

## 6 WATER CONSERVATION BEST MANAGEMENT PRACTICES

Water conservation is a method available to reduce water demands, thereby reducing water supply needs for the Visalia District. This chapter presents an analysis of water conservation best management practices (BMPs) and a description of the methods and assumptions used to conduct the analysis.

The unpredictable water supply and ever increasing demand on California's complex water resources have resulted in a coordinated effort by the Department of Water Resources (DWR), water utilities, environmental organizations, and other interested groups to develop a list of urban BMPs for conserving water. This consensus-building effort resulted in a Memorandum of Understanding Regarding Urban Water Conservation in California (MOU), as amended September 16, 1999, among parties, which formalizes an agreement to implement these BMPs and makes a cooperative effort to reduce the consumption of California's water resources. Table 6A presents the BMPs as defined by the MOU. The MOU is administered by the California Urban Water Conservation Council (CUWCC).

The MOU requires that a water utility implement only the BMPs that are economically feasible. If a BMP is not economically feasible, the water utility may request an economic exemption for that BMP. The BMPs as defined in the MOU are generally recognized as standard definitions of water conservation measures. California Water Service Company (Cal Water) is a signatory of the MOU. As a signatory of the MOU, Cal Water has agreed to implement the BMPs as defined in Exhibit 1 of the MOU that are cost beneficial and complete such implementation in accordance with the schedule assigned each BMP. Cal Water must submit to the CUWCC a report every two years describing BMP implementation.

TABLE 6A WATER CONSERVATION BEST MANAGEMENT PRACTICES	
No.	BMP Name
1.	Water survey programs for single-family residential and multi-family residential connections.
2.	Residential plumbing retrofit.
3.	System water audits, leak detection and repair.
4.	Metering with commodity rates for all new connections and retrofit of existing connections.
5.	Large landscape conservation programs and incentives.
6.	High-efficiency washing machine rebate programs.
7.	Public information programs.
8.	School education programs.
9.	Conservation programs for commercial, industrial, and institutional accounts.
10.	Wholesale agency assistance programs.
11.	Conservation pricing.
12.	Conservation coordinator.
13.	Water waste prohibition.
14.	Residential ULFT replacement programs.

## 6.1 ECONOMIC ANALYSIS METHODOLOGY AND ASSUMPTIONS

An economic analysis was conducted for seven of the 14 BMPs that are described in the MOU (i.e. BMP nos. 1, 2, 4, 5, 6, 9, and 14). Economic analyses were not done for BMPs 3, 7, 8, 10, 11, 12, and 13 because they are essentially non-quantifiable, but essential to the success of those BMPs that are quantifiable.

Assumptions used in the economic analysis for each BMP are described in Table E-1 (Appendix E). Directly beneath each assumption is a brief description of the rationale and/or supporting evidence for that assumption. Common assumptions for all BMPs are the value of conserved water (\$200/ac-ft), the real discount rate (6.15%), and the overhead rate (13%). The real discount rate is calculated from the assumed real cost of money (8.82%) and the assumed long-term inflation rate (2.52%) using the precise conversion method (A&N Technical Services 2000, pg A-2). Housing information and a breakdown of the number of connections for each connection category used for the economic analysis are presented in Tables 6B and 6C.

Year	Single family dwelling units	Multi-family dwelling units
1991	20,092	2,837
1997	23,389	2,901
2000	23,583	2,918
2005	25,778	--
2010	28,178	--
2015	30,801	--
2020	33,668	--

Source: California Water Service Company.

Classification	Connections
Single family	23,389
Multi-family	175
Commercial	3,050
Industrial	57
Institutional	228
Irrigation/landscaping	0
Total	26,899

Source: California Water Service Company

The economic analysis was performed using Microsoft® Excel 97, a spreadsheet program. A separate, customized worksheet for each BMP is presented in Appendix E. Each BMP economic analysis spreadsheet projects, on an annual basis, the number of interventions and the dollar values of the benefits and costs that would result from implementing a particular BMP. Terms and formulas that are common to all the worksheets are defined in Table 6D.

## 6.2 ECONOMIC ANALYSIS RESULTS

Table 6E summarizes the results of the economic analysis in terms of the benefit/cost (B/C) ratio, the simple pay-back period, the discounted cost per ac-ft of water saved, and the net present value (NPV) per ac-ft of water saved for each BMP.

TABLE 6D  
DEFINITION OF TERMS USED IN THE ECONOMIC ANALYSIS

Term	Definition	Comments
<b>BENEFITS:</b>		
Avoided Capital Costs	Capital costs that are avoided by implementing the BMP.	An example is the cost of a well that would not have to be installed due to implementation of the BMP.
Avoided Variable Costs	Variable costs that are avoided by implementing the BMP.	An example is the cost of electricity that would be saved if the BMP were implemented.
Avoided Purchase Costs	Purchase costs that are avoided by implementing the BMP.	An example is the cost of purchasing water that would not be needed due to implementation of the BMP.
Total Undiscounted Benefits	The sum of avoided capital costs, avoided variable costs and avoided purchase costs.	
Total Discounted Benefits	The present value of the sum of avoided capital costs, avoided variable costs and avoided purchase costs.	An annual percentage rate consisting of the cost of borrowing money minus the inflation rate.
<b>COSTS:</b>		
Capital Costs	Capital costs incurred by implementing the BMP.	For example, the cost to purchase and install meters for BMP 4.
Financial Incentives	The cost of financial incentives paid to connections.	Copay or distribution for purchasing low-flow plumbing devices or washing machines are examples of financial incentives.
Operating Expenses	Operational expenses incurred during implementation of the BMP.	
Total Undiscounted Costs	The sum of capital costs, financial incentives, and operating expenses.	
Total Discounted Costs	The present value of the sum of capital costs, financial incentives, and operating expenses.	The discount rate is used to calculate discounted costs from undiscounted costs.
NET PRESENT VALUE	Total discounted benefits minus total discounted costs.	A value greater than zero indicates an economically justifiable BMP.
<b>RESULTS:</b>		
Benefit / Cost Ratio	The sum of the total discounted benefits divided by the sum of the total discounted costs.	A ratio greater than one indicates an economically justifiable BMP.
Simple Pay-Back Period	The number of years required for the benefits to pay back the costs of the BMP, calculated as the sum of the total discounted costs divided by the average annual total discounted benefits.	A low value is considered economically attractive.
Discounted Cost / Water Saved	The present-value cost to save one acre-foot of water, calculated as the sum of the total discounted costs divided by the total acre-feet of water saved over the study period.	A low value is considered economically attractive because it indicates a low implementation cost. Value must be less than the marginal cost of new water to be cost effective.
Net Present Value / Water Saved	The net value of saving one acre-foot of water, calculated as the sum of the net present value divided by the total acre-feet of water saved over the study period.	A high value is considered economically attractive.

TABLE 6E  
 RESULTS OF ECONOMIC ANALYSIS

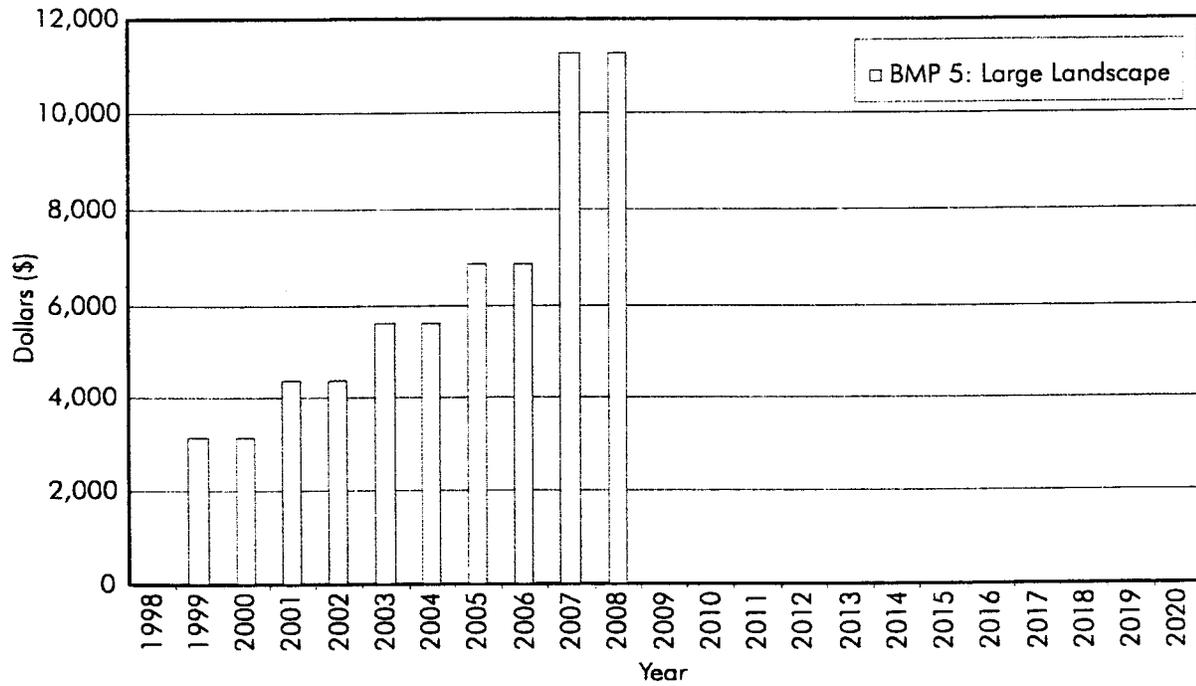
BMP No.	BMP Name	Total discounted cost over study period (\$)	Total water saved* (ac-ft)	Benefit / cost ratio	Simple payback period (years)	Discounted cost / water saved (\$/ac-ft)	Net present value / water saved (\$/ac-ft)
1	Water survey programs for single-family residential and multi-family residential connections.	170,180	613	0.6	23	277	-119
2	Residential plumbing retrofits.	460,459	674	0.2	68	683	-543
4	Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections	1,680,242	5,557	0.4	62	302	-194
5	Large landscape conservation programs and incentives.	50,843	765	2.2	6	66	83
6	High-efficiency washing machine rebate programs.	249,171	746	0.3	66	334	-233
9	Conservation programs for commercial, industrial, and institutional (CII) accounts.	332,533	1,729	0.8	17	192	-48
14	Residential ULFT replacement programs.	511,312	2,146	0.5	40	238	-119

\*Total water saved over study period.

Annual water costs and savings for each of the BMPs with a B/C ratio equal to or greater than one are presented graphically on Figures 6A and 6B and summarized in Table 6F. Table 6F also presents the number of annual interventions required for each BMP for the water system to be in compliance with the MOU for all cost effective BMPs. Interventions and costs shown for BMPs for prior year of 1998, 1999, and 2000, if not yet completed, would have to be implemented in future years.

Figures 6A and 6B and Table 6F do not include the water savings and costs associated with BMPs 3, 7, 8, 10, 11, 12, and 13 since no specific level of effort is defined in the MOU for these BMPs. BMP 11 is already implemented and, therefore, has no cost associated with it. BMP 13 is covered by CPUC General Order 103, and has no cost unless triggered by a water shortage condition.

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Note: Costs are undiscounted costs.

Figure 6A. Visalia BMP Implementation Costs

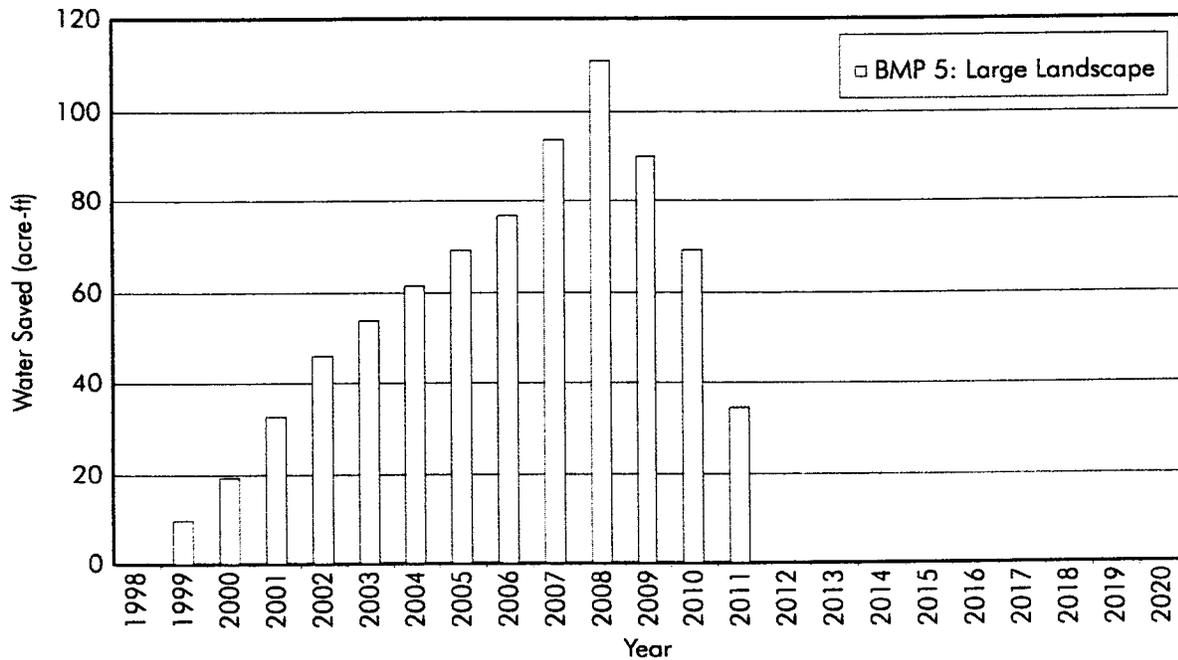


Figure 6B. Visalia BMP Water Savings

Note: Water costs and water savings from BMPs 7, 8, 10, 11, 12, and 13 not included. See text.



TABLE 6F  
SUMMARY OF BMP ANNUAL INTERVENTIONS, WATER SAVED, COST

Year	BMP 1: Residential water surveys		BMP 2: Residential plumbing		BMP 4: Install meters		BMP 5: Large landscapes	
	Interventions	Water saved (ac-ft/yr)	Interventions	Water saved (ac-ft/yr)	Interventions	Water saved (ac-ft/yr)	Interventions	Water saved (ac-ft/yr)
1998	B/C<1	B/C<1	B/C<1	B/C<1	B/C<1	B/C<1	0	0
1999							25	3,127
2000							25	3,127
2001							35	4,377
2002							35	4,377
2003							45	5,628
2004							45	5,628
2005							55	6,878
2006							55	6,878
2007							90	11,256
2008							90	11,256
2009							0	0
2010							0	0
2011							0	0
2012							0	0
2013							0	0
2014							0	0
2015							0	0
2016							0	0
2017							0	0
2018							0	0
2019							0	0
2020							0	0
Total	0	0	0	0	0	0	500	62,531

Note: B/C<1 indicates a benefit to cost ratio less than one.



### 6.3 ADDITIONAL ISSUES

This section describes additional issues required to be addressed by the Urban Water Management Planning Act. Non-economic factors, including environmental, social, health, customer impacts, and technological are not thought to be significant in deciding which BMPs to implement. No water supply projects are currently planned that would supply water at a higher unit cost. Cal Water has the legal authority to implement the BMPs. However, the costs of implementing these BMPs are subject to CPUC approval.