

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.

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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.

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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.

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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.

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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.

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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

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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:

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- 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.