Water Quest: Saving Water by the Yard

Courtney Brown
Jordan Valley Water Conservancy District
8215 South 1300 West
West Jordan, Utah 84088
801-565-4300
Fax: 801-565-4399
Email: courtneyb@jvwcd.org
Web: www.slowtheflow.org

The Water Quest program was developed by Jordan Valley Water Conservancy District (JVWCD) in 2003 to demonstrate principles of water-wise landscaping throughout the community. Based on reality television, the program follows a family's quest to save water on their landscape. Each year a different family, with the help of professionals, retrofits their all-turf front yard to water-wise landscaping. Landscape water use is metered and compared with water use records from previous years to show water savings. There is no monetary cost to the family. The purpose of the program is to:

- Raise awareness about the need for residents to adopt water-wise landscaping practices.
- Demonstrate the aesthetic and practical benefits of water-wise landscaping.
- Provide a convenient location where residents can go to get ideas for a water-wise landscape.
- Reduce outdoor water consumption, thus lowering per capita water use and helping JVWCD achieve its conservation goal.

JVWCD Background Information

Jordan Valley Water Conservancy District provides wholesale water deliveries to nineteen member agencies in Salt Lake County including: Granger-Hunter Improvement District, West Jordan City, Midvale City, Draper City, Taylorsville-Bennion Improvement District, Water Pro Inc., Kearns Improvement District, White City Water Improvement District, Riverton City, Magna Water Company, Bluffdale City, and the City of South Jordan. There is also a retail service area consisting of 8,500 connections in the unincorporated areas of Salt Lake County. Major facilities of Jordan Valley Water Conservancy District include two water treatment plants, 28 wells, 14 booster pump stations, and 170 million gallons of storage capacity.

Water Conservation Challenges in Utah

With an average annual rainfall of 13 inches and periodic droughts, Utah is the second driest state in the nation. Rapid population growth has increased the demand for an already scarce water resource. As a result, the State has adopted a water conservation goal to reduce per capita water use 25% by the year 2050, using the year 2000 as the base year. Since 60-65% of all culinary water in Utah is used outdoors, it makes sense to focus on landscapes. Keeping on track with the conservation goal will ensure an adequate supply of water for coming years and delay the development of costly new sources of water.

JVWCD Conservation Programs

The Conservation Garden Park, a 2.5 acre water-wise garden, at Jordan Valley Water was built in 2000-2001 to provide a central location in the Salt Lake Valley where the public can go to see firsthand what a finished water-wise landscape looks like and to get ideas for their own yards. Water use is monitored, charted and displayed in several different themed areas of the Garden. In addition, plants are labeled and listed so people can look for them at the nursery. With plans to eventually expand to ten acres, this garden promises to be the most exciting conservation destination in the state.

In addition to the Conservation Garden Park, other conservation programs include:

- **Support of the statewide media campaign:** "Slow the Flow, Save H2O".
- **Model landscape ordinances:** Available for cities to adopt.
- **Ultra low flush toilet replacement program:** 2002 and 2003 in retail service area.
- **Residential and commercial water audits:** Water Check Program operated by Utah State University Extension Services.
- **Water-wise landscaping classes:** Fourteen classes in 2006 taught by JVWCD conservation staff and other local experts.
- **Large-water-user workshops:** One day classes geared for water managers.
- **Water-wise landscape awards:** Provides recognition for residences and businesses who invest in water-wise landscapes.
- **Member Agency Assistance Program:** Grant money available to member agencies for conservation projects in their own retail service areas.
- **Water Quest: Saving Water by the Yard**

WATER QUEST

A total of four yards have been relandscaped so far in Salt Lake County. The 2003 home is in Sandy City, the 2004 home is in the City of West Jordan, and two homes were done in 2005; one in Kearns and the other in West Valley City. Although the landscape designs differ, they all follow the principles of water-wise landscaping. All the projects include some turf, which is watered by pop-up spray heads. All the shrubs beds are watered by drip irrigation. Irrigation controllers range from typical operator-based timers to more technical "smart" controllers that irrigate based on evapotranspiration (ET) or soil moisture sensors.

Meter information is recorded monthly from all four sites to track water savings. This program has shown that significant water savings can be achieved through proper landscaping and irrigation.

Selection Criteria

Water Quest homes were chosen by a selection process involving JVWCD staff, the participating member agency and the media consultant hired to administer the program. Once the member agency was determined, neighborhoods within the service area were scouted for ease of access and overall appearance. Applications in the form of flyers were distributed in selected neighborhoods. As applications were received by JVWCD, they were screened to narrow the participant pool. The top three were interviewed and one family was selected as the participant. This process involved the following criteria:

- Review of the application to evaluate responses.
- Size of the yard.
- Overall look of the yard (majority bluegrass).
- How well it is currently cared for.
- The interview of the family.
- Existing irrigation system.
- Access to billing information for the past three years for comparison.
- Marketability of the home for media relations and promotion of program.
- Location and easy access from a major road.
- Overall willingness to work with JVWCD, the media consultant, and the participating member agency.

An agreement, detailing the responsibilities of each party involved, was signed by both the participant and the District. Specifically outlined in the agreement was the purpose and nature of the program, design specifications, construction specifications, and participant requirements.

Sandy City 2003

The first home of the Water Quest Program was located in Sandy City within the JVWCD retail service area. A home with a "traditional" Utah landscape emerged from the selection process. The front yard was a typical Utah landscape consisting predominantly of Kentucky Bluegrass with a small planter area next to the house. Water usage information was easily accessible from billing records since the house was located in the JVWCD retail service area. The family was interviewed and demonstrated that they were willing and eager to participate.

Based on the design, construction on the front yard landscape renovation began in May 2003 after a significant leak was repaired in the service line between the water meter and the house. Much of the labor and materials for this project were donated. Specific design elements included a much smaller turf area consisting of turf-type dwarf tall fescue watered by a sprinkler system, a cobble-rock dry river bed, a variety of water-wise plants watered by a drip system, an elaborate hardscape area made of pavers and retaining wall blocks, an arbor structure with a porch swing, and an irrigation system controlling both sprinklers and drip automatically based on soil moisture sensors in the landscape.

In response to press releases issued at various stages of the project, a number of media events accompanied both the construction and completion of the Sandy Water Quest Project. This media interest was likely due, in some part, to a hightened public awareness of water conservation because of the ongoing drought. Most of the major television networks covered the project, usually by doing a remote weather broadcast from the site.

With the completion of the project in June 2003, water usage was tracked using three different water meters: the main meter and two sub-meters, one for front yard irrigation and the other for back yard irrigation. The back yard was untouched by the scope of the project and remained predominantly Kentucky Bluegrass. However, the back yard was now controlled independently from the front using a weather-based controller, while the front yard irrigation was controlled with a completely separate system using soil moisture sensors.

Water usage information is recorded monthly from both sub-meters and from the main meter, then charted based on overall usage from the main meter. As indicated on the water usage chart (Figure 1), there was a short adjustment period in 2003 immediately following completion, when water use increased slightly. The leak in the service line is also evident on the 2003 line

chart shown in figure one. Overall usage, however, has remained lower than the prior three year average since completion of the project.

During the remainder of the growing season of the first year, which was June through October of 2003, there was nineteen percent water savings compared to the prior three year average (Figure 2). In April through October of 2004 there was forty-nine percent savings, and in 2005, there was fifty-six percent savings. There was a change in the ownership of the home in the fall of 2005, but savings continued into 2006 with a savings of forty-eight percent from April through July.

City of West Jordan 2004

A similar home was chosen in 2004 in West Jordan using the same selection process. Again, the front yard and parking strip was all Kentucky Bluegrass turf. An existing mature Green Ash tree in the front yard was incorporated into the new design. The back yard was left unchanged and consists of Kentucky Bluegrass turf, planters next to the house and an in-ground swimming pool. Water billing records for the prior three year period were accessible through the City of West Jordan.

The new design of the front yard landscape once again incorporated all the principles of water-wise landscaping. Existing turf was removed and replaced with a smaller but functional area of dwarf tall fescue. A wide pathway made of pavers connected the driveway with the front door of the house. Large curving planters consisting of a variety of water-wise plants were created everywhere else and covered with a layer of bark mulch. The new irrigation system consisted of fixed spray pop-up heads for the new turf and drip emitters for all the planter areas. The controller was also replaced, but not with a weather-based product as in the previous year's project. This controller was a standard operator-based controller. Sub-meters were installed as part of the landscape contract, one to monitor front yard usage, and one to monitor back yard usage. No changes were made in the back yard landscaping.

As with the previous year, the media was an important part of the 2004 Water Quest project. A television event was held to kickoff the project with the beginning of the turf removal. Another television event was held at the end of construction and a third media event was held shortly after that to showcase a water audit of the turf area. There were also a few smaller broadcasts and articles on the project throughout the summer.

In addition to these events, a block party sponsored by JVWCD, was held at this home two years later, in July 2006, for the purpose of reaquainting family and friends of the homeowners with the Water Quest project. Four hundred flyers were distributed through the neighborhood to advertise the evening event. Participants enjoyed food, drinks, prize giveaways, and of course, water-wise landscape information. The block party event was reported in the local newspaper.

Water consumption has been monitored and reported by reading the three water meters monthly from April through October (Figure 3). The relandscape was completed in June 2004, so reporting began in July 2004. Monthly readings are compared to the prior three year average. Beginning in July 2004, water consumption fell drastically for the rest of the year. In 2005 there was a typical bell shaped usage curve, but it was well below the prior average. In the spring of 2006, the pool in the back yard was drained for some repairs, then refilled. As a result, the overall usage was above normal in May, but landscape water usage was similar to the previous year.

Year one (2004) for the West Jordan home saw twenty-six percent water savings from July through October (Figure 4). Year two (2005) saw thirty-three percent savings from April through October, and year three (2006) saw fifteen percent savings from April through July despite the filling of the pool.

West Valley City and Kearns Community 2005

Two homes were relandscaped as part of the Water Quest program for 2005. The selection process was essentially the same: both homes were owned by families willing to participate in the program, had lawns consisting of Kentucky Bluegrass, and had accessible water records. However, some challenges came up in 2005 that had not been experienced before. One of these was the weather. Winter hung on a little longer than normal and resulted in a couple wet months in May and June. It was hoped to have both projects completed by early June, but the wet weather was a contributing factor in pushing the completion of each landscape back a few weeks. Another factor was a contractor change that became necessary during the construction of the landscapes. This required the last minute hiring of a different landscape contractor and concrete sub-contractor during their busiest time of year when they were already behind schedule because of the rain! As a result, both of these projects sat unfinished for several weeks. Days went by with very little activity, which caused some concern from the homeowners and JVWCD staff. Finally, it all came together and both landscapes turned out very well.

The West Valley City home is located in an older part of town on a street lined with mature honey locust trees. There was some talk of removing these trees from the parking strip because of the damage they cause to the sidewalk, curb and street, but in the end, the trees stayed because of the value they add to the neighborhood. In the case of this project, many of the plants were chosen for shade tolerance due to the shady conditions provided by the large trees. The new design called for a stamped concrete walkway to the front door, a smaller turf area (fescue) across the middle of the yard, concrete curbing, plants consisting of groundcover, perennials, shrubs and trees, bark mulch in the beds, and a brick paver sitting area with an ornamental metal planting container. Irrigation consisted of fixed spray pop-up heads for the grass and a drip system for the plants. The old controller was replaced with a new weather based unit that receives a paging signal from a local weather station and allows the system to irrigate based on current weather conditions. Some minor changes were made to the large, all turf back yard to improve sprinkler efficiency, but it remained as turf.

The Kearns home was relandsaped simultaneously with the West Valley home. The design, however, was completely different. It consisted of a stamped concrete walkway with a different stamp pattern and color, connecting the front door to the back yard gate. The turf was donated fescue sod in a curvy pattern near the front and center of the yard. Plants were more heat tolerant due to the increased sun exposure of this location. The main difference though, was the use of ¾" -1" colored rock mulch rather than bark mulch. The all turf back yard was untouched during the project. The irrigation system was installed exactly the same as the West Valley home with the same products, including the weather-based control unit.

Media events were usually combined for both projects. The kick-off event was held at the West Valley home with both families in attendance, and the final event was held at the Kearns home, again with both families in attendance to discuss their appreciation of the project with the media. There were also some remote broadcasts done from the Kearns home. A block party was also held at the West Valley home in July 2006. It was organized along with the block party at the West Jordan home, but they were on different dates.

Water tracking began at both homes in July 2005. Water consumption is monitored the same as all the other homes using monthly meter readings from three meters: front yard, back yard, and main meter. At the Kearns home, water usage increased during the first month to slightly above the prior three year average, then gradually declined below the average (Figure 5). This was likely due to an initial establishment period during the heat of the summer. In the spring of 2006, usage was again above the prior three year average. The high consumption was isolated to the back yard and attributed to an incorrect setting on the sprinkler controller. After the problem was corrected, usage dropped below the average throughout the remainder of the summer.

At the West Valley home, water consumption was well below the prior three year average for the remainder of the first season, but rose sharply in the spring of 2006 for no apparent reason (Figure 7). It was later discovered that a wire had come loose on the control unit, rendering the irrigation system unworkable, and the homeowner had been turning the stations on manually for a number of weeks. The wire was reattached and usage went down.

Challenges with the Water Quest Program

As a water conservation program, Water Quest has presented some challenges. In 2005, the main problem was the coordination of too many entities. First there was JVWCD sponsoring the projects. An outside consultant was hired by JVWCD to help manage the projects. The consultant then hired a landscape architect and a landscape contractor who was recommended by the architect. The situation became messy when the contractor didn't work out and had to be replaced by another landscape contractor and a new sub-contractor for the concrete. Add to that the coordination of donations from several companies and the recognition they desired, not to mention the family receiving the free landscape and their personal preferences for their yard. In addition to all that was the involvement of the member agencies of JVWCD who helped choose the participants. The challenge was treating all these people fairly while still achieving the purpose of the program.

Another challenge is finding publicity for the Water Quest projects given that they are located at private residences. The desire is to reach as large an audience as possible with the message of water conservation to make the project more cost effective and useful to the public. However, extra planning and sensitivity is required because the project is at a private residence rather than a public place. It is necessary to respect the privacy of the participating family.

The participating family could also be a challenge with the program. What if they were not as cooperative as initially thought? Also, they could move shortly after the completion of the landscape. Fortunately, all the families who have participated in the Water Quest Program have been easy to work with. The family in Sandy did move two years later, but the new family has been interested and cooperative as well.

The quality of the irrigation design and installation is critical. Since the purpose of the program is water conservation, the landscape must be more than just aesthetically pleasing, it must actually reduce water consumption. A poor design or installation would doom the project right from the start. Even with a good landscape design and proper irrigation system installation, constant monitoring is required through the summer months.

Cost effectiveness of the Water Quest Program is difficult to quantify. Water savings at each project is quantifiable, but the real goal is water savings in the whole community. It is difficult to estimate how many people see the project and even more difficult to know how many people incorporate the ideas in their own landscapes.

Known Benefits of the Water Quest Program

Despite the challenges, there are many positive aspects of the Water Quest Program. It has shown quantifiable water savings. Based on these four homes, people can expect a water savings of approximately twenty-five percent just by relandscaping their front yard provided they manage the irrigation properly. Another benefit of the program is that it brings mini "demonstration gardens" to these communities. JVWCD has a large demonstration garden that shows the principles of water-wise landscaping, but each of these Water Quest homes teach the same concepts on a smaller scale in different parts of the valley. Once the landscape is complete, it only gets more beautiful with age as the plants bloom more, fill in and mature. Maintenance is the responsibility of the homeowner, so the program is relatively easy to manage once the landscape is complete. It really only requires occasional communication with the homeowner and monthly monitoring of water usage through the summer months. In addition, the program does help conserve water by increasing public awareness, and by providing water-wise landscaping ideas and information. As a water provider sponsoring the program, there are also public relations benefits by helping families in the community and being able to refer to the program when people call in with questions about how to reduce outdoor water use.

Conclusion

From a review of the water consumption at all four homes, we see that water use in general, has declined after the completion of the new landscapes. Obviously, installing plant material (including turf) that requires less water, can result in water savings. However, the amount of water saved ultimately depends on how well the irrigation is managed. "Smart" controllers can make the process easier by eliminating the need to constantly make manual adjustments to the watering schedule, but that does not mean they can be ignored either (as shown by the problems encountered in spring 2006 at the Kearns and West Valley homes). Furthermore, a vigilant homeowner can achieve the same water savings with a standard operator-based controller (as demonstrated by the West Jordan home). An increased awareness of water consumption among family members may also contribute to water savings with these projects. Nevertheless, the end result with all four Water Quest homes has been substantial water savings.

Figure 1:

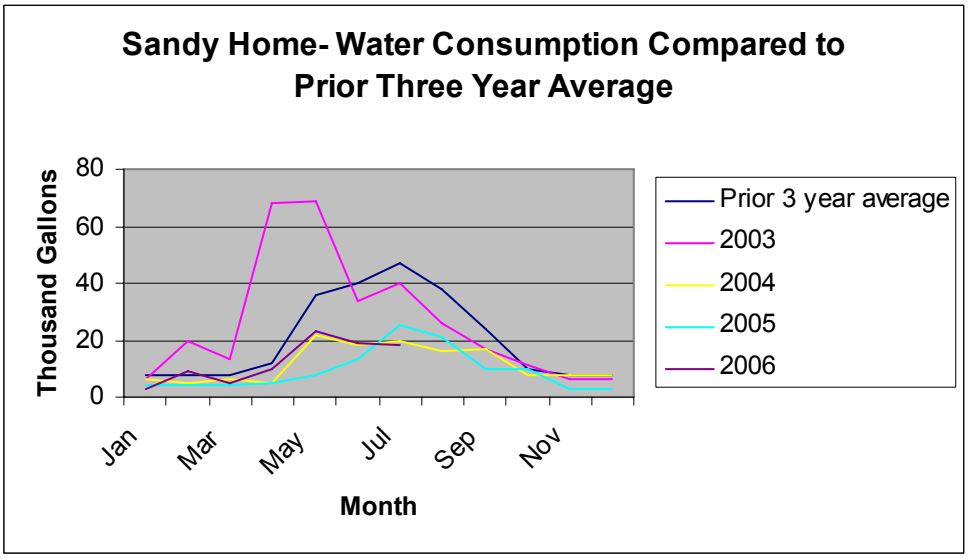

Figure 2:

Sandy Home - Water Use Report Chart

Consumption in thousand gallons

Sandy	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total April -Oct.	Total June-Oct.
Before Relandscaping (average 2000-2002)	8	8	8	12	36	40	47	38	24	10	8	8	**207**	**159**
Year One (2003)*	6	20	13	68	69	34	40	26	17	11	6	6	**265**	**128**
Water Saved (gallons) Year One	2	-12	-5	-56	-33	6	7	12	7	-1	2	2	**-58**	**31**
Percent Savings- Year One	**25%**	**-150%**	**-63%**	**-467%**	**-92%**	**15%**	**15%**	**32%**	**29%**	**-10%**	**25%**	**25%**	**-28%**	**19%**
Year Two (2004) **	6	5	6	5	22	18	20	16	17	8	8	8	**106**	
Water Saved (gallons) Year Two	2	3	2	7	14	22	27	22	7	2	0	0	**101**	
Percent Savings- Year Two	**25%**	**38%**	**25%**	**58%**	**39%**	**55%**	**57%**	**58%**	**29%**	**20%**	**0%**	**0%**	**49%**	
Year Three (2005) **	4	4	4	5	8	13	25	21	10	10	3	3	**92**	
Water Saved (gallons) Year Three	4	4	4	7	28	27	22	17	14	0	5	5	**115**	
Percent Savings- Year Three	**50%**	**50%**	**50%**	**58%**	**78%**	**68%**	**47%**	**45%**	**58%**	**0%**	**63%**	**63%**	**56%**	
Year Four (2006)	3	9	5	10	23	19	18							
Water Saved (gallons) Year Four	5	-1	3	2	13	21	29							
Percent Savings- Year Four	**63%**	**-13%**	**38%**	**17%**	**36%**	**53%**	**62%**							

*New Landscape was installed in June. Water savings in gallons and percent savings are from this point.
** Water savings in subsequent years are compared to previous average (2000-2002).

Owner change in September 2005

Figure 3:

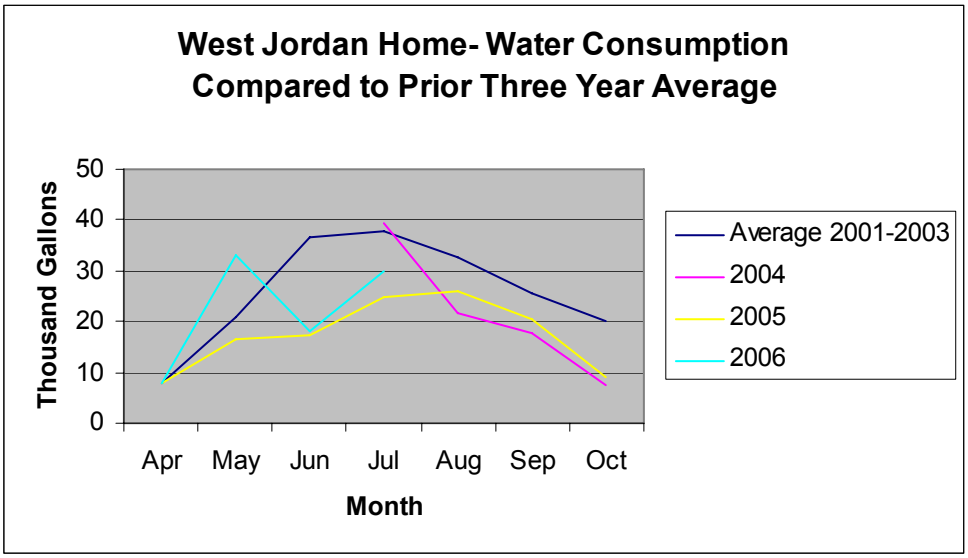

Figure 4:

West Jordan Home - Water Use Report Chart

Consumption in thousand gallons

West Jordan	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total April - Oct.	Total July -Oct.
Before Relandscaping (average 2001-2003)				8	21	37	38	33	26	20			182	116
Year One (2004)*							39	22	18	7			86	86
Water Saved (gallons) Year One							-2	11	8	13			30	30
Percent Savings- Year One							-5%	34%	30%	63%			53%	26%
Year Two (2005) **				8	16	17	25	26	20	9			122	
Water Saved (gallons) Year Two				0	5	19	13	7	5	11			60	
Percent Savings- Year Two				1%	22%	53%	34%	20%	20%	55%			33%	
Year Three (2006)***				8	33	18	30							
Water Saved (gallons) Year Three				0	-12	19	8							
Percent Savings- Year Three				0%	-57%	52%	22%							

*New Landscape was installed in June. Water savings in gallons and percent savings are from this point.
** Water savings in subsequent years are compared to previous average (2000-2002).
*** In May 2006 the pool was filled after some repairs. Landscape water usage in May was actually very low at slightly over 5,000 gallons.

Figure 5:

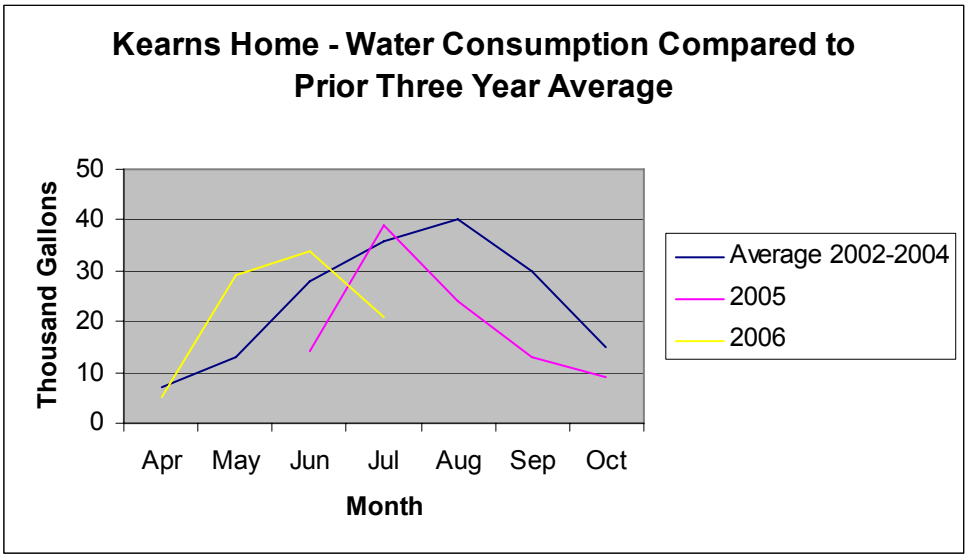

Figure 6:

Kearns Home - Water Use Report Chart

Consumption in thousand gallons

Arroyo	Apr	May	Jun	Jul	Aug	Sep	Oct	Total summer water use July -Oct.	Total summer water use April -Oct.
Before Relandscaping (average 2002-2004)	7	13	28	36	40	30	15	**121**	**169**
Year One (2005)*			14	39	24	13	9	**85**	**99**
Water Saved (gallons) Year One**			14	-3	16	17	6	**36**	**49**
Percent Savings- Year One			49%	-9%	40%	57%	39%	**30%**	**41%**
Year Two (2006)	5	29	34	21					
Water Saved (gallons) Year Two	2	-16	-6	15					
Percent Savings- Year Two	32%	-123%	-23%	42%					

* The landscape was installed in June, first month of official tracking was in July.

**Water saved above is shown in billing units (1=1000 gallons)

Figure 7:

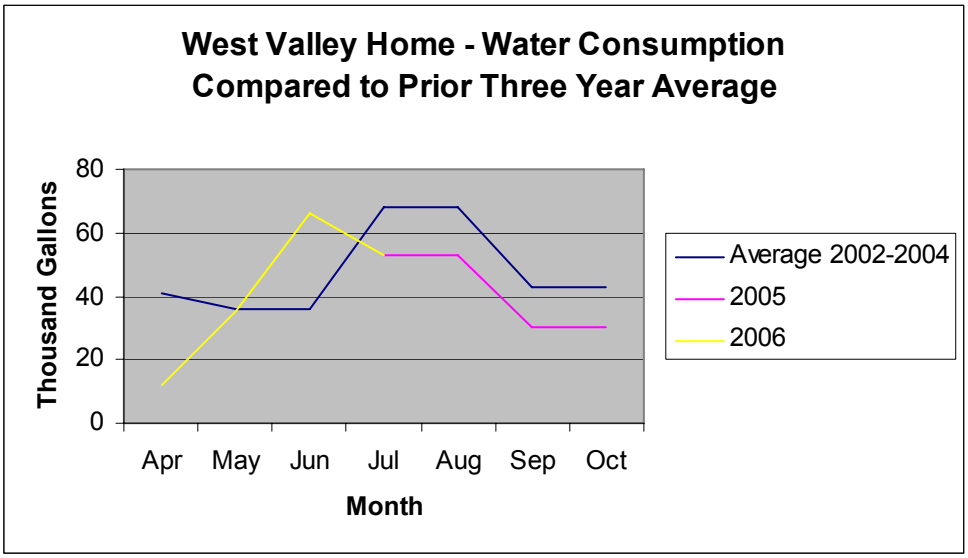

Figure 8:

West Valley Home - Water Use Report Chart

Consumption in thousand gallons

Mason	Apr	May	Jun	Jul	Aug	Sep	Oct	Year One Water use July -Oct.	Water use April -Oct.
Before Relandscaping (average 2002-2004)	41	36	36	68	68	43	43	**221**	**334**
Year One (2005)*				53	53	30	30	**165**	
Water Saved (gallons) Year One				15	15	13	13	**56**	
Percent Savings- Year One				**22%**	**22%**	**31%**	**31%**	**25%**	
Year Two (2006)	12	35	66	53					
Water Saved (gallons) Year Two	29	1	-30	15					
Percent Savings- Year Two	**71%**	**3%**	**-83%**	**23%**					

*The landscape was installed in May and June. Water usage was tracked starting in July and compared to the prior three year average from that point.