SNWA's Conservation Program

PRESENTATION TO THE OFFICE OF THE NEVADA STATE ENGINEER

Prepared by

SOUTHERN NEVADA
WATER AUTHORITY

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SNWA's Conservation Program

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Pertaining to:
Groundwater Applications 54003 through 54021 in
Spring Valley
and
Groundwater Applications 53987 through 53992 in
Cave, Dry Lake, and Delamar Valleys

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ACRONYMS

AMR	automated meter reading
AWWA	American Water Works Association
BOR	Bureau of Reclamation
CFR	Code of Federal Regulations
CY	calendar year
IWPAC	Integrated Water Planning Advisory Committee
LVVWD	Las Vegas Valley Water District
M&I	municipal and industrial
MOU	Memorandum of Understanding
NRS	Nevada Revised Statutes
NRW	non-revenue water
SNWA	Southern Nevada Water Authority
UDACS	Uniform Design and Construction Standards
WCC	Water Conservation Coalition
WET	Water Efficient Technologies
WSC	Water Smart Contractor
WSL	Water Smart Landscapes

ABBREVIATIONS

af	acre-foot
afy	acre-feet per year
ft^2	square feet
gal	gallon
gpcd	gallons per capita per day
gpm	gallons per minute
in.	inch
mi	mile

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EXECUTIVE SUMMARY

The Southern Nevada Water Authority (SNWA) meets the statutory standard set forth in Nevada Revised Statutes 533.370, having developed, adopted and effectively carried out a plan for the conservation of water. The SNWA has established and pursued conservation and water efficiency goals since the agency's inception in 1991. The current five-year Conservation Plan (SNWA, 2009a) has been accepted by both the State of Nevada and the Bureau of Reclamation as meeting or exceeding all regulatory requirements.

The SNWA's conservation efforts have been highly effective, particularly within the past decade. The SNWA has invested substantial resources in the implementation of the plan, with approximately $200 million dollars invested in conservation programming over the past decade. Per capita water use has declined from 315 gpcd in 2000 to 223 gpcd in 2010. The SNWA's current goal is 199 gpcd by 2035.

Conservation program efforts have been most aggressively focused on decreasing consumptive water use, such as landscape irrigation. Historically, 40 percent of water use in Las Vegas serves non-consumptive uses (those which return water to the sanitary sewer for treatment and reuse). Excepting a small amount of conveyance and process loss, nearly 100 percent of southern Nevada's wastewater is directly or indirectly reused. As such, non-consumptive uses have little or no influence on SNWA's water resource allocation.

The Conservation Plan (Plan) is multi-faceted and includes regulatory measures, educational programs, pricing signals and monetary incentives. Among agencies in the western United States, the SNWA has some of the most comprehensive and effective programs. Its Water Smart Landscapes Program is the largest known program of its kind, saving an estimated 26,000 af annually. Development standards adopted in 2003 have dramatically decreased water use in new residential development by nearly 50 percent.

Reaching the target goal of 199 gpcd will require additional conservation measures. In addition to continued pursuit of existing initiatives, the SNWA is committed to developing new initiatives and enhancing existing efforts to achieve the goal.

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1.0 THE SNWA CONSERVATION PLAN

1.1 Overview

The Southern Nevada Water Authority (SNWA) has produced a comprehensive conservation plan at five-year intervals since 1999. The current plan spans the five-year period from 2009 through 2013.

The SNWA Conservation Plan (SNWA, 2009a) has been reviewed and accepted by the State of Nevada in compliance with Nevada Revised Statutes (NRS) 540.121 through 540.151 inclusive, and by the Bureau of Reclamation (BOR) in compliance with Part 417 of Title 43, Code of Federal Regulations (43 CFR 417).

NRS Chapter 540 pertains to the effective management of the State's water resources. NRS 540.011 is the Legislative declaration for the chapter, which states, in part:

> The Legislature determines that it is the policy of the State of Nevada to continue to recognize the critical nature of the State's limited water resources. It is acknowledged that many of the State's surface water resources are committed to existing uses, under existing water rights, and that in many areas of the State the available groundwater supplies have been appropriated for current uses. It is the policy of the State of Nevada to recognize and provide for the protection of these existing water rights. It is the policy of the State to encourage efficient and non-wasteful use of these limited supplies.

NRS 540.131 through 540.151 relate to the requirement to submit a water conservation plan that ensures the submitting agency is compliant with the State's policy of encouraging the efficient, non-wasteful use of water.

In correspondence dated April 22, 2009, Deputy State Engineer Kelvin Hickenbottom affirmed that the Conservation Plan submitted by the SNWA on behalf of its seven member agencies met all statutory requirements of NRS Chapter 540.

At the Federal level, water allocations from the Colorado River are subject to water conservation requirements promulgated and enforced by the BOR. These policies are set forth in Section 210(b) of the Reclamation Reform Act of 1982 and 43 C.F.R. §427.1, which states, in part:

> (a) In general. The Secretary shall encourage the full consideration and incorporation of prudent and responsible water conservation measures in all districts and for the operations by non-Federal recipients of irrigation and municipal and industrial (M&I) water from Federal Reclamation projects.

> (b) Development of a plan. Districts that have entered into repayment contracts or water service contracts according to Federal reclamation law or the Water Supply Act of 1958, as amended (43 U.S.C. 390b), shall develop and submit to the Bureau of Reclamation a water conservation plan which contains definite objectives which are economically feasible and a time schedule for meeting those objectives.

In correspondence dated May 14, 2009, BOR Water Resources Program Manager, Tina Mullis, approved the SNWA five-year plan as meeting the Federal requirements.

The SNWA excels as a regional water agency due, in part, to the extraordinary level of collaboration and alignment between the member agencies. Conservation programs are handled on a regional basis, thus any member agency's customer has access to the same information and services as a customer in a neighboring jurisdiction. Combined with collaboration on regulatory initiatives, this level of collaboration allows the SNWA to utilize regional outreach and mass media messaging.

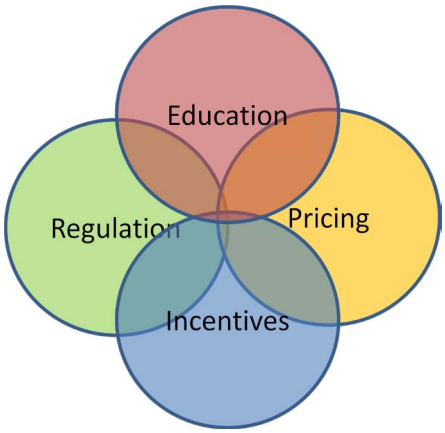
The SNWA established its first conservation goal in the year of its establishment, 1991. At the time, the Las Vegas Valley Water District (LVVWD) was implementing a visible and aggressive conservation program and the SNWA members temporarily adopted the existing goals and initiatives of the LVVWD. The first comprehensive, interagency conservation effort among SNWA member agencies produced a Memorandum of Understanding (MOU) regarding water conservation and efficiency programs in December 1995.

Since that first effort, the MOU has been succeeded by the SNWA Conservation Plan. The current plan has fine-tuned SNWA's conservation efforts to maximize beneficial use of available water resources. To do so, resources have been most heavily allocated to initiatives which the SNWA deems to have the greatest return on investment.

The current plan works in concert with the SNWA's Water Resource Plan (SNWA, 2009b), which is reviewed annually and updated when appropriate. The Water Resource Plan's long-term demand projections include the expectation of achieving conservation goals in full, and on time. The Conservation Plan, in turn, acknowledges the importance of reducing consumptive uses. Consumptive uses are generally those where the water is consumed by evaporation or evapotranspiration after diversion or withdrawal. Examples of consumptive uses include landscape irrigation, evaporation from open water, and losses from cooling and heating systems as steam or vapor.

2.0 CONSERVATION STRATEGIES

The SNWA Conservation Plan (SNWA, 2009a) utilizes a comprehensive suite of strategies to advance water efficiency: Education, Pricing, Regulation and Incentives. These strategic components are synergistic in their effect and their individual influence in conservation progress cannot be fully disaggregated.



An effective conservation plan must acknowledge the policies that govern the agency's water supplies. SNWA agencies have access to both local groundwater (governed by State policy) and Colorado River water (governed by Federal policy). Both State and Federal policies typically assign and measure water rights on the basis of consumptive use.

In all water efficiency arenas, the SNWA emphasizes improved management and conservation of consumptive uses. The SNWA also supports initiatives that reduce non-consumptive use of water. Because nearly all wastewater is treated and reused, efforts such as plumbing retrofits and direct wastewater recycling for landscape irrigation do not extend SNWA's water resources. Still, these efforts are beneficial components of SNWA's sustainability initiatives and effective components of the overall resource management strategy. While the SNWA makes great efforts to educate the community about the relative value of different water efficiency measures, having a multi-faceted conservation program helps bolster the community's conservation ethic by providing more opportunities to embrace water efficiency concepts.

Water measurement is the foundation of water management. SNWA member agencies meter all water customers and bill 12 times annually. Nearly all premises served by SNWA member agencies are equipped with automated meter reading (AMR) devices. The AMR technology not only makes collection of readings more efficient, it also provides opportunities to identify leaks and/or conduct a detailed analysis of water use characteristics on individual properties. This practice provides frequent feedback to customers and allows the agencies to effectively monitor water use and conservation progress for specific properties and customer types. Metered water use data often serves as the basis for evaluating specific conservation programs or supports research projects to evaluate new techniques or technologies.

Metered use information is processed through a database that allows analysis by customer type, meter size and monthly consumption. Metered use information, combined with data from highly-maintained production meters, also allows the agencies to determine the amount of non-revenue water (NRW), both on a regional scale, as well as within each purveyor's jurisdiction.

NRW is water that is produced and accounted for at the point of diversion, but cannot be accounted for at customer meters. SNWA and its member agencies proactively and aggressively control NRW. NRW can be classified as real or apparent. Real losses include leaks in distribution systems and storage tanks. Apparent losses are losses where water may have been beneficially used, but cannot be accounted for. Apparent losses include metering errors, theft, or authorized unmetered uses, such as firefighting.

Water distribution systems have expected levels of losses that are considered unavoidable. No water conveyance system is capable of delivering 100 percent of the water it produces. As such, the goal is not to completely eliminate losses, but to cost-effectively minimize that portion of the loss that is avoidable.

The SNWA regional transmission system contains more than 163 mi of large diameter pipe and two water treatment facilities. On average, the regional transmission system accounts for 98.9 percent of total water production as being delivered to member agencies. Losses from the regional system have averaged just 1.1 percent over the five calendar years 2006 through 2010.

Using the performance indices developed by the International Water Association and the American Water Works Association (AWWA), the SNWA's member agencies typically operate within the top performance tier for managing system losses. These industry-best practices and the techniques for assessing them are described in the AWWA Manual M36 (AWWA, 2009).

The SNWA and its member agencies combat non-revenue water with the following programs.

2.1 Infrastructure Management

All purveyors subscribe to the Las Vegas Valley Uniform Design and Construction Standards (UDACS) for water infrastructure. These standards ensure that systems are appropriately designed and tested to meet quality and durability standards unique to our region.

Efforts are ongoing in all purveyor service areas to identify older infrastructure that has been deemed susceptible to leaks. Through the collection and analysis of data, engineers predict the likelihood of failure and proactively replace susceptible segments of the system. 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. These measures increase the service life of the materials and reduce failures. Water agencies employ their own inspectors to monitor contractors and ensure use of the appropriate materials and techniques for water mains and service lines.

Production meters are regularly maintained and calibrated.

2.2 Active Leak Detection and Response

The SNWA and its member agencies have a variety of active programs to more effectively account for total production. These ongoing efforts will continue to improve accounting accuracy and minimize loss of unaccounted-for water. The following programs are conducted throughout the region:

- Reservoirs are inspected by divers at regular intervals (typically every five years) to ensure their integrity.

- A substantial portion of purveyor distribution lines have permanent listening devices installed that can identify unseen leaks 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 to improve the accuracy of water system accounting.

2.3 Meter Repair and Replacement Programs

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 for accuracy and rebuilt or replaced, as needed.

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3.0 REGULATORY PROGRAMS

Regulatory programs, such as water use regulations and development standards are among the most effective tools for moderating long-term demands. The SNWA, its member agencies and other regulatory jurisdictions have effectively collaborated to develop standardized, regional policies. Each agency is responsible for the adoption and enforcement of mutually-agreed-upon codes within their own jurisdiction.

3.1 Development Codes

Aggressive development codes relating to water efficiency were adopted in 2003 as a mechanism of drought response. These codes have had a substantial influence on reducing community per-capita water use and have since been adopted as permanent measures as follows:

- Clark County Unified Development Code Title 30.64
- Henderson Municipal Code Title 14.14
- North Las Vegas Municipal Code Title 13.08, 13.12, 13.16
- Las Vegas Municipal Code Title 14.08, 14.10, 14.11
- Boulder City Municipal Code 11-1-48 and 11-1-49

3.1.1 Turf Limitations

Research has determined that irrigated turfgrass is the most intensive consumptive use of water. During a five-year study conducted jointly by the SNWA and the BOR, it was found that turfgrass areas were receiving four times as much water as other styles of landscaping (Sovocool, 2005). To dramatically decrease consumptive use in new development, all jurisdictions prohibit the use of irrigated turfgrass in new non-residential construction. In new single-family homes, turfgrass is prohibited in front yards and restricted to 50 percent of the landscapable area in backyards.

Golf course turf acreage is limited to reduce water demand. In general, golf courses are limited to five acres of irrigated turfgrass per regulation playing hole. In most jurisdictions, golf courses are also required to utilize reclaimed water when it is available.

3.1.2 Water Feature Restrictions

Although restrictions on artificial bodies of water were implemented in the mid-1990s, additional measures were implemented in 2003. These policies:

1. Regulate the maximum area for commercial swimming pools.
2. Restrict development of man-made lakes.

3. Regulate the development and operation of ornamental water features.

The Las Vegas Strip continues to feature some of the world's best-known water attractions. While these attractions consume a relatively small amount of water, they are defensible beneficial uses due to the economic benefit they produce. Furthermore, some attractions, such as the Bellagio Fountain, utilize private water rights granted by the State of Nevada. Others, such as the Mirage Volcano and Buccaneer Bay, utilize wastewater reclaimed from the hotel towers.

Most southern Nevada resorts do not have substantial water attractions; however, among those that do, open bodies of water (including water attractions, swimming pools and spas) account for less than 2 percent of the land use. As an example, Figures 3-1 and 3-2 illustrate the relative scale of the Caesar's Palace fountain compared to the developed property. On average, as illustrated in Figure 3-3 just one-fourth of water deliveries to southern Nevada's resorts is consumptively used. As a result, the aggregate consumptive impact to SNWA's water resources from resort hotels is estimated to be less than 3 percent. According to a 2008 report by Applied Analysis (2008), southern Nevada's gaming and tourism industries account for more than one-third of Nevada's gross state product. Thus the relatively small amount of water consumed by Las Vegas resorts and water attractions provides a large boost to the economy of the State as a whole.

Figure 3-1
Caesar's Palace Street View

Figure 3-2
Caesar's Palace Aerial View

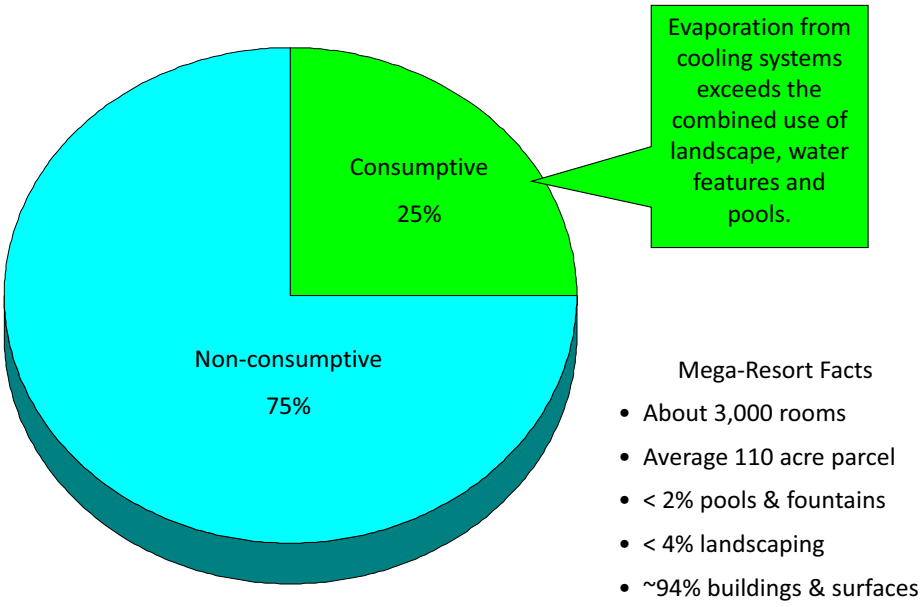

Figure 3-3
Las Vegas Mega-Resort Water Use

3.2 Water Use Policies

Depending upon the jurisdiction, water use policies are promulgated and enforced either through the municipal code, or the service rules of the water agency.

3.2.1 Seasonal Watering Schedules

All SNWA member jurisdictions utilize mandatory seasonal watering restrictions. The restrictions mandate:

1. One assigned watering day per week November through February.
2. Three assigned watering days per week March through April.
3. Mid-day spray irrigation prohibited May through September.
4. Three assigned watering days per week September through October.

3.2.2 Water Budgets for Golf Courses

All agencies have adopted water budgets for golf courses in lieu of mandatory watering schedules. Upon adoption of the policy in 2003, the average golf course was applying approximately 7.1 af of water per irrigated acre annually. The initial water budget was established at 6.5 af per irrigated acre. It has subsequently been reduced to 6.3 af per irrigated acre. Water use above the budget is billed at a punitive rate. Water budgets for golf courses were designed to produce similar sector water savings as assigned watering schedules imposed upon commercial and residential users. An analysis of 34 golf courses subjected to water budgets in 2003 found that they collectively reduced water use by more than 4,400 af by 2009.

The golf industry has responded effectively to water budgeting through improved water management and conversion of out-of-play areas on existing courses from turfgrass to water efficient landscaping. Since implementation of the water budget policy, golf courses have converted more than 38.8 million ft^2 of turfgrass to water efficient landscaping. These conversion areas comprise more than 890 acres, or about the equivalent turf area of nine 18-hole golf courses.

No new golf courses have been constructed since the drought response measures were adopted in 2003.

3.2.3 Water Waste Prohibition

All jurisdictions prohibit waste of water through provisions of the water utility's service rules or their municipal code. In addition to requiring adherence to seasonal watering schedules, the policies also prohibit allowing water to spray or flow from the property. The policies are supported by a comprehensive regional education and awareness plan. The policies are among the most aggressive in the United States. The LVVWD, for example, has assessed fees in excess of $5,000 per violation to chronic violators.

4.0 RATE STRUCTURES

All SNWA member agencies have inclining block rate structures to encourage efficient use of water.

These rate structures are consistent with the intent of the water resource policy of the State of Nevada per NRS 540.011, which states: "It is also the policy of the State to encourage suppliers of water to establish prices for the use of water that maximize water conservation with due consideration to the essential service needs of customers and the economic burdens on businesses, public services and low-income households."

The LVVWD is the largest of the SNWA member agencies, serving approximately 70 percent of the region's customers. Figure 4-1 illustrates the rate structure evolution for the LVVWD, showing the change from a flat rate structure in 1987, to the current four-tiered rate structure. The rate structure has remained very affordable in the first tier, which is intended to meet basic health and sanitation needs. The steepening of the rate structure is most evident after 2003, when the tier pricing was both increased and compressed.

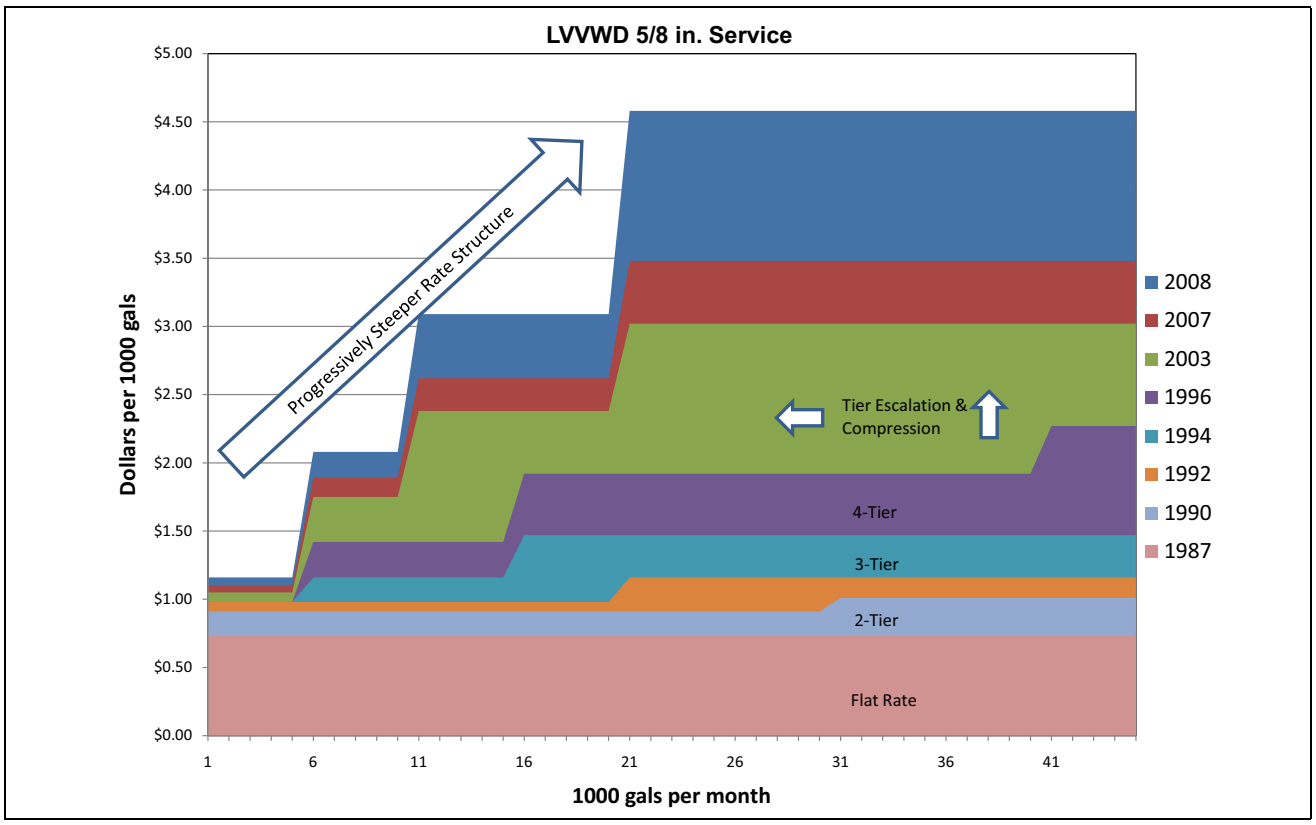

Figure 4-1
Conservation Rate Structure Evolution

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5.0 INCENTIVE PROGRAMS

Although regulatory measures effectively ensure water-efficient development, it is also necessary to effect greater water efficiency from existing properties through both regulation and voluntary measures. By providing products and/or financial incentives to customers, the SNWA has both strengthened its customer relationships and created substantial, long-term water savings on older properties.

Relative to the service population, the SNWA operates one of the largest water conservation incentive programs in the United States. For the 10 fiscal years of 2001 through 2010, an average of $16.44 million dollars per year has been paid directly to property owners for their participation in water efficiency programs.

5.1 Water Smart Landscapes

The Water Smart Landscapes (WSL) program is the flagship incentive program of the SNWA. Consumptive water efficiency is paramount to extending the region's resources, and landscaping accounts for the vast majority of consumptive use. The WSL program is an effective vehicle to encourage existing customers to replace high-water use lawns with water efficient landscaping.

Between 1995 and 2000, the SNWA, in conjunction with the BOR, conducted the nation's most comprehensive long-term research project on water use of urban landscapes. This research demonstrated that conversion of turf areas to water efficient landscape reduced irrigation demands on the converted area by approximately 75 percent (Sovocool, 2005). Based upon these findings, the SNWA initiated an incentive program to encourage property owners to convert lawn areas to water efficient landscapes in late 1999.

Since implementation, more than 43,000 WSL projects have been completed comprising approximately 150 million ft^2 of landscape conversion. The SNWA estimates these conversions reduced demand by more than 26,000 af in 2010. Over the past 10 years, this single program has reduced demand by more than 127,000 af (Figure 5-1).

In 2009, the SNWA identified and surveyed 33 other agencies that offer financial incentives for water efficient landscape conversions to determine typical program participation levels. Twenty-eight agencies responded to a request for the following information:

- Annual average amount of incentive payments
- Annual average number of incentives awarded
- Average square footage of landscape converted
- Average incentive amount paid per square foot converted.

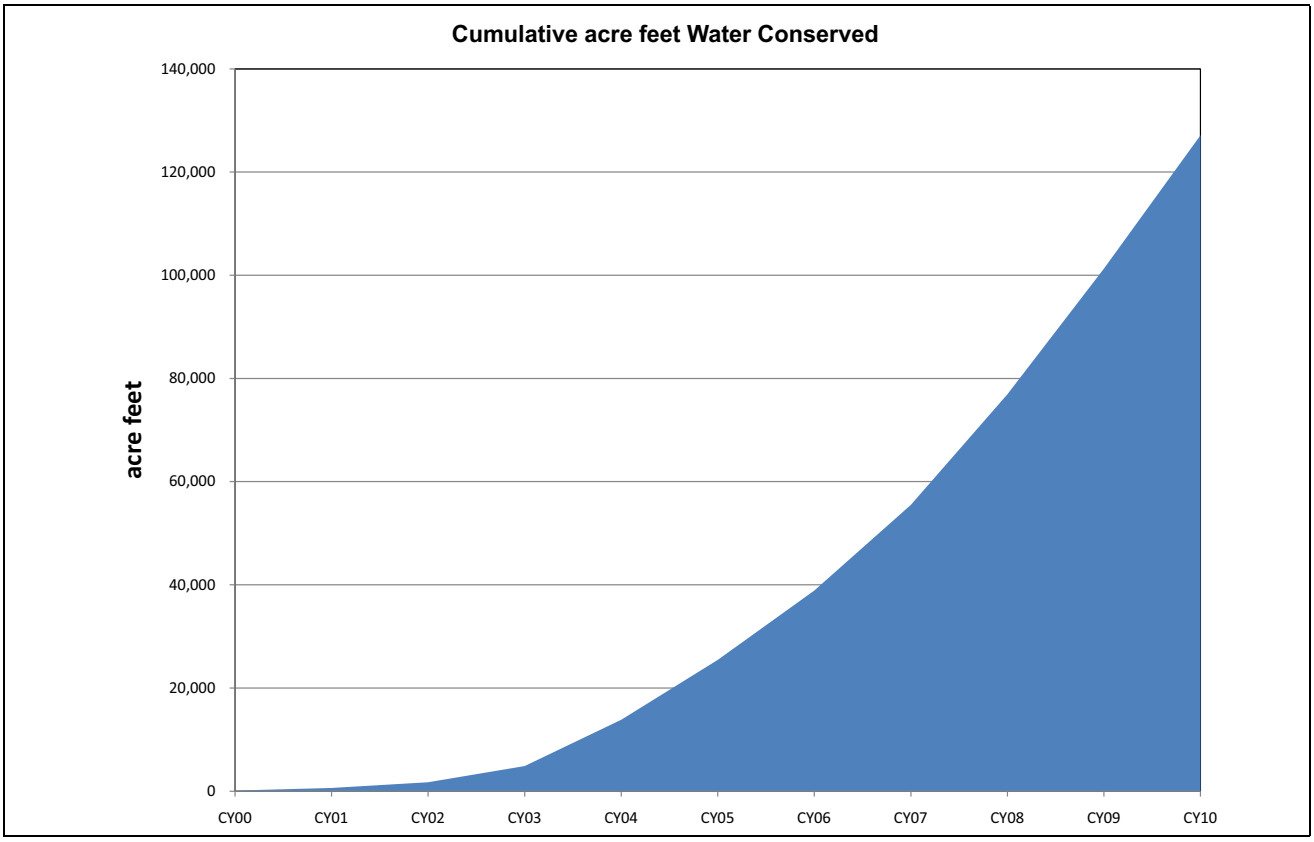

Figure 5-1
Water Smart Landscapes 2000-2010

Due to differences in program design and management, not all agencies were able to provide comparable data; however, 17 programs in California, New Mexico, Arizona, and Colorado provided complete, comparable data (Table 5-1).

According to the survey, the SNWA invests 10 times more in landscape conversion incentives than all 17 similar programs combined.

Beginning in June 2009, the SNWA began requiring WSL applicants to grant a restrictive covenant and easement to ensure that water efficiency gains achieved from the program would run with the land and be sustained by subsequent land owners. Prior to the covenant requirement, the owner was required to sustain the conversion as long as they controlled the property. SNWA conducted annual inspections to confirm continued compliance and determined a long-term compliance rate of 99.5 percent. The SNWA continues to conduct annual inspections to ensure compliance with WSL program requirements.

Table 5-1
Water Efficient Landscape Incentive Programs 2009

Agency	Annual Spending	Approximate Service Population	Square Feet Converted
SNWA Annual Average	**$15,704,756**	**1,950,000**	**14,226,382**
Albuquerque Bernalillo County Water Utility Authority, NM	$307,692	592,000	461,538
Aurora Water, CO	$255,811	310,000	274,162
City of Santa Rosa, CA	$250,000	220,000	250,000
City of Chandler, AZ	$200,000	240,000	288,404
City of Tempe, AZ	$142,857	181,000	142,857
Inland Empire Utilities Agency, CA	$120,953	850,000	87,156
City of Roseville, CA	$85,000	125,000	85,000
Soquel Creek Water District, CA	$80,000	49,000	43,333
City of Scottsdale, AZ	$40,668	240,000	110,345
City of Mesa, AZ	$26,750	440,000	52,134
City of Prescott, AZ	$22,741	60,000	61,687
City of Glendale, AZ	$9,400	180,000	40,920
City of Bullhead City, AZ	$8,607	42,000	16,703
City of Flagstaff, AZ	$6,788	63,000	47,998
Scotts Valley Water District, CA	$4,000	11,000	4,250
Town of Paradise Valley, AZ	$3,405	14,000	13,620
City of Gallup, NM	$2,100	22,000	8,600
Annual Total Other Programs	**$1,566,772**	**3,639,000**	**1,988,707**
SNWA Annual Average	**$15,704,756**	**1,950,000**	**14,226,382**

5.2 Water Efficient Technologies Program

The Water Efficient Technologies (WET) Program is intended to facilitate large scale conservation efforts, primarily for commercial and industrial clients. This voluntary program allows customers to submit applications for any capital improvement that is expected to produce a minimum water savings of 250,000 gal annually. The program issues a one-time incentive of $8.00 per 1,000 gal for reductions of non-consumptive water use and $24 per 1,000 gal for reductions in consumptive water use.

The program offers menu-based options for traditional technologies and a performance-based option for specialized technologies. Incentives are available both for new construction and retrofit projects. Among the menu options are:

- High Efficiency Toilets and Urinals (HET's and HEU's)
- High Efficiency Showerheads
- Artificial sporting surfaces in lieu of turfgrass

- Cooling tower improvements
- Closed loop liquid-cooled and air-cooled ice machines

Since inception of WET in 2001, 83 projects have been rebated for $1.78 million. These projects have been estimated to reduce demand by more than 2,400 af in 2010. Cumulatively, the program has produced a lifetime demand reduction of more than 8,200 af.

WET has undergone substantial modifications to make it more accessible. In 2006, the menu option was added to simplify the application process. Subsequently, in fall 2008, the eligibility threshold was reduced from 500,000 gal annual savings to 250,000 gal to further expand accessibility to smaller facilities. At the same time, the program was modified to allow the submittal of "group" applications where multiple facilities controlled by the same applicant could be aggregated to meet the minimum water savings threshold. Rebate amounts for consumptive water use projects were rescaled to be commensurate with the Water Smart Landscapes Program.

These modifications, combined with targeted marketing outreach to the commercial sector, have been successful in increasing participation. In the two years since the modifications, 34 projects have been rebated, accounting for more than 40 percent of the program's historic participation.

5.3 Voucher Programs

SNWA offers monetary incentives for consumer products, including swimming pool covers, rain sensors and smart irrigation controllers. In each case, the incentive can pay up to half of the cost of the product. These products are all eligible for SNWA's instant rebate vouchers. As a means of simplifying participation, customers may produce their own voucher via SNWA.com and redeem it instantly at a participating retailer. The voucher format is not only appealing to end users, but it also builds strategic relationships with local businesses by demonstrating the market influence of water efficiency products. Since the coupon format was introduced in 2005, more than 22,000 coupons have been redeemed with a combined value of more than $1.16 million.

5.4 Indoor Retrofit Kits

Approximately 70 percent of all plumbing fixtures in the valley are estimated to already meet the most current Federal water efficiency standards. However, the SNWA provides free components for indoor water efficiency retrofits. The kits are mailed upon request and include 1.0 gpm WaterSense faucet aerators, 2.0 gpm WaterSense showerheads, flow testing bag, toilet leak testing tablets and a swiveling, high-efficiency kitchen sink aerator. By providing items that exceed current plumbing standards, the kits achieve savings for homes of all ages. Between July 2007 and December 2010, more than 5,500 kits have been issued.

6.0 EDUCATION AND OUTREACH

The SNWA has one of the nation's most comprehensive education and outreach campaigns. Between 2007 and 2010, the SNWA invested approximately $2.5 million annually in mass marketing campaigns. In addition, the agency has a team of in-house public information specialists that handle a variety of conservation education and outreach initiatives.

The education and outreach program includes:

- Mass media advertising (broadcast, visual, direct mail)
- Bill inserts in collaboration with member agencies
- Speakers' Bureau
- Award-winning website (over 450,000 visits annually)
- Monthly television show (WaterWays)
- Quarterly newsletter (WaterSmart Living, 340,000 distribution)
- Annual calendar (340,000 distribution)
- Spanish language outreach program
- Community events outreach
- Instructional videos
- How-to publications and educational classes
- Community demonstration gardens
- Conservation Helpline telephone support

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7.0 PUBLIC/PRIVATE PARTNERSHIP PROGRAMS

The SNWA partners with the private sector to promote conservation efforts. This includes partnering with local retailers, landscapers, homebuilders, and the business community. Partnerships include:

Water Conservation Coalition (WCC) – Established in 1995, the WCC is comprised of 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 services for at-risk children. The project is estimated to save 6.75 af of water annually.

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 3 gal of water is saved. More than 300 restaurants participate in the program.

Water Smart Contractor (WSC) – Landscape contractors are critical links in promoting, implementing and sustaining water efficient landscapes. The SNWA determined that securing knowledgeable contractors was a potential impediment to customers who were interested in undertaking a water efficient landscape project. In response, the SNWA created the WSC program. The WSC program trains licensed landscape contractors in water-efficient landscape and irrigation design. Classes are offered in both English and Spanish. Contractors who complete the course and pass an exam are designated as Water Smart Contractors and receive promotional marketing assistance from SNWA. To date, more than 100 companies have completed the program.

Water Smart Home – In 2004, the SNWA partnered with the Southern Nevada Home Builders Association to develop a program that certifies new homes as "water smart." This is the nation's largest program for water efficiency in new homes, with more than 7,500 water smart homes constructed. The U.S. Environmental Protection Agency used the SNWA's program as the template for developing the recently launched WaterSense New Home program nationwide.

Water Smart Car Wash – Water Smart Car Washes recover all of their wastewater and reuse it onsite or send their wastewater to municipal facilities for treatment and reuse. This program encourages residents to use Water Smart Car Wash facilities instead of washing their vehicles at home. In addition to educating customers on the environmental benefits, the program offers instant discount coupons for dozens of valley car washes. On average, more than 2,500 visits are recorded for the coupon-producing page of SNWA.com every month.

Lodging Linen Exchange – Nearly two dozen resorts and other lodging properties, comprising approximately 35,000 guest rooms, 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 gal per room each day. This program is estimated to reduce potable water demand by approximately 1,500 af annually.

8.0 THE SNWA CONSERVATION PLAN IS EFFECTIVELY IMPLEMENTED

8.1 Conservation Goals and Achievements

To track conservation achievements, SNWA calculates water use in terms of gallons per capita per day (gpcd). For purposes of planning, SNWA weather normalizes each year's actual gpcd. For example, if weather is abnormally cool or wet, a portion of the demand reduction observed is known to be caused by weather conditions and not conservation efforts, thus the weather normalized gpcd will be higher than the actual gpcd. Likewise, a year that is hotter or drier than normal would be expected to inflate water use, resulting in a weather adjusted gpcd lower than the actual gpcd. Weather normalization is a recommended practice when gpcd is used as a long-range planning or monitoring metric (Dziegielewski and Kiefer, 2010).

The first SNWA conservation goals were established in 1995. The initial goal was to reduce actual demand 25 percent below a modeled demand by 2010. SNWA eclipsed the goal in 2004, six years ahead of schedule. The agency determined that future water efficiency objectives would be established as gpcd targets to better align with the methodologies and reporting associated with the SNWA Water Resource Plan.

In 2004, the SNWA convened the Integrated Water Planning Advisory Committee (IWPAC) to review SNWA's future water resource options and to make long-term resource recommendations. In early 2005, the IWPAC recommended a conservation target of 250 gpcd by 2010 and further reductions to 245 gpcd by 2035. At the time, the recommendation constituted an 8.8 percent water use reduction over a six year span. The SNWA Board of Directors adopted the recommendation. The SNWA projected that these goals would decrease demand by 107,000 af in the year 2035.

The SNWA again surpassed the 250 gpcd goal in 2008, two years ahead of schedule. It became clear that the IWPAC's recommendation to reach 245 gpcd by 2035 would not only be reachable, but swiftly surpassed. The SNWA convened a committee of water efficiency professionals from each of the member agencies to develop a more aggressive goal for the 2035 planning horizon.

In February 2009, the SNWA Board of Directors adopted the workgroup recommendation to establish 199 gpcd as the water efficiency goal for 2035. The revised goal increased the projected 2035 demand avoidance to 276,000 af (Figure 8-1).

Although SNWA's projected demands assume a linear path from current water use to the 199 gpcd goal, it is unlikely conservation progress will be as precisely consistent. As more waste and discretionary water use is eliminated, attaining remaining conservation potential becomes more challenging. This concept is known as demand hardening. Demand hardening results when water

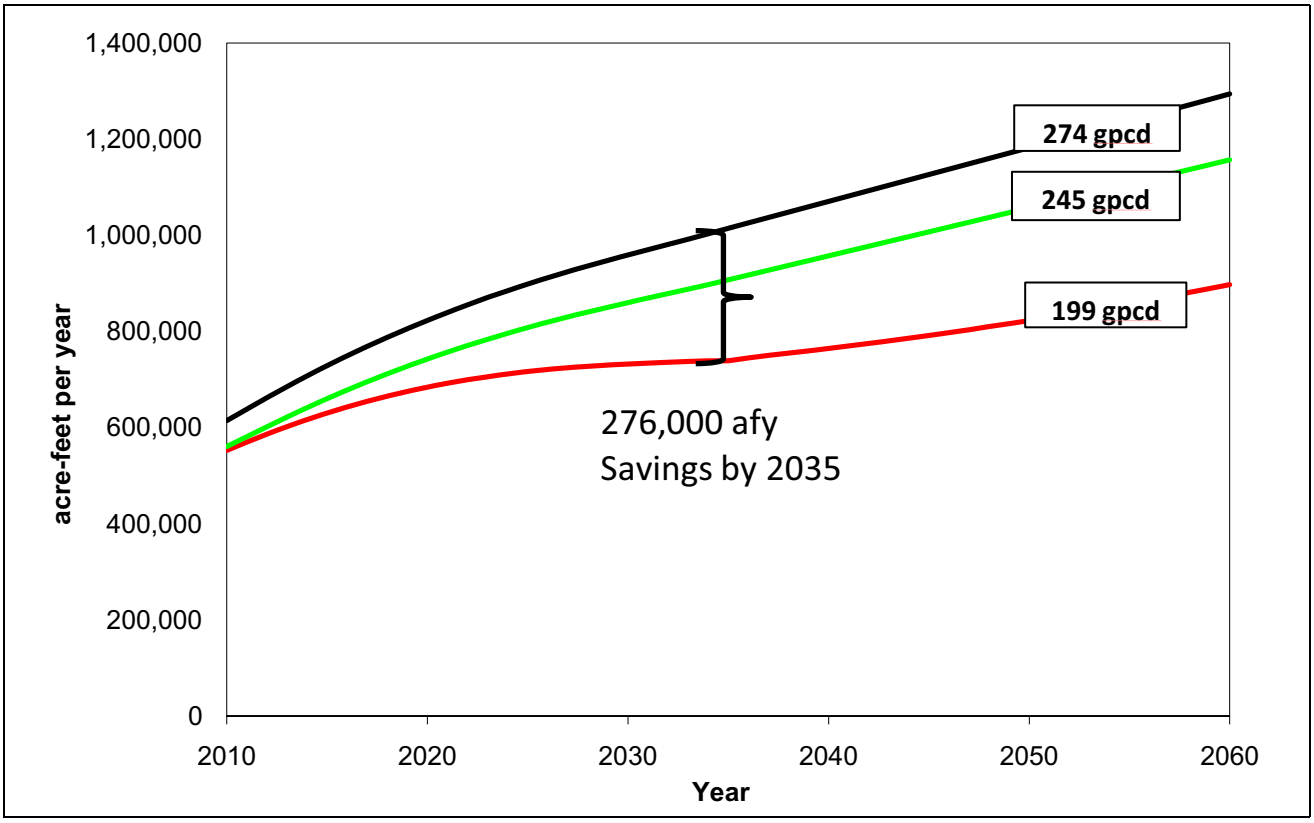

Figure 8-1
Summary of SNWA Water Demands and Conservation

users near the limit of either their ability or their willingness to further reduce water use. In addition to demand hardening, there are likely to be periods where conservation performance exceeds the goal and other periods where progress slows. This is characteristic of the complex group of variables that affect the public's use of water, some of which are beyond the control of the SNWA.

8.2 GPCD as a Metric for Evaluating Goal Advancement

The SNWA has a strong record of conservation achievement. The agency established a conservation goal in its first year, has consistently met or exceeded every goal, and has voluntarily established more stringent goals each time.

Gallons per capita per day is an effective metric for a community to project water resource demands and measure its own efficiency progress. However, it is not a metric that can be used to compare communities with varying climates, economies and demographics. Furthermore, there is no concise industry standard for the calculation of gpcd, thus the gpcd reported by various communities may not be produced by the same formulas.

In a 2003 study, "SMART WATER: A Comparative Study of Urban Water Use Efficiency Across the Southwest" (Western Resource Advocates, 2003), the authors forewarn the reader not to consider gross gpcd comparisons between cities:

> Although the water supply industry commonly uses this demand variable as a system demand indicator, the probability for comparison error in the system-wide per capita variable is relatively high, resulting in an "apples-to-oranges" comparison. Therefore, the displayed values in Figure 3.9 should be considered individually, instead of comparatively, to avoid erroneous conclusions on water consumption.

In the guidance manual produced by the AWWA Water Conservation Division, "Water Conservation Measurement Metrics," (Dziegielewski and Kiefer, 2010) the authors came to similar conclusions about the challenges of inter-agency comparisons of utility-wide gpcd.

In its simplest form, gpcd is derived by taking the average daily water production and dividing it by the number of permanent residents in the agency's service area.

$$\text{gpcd} = \frac{\text{total average daily production}}{\text{permanent residents served}}$$

Dziegielewski and Kiefer (2010) described broad variations in how utilities defined both the numerator and the denominator. Not all utilities include reclaimed water or raw water, for example, as part of their production, even if it was delivered to customers to meet demand.

In most jurisdictions, including SNWA's, other sources of water may be in use that are not part of the utility's production, such as private groundwater wells or landscape irrigation water from surface canals. In the Phoenix region, for example, residential properties have access to water from two different suppliers, one that provides domestic water and another that provides landscape irrigation water. In Australia's coastal cities, homeowners commonly have private wells, or bores, that are used for outdoor irrigation. Such disparities in the quantity and availability of alternate supplies is another confounding variable when trying to establish comparisons between communities. While some have advocated that single family residential use may be the only sector where gpcd comparisons could be drawn, the broad availability of secondary water supplies would give the impression of lower household use.

Dziegielewski and Kiefer (2010) found some utilities use the term "functional population" and convert transient populations such as seasonal workers, commuters and even tourists into "resident equivalents." These variations can have a tremendous effect upon gpcd. For example, in 2010, the Las Vegas region hosted more than 37 million visitors for an average stay of 4.6 days (Las Vegas Convention and Visitors Authority, GLS Research, 2010). These 171.7 million visitor days averaged over one year indicate more than 470,000 visitors are within the water service area every day.

To put the visitor load into perspective, consider that there are more people visiting Las Vegas on any given day than living in Sacramento, California. If the SNWA used "functional population" equivalents that included visitors, the region's per capita water use would be reduced by approximately 43 gallons to 180 gpcd.

In calculating its gpcd, the SNWA includes all water sources in its water production, including groundwater, surface water, raw water and reclaimed water. Only water produced for banking is deducted, since it will be recorded as a demand when it is recalled for use. SNWA's service populations include only bona fide residents estimated to be living in the service area at the mid-year

point. Residents living within the service area, but supplied by private wells are not included in the service population.

Dziegielewski and Kiefer (2010) also found weather and climate significantly influenced the gpcd of the communities they studied. For each inch of evapotranspiration not supplied by precipitation, the authors noted about a 3 gpcd increase in water demand.

Although the water efficiency achievements of other western communities may provide lessons for agencies within the same region, it is not appropriate to assume that the gpcd of one community would adequately meet the needs of another.

Water agencies are expected to take extraordinary measures to avoid situations that jeopardize the people they serve. While people can relate to the absolute need for water for drinking, cooking and sanitation, water is also a vital ingredient for sustaining the urban economy. The SNWA has established gpcd goals with the expectation of continuing to support water uses that contribute to quality of life and environment, such as efficiently-irrigated landscaping, as well as sustaining a viable economy that provides necessary employment and services to the community. A utility that finds itself in a long-term position of curtailing water use in such a way as to jeopardize the economy or human health has failed in their long range and contingency planning.

By its nature, providing water to a community requires conservative planning to avoid unmanageable shortfalls in water supply, water quality or infrastructure. The 199 gpcd goal is considered both prudent and achievable. The problems associated with overestimating future water efficiency achievements would pose an unacceptable risk to the community.

8.3 Water Rates

Designing effective rate structures is a delicate art. It is challenging to predict customer base response to radical changes in rate structures, thus such measures could jeopardize the financial stability of the agency. Instead, most rate setters prefer to make a series of modifications to rate structures with a known track record. It is not uncommon for an agency to design and review more than a dozen variations of rate structures. Many of the agencies also engage citizens' advisory committees in the review of rate philosophies and structures.

Each of SNWA's member agencies are public, not-for-profit utilities. As such, they are obligated to devise rate structures that produce adequate revenue to meet the costs of the agency, but not produce excessive revenue. As use of water decreases, cost per unit typically climbs to cover the operating costs of the agency. In most utilities, fixed costs account for the majority of expenses. This explains why water may be much more costly per unit in a community with low water demands, even if the low demand is the result of a cold or wet climate and not a designed conservation effort.

In an active conservation program it can be expected that water use reductions may result in increasing costs per unit of water, which in turn, effects further conservation. This "volley" between customer water use reductions and agency rate responses is common and can be managed; however, if an agency underestimates the community response to a rate change, the volley becomes amplified and can result in financial instability. This situation can actually threaten the viability of long-term

conservation achievement by eroding the agency's credibility with its customers and negating the effectiveness of non-rate components of the conservation plan. Volatile exchanges in water pricing and customer response are most often the result of radical rate changes.

SNWA member agencies have implemented and strengthened effective water efficiency rate structures. As an example, the LVVWD, which serves approximately 70 percent of the SNWA customer base, has evolved from a two-tier rate structure to a four-tier rate structure. Additionally, the LVVWD has substantially compressed the rate tiers, there by steepening the water rate.

SNWA's Cooperative Agreement establishes principles for the pricing of wholesale water to recover the costs of production. SNWA cannot directly or arbitrarily influence the water rate structures of individual purveyors, however, trends in operating costs have been exceeding increases in the consumer price index. As a result, it is expected that water rates will continue to increase at a rate exceeding inflation.

The suggestion that adopting rate structures of another agency should produce similar water use reductions in another community is misguided. Each agency has unique characteristics that influence both the rate structure and the community reaction to the rate. Among the variables on the utility side are debt load and energy use. On the customer side, per capita income and current levels of discretionary water use influence elasticity of response.

If necessary rate increases combined with ongoing programs do not produce adequate conservation gains, the SNWA agencies will be able to further modify rate structures to stay on goal.

8.4 New Development Efficiency

The cumulative impact of the 2003 development standards will continue to decrease per capita water use as SNWA's service population grows through 2035.

An SNWA analysis indicates that homes built after the 2003 development standards became effective use about half as much water as homes built just prior. The reduction appears to be largely attributable to higher densities and more efficient landscape irrigation.

The analysis included only homes with a continuous pattern of water use, thus avoiding unoccupied homes, and excluded homes built between 2000 and 2003 that had participated in the Water Smart Landscapes Program (Figure 8-2).

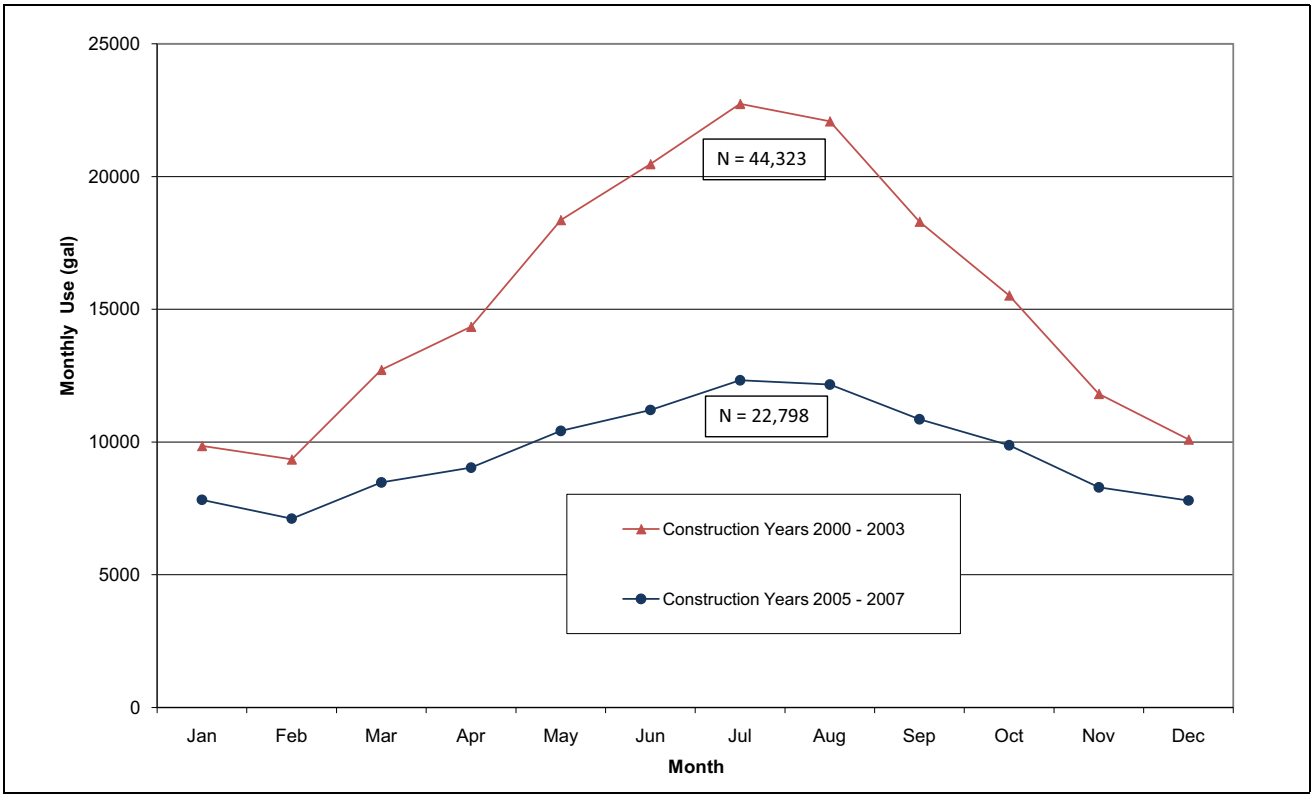

Figure 8-2
Average Home Monthly Consumption 2007-2008

9.0 CONCLUSION

The SNWA has a current conservation plan that has been reviewed and accepted by the State of Nevada in compliance with NRS 540.121 through 540.151 inclusive. Furthermore, the plan has also been reviewed and accepted by the BOR as meeting the requirements of 43 CFR 417.

The SNWA has been aggressive in establishing and pursuing meaningful conservation goals since its establishment in 1991. The agency's 20-year history demonstrates progressively-increasing commitment and innovation in water efficiency policy and programming. The current conservation plan and the programs that support it are unrivaled by any community in the State of Nevada and considered a top-tier program nationally.

The efforts of the SNWA and its member agencies have produced meaningful reductions in both gross demand and per capita demand. Without the improvements in water use efficiency achieved since 1991, the SNWA service area would currently demand more than 700,000 af of water annually. In 2010, gross production was approximately 488,000 af, a 30 percent reduction.

The programs implemented in 2003 in response to the unprecedented Colorado River drought demonstrate the capacity of SNWA to swiftly respond to changing conditions and the ability of the community to respond effectively. This demonstrated ability ensures that the agency has the ability to meet water use efficiency goals in the future.

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