

ECoBA

Evaluation & Cost Benefit Analysis Of Water Conservation Programs

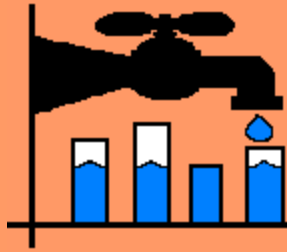
VAL LITTLE

Thursday, September 14, 2006



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FUNDING PARTNERS

... in addition to **Water CASA:**

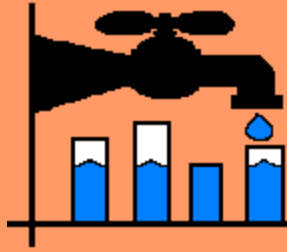


University of Arizona, TRIF

US Bureau of Reclamation

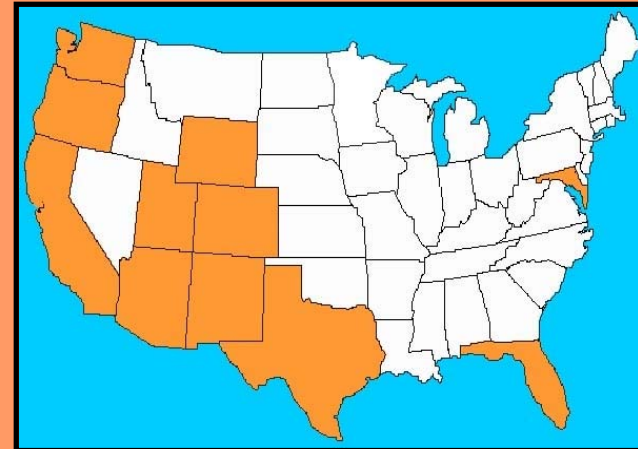
AZ Dept. of Water Resources

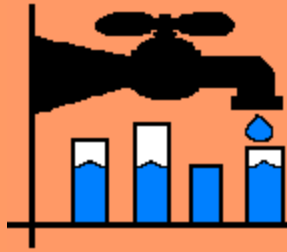
Tucson Water Department



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- 💧 **89 cases analyzed.**
- 💧 **44 programs.**
- 💧 **11 states.**

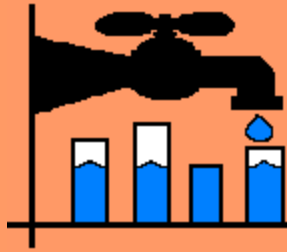




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WHAT IS IT?

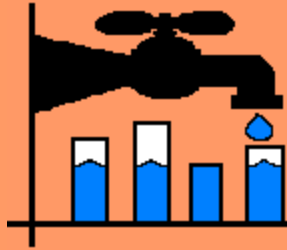
- 💧 **An apples-to-apples comparison of water conservation programs which, to the degree possible, incorporates similar types of direct costs and benefits of the programs (admin. costs, rebate costs, savings on water bills).**
- 💧 **A snapshot in time of what results conservation programs are actually achieving.**



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WHAT IT IS NOT:

- 💧 **A place to find easy answers to conservation programming. It can serve only as a source for findings and data, intended to inform the water resource management decision-making process.**
- 💧 **An attempt to justify or defend water conservation programs. The case for conservation has been well made by many others, many different ways.**
- 💧 **An attempt to quantify every possible cost and benefit.**

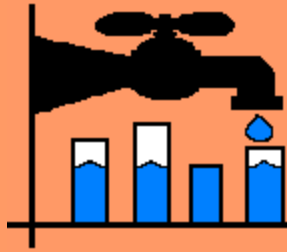


“ . . . water managers and planners need to measure the effectiveness of their conservation efforts. Unfortunately, most will readily admit that water conservation programs have been poorly quantified in the past”

Cost-Effective Cost Effectiveness: Quantifying Conservation on the Cheap, AWWA Toronto 1996

Situation as we found it:

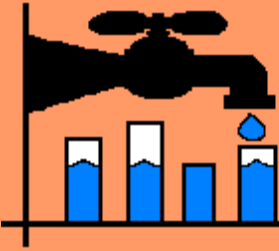
- 💧 **Actual water savings for a given conservation measure almost impossible to find.**
- 💧 **After-the-fact assessment of a program rarely done.**
- 💧 **Quantification of water savings, costs, etc. are usually seen as estimates, prior to program implementation, when used as justification for doing the measure.**



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Methodology:

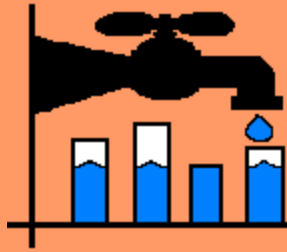
- 💧 **Participants' water use - 2 years prior & 2 years after the program; not year of.**
- 💧 **Compare participants' water use with that of a control group (e.g., utility as a whole, or a subset population).**
- 💧 **Determine direct program costs to utility, other funders, & customers.**
- 💧 **Obtain comparative ranges and average costs to utility, other funders, & customers.**



*“Be Creative, Have Fun, Save Water”
motto adopted by WATER CASA, 1997*

Analysis:

- 💧 **Water Use.**
- 💧 **Water Savings.**
 - **Persistence of Water Savings.**
 - **Comparison with Predicted Savings.**
- 💧 **Economic Analysis.**
 - **Cost to save an AF of water.**
 - **Cost to Utility per participant.**
- 💧 **Comparison BETWEEN measures.**
- 💧 **Other Findings**
- 💧 **Lessons & Recommendations**

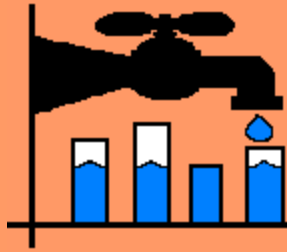


“Accurately measuring . . . the effectiveness of conservation efforts has been the Achilles heel of urban water planning for many years”.

Residential End Uses of Water, AWWA 1999

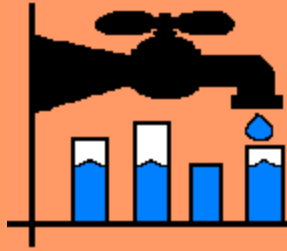
Programs categories being analyzed:

- 💧 **Audits**
- 💧 **Device Giveaways**
- 💧 **Washing Machine Rebates**
- 💧 **Landscape Conversion/Rebates**
- 💧 **Toilet Rebates**
- 💧 **Toilet Distributions**
- 💧 **Rates - Ordinances - Surcharges - Classes**



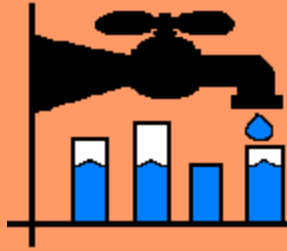
AUDITS

- **Wide range of savings achieved.**
- **Large variation in costs to save an AF of water.**
- **Target customers with the greatest potential for savings.**
- **The auditor is key to program success.**
- **Audits are excellent customer service tools, putting a face on the utility with a personal visit.**
- **Coupling audits with related ordinances may yield greater savings than each effort individually.**
- **No fall-off in water savings from first to second year after.**



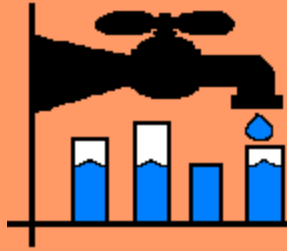
DEVICE GIVEAWAYS

- **No savings shown.**
- **Doesn't cost much.**
- **Questionable as a bribe or awareness raiser.**
 - **A nice customer service, and engenders goodwill.**



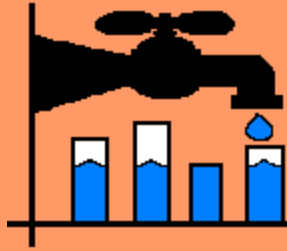
WASHING MACHINE REBATES

- **Wide range of savings achieved.**
- **The potential for savings is only about 5,000 gpyr.**
- **Would these customers have gotten a new machine anyway?**
- **Would targeting this type of program to certain demographics yield higher returns?**



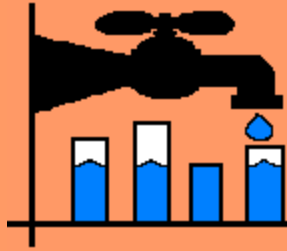
LANDSCAPE CONVERSIONS

- 💧 **These programs attracted lower than typical water users.**
- 💧 **Water savings shown was second only to Toilet Distribution programs.**
- 💧 **Showed the highest per participant cost to the Utility and other funders.**



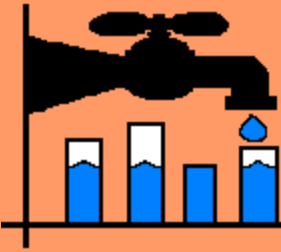
TOILET REBATES

- 💧 **No correlation found between amount of the rebate and water savings.**
- 💧 **Water savings not as high as predicted.**
- 💧 **Showed the tightest range of savings per participant.**

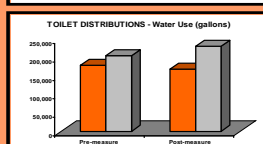
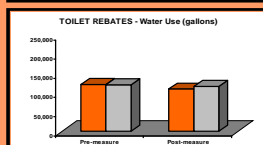
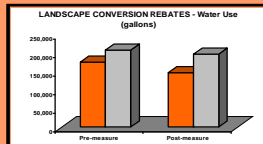
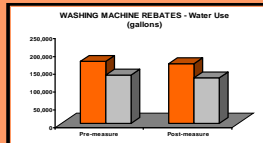
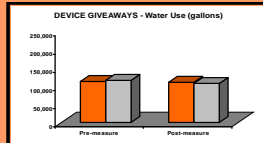
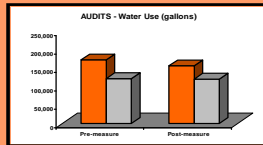


TOILET DISTRIBUTIONS

- Showed the highest persistence in water savings.
- The highest average water savings per participant.
 - Much higher water savings than predicted.
 - A large variation in water savings.
- The lowest cost to save an AF of water.



WATER USE



■ Participant Groups
■ Control Groups

AUDITS

PRE POST

144% 132%

DEVICES

97% 101%

WASH. MACHINE

130% 132%

LANDSCAPE CONV.

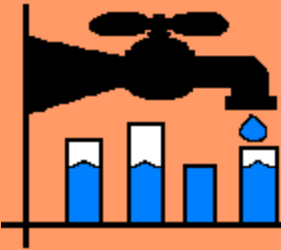
87% 77%

TOILET REBATES

104% 96%

TOILET DISTRIBUTIONS

91% 78%



WATER SAVINGS

AVERAGE (GPY) per PARTICIPANT

TOILET DIST. 26,890

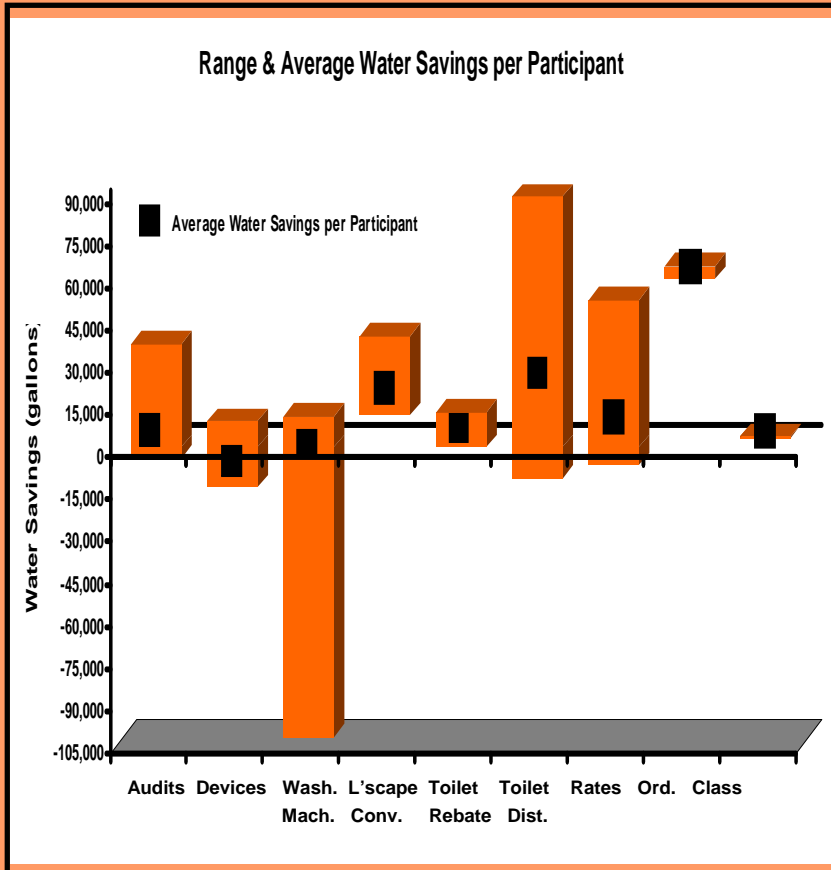
LANDSCAPE 21,900

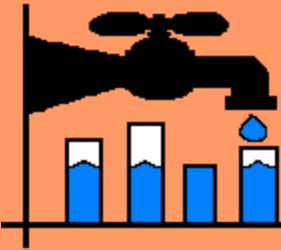
AUDITS 8,690

TOILET REB. 7,440

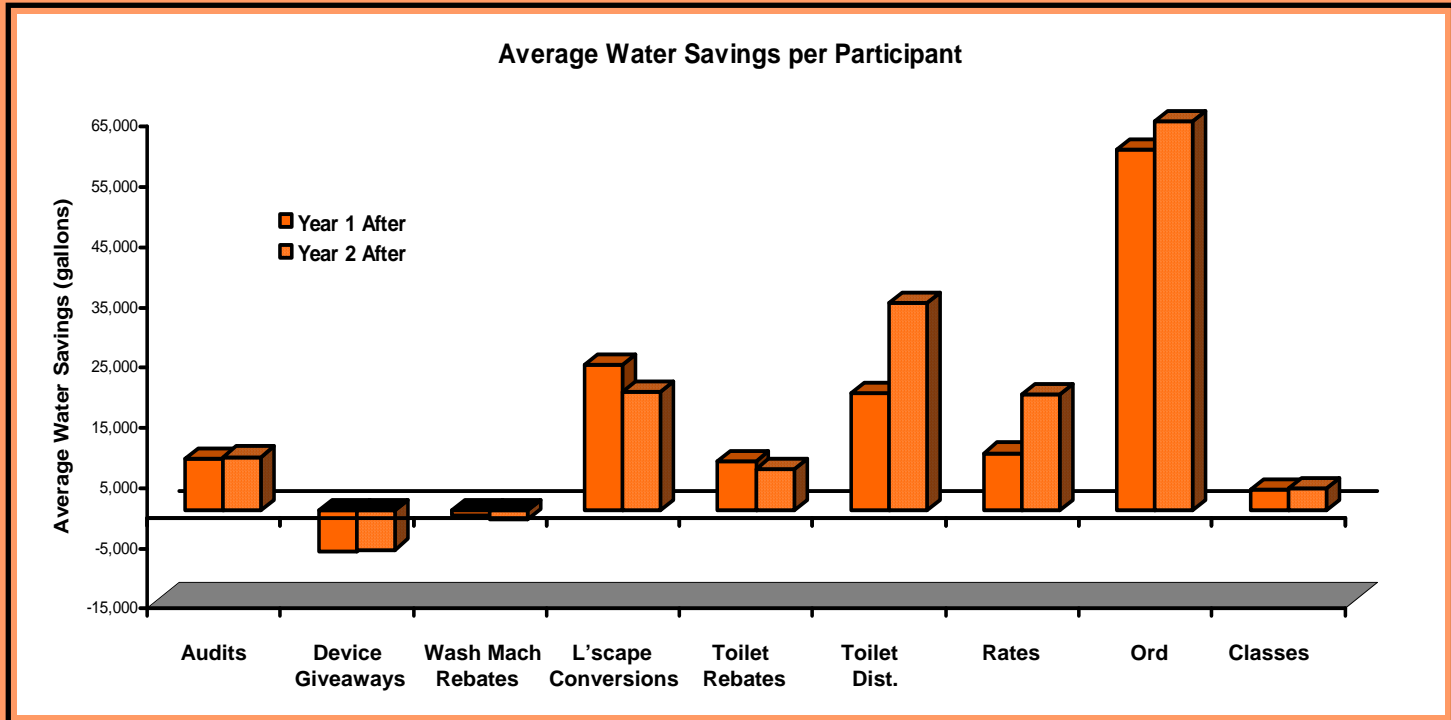
WASH. MACH. 3,180

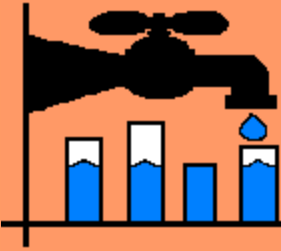
DEVICES -6,690



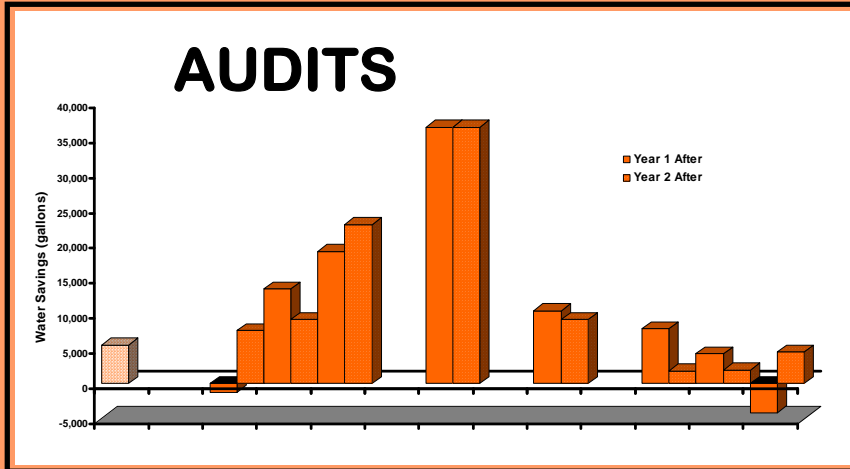


WATER SAVINGS PERSISTENCE





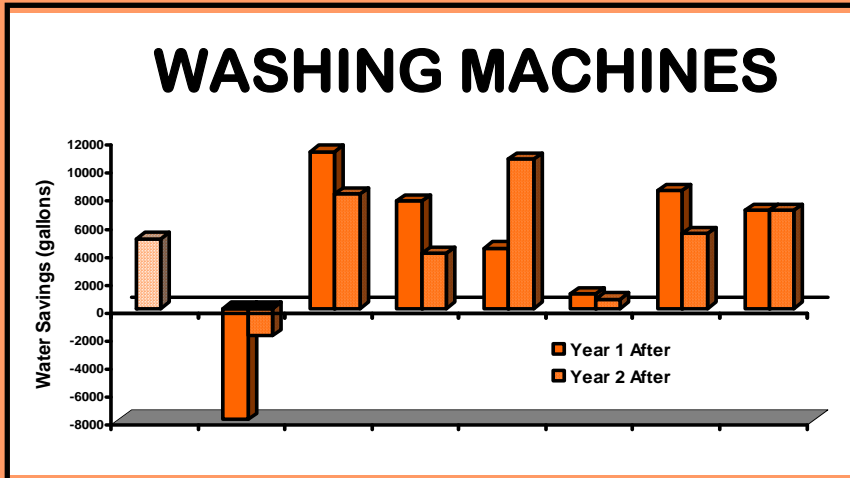
WATER SAVINGS PREDICTED



159% of predicted

Predicted: 5,474 gpyr

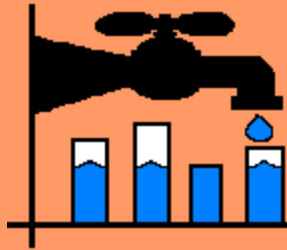
Actual: 8,690 gpyr



64% of predicted

Predicted: 5,000 gal/yr

Actual: 3,180 gpyr

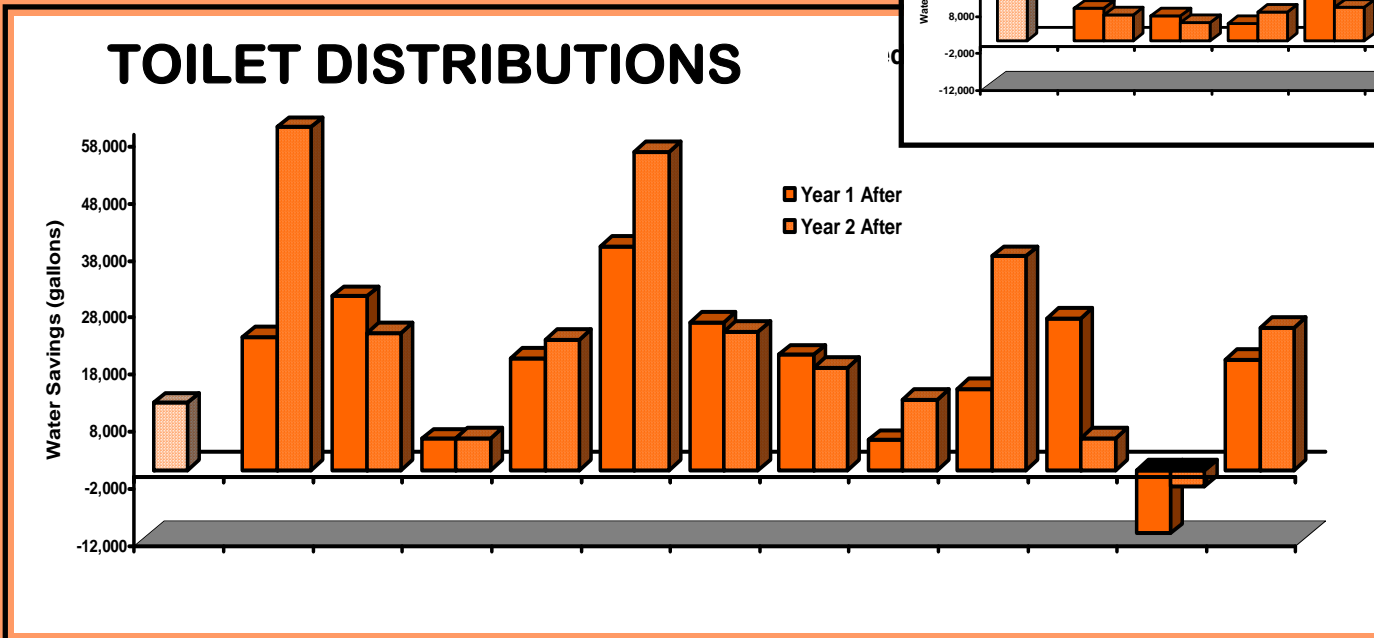
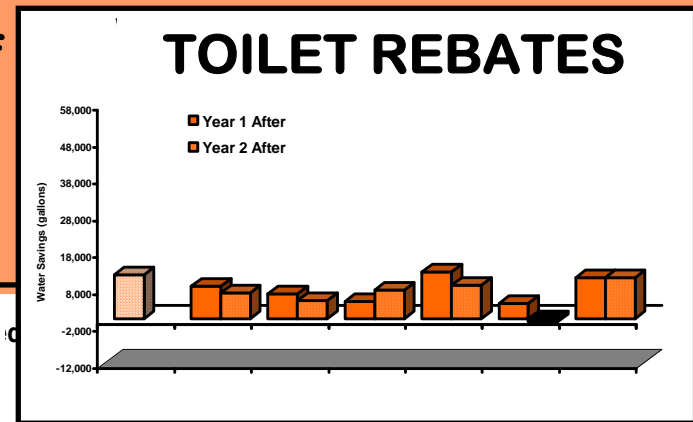


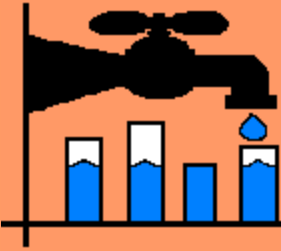
WATER SAVINGS PREDICTED

Predicted: 11,790 gal/yr

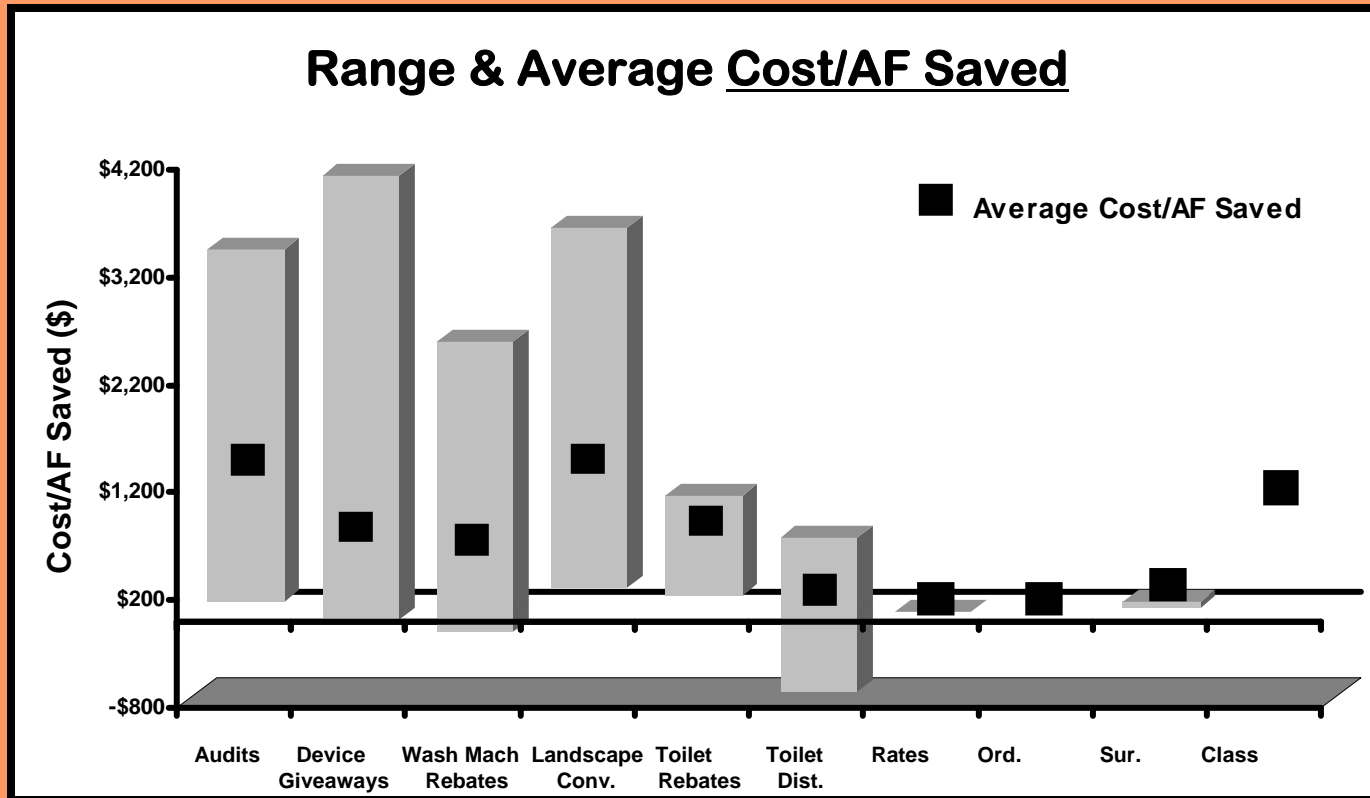
63% of predicted

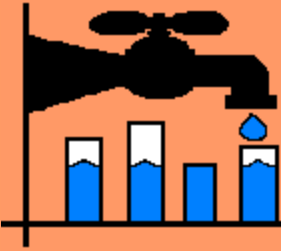
228% of predicted





ECONOMIC ANALYSIS

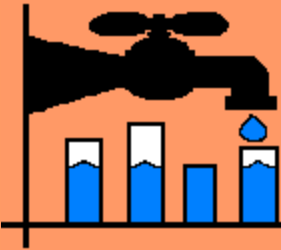




ECONOMIC ANALYSIS

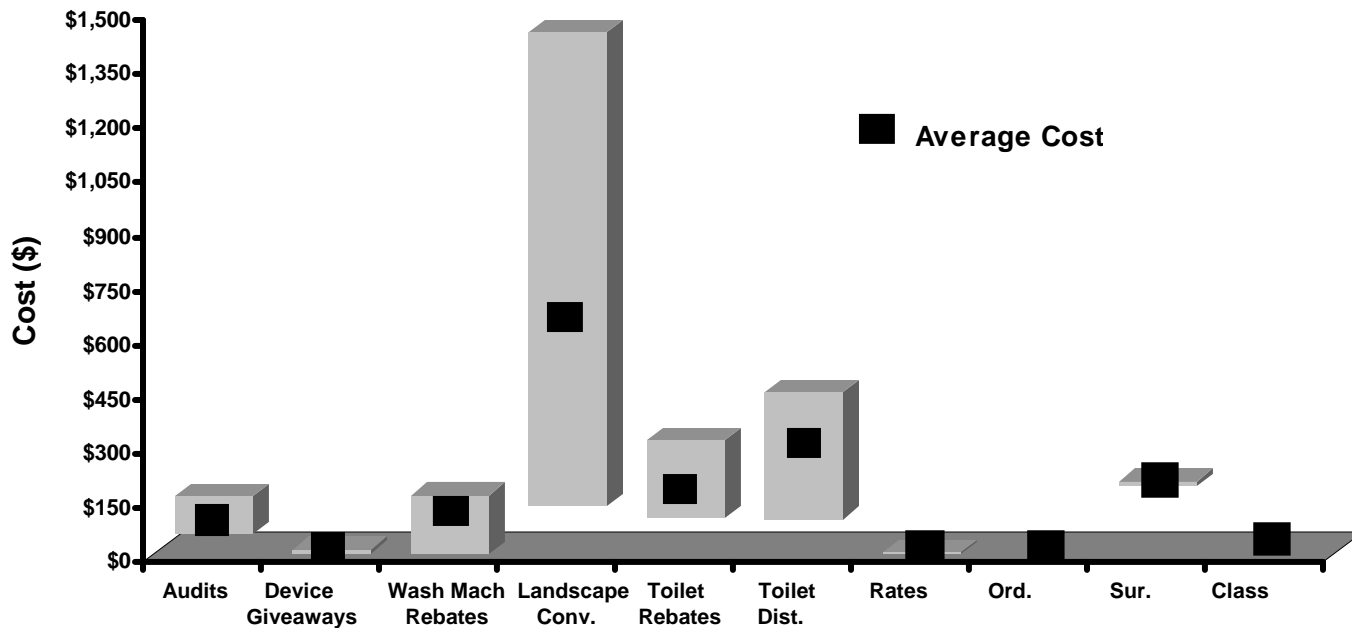
Average Cost Per AF Saved

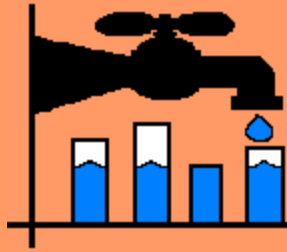
AUDITS	\$1,284*
LANDSCAPE CONVERSIONS	\$1,099
DEVICE GIVEAWAYS	\$457
TOILET REBATES	\$436
WASH. MACHINE REBATES	\$404
TOILET DISTRIBUTIONS	\$181



ECONOMIC ANALYSIS

Range & Ave. Cost to Utility & Others per Participant

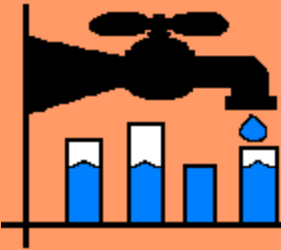




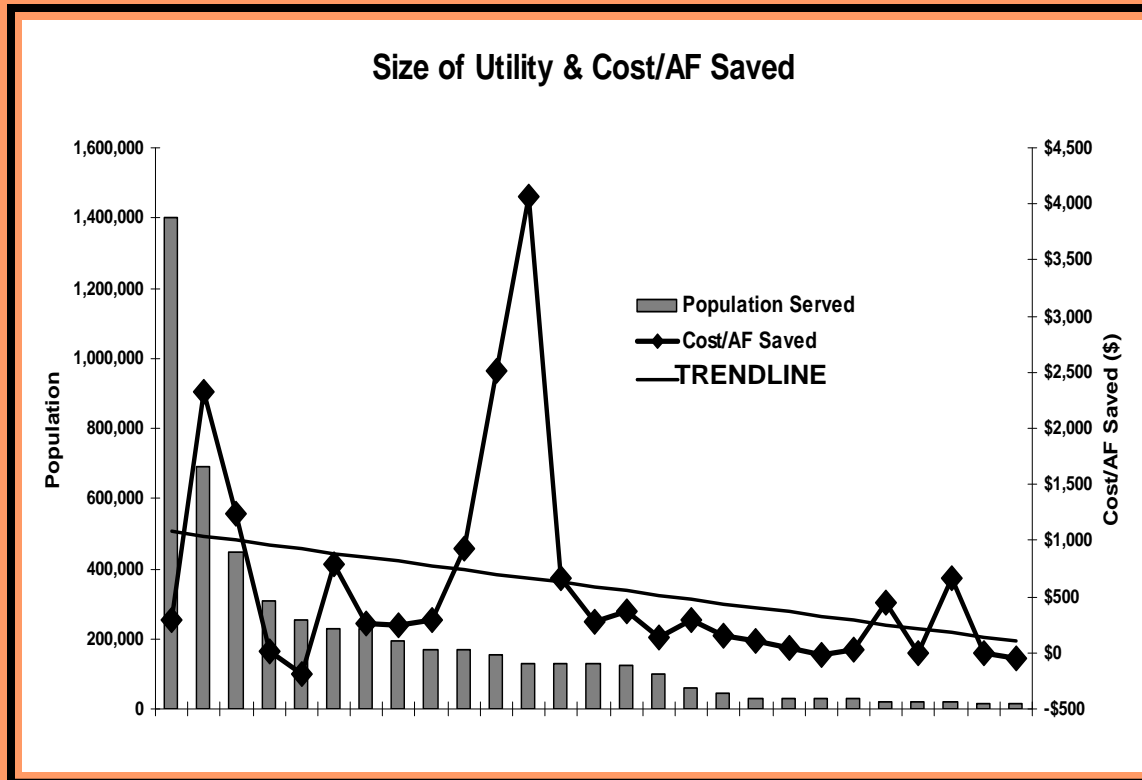
ECONOMIC ANALYSIS

Average Cost Per Participant

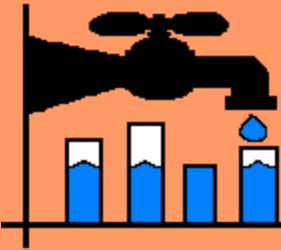
DEVICE GIVEAWAYS	\$5 + \$2 = \$7
AUDITS	\$116
WASH. MACHINE	\$54 + \$91 = \$144
TOILET REBATES	\$151
TOILET DISTRIBUTIONS	\$291 + \$39 = \$331
LANDSCAPE CONVERSIONS	\$650



UTILITY SIZE & COST PER AF SAVED




WHY?



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Interactive Calculator



INTERACTIVE CALCULATOR WORKSHEETS

WATER SAVINGS

The Interactive Calculator will work for one year of the program. If you want to analyze multiple years of your program, each must be analyzed separately.
Items that are shaded require input.

Necessary Information:

- Participant average annual water use 2 years before through 2 years after the measure was implemented.
- Control group average annual water use 2 years before through 2 years after.
- Lifespan (from list or choose your own).
- Number of participants being analyzed.

Number of Participants Length of lifespan in years (from list page 85)
 Participant average annual water use: 2 years before Control group average annual water use: 2 years before
 1 year before 1 year before
 year of the program year of the program
 1 year after 1 year after
 2 years after 2 years after

Participant Average Pre-measure Control Average Pre-measure
 Participant Average Post-measure Control Average Post-measure

Water savings 1 year after (%)
 Water savings 2 years after (%)
 Water savings per participant 1 year after (gallons)
 Water savings per participant 2 years after (gallons)
 Water savings 1 year after (gallons)
 Water savings 2 years after (gallons)
 Average water savings per year (gallons)
 Total water savings over lifespan (gallons)

ECONOMIC ANALYSIS

The Interactive Calculator will work for one year of the program, if you want to analyze multiple years of your program, each must be analyzed separately.
Items that are shaded require input.

Necessary Information:

- Discount rate (from list page 85).
- Rate of inflation (from list page 85).
- Cost for the year (exact cost for the number of participants included).
- Average water rates over time (per 1,000 gallons).

Costs: Benefits:

Costs to the utility Benefits to the utility
 Costs to participating customers Benefits to participating customers (other than water bill)
 Costs to any other organizations (ex., funders) Benefits to any other organizations
 Discount rate - % (from list page 85) Current year CPI (from list page 85)
 Average water rates (per 1,000 gallons) Base year CPI (year of the program)

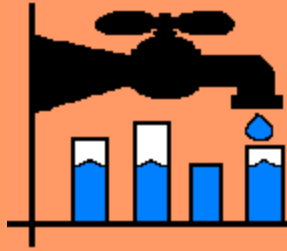
Cost to the utility over lifespan Benefit to the utility over lifespan
 Cost to participating customers over lifespan Benefit to participating customers over lifespan
 Cost to any other organizations over lifespan Benefit to any other organizations over lifespan
 Total costs Total benefits
 Net present value (NPV), utility perspective Cost per AF saved, utility perspective
 Net present value (NPV), per AF saved, participant perspective participant perspective Cost
 Net present value (NPV), overall perspective Cost per AF saved, overall perspective

Calendar Year	3-Year	6-Year	7-Year	10-Year	30-Year
1990	7.4	7.5	7.6	7.7	7.8
1991	7.2	7.4	7.4	7.5	7.7
1992	6.1	6.5	6.7	7.0	7.1
1993	5.6	6.0	6.3	6.7	6.8
1994	5.0	5.3	5.5	5.7	5.8
1995	7.3	7.6	7.7	7.9	8.1
1996	8.4	8.5	8.5	8.8	8.7
1997	6.8	6.9	6.9	6.1	6.3
1998	5.6	5.7	5.8	5.9	6.1
1999	4.7	4.8	4.9	4.9	5.0
2000	5.9	6.0	6.0	6.1	6.3
2001	5.4	5.4	5.4	5.4	5.3
2002	4.1	4.5	4.8	5.1	5.8
2003	3.1	3.6	3.9	4.2	5.1
2004	3.0	3.7	4.2	4.8	5.5
2005	3.7	4.1	4.4	4.8	5.2

Year	Index	Year	Index
1990	132.2	1998	162.5
1991	136.2	1999	165.5
1992	142.3	2000	172.4
1993	146.5	2001	177.1
1994	148.2	2002	179.8
1995	152.4	2003	184.0
1996	155.5	2004	188.5
1997	163.5		
1998	162.0		
1999	165.5		
2000	172.4		
2001	177.1		
2002	179.8		
2003	184.0		
2004	188.5		

CONSUMER PRICE INDICES	ECoBA LIFESPANS USED - IN YEARS
Airfares	6
Auto Insurance	6
Child Care	12
College Tuition	12
Electricity	10
Food	20
Gasoline	20
Health Insurance	10
Life Insurance	6
Medical Care	6
Real Estate	6
Transportation	6
Utilities	6

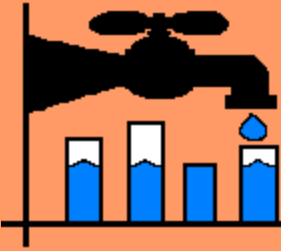




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LESSONS & RECOMMENDATIONS

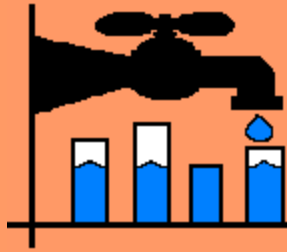
- 💧 **There are no easy answers. No “One Size Fits All”**
- 💧 **COMMITMENT to conservation as a water management tool is the highest priority.**
- 💧 **Everyone needs to fully understand the social and economic factors of their service areas.**
- 💧 **Conservation programs should increasingly target areas of actual inefficiency rather than just overall high water use.**



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LESSONS & RECOMMENDATIONS

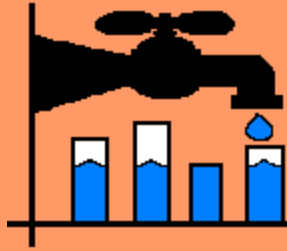
- 💧 **Evaluate your programs: be willing to change direction, doing more of what is working and less of what is not.**
- 💧 **Place a higher premium on good record keeping.**
- 💧 **The importance of tracking program participation in detail, including water consumption for participants and similar non-participating households, and the whole customer class can not be overstated.**



ECoBA

LESSONS & RECOMMENDATIONS

- 💧 **There is a disconnect between the conservation staff and the rest of the water resource management team in many utilities.**
- 💧 **There is often an even a greater disconnect between the conservation folks and those who are the utility data 'gatekeepers'.**
- 💧 **These issues need to be addressed in order to achieve the most meaningful program selection, implementation and evaluation.**



ECoBA

Thanks to all the utilities that were so willing to share their data with us for the good of all.

Thanks to those funders who were willing to support this effort.

And, particular thanks to all the decision makers and utility staff who, we hope, will make good use of this research.

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