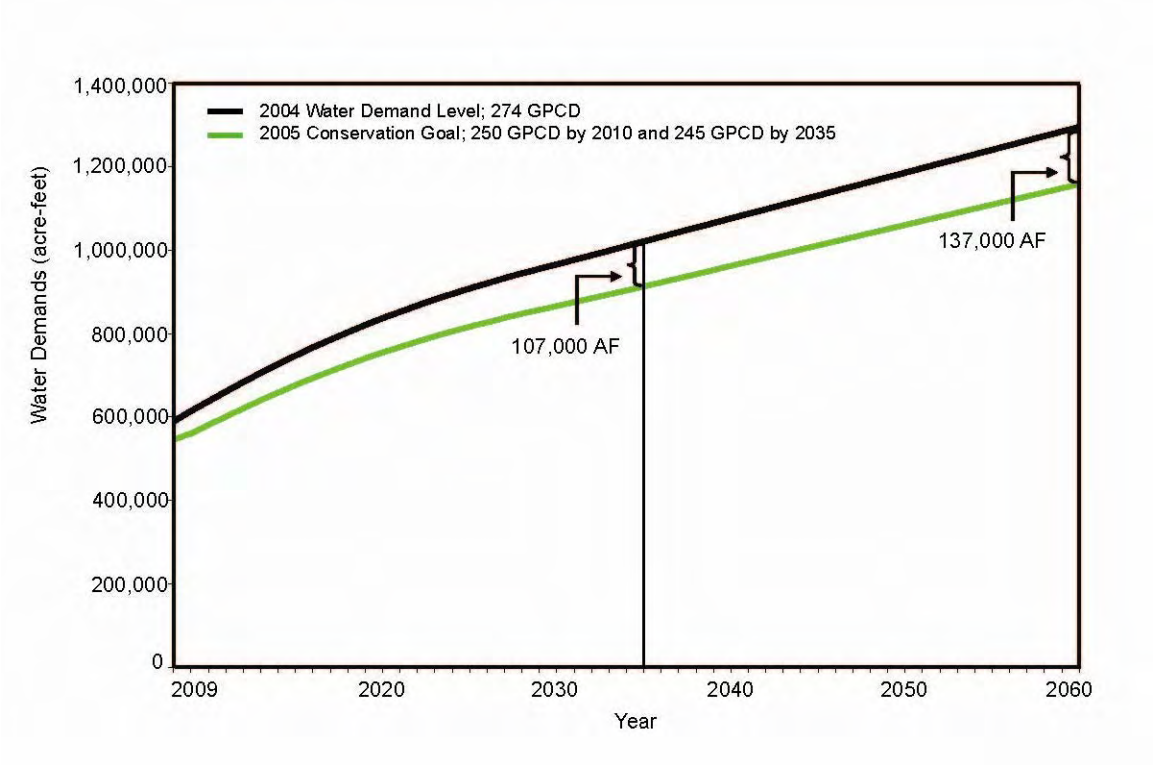
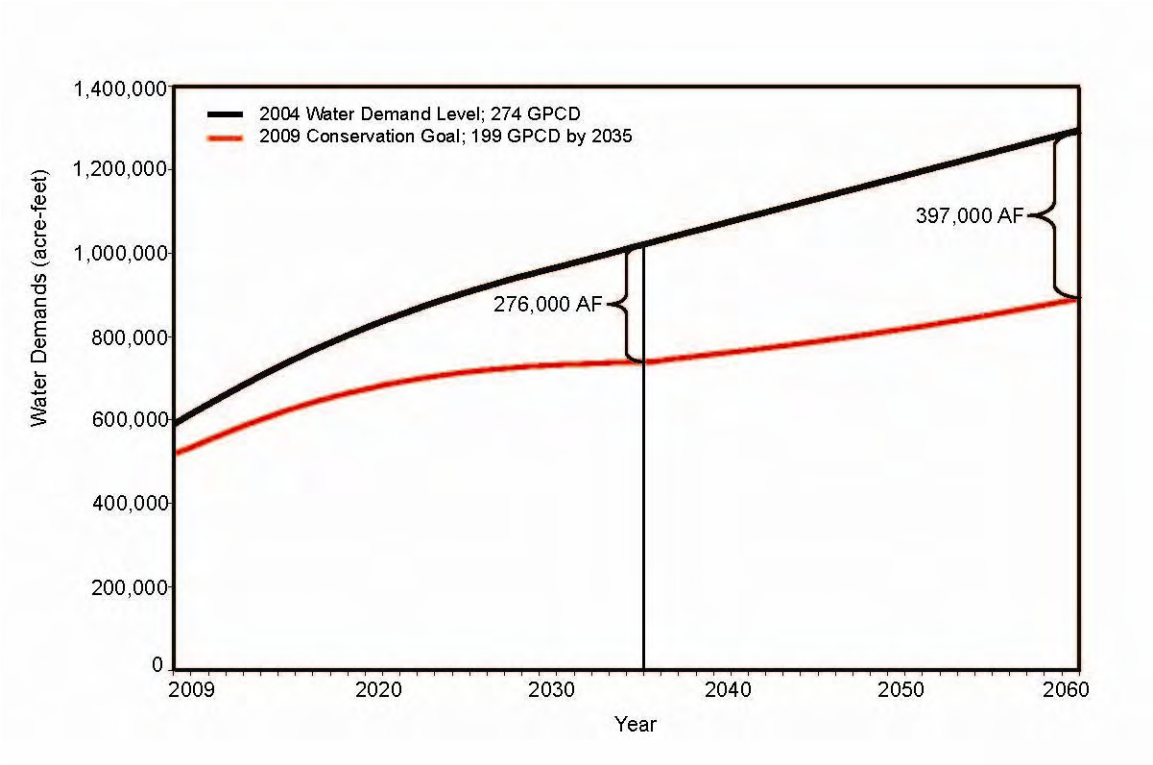


FIGURE 3 – SNWA Water Demands and Conservation (199 GPCD by 2035 Conservation Goal)

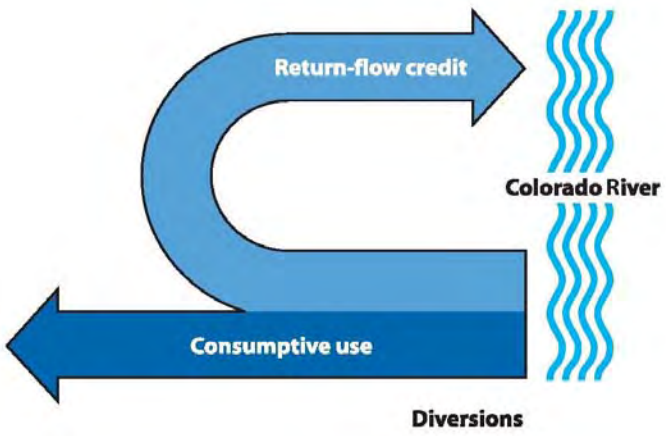


CONSERVATION STRATEGIES

Although the SNWA supports and promotes water conservation both indoors and outdoors, significant effort goes into promoting more efficient water use outdoors. Approximately 60 percent of the water delivered to customers is used consumptively, meaning it can be used just once. For example, landscape irrigation is collectively the single largest consumptive water use.

In Southern Nevada, all indoor water use that reaches the sanitary sewer is reclaimed. It is either returned to the Colorado River, or delivered to other municipal uses, such as golf course irrigation or power plant use. In accordance with Bureau of Reclamation policy, the SNWA receives credit to withdraw one acre-foot of water from the Colorado River for every acre-foot of Colorado River water that is treated and returned (figure 4). As a result, additional local reuse and indoor conservation does not enlarge the SNWA's resource portfolio.

Figure 4 – Return-Flow Credits



The SNWA's conservation success is partly dependent upon the water management and business practices of its individual member agencies. There are three key areas related to demand management that are within the purview of the member agencies: metering, managing unaccounted-for water and tiered water rates. The SNWA and its member agencies will continue to use these base water management practices to sustain previous GPCD reductions and achieve future gains.

Metering – Metering is the foundation of sound demand-management programs. SNWA member agencies will continue to meter all customer connections for all classes of water in accordance with American Water Works Association standards.

All purveyors operate on-going meter maintenance and replacement programs. Meters are read monthly and data is classified and retrievable on the basis of customer class, meter size, land use and other relevant variables. Purveyors have the ability to identify unusual water use patterns, such as spikes in consumption due to leaks, and to notify customers of unusual account activity. In addition, the three largest purveyors, Las Vegas Valley Water District (LVVWD), City of Henderson and City of North Las Vegas have all expanded their automated meter reading (AMR) systems, which record water usage data at each meter and transmit the information through radio waves to specialized receiving units. AMR systems eliminate the need for individual manual reads, improve meter-reading efficiency and provide customers with improved billing processes.

Unaccounted-for Water – All water delivery systems experience losses. In the water industry, these losses are known as unaccounted-for water. Unaccounted-for water is the difference between an agency's total water production and the sum of all metered uses. Such losses are predominantly associated with leaks, variations in meter accuracy and theft.

The SNWA and its member agencies have a variety of active programs to more effectively account for total production. While these ongoing efforts will continue to improve accounting accuracy for and

minimize loss of unaccounted-for water, measurable GPCD savings are not attributed to this management tool. The following programs are conducted throughout the region:

- Working together, the SNWA's member agencies have created and adopted the Uniform Design and Construction Standards. These detailed construction standards assure that delivery systems meet or exceed industry standards, including water-distribution systems pressure zones, main sizes and service lateral installations.
- Efforts are ongoing in all service areas to identify older infrastructure that has been deemed susceptible to leaks. For example, most cast iron mains are being systematically replaced, as are polyethylene service connections that do not appear to be meeting longevity expectations.
- Prior to installing facilities, soil testing is conducted to identify potential threats to the distribution system's integrity. For example, where testing indicates that soil chemistry will be destructive to copper piping, plastic sleeves are installed over the service line to prevent corrosion.
- Reservoirs are thoroughly inspected at regular intervals to assure their integrity; special monitoring devices beneath each reservoir detect and report leakage.
- Production meters are regularly maintained and calibrated.
- All customer meters are monitored for consumption anomalies. Small customer meters are subject to a planned replacement program based upon life expectancy and large meters are regularly maintained and calibrated.
- A substantial portion of purveyor distribution lines have permanent listening devices installed that can signal patrolling employees of leaks that fail to surface and assist in accurately determining the leak location for excavation.
- Interagency collaboration speeds leak repairs through fast-tracking line location ("call-before-you-dig") and prompt repair. Records are kept of the estimated system loss for each leak repaired.

Water Rate Setting – All potable water purveyors will continue to utilize multi-tier increasing block rate structures. These pricing structures provide financial incentive for all water users to implement and participate in conservation measures.

In the past several years, local purveyors have implemented major rate restructuring and increases specifically for the purpose of accelerating conservation. This restructuring involves significant price increases in the higher tiers and a compression of tier thresholds. The impact of water rates on GPCD reductions is discussed in detail below.

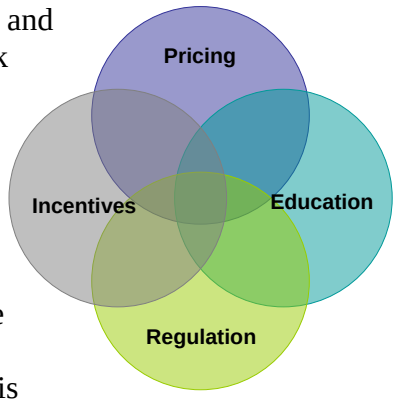
CONSERVATION MEASURES

In addition to municipal water management practices discussed in the preceding section, the SNWA and its member agencies will continue to utilize a variety of demand-management measures to promote conservation and reduce overall water use. These include a combination of the following:

- Water Pricing: tiered-rate structures charge higher rates as water use increases. These rate structures encourage efficiency, while ensuring the affordability of water for essential uses.
- Incentives: incentives are flexible tools that invite the community to participate in the conservation effort. The SNWA has a number of "water smart" programs that are critical to achieving its conservation goals.

- Regulation: city and county governments have adopted a variety of land-use codes and water-use ordinances to promote the efficient use of Southern Nevada's water resources.
- Education: the SNWA's public-education programs are designed to elicit buy-in from the community and help residents understand that responsible water use is a critical part of living in a desert environment.

These measures, discussed in detail in the latter portion of this section, work in conjunction with one another to promote efficient water use. For example, water pricing (including water rates and water-waste fees) provides a financial signal for customers to reduce water use, which in turn, may lead some customers to seek out ways to improve their efficiency. Through passive and active education, customers learn about regulations (such as day-of-week watering restrictions) and incentive programs, which, when acted upon, will help the customer to save water, and therefore reduce the impact of rates. Ideally, these measures all drive customers to higher levels of efficiency.



The complex and inter-related nature of these conservation measures makes it difficult to attribute specific GPCD reductions to any one single measure. A table of the estimated GPCD reduction, and the amount of water estimated to be saved each year over the 5-year planning horizon, is included in **Appendix B**.

The following sections detail how the SNWA will utilize each of these conservation measures to achieve its conservation targets throughout the 5-year planning horizon.

Water Pricing

Price can be an effective instrument for reducing water demand. Research has consistently shown that water users respond in an inverse manner to changes in the price of water – in general, as the price of water increases, water use decreases. This principle, however, may only hold true for discretionary water use, the portion of a person's water use beyond what is necessary to meet their perceived basic needs.

Economists measure the relationship between pricing and demand as Price Elasticity of Demand (PED). Water PED measures the degree of customer water demand responsiveness due to changes in water rates, holding all other factors constant. Mathematically, PED is the percent change in water demand divided by the percent change in water rates. Water is typically considered relatively inelastic; that is, the response to a change in price is less than the degree of the price change. PED can only be estimated in retrospect and can be substantially influenced by economic conditions in the community, including income levels and other factors.

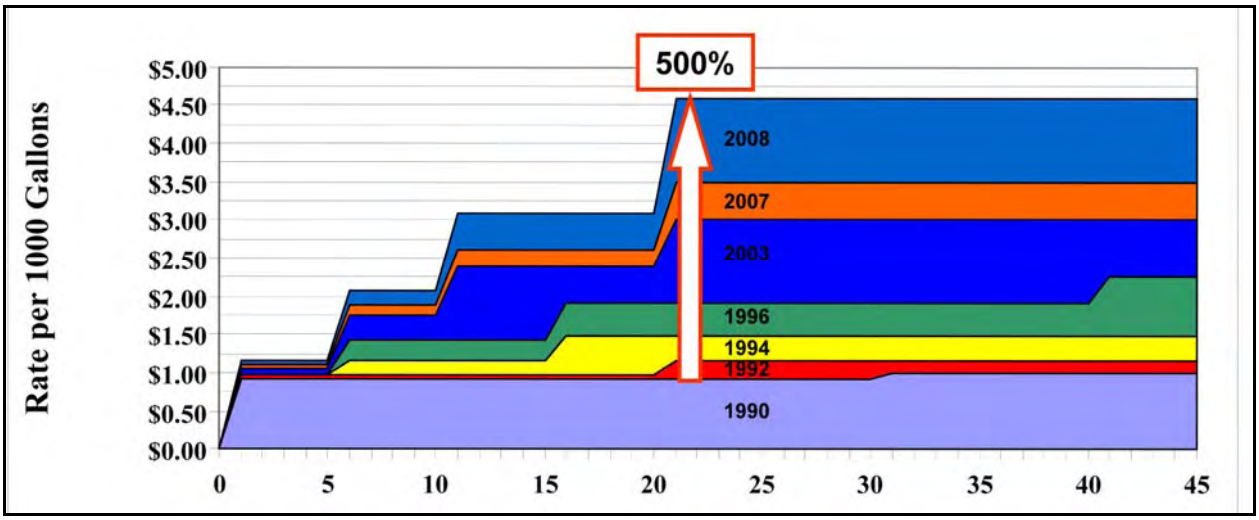
Water users respond to changes in water rates by changing water use practices and implementing available water conservation measures. In the short-run, water users may respond by reducing car washing or their showering time. This short-run response is difficult to quantify and may not be permanent as customer water-use patterns change over time. For the longer term, water users respond to rates by taking advantage of water conservation measures. These measures may include replacing fixtures and appliances with more efficient devices or participating in incentive programs, such as the

SNWA's Water Smart Landscapes Rebate Program. In fact, research shows that water bills are a principal reason for customer participation in incentive programs.

A common strategy for managing demand through pricing is the use of increasing block rates. Increasing block rates encourage water conservation by charging water users higher rates for higher volume use. Since 1995, SNWA member agencies have subscribed to a Memorandum of Understanding in which they agree to utilize progressive rate structures to manage demand. All SNWA member agencies currently use increasing block rates to encourage water conservation among high water users, while maintaining overall affordability. In 2005, the SNWA adopted the recommendations of a citizens advisory committee to promote water rates that sustain and advance conservation achievements by ensuring water rates keep pace with inflation.

While each of the SNWA's member agencies set water rates independently, all utilize similar rate principles to manage demand. For example, the Las Vegas Valley Water District (LVVWD), which delivers nearly 70 percent of the public water supply in Southern Nevada, has a long history of encouraging conservation through water rates. Figure 5 illustrates successive modifications to the tiered rates. These include expanding from two tiers to four, increasing the rate for upper tier water and compressing upper tier thresholds. Since 1990, the rate at the 20,000 gallon threshold has increased by 500 percent. During the same time period (1990-2008), the Consumer Price Index increased 64 percent. While rates are an important conservation measure, public water agencies also have an obligation to the well being and vitality of the communities they serve.

FIGURE 5 – LVVWD Rate History (1990-2008)



The SNWA's conservation goal of 199 GPCD by 2035 is predicated upon continued performance in all conservation measures. Whereas SNWA and its member agencies operate some of the nation's most aggressive regulatory, education and incentive programs, these programs may approach their practical limitations over the planning period. Rates, on the other hand, have long-term potential to continue to influence demand as needed. As such, SNWA member agencies are committed to periodically adjusting rates to a level necessary to meet its conservation goals.

Incentives

The SNWA recognizes that long-range demand management requires not only implementing progressive conservation strategies for new customers (such as landscape codes for new development), but also creating incentives for existing customers to improve their water efficiency. The SNWA is nationally-renowned for its customer-incentive programs. The following incentives will continue to play a significant role over the next five years in helping the community meet its water conservation goal.

Water Smart Landscapes Rebate Program – The Water Smart Landscapes (WSL) Rebate Program offers financial incentives to residents who replace water-thirsty lawn with water-efficient landscaping. Since the majority of Southern Nevada's water is used outdoors on landscaping, the WSL program targets one of the largest consumptive water uses. The current program rebate amount is $1.50 for the first 5,000 square feet of lawn removed and $1 for additional lawn removed, up to $300,000. Based on prior achievements and a community-wide turf assessment, the WSL program is projected to remain a major demand-reduction tool as the SNWA works toward its new conservation goal.

Rebate Coupons – The SNWA offers a variety of instant rebate coupons for single-family, residential property owners, including Pool Cover Instant Rebate Coupon, Rain Sensor Instant Rebate Coupon and Smart Irrigation Controller Rebate Coupon. These rebates are expected to contribute to significant GPCD reductions in the future, based on past program involvement and current research initiatives.

An exposed pool can lose approximately 50 gallons of water per square foot per year to evaporation. Pool covers reduce evaporation by 90 percent, limit windblown debris and conserve energy. Southern Nevada pool owners are encouraged to cover their pools to conserve water and save money on their water bills. The SNWA Pool Cover Instant Rebate Coupon value is $50 or 50 percent off the purchase price of a pool cover, whichever is less, or $200 or 50 percent off the purchase of a permanent, mechanical pool cover.

Water Efficient Technologies – The Water Efficient Technologies (WET) Program was initiated in 2001 and offers financial incentives to commercial and multi-family property owners who install water-efficient devices that save at least 250,000 gallons annually. The SNWA plans to continue to offer a menu of pre-approved water-saving technologies with predictable savings and a defined monetary incentive, including high-efficiency toilets, showerheads, and urinals; converting a grass sports field to an artificial surface; converting from old water cooled ice machines to air-cooled machines; and retrofitting standard cooling towers with high-efficiency drift elimination technologies. Additionally, businesses can work directly with the SNWA to implement a custom technology that meets their needs. Currently, the SNWA offers a rebate of up to $8 per 1,000 gallons conserved annually for reducing nonconsumptive-use water or $25 per 1,000 gallons conserved annually for reducing consumptive-use water through technology improvements. Commercial and multi-family property owners are encouraged to apply to the WET program to receive financial and conservation incentives.

Regulation

The SNWA works collaboratively with its member agencies to develop and implement regulations that promote water conservation.

Development Codes and Policies – Member agencies adopted landscape and plumbing codes in the mid-1990s to limit water use. Under the 2003 drought plan, all agencies adopted more stringent policies for landscape watering, vehicle washing, lawn installation, mist systems and golf course water budgets during declared drought. In 2005, a citizens advisory committee recommended permanent adoption of these drought restrictions as a way to help meet long-term resource needs for the community. To this end, the SNWA and its member agencies have agreed to and will work to adopt the drought response measures as permanent conservation measures for the community as part of the overall conservation effort. These policies and previously adopted development codes, which are among the most stringent in the United States, include:

- Landscape watering: watering groups are mandatory and limit watering to one day a week in winter, three days a week in spring and fall, and prohibit watering from 11 a.m. to 7 p.m. in summer.
- Vehicle washing: a positive shutoff nozzle is required for residential vehicle washing. Commercial vehicle washing is prohibited unless water is captured to the sanitary sewer where that water can be treated and reused.
- Lawn installation: turf installation is prohibited in new residential front yards and is limited to a maximum of 50 percent the landscapeable area in new residential backyards.
- Mist systems: use of commercial mist systems is limited to summer months.
- Golf course water budgets: golf courses are subject to mandatory water budgets (6.3 acre feet of water per year per irrigated acre).
- Fountains and ornamental water features: these features are prohibited except as allowed by jurisdiction policy.
- Resort water efficiency plans: a hotel/resort water efficiency plan must be submitted and approved by an appropriate water purveyor, prior to the issuance of associated permits.
- Water waste: ordinances and service rules prohibit water waste (allowing water to runoff into streets and/or into adjoining property). It also is considered water waste to violate policies that limit the time of day or assigned days of the week when watering may occur. If wasteful behavior isn't corrected, property owners are assessed citations and fees. Fees double with additional violations and are assessed consecutively based upon the previous 18-month history for the account.
- Plumbing fixtures: each new, remodel or replacement of plumbing fixtures in residential or commercial buildings shall incorporate minimal standards for plumbing fixtures, including water-use standards for toilets, faucets, showerheads and urinals.

Education

In addition to extensive conservation and incentive programs, the SNWA will continue to maintain an education and public outreach campaign to assist residents and businesses with conservation efforts. Currently, the campaign utilizes a variety of media to educate customers on the need for conservation, to provide practical tips on how to conserve, and to put customers in touch with SNWA experts who can help them reduce water use at their properties. The efforts include advertising, community events, publications, an interactive Web site, public-private partnerships, and demonstration gardens to inspire water-efficient landscape designs. Education is an ongoing initiative for the SNWA that will contribute to GPCD reductions during the 5-year planning period.

The SNWA believes that education and outreach help to drive the community towards its incentive programs (for example to the WSL program) where specific reductions are measurable. Without education and promotion, these programs are not likely to have realized the level of conservation gains achieved to date or that are projected in future years.

The following section describes current education and public outreach initiatives employed by the SNWA. While actual products and services may vary, the SNWA expects to continue to provide this type and level of service throughout the 5-year planning horizon.

Demonstration Gardens – Through the combined efforts of the SNWA and its member agencies, there is a demonstration garden in every part of the valley. The SNWA also promotes visits to the Springs Preserve, a 180-acre facility that offers hundreds of examples of water-efficient landscaping, as well as classes by master gardeners and horticulturists. Advice from the facility's staff is available seven days a week. Free tours also are available for area students.

The SNWA supports the development of smaller demonstration projects throughout the Las Vegas Valley to show the public that water-smart landscaping is attractive and the most water-efficient choice for Southern Nevada. Currently, schools may apply annually for SNWA funded conservation grants of up to $5,000 to develop demonstration projects for their own campuses. Grants also are available for conservation-related curriculum programs or other approved activities.

Public Outreach Efforts and Events – The SNWA employs a variety of community outreach efforts to educate customers on the need for conservation and on the programs and services that are available. Customers can easily access this information through the Conservation Helpline, a phone center that connects customers to rebate and conservation program information, free landscape publications, landscape watering schedules, and a place to report water waste. The same information is available online at **snwa.com**. The SNWA's Web site includes interactive features that allow customers to enter their address and receive a customized landscape watering schedule based on their assigned watering days, online rebate program applications, landscape sample designs, and landscape care tips. In addition, the SNWA produces a variety of collateral materials to educate consumers. These include:

- Landscape Watering Schedule: This schedule explains the SNWA's mandatory watering restrictions, illustrates which day(s) of the week each watering group may water, and offers practical tips for irrigating efficiently. The schedule has been included with customer water bills, published in SNWA newsletters and is available at member agency locations valley-wide.

- Water Smart Living: This quarterly publication is mailed to more than 675,000 residents in Southern Nevada. It includes drought updates, information on conservation programs and incentives, and tips for landscape care and using water more efficiently outdoors.

- Simply Beautiful Book and CD: These free tools help homeowners to plan water-smart landscapes. The user-friendly book and interactive CD include step-by-step planning instructions, a searchable plant database and sample designs.

- Sample Designs: The SNWA teamed with the American Society of Landscape Architects to produce five sample landscape designs. The designs include a variety of water-efficient plants

to help homeowners convert their existing landscape or to install the right landscape from the start.

- Water Smart Calendar: This annual publication enables the SNWA to provide information on water-smart plants and conservation tips, and keeps that information in front of customers year-round. The twelve-month calendar is sent to single-family homeowners and includes landscape watering restrictions and water-smart landscape inspiration.

- Water Ways: This monthly television program airs on local government cable channels and includes segments focusing on water conservation. The program airs daily.

- Videos: Instructional videos are available free of charge to customers. These include "Detecting and Silencing Leaks," a video to help customers find and fix leaks in and around their property, and "Lawn to Lush," a video to walk customers through the steps of converting lawn to water-smart landscaping.

The SNWA also attends a variety of community events to educate customers on conservation issues. In addition, SNWA and member agency representatives provide valuable landscape and irrigation expertise through classes taught at several venues in Southern Nevada.

Advertising Campaigns – A long-term commitment to water conservation includes an aggressive advertising campaign that utilizes television, radio and print advertisements to reach target audiences. New community advertising campaigns challenge homeowners, businesses and community associations to take conservation to the next level by taking control of their irrigation clocks and replacing more grass with water-smart landscaping.

The SNWA also created a bicultural campaign, which includes television, radio, and print ads designed specifically for the Spanish-speaking audience. This allows the SNWA to effectively communicate the need for conservation as well as inform residents of the rebate programs available to them.

Youth Education Programs **–** The valley's youth play an important role in SNWA outreach efforts and the SNWA is committed to educating the next generation on the importance of water resources and conservation. The SNWA has partnered with the Springs Preserve to develop a comprehensive education program known as H2O University for teachers in the Clark County School District. One innovative component of the program is the Youth Advisory Council, which allows select high-school students to pursue an interest in water-related issues and further develop leadership skills. Previous Youth Advisory Council projects include planting a demonstration garden at a local elementary school, helping to restore wetlands in the Las Vegas Wash and creating the first water-smart home with a local homebuilder.

In addition, the SNWA offers the Water Education Institute, a continuing education program for teachers. Elementary and secondary teachers attend a two-day workshop and take with them lesson plans and activities they can use in the classroom. Nearly 600 teachers have participated in the program.

Public-Private Partnerships – The SNWA partners with the private sector to promote conservation efforts. These include partnering with local retailers, landscapers, homebuilders, and the business community. Partnerships include:

- Water Conservation Coalition (WCC): Established in 1995, the WCC is a group of local business and community leaders that have partnered to promote water-efficient practices in the Southern Nevada business community. WCC members speak to professional and civic organizations to explain the benefits of increased water efficiency, encourage other businesses within their industries to participate in SNWA incentive programs and identify water conservation projects within the community to organize and sponsor. In 2008, the WCC completed water-efficient upgrades at Boys Town Nevada, a group of homes that provide short-term residential services for at-risk children. The project is estimated to save 2.2 million gallons of water each year.

- Water Upon Request: The Nevada Restaurant Association, WCC and SNWA partner with local restaurants, which agree to serve water only when patrons request it. This program saves participating restaurants water, time and money by eliminating unconsumed glasses of water. For every glass of water not served, as much as 1.5 to more than 3 gallons of water is saved. There are currently more than 300 restaurants participating in the program.

- Water Smart Contractor: The key to preventing many water waste problems is efficient landscape design. The SNWA provides a course in water-efficient landscape and irrigation design and installation for licensed landscape contractors. Contractors who complete the course and pass an exam are certified as Water Smart Contractors. Classes are offered in both English and Spanish. To date, more than 100 companies have completed the program.

- Water Smart Home: The SNWA has partnered with the Southern Nevada Home Builders Association to develop a program that certifies new homes as water smart. Homeowners purchasing a water-smart home can save as much as 75,000 gallons of water per year. This is the nation's largest program for water efficiency in new homes, with more than 7,000 water smart homes constructed so far.

  In addition, the SNWA consistently engages with the Environmental Protection Agency (EPA) in developing new national standards for WaterSense, a partnership program that provides information on products to save water and protect the environment. The SNWA's Water Smart Home program is the principal model for the WaterSense New Homes Program. In 2006, the SNWA was the first water agency to receive the EPA's Water Efficiency Leadership Award for its comprehensive suite of progressive water efficiency programs.

- Water Smart Car Wash: This program encourages residents to use commercial car wash facilities instead of washing their vehicles at home by offering residents instant coupons for dozens of valley car washes. Water Smart Car Washes recover all of their wastewater for treatment and reuse. Water used at these facilities is either reused on site, or treated and returned to Lake Mead for return-flow credits.

- Linen Exchange: Nearly two dozen resorts and other leading properties participate in this voluntary program through which linens are changed only on the third day of a guest's stay,

unless otherwise requested. The average savings of washing linens and towels every three days is about 50 gallons per room each day.

RESEARCH

In addition to existing demand-management tools, ongoing research enables the SNWA to make informed decisions regarding water policy and programs. The SNWA recognizes the value and necessity for research and innovation in water conservation and has developed a number of research initiatives to foster cutting edge techniques and technologies. These research initiatives are expected to continue during the 5-year planning horizon.

The following section outlines present research initiatives and their impacts to the community's water conservation efforts. A listing of completed research initiatives is included in **Appendix D**.

Current Research Initiatives

EPA New Homes Water Efficiency Benchmarking **–** SNWA is one of several utilities participating in a nationwide study of water efficiency in new homes. The research includes comparisons of water consumption in new and older homes, as well as construction and monitoring of new homes with high-efficiency fixtures and appliances. To date, the SNWA has secured Pulte Homes as a participating builder and developed relationships with product representatives. While the current housing market has negatively impacted study recruitment, the first resident has moved into a study home.

Watering Group Assistant Study **–** SNWA is pioneering a research project to test a new water-saving device that eliminates the need for residents to change their watering clock to comply with mandatory seasonal day-of-week and time-of-day watering restrictions. The Watering Group Assistant automatically adjusts an irrigation clock to a property's assigned watering group throughout the year. SNWA is providing approximately 600 units made from four different manufacturers for test purposes.

Smart Controls Exemption Study **–** SNWA is testing whether residents using smart irrigation controllers that receive an exemption from day-of-week watering restrictions can save more water than conventional controls subjected to landscape watering restrictions.

Leak Detection Research **–** Using Automated Meter Reading (AMR) technology, SNWA assisted the Las Vegas Valley Water District in identifying persistent leaks. Coupled with forthcoming automated messaging being developed, such a leak detection program could save hundreds of millions of gallons each year.

School Audits **–** SNWA facilitated water efficiency audits of 30 Clark County School District (CCSD) schools, which included review and accounting of all indoor and outdoor uses. The research will be used to further develop custom conservation programming for this unique and largest of customer groups served by local purveyors.

Turf Assessment Project – SNWA has been pioneering the use of aerial imagery to find and estimate the amount of lawn at local properties. While technical challenges and overlying tree canopy have thus far prevented a valley-wide accounting of the amount of lawn in Southern Nevada, the data collected has proven very valuable for targeted direct-mail outreach to residents with significant amounts of

grass. This has helped boost enrollment in the SNWA's Water Smart Landscapes Rebate Program, as well as assist with various studies.

Smart Sprinklers Study – SNWA is planning to begin research in 2009 on a variety of possible improvements to distribution uniformity of popup sprayheads. Such improvements should theoretically facilitate water savings in lawn areas.

CONCLUSION

The SNWA has one of the most dynamic and comprehensive water conservation programs in the nation. While the general strategies employed will continue to yield results, the SNWA constantly pursues refinement and innovation.

The 2004-2009 planning period witnessed significant conservation results that helped to safeguard Southern Nevada's resources during evolving global, national and regional circumstances.

It is anticipated that the next five years are likely to reveal even greater challenges and opportunities. The SNWA supports continual cycles of program planning, implementation and evaluation. This on-going process allows the agency to succeed in meeting community needs under a diverse set of circumstances. These efforts are expected to yield new opportunities that may result in further improvement of this five-year plan.

Appendix A
Conservation Achievements

The SNWA witnessed substantial conservation gains during the 2004-2009 planning period, contributing to the following noteworthy accomplishments:

- Now in its tenth year, the Water Smart Landscape (WSL) Rebate Program has helped the community to upgrade more than 125 million square feet of lawn to water-efficient landscaping, saving the community more than 25 billion gallons of water.

- More than 14,000 coupons have been distributed to participants in the Pool Cover Instant Rebate Coupon Program, contributing to a total of 480 million gallons of water saved.

- The Irrigation Clock Rebate Program, which provided financial assistance for customers to upgrade landscape irrigation controllers to models that can increase water efficiency, facilitated replacement of nearly 2,000 controllers for residential and commercial properties, saving the community more than 150 million gallons of water.

- Since 2001, participating businesses in the Water Efficient Technologies (WET) Program have saved more than 1.75 billion gallons of water.

- In 2008, the SNWA, in partnership with the U.S. Environmental Protection Agency's WaterSense program, hosted the inaugural WaterSmart Innovations Conference & Expo. Roughly 1,200 participants from across the U.S. and 17 foreign nations came together to share information about conservation programs and water-efficient technologies.

Appendix B
2009-2014 Conservation Plan Measures, Estimated Savings and Implementation Schedule

2009

	Water Pricing Influence Coefficient	Water Pricing Influence GPCD	Education & Ethic Influence Coefficient	Education & Ethic Influence GPCD	Other Influence Coefficient	Other Influence GPCD	TOTAL REDUCTION (GPCD)	TOTAL REDUCTION (ACRE-FEET)
Water Smart Landscapes Program	40%	0.34	40%	0.34	20%	0.17	0.85	1829
Water Efficient Technologies Program	40%	0.064	20%	0.032	40%	0.064	0.16	351
Coupon Programs	40%	0.024	30%	0.018	30%	0.018	0.06	134
Adoption of improved equipment, appliances and fixtures	25%	0.1825	25%	0.1825	50%	0.365	0.73	1571
Landscape Development Codes*	0%	0	0%	0	0%	0	0	0
Other	40%	0.02	40%	0.02	20%	0.01	0.05	100
TOTAL	N/A	0.63	N/A	0.59	N/A	0.63	1.85	3985

Note: Calculations assume a linear annual decrease in total GPCD consistent with achieving a 199 GPCD by 2035 conservation goal. Actual savings may be higher or lower in a given year.

As discussed on page 10, these figures represent estimated savings based on SNWA demand-management measures. Water Pricing and Education & Ethic achievements are embedded in the total GPCD reduction. For the purposes of this plan, those estimated contributions have been outlined in the table above.

*****Based on estimated population projections, the SNWA does not anticipate Landscape Development Codes contributing to GPCD reductions in 2009. Savings are represented for 2010 through 2014 (see pages 21-25), as population increases are expected.

2010

	Water Pricing Influence Coefficient	Water Pricing Influence GPCD	Education & Ethic Influence Coefficient	Education & Ethic Influence GPCD	Other Influence Coefficient	Other Influence GPCD	TOTAL REDUCTION (GPCD)	TOTAL REDUCTION (ACRE-FEET)
Water Smart Landscapes Program	40%	0.176	40%	0.176	20%	0.088	0.44	977
Water Efficient Technologies Program	40%	0.064	20%	0.032	40%	0.064	0.16	366
Coupon Programs	40%	0.024	30%	0.018	30%	0.018	0.06	140
Adoption of improved equipment, appliances and fixtures	25%	0.1825	25%	0.1825	50%	0.365	0.73	1638
Landscape Development Codes	0%	0	0%	0	100%	0.45	0.45	1006
Other	40%	0.004	40%	0.004	20%	0.002	0.01	23
TOTAL	N/A	0.45	N/A	0.41	N/A	0.99	1.85	4150

Note: Calculations assume a linear annual decrease in total GPCD consistent with achieving a 199 GPCD by 2035 conservation goal. Actual savings may be higher or lower in a given year.

As discussed on page 10, these figures represent estimated savings based on SNWA demand-management measures. Water Pricing and Education & Ethic achievements are embedded in the total GPCD reduction. For the purposes of this plan, those estimated contributions have been outlined in the table above.

2011

	Water Pricing Influence Coefficient	Water Pricing Influence GPCD	Education & Ethic Influence Coefficient	Education & Ethic Influence GPCD	Other Influence Coefficient	Other Influence GPCD	TOTAL REDUCTION (GPCD)	TOTAL REDUCTION (ACRE-FEET)
Water Smart Landscapes Program	40%	0.168	40%	0.168	20%	0.084	0.42	977
Water Efficient Technologies Program	40%	0.064	20%	0.032	40%	0.064	0.16	380
Coupon Programs	40%	0.024	30%	0.018	30%	0.018	0.06	146
Adoption of improved equipment, appliances and fixtures	25%	0.1825	25%	0.1825	50%	0.365	0.73	1701
Landscape Development Codes	0%	0	0%	0	100%	0.42	0.42	968
Other	40%	0.024	40%	0.024	20%	0.012	0.06	144
TOTAL	N/A	0.46	N/A	0.43	N/A	0.96	1.85	4316

Note: Calculations assume a linear annual decrease in total GPCD consistent with achieving a 199 GPCD by 2035 conservation goal. Actual savings may be higher or lower in a given year.

As discussed on page 10, these figures represent estimated savings based on SNWA demand-management measures. Water Pricing and Education & Ethic achievements are embedded in the total GPCD reduction. For the purposes of this plan, those estimated contributions have been outlined in the table above.

2012

	Water Pricing Influence Coefficient	Water Pricing Influence GPCD	Education & Ethic Influence Coefficient	Education & Ethic Influence GPCD	Other Influence Coefficient	Other Influence GPCD	TOTAL REDUCTION (GPCD)	TOTAL REDUCTION (ACRE-FEET)
Water Smart Landscapes Program	40%	0.16	40%	0.16	20%	0.08	0.40	977
Water Efficient Technologies Program	40%	0.064	20%	0.032	40%	0.064	0.16	394
Coupon Programs	40%	0.024	30%	0.018	30%	0.018	0.06	151
Adoption of improved equipment, appliances and fixtures	25%	0.1825	25%	0.1825	50%	0.365	0.73	1764
Landscape Development Codes	0%	0	0%	0	100%	0.40	0.40	950
Other	40%	0.04	40%	0.04	20%	0.02	0.10	240
TOTAL	N/A	0.47	N/A	0.43	N/A	0.95	1.85	4475

Note: Calculations assume a linear annual decrease in total GPCD consistent with achieving a 199 GPCD by 2035 conservation goal. Actual savings may be higher or lower in a given year.

As discussed on page 10, these figures represent estimated savings based on SNWA demand-management measures. Water Pricing and Education & Ethic achievements are embedded in the total GPCD reduction. For the purposes of this plan, those estimated contributions have been outlined in the table above.

2013

	Water Pricing Influence Coefficient	Water Pricing Influence GPCD	Education & Ethic Influence Coefficient	Education & Ethic Influence GPCD	Other Influence Coefficient	Other Influence GPCD	TOTAL REDUCTION (GPCD)	TOTAL REDUCTION (ACRE-FEET)
Water Smart Landscapes Program	40%	0.156	40%	0.156	20%	0.078	0.39	977
Water Efficient Technologies Program	40%	0.064	20%	0.032	40%	0.064	0.16	408
Coupon Programs	40%	0.024	30%	0.018	30%	0.018	0.06	156
Adoption of improved equipment, appliances and fixtures	25%	0.1825	25%	0.1825	50%	0.365	0.73	1825
Landscape Development Codes	0%	0	0%	0	100%	0.37	0.37	927
Other	40%	0.056	40%	0.056	20%	0.028	0.14	338
TOTAL	N/A	0.48	N/A	0.45	N/A	0.92	1.85	4631

Note: Calculations assume a linear annual decrease in total GPCD consistent with achieving a 199 GPCD by 2035 conservation goal. Actual savings may be higher or lower in a given year.

As discussed on page 10, these figures represent estimated savings based on SNWA demand-management measures. Water Pricing and Education & Ethic achievements are embedded in the total GPCD reduction. For the purposes of this plan, those estimated contributions have been outlined in the table above.

2014

	Water Pricing Influence Coefficient	Water Pricing Influence GPCD	Education & Ethic Influence Coefficient	Education & Ethic Influence GPCD	Other Influence Coefficient	Other Influence GPCD	TOTAL REDUCTION (GPCD)	TOTAL REDUCTION (ACRE-FEET)
Water Smart Landscapes Program	40%	0.152	40%	0.152	20%	0.076	0.38	977
Water Efficient Technologies Program	40%	0.064	20%	0.032	40%	0.064	0.16	421
Coupon Programs	40%	0.024	30%	0.018	30%	0.018	0.06	161
Adoption of improved equipment, appliances and fixtures	25%	0.1825	25%	0.1825	50%	0.365	0.73	1885
Landscape Development Codes	0%	0	0%	0	100%	0.35	0.35	899
Other	40%	0.068	40%	0.068	20%	0.034	0.17	438
TOTAL	N/A	0.49	N/A	0.45	N/A	0.91	1.85	4781

Note: Calculations assume a linear annual decrease in total GPCD consistent with achieving a 199 GPCD by 2035 conservation goal. Actual savings may be higher or lower in a given year.

As discussed on page 10, these figures represent estimated savings based on SNWA demand-management measures. Water Pricing and Education & Ethic achievements are embedded in the total GPCD reduction. For the purposes of this plan, those estimated contributions have been outlined in the table above.

Appendix C
Historical and Projected SNWA Total Water Use
GPCD Estimates

YEAR	Estimated and Projected SNWA Population	SNWA Total Usage (acre-feet)	Historical SNWA GPCD	Projected SNWA GPCD
1989	708,704	276,407	348	
1990	750,621	291,760	347	
1991	790,099	304,435	344	
1992	839,295	318,650	339	
1993	886,207	334,282	337	
1994	954,106	352,107	329	
1995	1,002,411	367,244	327	
1996	1,075,331	395,908	329	
1997	1,123,316	404,626	322	
1998	1,193,489	423,182	317	
1999	1,265,475	445,853	315	
2000	1,364,248	481,798	315	
2001	1,439,973	513,580	318	
2002	1,517,885	533,154	314	
2003	1,577,737	519,376	294	
2004	1,679,845	515,025	274	
2005	1,747,536	526,995	269	
2006	1,846,561	546,516	264	
2007	1,930,414	550,955	255	
2008	1,921,352	538,048		250
2009	1,921,352	534,062		248
2010	2,002,629	552,500		246
2011	2,080,818	569,755		244
2012	2,157,517	586,281		243
2013	2,232,364	601,989		241
2014	2,304,996	616,794		239

Note: The SNWA considers weather adjusted water use in tracking water conservation and in long-term planning to account for variations in weather among years. Weather-adjusted GPCD of 250 in 2008 is a rough estimate used as a starting point for long-term planning purposes; weather-adjusted GPCD for 2008 will be reported at a later date upon completion of 2008 data collection and verification process.

Estimated population was projected using forecasts from the Center for Business and Economic Research at the University of Nevada, Las Vegas and adjusted based on short-term population trends.

Appendix D
Completed Research Initiatives

Xeriscape Conversion Study (XCS) – This partnership study between the SNWA and Bureau of Reclamation (BOR) identified several objectives to determine the potential water savings from upgrading lawn to water-smart landscaping (xeriscape). The objectives included:

- Identifying candidates for participation and monitoring their water use by submetering xeriscape and lawn irrigation use separately for comparison purposes.
- Measuring the average reduction in water use among study participants.
- Measuring the variability of water savings over time and across seasons.
- Assessing the variability of water use among participants and to identify what factors contribute to that variability.
- Measuring the capital costs and maintenance costs of landscaping among participants.
- Estimating incentive levels necessary to induce desired changes in landscaping.

The objectives of this study were completed in 2005. The study demonstrated that in Southern Nevada average savings obtainable from lawn to water-smart landscape conversions is 55.8 gallons per square foot annually and reanalysis of subsequent data continues to support this significant savings figure. The results of the XCS have supported the basis for the SNWA's Water Smart Landscapes Rebate Program and helped guide local conservation policies. The study along with subsequent analyses of landscape conversions has been published in the *Journal of the American Water Works Association* and the work is commonly recognized as the nation's largest, most complete investigation of the conservation potential of conversion projects. In recognition of the work performed on the XCS, the BOR awarded SNWA the Water Conservation Field Services Program Regional Director's Award. The study is available online at **snwa.com/assets/pdf/xeri_study_final.pdf**.

Construction Water Use Study – This University of Nevada, Las Vegas (UNLV) study was funded by the SNWA and Bureau of Reclamation and completed in 2005. The study presented objectives related to construction activities and water-use practices, including:

- Benchmarking existing practices and efficiencies.
- Determining opportunities to improve water efficiency for construction water users.
- Creating practical recommendations and/or tools for construction professionals to improve water efficiency without compromising quality of work, regulatory compliance needs or cost efficiency.
- Providing credible information to allow the SNWA to evaluate opportunities for incentive and educational programs for construction water users.

The results demonstrated that relatively simple and inexpensive improvements to construction water trucks could reduce consumption by approximately 20 percent. Other findings and recommendations pertain to ideal soil surface wetting to achieve dust control while avoiding track-out of mud onto right-of-ways. These findings have been presented in several forums and at least one construction company

locally is following the study's recommendations. The study is available from SNWA upon request.

National Multiple Family Submetering and Allocation Billing Study **–** The SNWA agreed to participate in this national study to determine the benefits of submetering at multi-family housing units, such as apartment complexes. Multi-family water billing is traditionally done with one or just a few meters on site, which means that individual apartment dwellers typically do not receive a price signal corresponding to their individual levels of consumption and thus have little or no financial incentive to conserve. The study objectives included:

- Determining the water savings potential in the multi-family sector resulting from both direct metering and allocation programs.
- Understanding the current regulatory framework governing billing conversion programs across the U.S.
- Assessing the current business practices in the sub-billing industry.
- Making recommendations that offer consumer protection, provide ethical business practices for the industry and capture cost-effective water savings.

Completed in 2004, the study demonstrates that submetered units save about 15 percent in annual indoor water use relative to properties with "in-rent" water charges. The study is available from Aquacraft, Inc. by visiting **aquacraft.com**.

Automated Irrigation Controllers **–** This study funded by SNWA and administered by UNLV was completed in 2006. The study explored the possible savings that might be associated locally with the use of smart irrigation controllers, which mediate irrigation based on calculated landscape needs as revealed by analysis of environmental data. The objectives of the study included:

- Recruiting and selecting appropriate sites for controller evaluation.
- Installing controllers at treatment sites.
- Monitoring study sites by recording detailed consumption data and responding to customer inquiries.
- Performing analyses to determine the potential water savings achievable from the technology.

The results demonstrated smart controllers reduce outdoor consumption by 15-25 percent locally and advanced the SNWA's decision to offer a rebate program for smart controllers. Information on papers covering various aspects of the research is available from the SNWA. Alongside local research, the SNWA has provided leadership on national initiatives to develop standardized protocols for efficient irrigation system components. Additional information on this progress is available online at **irrigation.org/SWAT/Industry**.

Additional Research Results **–** In the previous five-year planning period, the following research also was completed:

Appendix D continued

- SNWA hosted an investigation by Utah State University that revealed that statistically significant water savings are being obtained by local water waste enforcement efforts.
- Water budgeting policies implemented by SNWA purveyors were found to be helping to facilitate conservation efforts in the golf sector that are saving approximately 1 billion gallons annually.
- While SNWA cooling tower research is ongoing, a major cover article on cooling towers was completed in 2008 and published in *HPAC Engineering*. The article found that facilities partnering with SNWA on cooling-tower retrofits are saving on average 17.7 million gallons of water annually. Total savings from SNWA's cooling tower efforts have exceeded 1 billion gallons.