

# **Yavapai County Water Advisory Committee Options for Water Conservation Strategies**



Del Rio Springs area  
Courtesy Sharlot Hall Museum

**Report to the Yavapai County Water Advisory Committee**

**From the Water Conservation Workgroup**

**September, 2004**

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A Note about the Water Conservation Workgroup Committee:

The Workgroup was composed of volunteers throughout the County who have keen concerns about the water resources in the region. The active members included Doree Christensen (from Jerome and WAC member), Anita MacFarlane (Sedona, WAC member), Dorothy Hores (from Big Park and League of Women Voters), Connie Tucker (City of Prescott), Howard Mechanic (from Prescott and Citizens Water Advisory Group), Brian Lane (from Sedona and Sedona Water Conservation Plan), Charlene Craig and John Kaminski. The group performed its work over a series of meetings held every two weeks from April through July. The subcommittee acted in the spirit of the Water Advisory Committee by processing decisions on a consensus basis and welcoming any other persons wishing to attend the meetings.

## **Executive Summary:**

The Yavapai County Water Advisory Committee, with the assistance of the Water Conservation Workgroup, has developed a series of water conservation strategies. Water conservation is one water management decision that does not require a detailed understanding of hydrology to realize positive benefits for the community. Water conservation helps extend the area's water resources and saves money for residents and communities.

The Water Conservation Workgroup examined numerous water conservation techniques in use around the nation and ranked them for their applicability and effectiveness within Yavapai County. In general, several strategies are proposed for the primary water use sectors in the region:

- For public water supply systems, the suggestions include implementing tiered water rates, starting an incentive and rebate program for low water use fixtures and landscaping, enacting some regulatory programs that affect only new construction and other regulatory programs affecting all users and initiating an education and outreach program.
- The suggestions for private well users are similar, excluding the tiered water rate program.
- Outdoor landscaping and turf facilities are significant users of water, limiting the amount of high water use landscaping and the number of turf facilities in new construction is recommended.
- Irrigation water users have a large potential to save water; the County and communities could encourage and assist existing agencies and organizations that provide the necessary technical expertise to achieve irrigation water savings.

It is apparent that water conservation is not a common practice in large portions of the County. A basic water conservation framework should be established to start conserving water. . This framework should consist of the following four elements:

1. A dedicated staff position to develop and assist with the implementation of the various strategies. This position will be key to success of the following three elements.
2. Include enforcement measures on any of the regulatory or incentive/rebate programs.
3. Develop grassroots buy-in from the public on water conservation.
4. Initiate a Public Education and Outreach program and run on a continuous basis.

If the WAC and Board want to move forward with any of the suggestions provided in this document, several procedural and technical concerns should be addressed. The procedural concerns can be addressed by a joint meeting of the Board of Supervisors and the WAC to discuss buy-in and process for moving any of these suggestions forward. Some technical support is necessary for making decisions on some of the conservation strategies. Quantifying potential savings and costs of various conservation strategies will take some time and effort. This quantification process should also be framed by a water conservation goal. Personnel resources should be dedicated to this research.

## **Introduction & Background:**

The Yavapai County Water Advisory Committee (WAC) was established in January 1999 as a vehicle to address water resource issues in Yavapai County. As a fast growing region, Yavapai County is faced with significant long-term concerns about how to provide adequate water resources for its current and future residents and its important aquatic habitat. The goals and objectives of the WAC are described in Appendix A.

Much of the resources of the WAC have since been devoted to developing a comprehensive understanding of the Verde River hydrologic system. More recently, the WAC began to look for areas where it could provide leadership in water resource issues. Water conservation is one area that does not require a great amount of hydrologic data in order to create positive effects for the region. In December 2003, the Board of Supervisors authorized the WAC to start working on a suite of different water management and conservation options for Yavapai County. The goal is to explore several options available to the region, develop a menu of approaches, and present these ideas to the Board of Supervisors when complete.

To complete this task, the WAC assembled two working subcommittees, The Water Conservation and Water Management subcommittees. Membership was selected from a list of volunteer WAC members, WAC alternates, and interested members of the public. The two subcommittees met in a series of meetings, twice a month from April through July to develop and discuss numerous ideas and construct a menu of possible approaches. This document discusses the menu of water conservation approaches and the specific information that the WAC believes is necessary for making an informed selection from the list.

## **Historical Perspective:**

Yavapai County is a diverse area in terms of natural resources. Its rugged topography has, until recent decades, allowed the region to remain relatively isolated from the rest of the state and nation. This same topography has also created a desirable place to live with stunning vistas and mild four-season climate. Until the 1970s, the primary economy was based on farming, ranching, and mining. Then with improved access and services, the County has become a destination for people looking to relocate to a better way of life.

From the 1920s to the 1960s, the population of the County remained relatively stable at around 25,000 people. From the period 1970 to present, the population has increased from 37,000 to approximately 190,000 people, a 5-fold increase in just over 3 decades (Yavapai County General Plan). The growing population creates new demands for water, including household, recreational (parks, golf courses), commercial and industrial uses.

Irrigated agriculture has played an important role in Yavapai County's past; beginning with the diversion of surface water in territorial times and further expanding into lands irrigated by groundwater with the drilling of pumped and artesian wells in the late 1930s. Irrigation water use has historically been the largest water use sector, comprising

approximately 60% of the water demand in the Verde Valley, and 85% of the water demand in the Big Chino subbasin. Growing concerns about groundwater overdraft by pumping in the Prescott AMA groundwater basin began as early as the 1950's. Since the passage of the Groundwater Management Act in 1980, the irrigated agriculture in the Prescott AMA has declined significantly, comprising only 21% of the total groundwater use in 2002. With the exception of the Prescott AMA, water demand for irrigation has remained relatively stable in most groundwater basins in Yavapai County.

### **Current Conditions:**

Yavapai County residents demonstrate a variety of water conservation habits, depending in part on where they live, the availability of water and their economic activities. Community-wide water use activity can be characterized by examining the gallons used per person each day. These quantities incorporate all of the water use activities, residential, commercial, industrial and recreational into one statistic. A community with a high industrial base may have a large gallons per capita per day (gpcd) value compared to another community without the industrial base, even if the residents of that community are more conservative in their water use at home.

Jerome and Sedona have a high water use per capita, at around 400 and 250 gpcd (Verde Valley Water Budgets, WAC, 2002). This is primarily due to the high number of workers and tourists who consume water but are not counted as part of the population. Many of the other communities in the Verde Valley use approximately 100 gpcd, with the overall average at approximately 160 gpcd. Prescott and Prescott Valley use approximately 150 and 125 gpcd, respectively.

In comparison, the communities in the Salt River Valley use, on average, approximately 230 gpcd, higher in part because of the warmer climate and more industry. However, the Arizona Department of Water Resources has found that interior residential water use is similar throughout Arizona.

### **What is Water Conservation?**

Water conservation often means different things to different parties. For private residences, it may mean limiting time in the shower or washing the car with a bucket instead of a hose, for irrigators it may mean planting different crops or upgrading irrigation systems, for water resource agencies it may mean reducing the gallons-per-capita-day use within an entire city.

Conservation doesn't necessarily mean sacrifice, it means making good use of all the water that comes out of the tap. Limiting the amount of water that runs down the drain or sidewalk, fixing leaks, and watering landscaping with only as much as it needs are some of the best conservation measures and the easiest to carry out.

A conservation program can take two possible approaches, a technology based approach or a behavior based approach, however, using both approaches is most effective. Below

is a definition of these approaches provided within the Arizona Statewide Water Conservation Strategy draft report:

- *Technology-based* measures, such as equipment retrofits and the installation of water-efficient appliances, achieve long-term savings that will last as long as the efficiency device remains installed. They are usually expensive compared to behavior-based practices and often require incentives (e.g., rebates, ordinances) to entice water users to adopt them. Hardware measures require one step – installation – to achieve lasting water savings.
- *Behavior-based* practices such as turning off faucets while washing dishes and not hosing sidewalks typically result in only short-term water reductions because they require ongoing reminders (e.g., public messaging) about the need to change personal behavior in order to save water. Water managers often promote behavior-based water efficiency practices during drought because a) they need only temporary reductions in water use until the drought has passed, b) behavior changes can quickly result in water reductions (e.g., ban on lawn watering), and c) water savings from behavioral changes are largely free (drought response is considered a news item compared to long-term public education campaigns which involve paid advertisements). Behavior-oriented measures require repeated actions on the part of water utilities and water users to remember to change water habits. Utility experience has shown that these types of water-saving actions are quickly abandoned by the public once a drought ends; similar results are indicated by public education (only) campaigns that are tied to long-term water supply issues.

Saving water is a multi-faceted approach to meeting long-term water needs that has several value-added benefits. Water conservation benefits both individuals and society. It can result in monetary savings for the individual in reduced water costs. The shared water system can benefit by reducing infrastructure, pumping and water acquisition costs – further saving money for individuals that it serves. Finally, society can benefit by being able to sustain the water resources that provide all water users, including ecological needs. Efficient water use benefits ecological resources by keeping as much water as possible in its natural environment.

USEPA *Water Conservation Plan Guidelines* state that ... Properly planned and implemented, water conservation programs can defer, reduce, or eliminate the need for not only water supply facilities but wastewater facilities, as well. Significant capital cost savings can result.... Water conservation extends water supplies, of course, but can also reduce utility operating costs. Energy use by customers and utilities can be reduced, which saves money and reduces greenhouse gas emissions. Reducing water withdrawals also helps improve water quality, maintain ecosystems, and protect water resources.

#### **Reasons to Conserve Water:**

Critics of water conservation often decry the need for conserving water as a means to make water available for more growth or that it makes delivery systems more vulnerable

to drought. But there are numerous reasons to conserve water that will mute this argument:

- Conserving water is ethical; wasting water is not. This is commonly referred to as water etiquette.
- Uncertain impacts from climate change may make water conservation a way of life now and in the future.
- Water should be conserved for future generations. This also protects the value of investments for the current generation by ensuring long-term water availability.
- Water conservation allows more water to be available for the natural environment.
- Water conservation is not about making more water available for growth - the fact is that growth in much of Yavapai County, outside of the Prescott AMA, is not currently tied to the availability of water supplies. Concerns about growth should be directed at growth issues and not be used to detract from the need to conserve water. Regardless of how growth and water are considered in the future, we can make significant inroads toward meeting future needs by saving water now.
- Water conservation helps water supplies survive drought impacts. There are some concerns that water conservation measures will reduce the capability of water systems to manage water deliver during drought. If everyone is already being conservative during wetter times, there will not be the capacity for cutbacks during a drought emergency. However, if customers within a water system are always conservative with their water use, the water supply will be better able to support demands during a drought and drought emergencies may be avoided in the first place.

It is still prudent to plan for drought emergencies by developing capacity and/or supply triggers for restricting water use. These are strategies that utilize staged alerts to restrict water use when use exceeds a given water supply or delivery capacity. They apply more toward seasonal or immediate water supply or water delivery capacity threats and are typically initiated by individual water providers. It is a water conservation tool, but does not directly apply toward the goal of reducing water use through use of technology and changes in habit.

Without doubt, we are in a drought. Precipitation in Yavapai County has been below average for 8 of the past 9 years (1998 was above normal) and 4 of those years rank among the 5 lowest precipitation years in the last 100. Experts generally agree that drought cycles in the southwest typically last for 20 to 30 years, with some years bringing above average precipitation and most being below average. Though no one can predict the future with certainty, it is likely that we are in for a long dry period. Conserving water in a drought not only helps the long-term water outlook for humans, it helps ecological resources by better maintaining groundwater levels, spring and stream flows on which many plants and animal rely on during dry periods.

## **Existing Water Conservation Programs:**

Water conservation is commonly practiced throughout the nation and the world. Conservation strategies commonly fall into three broad categories: 1) Conservation due to a drought emergency, 2) Conservation due to infrastructure limitations and 3) Conservation due to a need to preserve water resources. The examples below explain strategies employed by various entities in order to preserve water resources.

Prescott AMA: Within the Prescott AMA, water conservation is one tool used by the Arizona Department of Water Resources to help reach the management goal; groundwater users are required to meet conservation goals. The Department of Water Resources sets these goals at the water provider level and leaves the specifics of meeting the goal up to the providers. These water providers have instituted a variety of programs to help meet their mandates: Prescott Valley has implemented an inverted rate structure and information campaign, while Prescott has approached the problem with an incentive program for low water-use landscaping and plumbing fixtures. The agricultural and industrial use sectors also have mandatory conservation measure imposed on their water use.

City of Prescott: Prescott has voluntary use restrictions, incentive and regulatory programs to help meet conservation requirements.

- Voluntary water use restrictions are intended to reduce peak demands during summer months when infrastructure capacity is at maximum capacity
- Rebate programs for low water use landscape, low-flow plumbing fixtures
- Use of reclaimed water on golf courses

Town of Prescott Valley:

- Tiered water rate structure
- Public Education and Outreach through Water Use It Wisely
- Use of reclaimed water on golf courses

City of Flagstaff:

- Rebate program for water efficient toilets, rain barrels
- Regulations on outdoor watering (time of day, day of week)
- Delivery of reclaimed water for landscape irrigation

Town of Payson:

The Town Council sets annual water conservation goals that it meets through a number of regulatory programs. New system demands are strictly regulated and sometimes prohibited based on the annual amount precipitation. Of the programs reviewed, Payson has the strictest water conservation and management plan. Payson has in some cases denied permits for new businesses and homes, but this has not appeared to have a negative impact on their economy. Some of the regulatory programs include:

- Stepped water use restriction regulations based on available water in the aquifer
  - Water use limitations become increasingly strict with each step



- Three levels of enforcement, fines, loss of water service or criminal prosecution are included
- New turf, misters, water features, and plants that require spray irrigation are prohibited
- Notice of water conservation programs required at completion of a real estate transaction
- Nurseries, public restrooms, showers, and guest rooms required to provide notice of water conservation programs
- Leaks must be repaired within 15 days or the user will face fines

City of Albuquerque: Sets long term water conservation goals. In 1994 the City set a goal to reduce water use per resident by 30% in ten years – and achieved that goal. They accomplished this through the following measures:

- Incentive and rebate programs for low water use fixtures and landscaping: Albuquerque has a low flow toilet rebate program. Residential customers get a \$125 rebate for the first toilet, \$75 for the second, and \$50 for each additional toilet. Non-residential customers get up to a \$909 rebate per toilet.
- Water use audits
- Water use restrictions (time of day, day of week) with enforcement by use of fines.
- Education and Outreach programs
- Tiered rates to recapture lost revenue from water use reductions, levied on the higher water users.
- Seasonal surcharge of 21 cents per unit when customer's use exceeds 200% of their winter rate.
- Delivery system improvements to reduce water losses

### **Proposed Statewide Conservation Program**

The Governor's Drought Task Force has prepared a Statewide Water Conservation Strategy document that is current undergoing public review. Many of the components in this document compliment the findings in this report. The concept of the report is to provide guidance and assistance to water users who want to achieve water savings, helping especially those communities that are hard pressed to do it on their own. No additional regulatory authority has been proposed. Report recommendations include:

- Create an Office of Water Conservation
- Continue/Expand Education Programs
- Develop Partnerships
- Strengthen conservation media messaging efforts
- Adopt ABC's of water use
  - Reduce unaccounted for water to a maximum of 10%
  - Conduct annual system audits
  - Implement universal metering
  - Reduce discretionary outdoor water uses

- Time of day watering restrictions
- Fixing leaks
- Water shutoff nozzles
- ET based irrigation controllers
- Removing turf
- Installing low water use landscaping
- Provide assistance in rural areas for developing voluntary benchmarks or other conservation goals
- Create a Rural Water Systems Development Fund for Conservation
- Create a Water Conservation Advisory Board

### **Water Conservation Goals:**

Of the water conservation goals in place in other areas, the most successful are those programs that have a conservation goal. Furthermore, the programs with the greatest success are those that have a quantifiable goal (i.e. percentage reductions, quantified amount of savings), and that have community and leadership support of those goals. Some goal examples follow:

Potential goals could include:

- A percentage reduction in total water use (i.e. 15% reduction over a specified time period)
- A percentage reduction in gallons-per-capita-day (i.e. a 15% reduction over a specified time period)
- An end target water demand value (i.e. 75 gpcd within a specified time period)
- Replenishment of groundwater supplies
- Preservation of ecosystems
- Economics (make best use of the least expensive sources of water)
- Help reach water management goals

Other concerns include water use by governmental agencies, especially in high profile areas. These entities should lead by example and be among the first to enact water conservation programs. Governments in the county should do audits on their water uses, and reduce unnecessary turf as well as instituting other measures regarding their own water use.

The combined use of water rates and rebate programs have a duplicative effect – if water rates increase in order to encourage conservation, the water rate program provides a portion of the incentive necessary to reach the water savings goal. Similarly, regulations and rebates can be considered to work in tandem. Cost of rebates can be reduced if regulations also provide incentive for water conservation. The cumulative impacts from any number of strategies may need to be evaluated prior to developing a list of approaches.

The water demand characteristics of any industry moving into the region or being encouraged to move into the area should be considered. The amount of water consumed

by prospective industry should be a factor in comparing its relative value to the community.

## **Suggested Water Conservation Programs**

The WAC Water Conservation Workgroup examined numerous water conservation strategies from other areas and developed an initial evaluation process to rate the expected effectiveness of each strategy within Yavapai County. The complete list of strategies considered is provided in Appendix A. Overall, the Workgroup decided that there were three primary water use sectors that deserve the most attention within the region: public water supply systems, private water supply systems (primarily small well users), and the agricultural sector.

There were some themes that the Workgroup decided would be common to the success of any of the programs or strategies suggested.

1. A dedicated staff position to work on developing and assisting with the implementation of the various strategies. This may be why conservation programs are not widespread within Yavapai County. Possible funding sources for such a position are discussed later.
2. Enforcement measures, such as fines or civil prosecution, are a necessary component of any regulatory or incentive/rebate programs. Without the ability to enforce regulations they become little more than recommendations.
3. All of the water conservation strategies will need to have grassroots buy-in from the public for a successful implementation.
4. All water conservation strategies require public education. Even the technology-based measures are not fool proof and require an educated individual to make full use of the technological potential.

Below is a summary of the strategies that are most likely to conserve water within each water use sector:

### **Public Water Supply Systems**

- **Tiered rate structures for water providers** - Most rate structures generally contain two elements: a fixed service charge and a charge based on consumption. A fixed service charge should reflect the true costs of delivering water and a minimum use charge. The true costs of delivering water include current operating costs, the costs associated with over-sizing the system to meet maximum daily demand, and the costs of developing future sources of water. Consumption charges that encourage the efficient use of water include:
  - Increasing block (inverted block) or tiered rates have a per-unit charge that increases as water consumption increases.
  - Seasonal rates include an additional charge for water use above a certain threshold during months when system demand is highest.

- A base rate should provide a low cost for the quantity of water necessary for basic needs.

Tiered rates demonstrate good success in creating efficient use of water. It is simpler for municipally owned water systems or Water Delivery Districts to change rates than it is for private water companies. It is recommended that the Arizona Corporation Commission rules for rate changes for conservation purposes be streamlined, that a gross increase in water rates should be encouraged to help conserve water, and that additional revenue generated from a rate increase be specifically earmarked to fund water conservation programs.

- **Charge similar rates for groundwater and effluent** - In communities with groundwater recharge facilities, treated effluent water rates should be more compatible with the rates charged for other water sources. Currently, effluent costs are subsidized for use at golf course facilities at approximately 1/3 to 1/2 of the rate charged for groundwater. When the effluent can be used to recharge groundwater supplies, it makes no sense to provide incentives for the consumption of effluent.
- **Incentives and Rebates:** Initiate rebates that combine conversion of existing landscaping to xeriscaping and/or use of native plants and low flow plumbing fixtures. (Deed restrictions or penalty for converting back to high water use are necessary). Incentives for removal of existing turf can be based on a fixed amount per residence, or an amount per square foot removed.
- **Regulatory Programs**
  - **New Construction:**
    - Turf restrictions -- In some jurisdictions, turf restrictions allow a certain percentage of each residential property or landscaped area to have an "oasis", with minimum and maximum square footage allowed. A typical ordinance allows something like 10-20% of the landscaped area to be an "oasis", with a maximum allowable.
    - Irrigation system design--drip systems to be installed for the majority of landscaping, provide some limits on allowable size of an "oasis" area (turf/fruit trees, etc).
    - Restricted list of allowable plants (low water use plants appropriate for the area)
    - Limit the use/type of water features-- no aerial spray fountains, limit size of ponds, etc.
    - Recycle water for new car wash facilities
    - Installation of waterless urinals in commercial establishments
    - Gray water reuse plumbing requirements only for houses on septic systems.
  - **All Water Users**
    - Time of day and/or day of week outdoor water use restrictions

- Restrictions on home car washing – use bucket or shutoff nozzle
  - Initiate use of timers for landscape irrigation
  - Allow platting authorities to consider water resources for new developments outside of the Prescott AMA.
- **Education and Outreach Programs**
  - Initiate a public awareness campaign for water conservation
  - Fund and fill a dedicated staff position to work on countywide conservation efforts
  - Construct an informational website on countywide water conservation programs/tips
  - Utilize existing educational programs – Project WET, Water Use it Wisely
  - Utilize existing educational groups – (VWA, Cooperative Extension, NAU, etc)
  - Package the concept of water conservation as an efficiency/cost reduction program
  - Relate the value of riparian habitats to the quality of life issue
  - Provide water use audit program with volunteer field personnel
  - Educate public on how to check for and repair water leaks.

#### **Private Well Water Systems (small well users)**

- **Regulatory Programs**
  - **New Construction**
    - Restrict Turf area
    - Irrigation system design – drip systems to be installed for the majority of landscaping, provide some limits on allowable size of an “oasis” area (turf/fruit trees, etc).
    - Restricted list of allowable plants (low water use plants appropriate for the area)
    - Limit the use/type of water features – no aerial spray fountains, limit size of ponds, etc.
    - Recycle water for new car wash facilities
    - Installation of waterless urinals in commercial establishments
    - Gray water reuse plumbing requirements on houses with septic systems
  - **All Water Users**
    - Time of day and/or day of week outdoor water use restrictions
    - Restrictions on home car washing – use bucket or shutoff nozzle
    - Initiate use of timers for landscape irrigation
- **Education and Outreach Programs**
  - Initiate a public awareness campaign for water conservation
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- Utilize existing educational programs – Project WET, Water Use it Wisely
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- Package the concept of water conservation as an efficiency/cost reduction program
- Relate the value of riparian habitats to the quality of life issue
- Provide water use audit program with volunteer field personnel

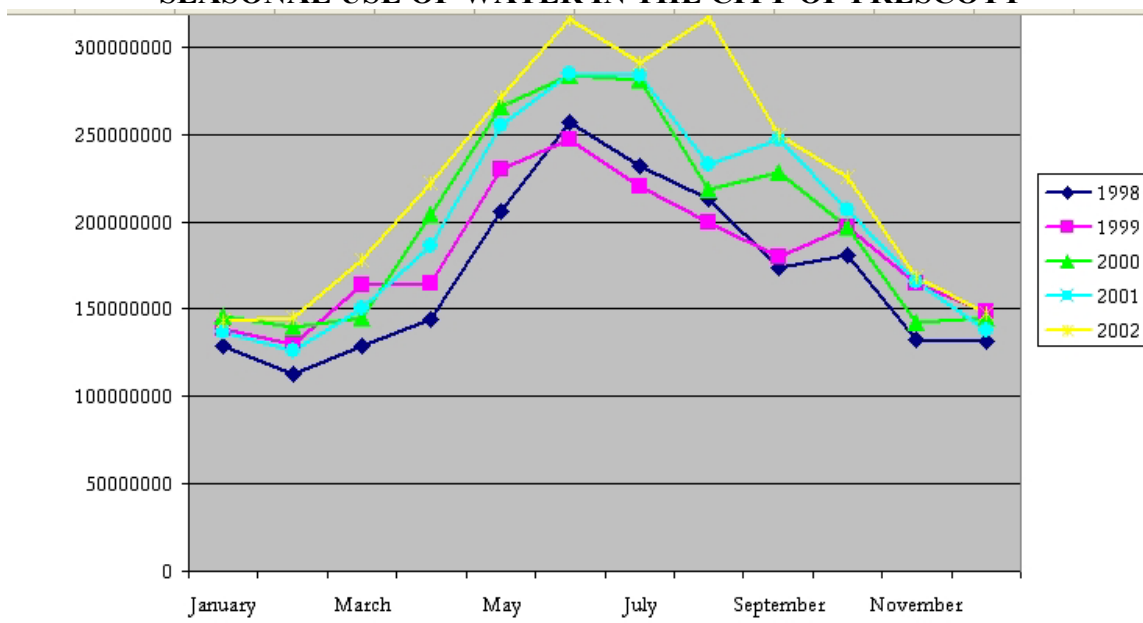
**Outdoor landscaping:**

On average, only about 10% of residential water use in winter is for outdoor use. However, during other times of year the situation is quite different. According to a study of five western cities, outdoor water use averaged 65% of the total single family residential water demands during the spring and summer months. In the Yavapai County area, water use typically doubles during the summer months (see graph below). It is particularly important that we cut water use during the times of highest demand. If peak usage can be cut, then our existing water infrastructure and water sources will be better able to handle increased growth; lessening the need for additional infrastructure and new water sources.

For this reason, it is particularly important to try to reduce summer use of water on landscaping. It is also more important to reduce the amount of water used outside for landscaping because only a small amount of that water is returned to our local aquifer through recharge -- since only inside water is collected in effluent and recycled in most of the County.

Reducing summer usage can be done by a combination of measures: tiered water rates, higher water rates in summer, rebates for conversion to low-water use landscaping, and restriction of high-water landscape areas in new construction. Conversion to low-water use landscaping can be done in an aesthetically pleasing manner and in a way that will not negatively affect the population's quality of life in an appreciable measure. Education will be an important component to assure public acceptance.

**SEASONAL USE OF WATER IN THE CITY OF PRESCOTT**



**Turf Facilities:**

Turf and grass lawns require large amounts of water and consume most of the water applied. Green lawns and turf provide a cultural concept of beauty from wetter climates that does not transfer well to a high desert climate with its own natural beauty. Although turf area makes sense for ball fields and public parks that provide a benefit for a large percentage of the public, they are a selfish use of public water supplies when enjoyed by only a few individuals. Golf courses and large private lawns are the most notable example. By one estimate, Yavapai County has more golf course turf per capita than Maricopa County, a statistic hard to accept when comparing Maricopa County’s wealth of water to our meager supplies.

It is suggested that platting authorities be strongly critical when evaluating new facilities that propose installing a large amount of turf. New homes should be allowed to have a limited amount of an “oasis” area for landscaping, new golf courses and other turf facilities should be weighed on the basis of water availability within the affected groundwater basin and the amount of public that will be able to enjoy it. The Water Advisory Committee will be happy to help develop turf area criteria for any community willing to accept this recommendation.

**Irrigation Water Users:**

Although irrigation water use is the largest water use sector in Yavapai County, with approximately 60% of the total demand, this water use sector has experienced significant gains in efficiency overall in the past several decades. Irrigation efficiency is the term

used to describe the ratio between the amount of water transpired by the crop and soil versus the amount of water applied to the field. Irrigation efficiency can be used to measure the efficiency of a single field irrigation system, or the efficiency of an entire irrigation district, including conveyance losses and useable return flows. Additional water savings could be gained by changing the crop types grown. For instance, high water consuming crops such as alfalfa and pasture may be converted to lower water use crops such as corn or other grains. Developing new markets and modifying farm operation characteristics are obstacles to changing crop types.

The Natural Resources Conservation Service (NRCS), Natural Resource Conservation Districts (NRCDs), and Cooperative Extension offices have provided technical services to irrigation water users for many years, but there is opportunity for further assistance. Within the Prescott AMA, it is estimated that irrigation efficiencies have increased from less than 50% to approximately 75% due to water conservation mandates. An efficiency increase of this magnitude would save approximately 50 acre-feet per year, or 16 million gallons, on a 40-acre field of alfalfa. This is roughly equivalent to the water savings gained from retrofitting 1,800 toilets to low-flow devices. In some areas of the county, irrigation efficiency increases would save little water. For instance, because of the geo-hydrological setting in the Verde Valley, unused irrigation water is returned to either a high water table or to a surface stream for capture by water users further downstream. However, there may be other benefits to increasing irrigation system efficiencies besides just saving water, such as leaving more water in the natural channel for wildlife and recreation.

An irrigation water conservation program at the county or community level should depend on the expertise of agencies and individuals with experience in this field. Incentives or rebates should be developed to encourage irrigation water users to conserve.

### **Possible Funding Sources:**

Some of the suggested water conservation programs will require funding. The suggestion to hire a dedicated staff person, enforcement of regulations, incentives and rebates, and education and outreach would require some source of money. Several suggestions are provided below:

**Water Rates:** When implementing a tiered rate structure, direct additional revenues created from the high water use tiers toward water conservation programs. A successful water conservation program will eventually curtail the funds available by reducing the water used by the heavy consumers.

**Grants:** There are some federal and state agencies that provide grants for water conservation programs: The U.S. Bureau of Reclamation, Environmental Protection Agency, and Arizona Department of Water Resources -- to name a few. One of the tasks of a dedicated position could include writing grants.



Community Contributions: Similar to the WAC program that collects contributions from member governmental jurisdictions to pay for staff and other programs, a prorated contribution based on population could help pay for conservation programs.

The Bureau of Reclamation's Water Conservation Field Services Program provides technical and financial assistance to promote efficient water use. The program is designed to assist water agencies in developing and implementing effective water management and conservation plans; coordinate with state and other program efforts; and generally foster improved water management on a regional, statewide and watershed basis. Areas of emphasis include:

1. Water Management Planning
2. Conservation Education
3. Demonstration of Innovative Technologies
4. Implementation of Conservation Measures

### **Next Steps:**

Although several suggestions are provided in this report for programs that are expected to conserve water, quantifying potential water savings for each strategy were beyond the scope of this report. The suggested strategies can be quantified using estimated savings from various communities, but this direction should be provided along with the necessary staff resources.

The primary question posed by the Water Conservation Workgroup is whether the Board of Supervisors and other governmental jurisdictions in the County want to move forward with one or several of the suggestions, and what kind of process is envisioned. Partners and firm funding sources need to be identified, and institutional obstacles need to be overcome.

In general, the Water Conservation Workgroup identified water rates, regulatory, and educational programs as water conservation strategies, each requiring a unique set of solutions to enact and become effective.

For instance, setting tiered rates in Yavapai County communities will require significant technical support and education for those communities that have control of their own water company. Private water companies will need the cooperation of the Arizona Corporation Commission (ACC), along with technical and educational support. Also, any rebate program established through private water companies will require the support of the ACC.

Regulatory programs will also have similar support needs to be enacted, but along with the technical support, more significant public involvement will be required to gain grass roots buy-in. A funding mechanism will need to be developed to provide enforcement, and communities served by private water companies will need their support, and possible support from the ACC.

Education and Outreach programs will likely involve the help of the organizations with educational and water savings expertise. These potential partnerships will have to be developed, along with a funding source for educational material.

The Water Conservation Workgroup considered many other conservation strategies. These other strategies were rated lower in terms of effectiveness in an initial county program because of various reasons including cost, perceived lack of public acceptance, or because those measures would affect only a small portion of our water use. Some of those other measures are:

- Rebates for: hot water circulation pumps, low-water use appliances, small well metering, grey water systems (for users on septic systems), and rain catchment systems
- Regulations for new construction: Pool restrictions, low water use appliances, and grey water systems.
- Regulations for all users: Driveway washing and community pool covers
- Policy: Conservation easement programs, exempt well user regulation, enacting GPCD or conservation measures for water providers, and providing water supply/conservation information to new homeowners during home purchase.

**Areas for More Study:**

- Determine the amount of water savings can be achieved through use of tiered water rates.
- Determine interactive effects, costs, and water savings impacts of rebate programs
- Quantify estimated water savings from water conservation strategies based on estimates from other communities.

## APPENDIX A:

### Water Advisory Committee Goals and Objectives:

**Charter:** The Yavapai County Water Advisory Committee is a coalition of communities and selected stakeholders that is dedicated to developing a management plan for the sustainable use of our regional water supply.

**Mission Statement:** The Yavapai County Water Advisory Committee is committed to preserving sustainable water resources for future generations while enhancing the economic viability of our County. We are dedicated to meeting the long-term water resource needs of our customers - the citizens of the Yavapai County region. We will accomplish our goals by developing and enacting a regional water management strategy through a consensus of our coalition members.

**Situational Analysis:** Historic uses of water and new demands for water may have created changes to the conditions of the water resources of the region. Water levels have declined in some local aquifers, pointing to a change in the water resource system. It is imperative that measures are taken to obtain a better understanding of the county's water resources and to ensure the good health of our surface water and groundwater systems.

**Critical Planning Assumptions:** The factors and events that are likely to occur with a high degree of probability in the near future:

1. The Prescott AMA Tri-City Communities will continue with plans to construct a pipeline and develop the Big Chino groundwater basin as well as mitigate impacts from pumping.
2. The Verde River Downstream water right holders and residents (to date) plan to oppose this proposed pipeline.
3. Other groups represented by committee members will also move forward with water acquisition & infrastructure projects.
4. Growth (and demand for water) will continue.
5. Hydrologic and other scientific studies will continue.
6. New legislation will change how we do business within AMAs and with AMAs.
7. Additional or new water supplies will be needed for the Yavapai County region.
8. Water Rights, Water Law and the Regulatory Framework of water management will play a very significant role in the development of water resources.
9. The least costly sources of water have already been developed; additional water sources will likely be more expensive.

### Key Objectives.

- I. Goal No. 1: Develop regional Yavapai County water management and conservation strategies that ensure sustained use of water resources and that protect the base flows of the County's rivers and streams.
- II. Goal No. 2: Establish strong communication links among federal, tribal, state, county, local government, individual citizens and all other stakeholders.

- III. Devise and promote enabling legislation that will provide a local basis for management of water resources.

**Tactics:**

- I. For Goal No. 1: Develop regional Yavapai County water management and conservation strategies that ensure sustained use of water resources and that protect the base flows of the County's rivers and streams.
  - a. Inventory municipal, private, tribal and downstream ownerships of water resources.
  - b. Inventory the location of all known sub-basin aquifers
  - c. Inventory existing scientific studies to include total water resources (e.g. surface, ground and effluent).
  - d. Through development of scientific information, allow the water resource to drive the water management strategy.
  - e. Participate in local, state, federal water policy issues that impact our ability to manage regional water resources.
  - f. Outcome: Yavapai Countywide consensus on water resource use and its management.
  - g. Develop a subcommittee structure to address specific issues such as, but not limited to, conservation and education issues.
- II. For Goal No. 2: Establish strong communication links among federal, tribal, state, county, local government, individual citizens and all other stakeholders.
  - a. Develop trust among citizens, cities & towns, and individuals via news media(s) and town hall meetings.
  - b. Continue timely reporting to the Yavapai County Board of Supervisors.
  - c. Keep current on legislative and regulatory issues.
  - d. Provide opportunities for representation and presentations from regulatory agencies.
  - e. Outcome: Heightened awareness of total water management and support of those goals.

Support implementation of goals 1 and 2 by utilizing the collective strength of the WAC membership .

## APPENDIX B

### WATER CONSERVATION STRATEGIES CONSIDERED

Strategy	Comments
Water Rates	Harder to implement for Private compared to Municipal Providers. Suggest seasonal as well as tiered rates be explored.
Incentives and Rebates	Require recipient to attend an educational program. Conduct follow up evaluations.
Irrigation system Conversion	Includes management of automatic irrigation timers
Xeriscaping and use of native plants	
Low flow plumbing retrofit	Includes installation assistance
Grey Water Reuse	Should be specific to home not on wastewater collection reuse/recharge system
Increase Ag irrigation efficiency	Will require technical assistance
Low water use appliances	Market choices between low and high water use appliances will likely diminish
Voluntary metering programs for small wells	Information collected may lead to conservation, would increase scientific understanding
<b>Local Policy and Regulatory Programs</b>	Code enforcement is a necessary component of the following strategies
<b>Limits/Restrictions for New Construction:</b>	
Turf restrictions	
Irrigation systems – drip systems only	Sprinklers may be allowed in small “oasis” areas
Restricted landscape plants/allowable landscape plants	Should allow a specified area of landscape to have fruit trees or gardens (percentage of acreage square footage)
Water features (fountains, ponds)	No aerial spray from fountains, capacity restrictions, recirculating pump requirements
Recycle water at car washes	
Hot water recirculation	Establish distance from hot water heater these should be required
Pool restrictions	Encourage community pools over private ownership
Pools – Individual	Limit size and quantity
Low water use appliances	Consumers may not have a choice between low and high use appliances in a few years.
Washer (clothes and dish)	
Sink disposal	Forbid disposals in new homes
Grey water reuse plumbing requirements	Grey water systems for homes on septic tanks only
<b>Regulations/ordinances for all water users</b>	
Time of day/day of week watering restrictions	
Driveway washing	
Car washing (at home)	
Community Pool Covers	
Fugitive water	
Use of timers for landscape irrigation	Water savings likely to offset cost of unit.

<b>Policy</b>	
Develop Conservation Easements program	
<b>State and Federal Regulations</b>	
Provide tools for increasing conservation for exempt (small) well owners	
Allow Platting Authorities to consider water resources when considering new developments	Already in effect within AMAs
GPCD Requirements for Water Providers.	
Enact Water Conservation Measure for Water Providers	
Streamline Arizona Corporation Commission rules to let private water companies modify rates to meet water conservation goals.	

### Public Education and Outreach

<b>Strategy</b>	<b>Comments</b>
Educational Grants	
Public Awareness Campaign (use of media outlets, bill inserts)	Informational column in newspaper, lawn watering guides
Dedicated staff position	Everybody contributes to fund
Coordination of efforts, use of volunteers	Identify and involve cost-share partners
Informational website	Good support tool for other strategies
Utilize existing programs (Project W.E.T. and Water Use It Wisely)	
Utilize existing educational groups (VWA, Cooperative Extension, NAU, etc)	
School Programs, contests for xeriscape concepts	
Incorporate artistic interpretation into low/no water use landscape to make these features more attractive and acceptable to public	Needs visibility to be effective, employ contests, coordinate with nurseries
Educate garden clubs about xeriscape methods	
Educate private water companies on cost savings of conservation (reduce need for new water sources and infrastructure)	
Sell the idea of conservation as a water use efficiency program	Part of whole package to sell a conservation program, difficult to consider as a separate strategy.
Relate riparian habitats to the human quality of life equation	
Rainwater harvesting	Possible incentives, incorporated into subdivision regulations
Water use audits	By trained Volunteers

Water leaks	
Water supply/conservation information provided to new homeowners during home purchase	

**Additional Sources for Information:**

**Benchmarks for water savings:** [http://www.epa.gov/owm/water-efficiency/wave0319/append\\_b.htm](http://www.epa.gov/owm/water-efficiency/wave0319/append_b.htm)

**Water Quality & Conservation**

Water Conserve is a water conservation portal providing up-to-date news stories from around the world and hundreds of links to water-related sites, organized into categories. [www.waterconserve.info/news/](http://www.waterconserve.info/news/)

