

Larson and Associates

Water Resources Consulting

Memorandum

To: Upper Verde Watershed Protection Coalition Board

From: Keith Larson, Larson and Associates

Subject: Proposed Phase 1 Regional Water Conservation Program Alternatives

Date: August 5, 2008

This memorandum describes a proposed Phase 1 Regional Conservation Program for the Upper Verde Watershed Protection Coalition area. Several options for implementing Phase 1 programs are provided. The recommendations are based on an evaluation of conservation program alternatives conducted by Larson and Associates and the input of Technical Advisory Committee (TAC) members and other stakeholders received during two workshops held on June 11 and July 14, 2008. In addition, feedback received from Board members at the July 23, 2008 meeting is addressed. During the workshops, the cost-effectiveness, pros and cons, and implementation issues of various conservation program alternatives were presented by Larson and Associates and discussed in detail by the stakeholders. This memorandum provides a brief summary of the analyses of program alternatives, descriptions of the programs recommended for implementation, the potential water savings from each program, and planning level budget estimates for several program alternatives.

Executive Summary

The TAC's recommendation is that a first phase of a balanced regional water conservation program be implemented by the Coalition that includes the following elements:

- Implement an intensive public information and education effort focused on reducing outdoor landscape water use in the municipal sector (residential and commercial/industrial).
- Provide financial incentives for the installation of water-saving technology and turf landscape conversions to xeriscape.
- Provide water use audits for residential and nonresidential water users.
- Develop and implement a model regional water conservation ordinance aimed at improving water use efficiency in new residential and nonresidential developments and among existing water users.

Most cities and regions that have reduced overall water use significantly have implemented comprehensive programs comprised of the above elements.

The water conservation savings goal of the Phase 1 regional program is to achieve approximately a 5 percent overall reduction in municipal water use rates within five years of program implementation. The planning level estimate for the program budget is approximately \$382,000 per year. It is recommended that the Coalition apply for federal grant funding for 50 percent of program costs. Several alternatives are provided for program funding and implementation to mitigate the cost impact to Coalition members. The total projected water savings after five years of implementation of the recommended programs (by the end of 2013 assuming program start-up in 2009) and the estimated annual budget for program is as follows:

Regional Program Summary	Program 5-Year Savings Goal (AF/YR)	Annual Program Budget
Financial Incentives	256	\$213,000
Customer Outreach – Audits	26	\$29,000
Information and Education	340	\$60,000
Ordinances	240	N/A
Program Administration (1 staff position or consulting fees)	-	\$80,000
Conservation Program Totals	862	\$382,000

Two U.S. Bureau of Reclamation conservation grant programs exist: 1) The Water Conservation Field Services Program administered out of the Phoenix office (provides grants up to \$50,000 per year); and 2) the 2025 Challenge Grant Program administered out of the Denver western regional office (provides grants up to \$300,000/year).

Additional water conservation programs beyond those recommended for Phase 1 implementation could be implemented by the Coalition in the future to achieve a 20 percent reduction or more. Additional programs would involve additional implementation costs and potential social and economic impacts within the community. Additional regional programs that could be implemented as part of future phases are described later in this memorandum.

Recommended Public Information and Education Element

The regional water conservation survey data collected in 2007 clearly indicated that many homeowners are not irrigating outdoor landscapes efficiently. Many water users are probably over-irrigating by as much as 50 to 100 percent. This is true whether users are irrigating turf, xeriscape landscapes, or native plants. Therefore, the objectives of the regional public information and education element include:

- Provide detailed seasonal information on irrigation budgeting to reduce outdoor water use to homeowners and landscape professionals.
- Provide information on landscape and irrigation design to homeowners and landscape design and maintenance professionals. Work with the nursery and landscape profession in developing appropriate irrigation scheduling information and messaging.
- Publicize the availability of financial incentives to water users in the region.

- Communicate specific regional water savings goals, the need for conservation in the region, and other aspects of the program (such as the availability of audits and ordinances).
- Utilize one regional conservation program “branding slogan,” such as the “Water Smart” brand currently in use by the City of Prescott.

The use of a single conservation brand and a cohesive information and messaging program will be more effective in achieving behavioral changes within the community than having individual conservation programs implemented by Coalition members. Individual programs that differ in content can lead to confusion among water users as to the need for water use efficiency and how to achieve reductions in water use.

A primary objective of the information and education effort is to reduce annual outdoor water use among single family residences by an average of 10 percent. Achieving this goal would result in approximately 340 AF/YR of water savings based on estimated 2007 single family unit outdoor water use within the Coalition area. Additional savings would occur through reductions in nonresidential landscape water use and indoor conservation efforts. The proposed media and communications strategy for conveying conservation messages to all water users in the region includes:

- Develop print material for regional direct mail distribution, bill inserts, and distribution at pay stations, government buildings and community fairs.
- Advertise in local newspapers and regional magazines.
- Focus messaging on specific outdoor irrigation budgeting information appropriate to the season, irrigation system management, and xeriscape design.
- Use the above media to advertise incentive programs.
- Utilize at least quarterly messaging geared to the primary irrigation seasons: Spring/early summer, Monsoon, fall, winter (onset of rains).
- Use radio spots to communicate seasonal irrigation scheduling guidelines, etc.
- Develop a conservation packet to be sold at a nominal cost (e.g. \$10) to homeowners within the area. This packet would include items such as low-flow showerheads, faucet aerators, information on irrigation budgeting, xeriscape design, and rainwater harvesting.

The estimated budget for the information and education program is approximately \$60,000 per year. This is based on the example budget shown below (does not include administrative cost). The actual mix of the media used may vary from that presented below and may include other education elements.

Education Program Element	Items per Year	Cost/Item	Annual Cost
Newspaper Ads (3 papers)			
Daily Courier	8	\$834.00	\$6,672
Prescott Valley Tribune	8	\$382.80	\$3,062
Chino Valley Review	8	\$306.90	\$2,455
Smart Card Printing (Glossy)	60,000	\$0.12	\$7,200
Smart Card Printing (non-Glossy)	258,000	\$0.02	\$5,160
Smart Card Production - 6 cards	6	\$650.00	\$3,900
Mailing Costs to Exempt Wells	54,000	\$0.18	\$9,720
Radio Ads	600	\$22.00	\$13,200
Radio Ad Production	6	\$1,000.00	\$6,000
Conservation Packets	300	\$10.00	\$3,000
Education Program Totals			\$60,370

Recommended Customer Outreach – Water Use Audit Program

Providing water use audits to residential and nonresidential accounts has been shown to be a cost-effective means of reducing community water use. It is proposed that the regional program make available indoor and outdoor water use audits targeted to high water use customers. Audits would be conducted by trained auditors employed as staff of the Coalition, by staff of the Coalition members, or by outside vendors. Auditors would examine residences and businesses for leaking toilets and leaking faucets, repair leaks (e.g. install new toilet flapper), install low-flow shower heads and faucet aerators, and review outdoor irrigation uses and make recommendations regarding irrigation scheduling. The estimated cost per residential audit is \$125 per single family home. Commercial facility audits would also be offered at an anticipated average cost of approximately \$1,000 per facility. Anticipated water savings from commercial audits is not predicted here and would be in addition to the estimated savings shown below.

Audit Program Element	Program 5-Year Savings Goal (AF/YR)	Annual Program Budget	Projected Annual # Participants
Customer Audits			
Residential Audits	26	\$25,000	200
Commercial/Industrial Audits	Unknown	\$4,000	4
Total Audit Program	26	\$29,000	204

Recommended Financial Incentive Programs

A number of potential financial incentive programs were analyzed for potential implementation on a regional scale. The programs evaluated include:

- Toilet rebates – Ultra low-flow (ULF - 1.6 gallons per flush [gpf]), High Efficiency Toilets (HEF – 1.3 gpf), and Dual Flush Toilets (0.6 gpf and 1.6 gpf)
- Toilet distribution programs for each of the three types of toilets
- High efficiency washing machine rebates (22 gallons per load or less)
- Hot water recirculation equipment rebates
- Landscape conversion rebates (turf to xeriscape)
- Commercial waterless urinal rebates
- Rain water harvesting equipment rebates (rain barrels)
- Device Giveaways (showerheads, hose nozzles, and faucet aerators)
- Other potential incentives, such as customized commercial rebates and Et-based irrigation controllers.

A spreadsheet was developed that calculated potential program costs and benefits for each incentive program. The following statistics and parameters related to program cost-effectiveness were compiled based on industry studies:

- Assumed cost for each device to either the consumer or the Utility/Coalition
- Device installation cost
- Incentive amount provided
- Annual water savings per customer account
- Potential regional customer base eligible to participate
- Expected annual market penetration percentage and total annual participants
- Customer payback period in years assuming \$4.00/1000 gallons cost of water
- Cost per acre-foot of water saved (to the Utility/Coalition)
- Total potential annual program cost within Coalition area
- Total potential annual water savings after 5 years of program implementation.

Additional considerations impacting the cost-effectiveness of each program were also discussed, such as expected participation rates, percentage of “Free Ridership,” and potential water savings versus program administration cost. Based on this analysis, the consensus of the TAC and other stakeholders was that the Phase 1 regional incentive program should include the incentives listed below. Shown below are the projected 5-year program savings from each element, cost per acre-foot of water saved, the expected number of participants, and the total annual program cost estimate. It is recommended these programs be made available to all residents and businesses within the Coalition area, including well owners and those served by private water companies or small community water systems.

Phase 1 Incentive Program Element	Program 5-Year Savings Goal (AF/YR)	Annual Program Budget	Projected Annual # Participants	\$/AF Water Saved
Incentive Programs				
Single Family Toilet Distribution or Rebate (HET, 1.3 gal./flush, or dual flush)	184	\$84,600	564	\$2,300
Multifamily Toilet Distribution or Rebate (HET, 1.3 gal./flush, or dual flush)	68	\$24,000	192	\$2,300
Single Family Turf Conversion Rebate @ \$0.50/s.f. of turf removed	62	\$70,500	141	\$5,700
Nonresidential Waterless Urinal Rebate	22	\$18,000	90	\$4,000
Custom Commercial/Industrial Rebates @\$4,000/AF Saved	20	\$16,000	2	\$4,000
Total Incentives	356	\$213,100	989	

Incentive Programs Not Selected for Implementation in Phase 1

Several programs were analyzed but not selected for implementation because either: 1) the program has a high cost per acre-foot of water saved, 2) the anticipated water savings per installation is small compared to other programs, or 3) the programs have high expected rates of “Free Ridership.” Incentive programs not selected for implementation in Phase 1 but that could be implemented at a later time by the Coalition if additional water savings are desired include: Hot-water recirculation equipment rebates for single family residences (\$8,000/AF cost), high-efficiency washing machine rebates (\$7,800/AF cost), Et-based irrigation controller rebates for residential use (the high complexity of use is problematic for most homeowners), and rain water harvesting barrel rebates (\$10,000/AF cost).

Recommended Model Regional Water Conservation Ordinance

Several concepts were discussed by the TAC related to development of regional water conservation ordinances. The concept for which there was consensus was the development of a model conservation ordinance to be brought to the Coalition Board of Directors for adoption. Through adoption of a regional model ordinance by the Board, each Coalition member agency would agree to adopt the ordinance (or a variation of the ordinance) in its City, Town, or County Code. Individual Coalition members would be able to adopt more stringent conservation ordinances if desired to deal with its unique water resources situation.

Several ordinance approaches adopted by cities in Arizona and other western states were evaluated and discussed. The elements of the model ordinance for which there was consensus among the TAC members and other stakeholders, and the projected water savings for each element after five years of implementation are shown below. Annual water savings from these ordinances would continue to increase beyond 2013 as more new homes and businesses are constructed with water conserving landscapes and interior plumbing.

Recommended Ordinance Element	Water Saved by 2013 (AF/YR)
<u>HET Toilet Requirement New Residential and Nonresidential</u>	
Ann. Savings per SF Unit (gallons)	
1,205	36
Ann. Savings per MF Unit (gallons)	
1,205	10
<u>Turf Restricted to 600 sq.ft. in New Single Family Residential Units</u>	
Ann. Savings per Unit (gallons)	
3,500	103
<u>Turf Restrictions for New Commercial, Industrial, and Multifamily Develop.</u>	Unknown
<u>Hot Water on Demand Requirement for New Single Family Units</u>	
Ann. Savings per SF Unit (gallons)	
2,000	59
<u>Waterless or 0.125 Gal/Flush Urinals in New Commercial/Industrial</u>	
Annual Savings per Unit (gallons)	
18,250	32
Total Coalition Area Savings (AF/YR)	240

Water Waste Prohibitions and Other Elements of the Recommended Model Conservation Ordinance

Water conservation ordinances often include provisions for which accurate water savings estimates are not possible, but which most certainly will result in water savings. These requirements are also important in communicating to the community the importance of efficient water use. The water waste prohibitions and education-oriented ordinance components for which there was consensus among the TAC and other stakeholders include:

1. Prohibition on fugitive water leaving the property and running in streets and gutters.
2. Prohibition on spray irrigation during the daylight hours to reduce evaporation losses (currently in place in City of Prescott).
3. Requirement that new multifamily units be individually metered.
4. Car washing and other outdoor water uses allowed only with use of a hose nozzle shutoff.
5. Water recycling requirements for new commercial car washes.

6. Requirements for hotels/motels to post water conservation information in guest rooms.
7. Requirements for nurseries to provide water conservation literature to customers.
8. Requirements for model homes to provide water conservation literature to prospective buyers.
9. Model home turf restrictions.

Should the Board approve the model water conservation ordinance concepts, more detailed ordinance language will be developed and brought back to the Board for consideration and adoption. The language adopted by the Board could then be modified by individual entities as needed.

Ordinances Evaluated but Not Recommended for Implementation at this Time

The following ordinance approaches were evaluated and discussed by the TAC, but no consensus recommendations were arrived at by the committee and stakeholders. However, the ordinances described below could be implemented in the future within the Coalition area. The projected water savings of ordinances not recommended for implementation as part of the Phase 1 program are shown in the table below. These potential ordinances are:

1. Retrofit on Resale Requirement for all residential and commercial properties (currently in place in Monterey, California). Such an ordinance would require that, as a condition of sale, all residential and nonresidential properties certify that the property is equipped with 1.6 gallon/flush toilets (or more efficient), low-flow showerheads, and faucet aerators. While a retrofit on resale requirement is projected to result in a high degree of conservation savings, this requirement is not recommended for implementation at this time due to high administrative costs and potentially high retrofit costs to property owners. This requirement could be implemented in combination with a rebate program to provide property owners with funding toward the retrofits (as has been done in Monterey, CA).
2. A prohibition on any new installation of high-water-use turf grass in residential or nonresidential development (with certain exceptions). The projected water savings shown below are for single family residential units only. No consensus could be reached among TAC members regarding an absolute ban on turf in new development.
3. A requirement that all new single family homes install a large rainwater collection, storage, and pumping system (policy currently in place in Sante Fe, NM). This approach is not recommended due to the extremely high cost to new homeowners (\$7,500 estimate per home) and the extremely high cost per acre-foot of water saved (\$158,000/AF).

Ordinances Not Recommended in Phase 1	Water Saved by 2013 (AF/YR)
<u>Retrofit on Resale Requirement</u>	
Ann. Savings per SF Unit (gallons)	
15,400	397
<u>No New Residential Turf Permitted</u>	
Ann. Savings per SF Unit (gallons)	
8,750	258
<u>New Residential Rainwater Harvesting Requirement</u>	
Ann. Savings per SF Unit (gallons)	
15,400	454

Regional Conservation Program Administration Alternatives

Several alternatives for program administration and implementation are possible. There are advantages and disadvantages to each of the approaches, as described briefly below:

1. Coalition executes an MOU with the Yavapai County Cooperative Extension to implement for program administration.
Advantage: Extension is already providing Project WET services in the area through funding provided by the Water Advisory Committee (WAC).
Disadvantage: Lack of control by the Coalition Members.
2. Coalition funds a Yavapai County staff position to be managed through the Water Advisory Committed (WAC) process.
Advantage: County already has a Water Resources Coordinator position funded in part through WAC.
Disadvantage: County and WAC responsibilities go beyond the Coalition area.
3. Coalition hires full time staff position to be managed by the TAC.
Advantage: Provides for direct control by the Coalition management.
Disadvantage: Office space, computer and vehicle would have to be provided for the position through one of the Coalition member offices. (Could be provided as in-kind services toward that member's share of program costs.)
4. Burgess and Niple administers the program as part of overall program manager responsibilities. Outside vendors could be used to process rebates or perform customer audits. Use of rebate processing vendors would add approximately 15-20 percent to the cost of financial incentive programs.
Advantage: Provides for direct control by the Coalition. Allows for seamless program adjustments should grant funding sources decrease or increase.
Disadvantage: Potentially higher costs than other alternatives.

5. Individual Coalition members agree to implement the agreed upon regional conservation programs within their jurisdictions.

Advantage: Allows for customization of programs in different areas within agreed-upon regional program guidelines.

Disadvantage: The economies of scale associated with a regional effort are lost. In addition, it may be easier to obtain grant funds for a regional program rather than for several individual entities. The advantage of having one regional water conservation program brand and messaging is lost.

6. Some aspects of the regional program could be administered by individual Coalition members while other aspects of the regional program could be administered on a regional basis. For example, financial incentive programs could be funded and administered by each individual Coalition member within their jurisdiction, while public information and education efforts and ordinances could be implemented regionally.

Advantage: Provides flexibility to deal with funding issues of Coalition members without losing regional program identity.

Disadvantage: Some economy of scale advantages are lost.

Based on the advantages and disadvantages of these approaches, it is recommended that either Alternative 3 or Alternative 4 above be utilized to administer the Phase 1 conservation program.

Regional Conservation Program Water Savings Goals – Phase 1 and Beyond

Water savings goals or goals, either in terms of a percentage reduction in use or a specific annual water volume savings are typically established for water conservation programs involving significant expenditures of funds. The value of establishing overall program goals includes:

- Checking progress against goals allows the effectiveness of the program approaches to be evaluated and adjusted to maximize program effectiveness.
- Providing conservation goals to the water-using public is a valuable tool in motivating people to monitor and evaluate their own water use and conservation efforts.

The estimated volume of water savings after five years of Phase 1 program implementation is 862 AF/YR. This is equal to approximately a 3.6 percent reduction in overall per capita water use within the Coalition area, including use by private well users and those served by private water companies. Without additional conservation efforts, it is estimated that total municipal sector water use will be 23,900 AF/YR by 2013. In addition, the construction of new, more efficient housing units is projected to result in approximately an additional 3.5 percent reduction in municipal sector water use, assuming the commercial water use percentage within the Coalition area remains at approximately 30 percent. However, the commercial use percentage is likely to continue to increase somewhat in the future. If the anticipated water savings related to new, more efficient housing units is partially offset by greater commercial use, an overall target for a reduction in per capita water use of approximately 5 percent is an achievable 5-year goal for the proposed Phase 1 Regional Water Conservation Program. Additional reductions related to ordinances affecting new development should continue to increase beyond the 5-year time

frame and result in overall program reductions exceeding 5 percent. The next section discusses additional programs and costs that could be implemented in future conservation program phases to achieve significantly higher percentage reductions in Coalition area water use.

Additional Programs and Sector Reductions Needed to Achieve a 20 Percent Reduction in Overall Water Use within the Coalition Area

It is projected that a 20 percent reduction in overall water use can be achieved by implementation of a combination of additional incentive programs, ordinances, and water rate structure changes. The programs that could be implemented in future phases and potential costs and savings of the programs include:

- Implement a “Retrofit on Resale” ordinance and provide rebate funds to retrofit all pre-1994 residential and commercial units by 2030 with HET toilets, etc.
 - Overall projected water savings within Coalition area – 6 percent.
 - Estimated cost - \$500,000 per year (\$400 per residential unit)
- Achieve a reduction in outdoor residential water use of 35 to 40 percent through education, ordinances, and implementation of steeply tiered water rates.
 - Overall projected water savings within Coalition area – 6 to 7 percent
 - Increased costs beyond Phase 1 program costs for turf removal incentives, education programs, and residential audits)
- Reduce overall non-residential water use by 20 percent through retrofit on resale requirement, tiered rates, education, custom commercial incentives, and non-residential customer audit programs.
 - Overall projected water savings within Coalition area – 5 percent

Additional residential and non-residential water savings to get to the 20+ percent reduction level could be achieved with additional incentive and ordinance programs, or water rate structure changes. Examples include:

- Incentives for installation of hot-water recirculation devices and high efficiency washing machines.
- Additional ordinance restrictions on landscape water use for new residential and/or commercial development (turf prohibitions, rainwater harvesting requirements)

Funding Alternatives for Recommended Phase 1 Conservation Programs

Several alternatives are possible for implementation and funding of Phase 1 Programs. For all of the alternatives presented below, it is assumed that federal grants will be obtained to pay for 50 percent of the costs.

Alternative 1 – Implement all Recommended Phase 1 Programs in 2009 (total cost to Coalition after federal grants - \$191,000

Use of 50 percent of total FY 08-09 and FY 09-10 Coalition budgeted funds applied to the Phase 1 conservation program would leave the following unfunded amounts for each Coalition

member, broken out by funding percentages shown below. Use of already budgeted funds will leave \$100,000 plus any carryover funds from FY 07-08 to apply toward the recharge task.

Prescott -	\$29,100 (32%)
	(Current Prescott budget for Educ. \$54K, Incentives \$75K)
Prescott Valley -	\$24,900 (27.4%)
Chino Valley -	\$9,000 (9.9%)
Dewey Humboldt -	\$2,600 (2.9%)
Yavapai County) -	\$24,900 (27.4%)

Alternative 2 – Implement Recommended Phase 1 Education/Information Program, Model Regional Conservation Ordinance, and 50 Percent of Recommended Financial Incentive Program Funding in 2009 (total cost to Coalition after federal grants - \$123,000)

Use of 50 percent of total FY 08-09 and FY 09-10 Coalition funds applied to the Phase 1 conservation program would leave the following unfunded amounts for each Coalition member, broken out by funding percentages shown below.

Prescott -	\$7,400 (32%)
Prescott Valley -	\$7,000 (27.4%)
Chino Valley -	\$2,300 (9.9%)
Dewey Humboldt -	\$700 (2.9%)
Yavapai County -	\$7,000 (27.4%)

Alternative 3 – Implement only the \$60,000/YR Education/Information Element and develop a model regional water conservation ordinance

This alternative, while much less expensive and easily affordable under the existing program budget, is not recommended for the following reasons:

- Water users in the Coalition area and throughout Arizona are well-accustomed to being asked to conserve water. Without Coalition funding of new incentive programs, the regional conservation program could be perceived by water users as nothing new (i.e. “business as usual”) and may not be heeded.
- Providing financial incentives to all water users in the Coalition area sends the message that government is doing its share toward achieving water conservation goals.
- Incentives programs to encourage fixture retrofits of older homes and businesses provide “hard” water conservation savings.