



Case Studies in Water Use Reduction from California

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For many years, golf courses in California have been dealing with a restricted water supply. The stark reality is that golf courses must find a way to manage with less water while attempting to satisfy golfers and maintain an economically viable business. Although challenging, many golf courses have been successful using a variety of strategies to reduce the overall amount of water while maintaining acceptable playing quality. This article highlights three case studies relative to that effort.

Turf reduction – Pasatiempo Golf Club, Santa Cruz, California

Pasatiempo Golf Club is one of many golf courses in California that took the approach of eliminating turf in out of play areas as a method to reduce overall water use. As of 2007, Pasatiempo maintained 95 irrigated acres. Because of severe water shortages in the area, the City of Santa Cruz announced that a mandatory 28% water cutback would be initiated in 2009. The club quickly realized that a water reduction of that scope was not sufficient to adequately irrigate all areas of the golf course and a plan was developed to eliminate irrigation in out of play areas. During an initial review of the golf course in 2008, five acres were identified where irrigation would be eliminated. The non-irrigation zones were mainly near teeing grounds, out of play areas of the rough and edges of the property. Knowing that more had to be done, Pasatiempo contacted golf architect Jim Urbina to help identify additional areas where turf could be removed while preserving the architecture and playability of the golf course. An additional 20 acres of turf were identified for turf

Figure 1. Pasatiempo Golf Club reduced water use by eliminating turf in out of play area such as near teeing grounds.



removal during this process. Then plans were made to update and replace the aging irrigation system to coincide with the boundaries of the turf removal areas and establish native grasses in the non-irrigated areas that could survive on natural rainfall. Pasatiempo now maintains 70 acres of irrigated turf and has saved a significant amount of money and water in the process. The water savings alone amounted to \$369,000 in 2009, \$320,000 in 2010, and \$300,000 in 2011. Key aspects of the success of the Pasatiempo project included careful analysis of where turf would be

Figure 1. The turf reduction and native grassing project at Pasatiempo Golf Club was carefully coordinated with the design of the new irrigation system so that irrigation would be totally eliminated in out of play areas with native grasses left to survive on natural rainfall.



removed and then strategically designing the irrigation system to fit the plan. Although Pasatiempo’s project was comprehensive in scope, other courses in California have been successful with turf removal projects by implementing plans in smaller phases. Prominent examples include El Caballero Country Club (Tarzana), Woodland Hills Country Club (Woodland Hills), Barona Creek Golf Course (Lakeside), Porter Valley Country Club (Northridge) and Hansen Dam Golf Course (Pacoima).

Deficit irrigation – Friendly Hills Country Club, Whittier, California

Faced with steadily increasing water costs, Friendly Hills Country Club knew that reducing water use was a matter of economic survival for the club. The green committee and superintendent David Michael developed a three step plan to reduce overall water use. The main focus was on reducing irrigation on the tees, fairways and rough while providing the necessary water to keep the greens healthy at all times. Since the course had a mixture of cool season and warm season grasses throughout the property, step one focused on establishing a uniform stand of kikuyugrass in the fairways and rough that would survive with less irrigation. Step two of the plan

focused on communication with golfers letting them know that course maintenance standards would be focused on providing firm and fast conditions on the fairways and rough and using less water. Step three involved carefully monitoring the data from the on-site weather station and incrementally reducing the amount of water applied as a percentage of evapotranspiration (ET). Studies at UC Riverside indicate that kikuyugrass retains good color and growth when irrigated at 75% of ET. During the 2008 season, irrigation was reduced to 65% of ET and then to 60% of ET in 2009. Golfer response was very favorable, and the club decided to irrigate at 55% of ET during 2010 and 2011. This level of irrigation proved to be detrimental to the turf and the decision was made to irrigate at the 60% ET level in 2012.

Looking at a subset of water use records for July, August and September (months with the highest water demand), Friendly Hills Country Club was very effective in reducing overall water use (Table 1). In 2010, summer water use was cut by an average of 35% and saved a total of 44.36 acre-feet of water. The summer of 2011 was similar with July – August water use reduced by an average of 35% with savings of 45.01 acre-feet. The program was backed down in the summer of 2012 with average water use reduced 26% compared to ET for a savings of 34.93 acre-feet of water.

Two key aspects of the program were mainly responsible for the success: 1) the club fine tuned their grassing scheme to favor a warm-season grass that uses less water, and 2) the green committee supported the decision to use less water and favor firm and fast golf course conditions. Essentially, the committee gave the superintendent permission to use less water regardless of the impact on course cosmetics. As noted after the summer of 2011, the club pushed the limit of what golfers would tolerate finding that irrigating at 55% of ET was detrimental to course conditions and went beyond their goal of achieving firm and fast conditions. Ultimately, the water reduction policy at Friendly Hills

Table 1. Looking at a subset of water use records for July, August and September, the deficit irrigation program at Friendly Hills Country Club successfully reduced water consumption, ranging from 26% to 35% compared to reference evapotranspiration.

Friendly Hills Country Club Water Use (AF)									
	2010			2011			2012		
	Jul	Aug	Sep	Jul	Aug	Sep	Jul	Aug	Sep
Eto	43.00	47.75	36.16	48.50	47.00	32.50	47.83	48.08	37.66
Water use	28.50	31.59	22.46	31.87	30.35	20.77	34.55	36.20	27.89
Water saved	14.50	16.16	13.70	16.63	16.65	11.73	13.28	11.88	9.77
% reduction	33%	35%	38%	34%	35%	36%	27%	25%	26%

Figure 2. The first phase of the water reduction plan at Friendly Hills Country Club involved restoring a uniform stand of kikuyugrass throughout the fairways and rough that would perform well when water applications were reduced.



met its goal of significantly reducing water use and saving money in the process to the point where the local water district kindly pleaded with the club to use more water because their revenues were down – the ultimate sign of success.

Regulatory compliance – the LADWP Golf Water Task Force

Instituting new water use regulations has an interesting way of encouraging dialog and cooperation. Such was the case when the City of Los Angeles and the Los Angeles Department of Water and Power (LADWP) passed a new landscape water ordinance in 2009, which affected 35 golf courses within the service area. The ordinance was precipitated by consecutive years of below average rainfall along with the governor and state legislature setting the ambitious goal of reducing water use in California 20% by the year 2020.

Beginning in June 2009, the LADWP ordinance called for reducing landscape water use by 15%. Days of irrigation were limited to Monday, Wednesday, Friday; irrigation run-times were limited to 10 minutes per valve; and no irrigation could be performed between 10:00 a.m. and 4:00 p.m. This proved to be an unworkable model for golf courses from both an agronomic and business perspective.

On behalf of the golf courses in the region, Craig Kessler with the Southern California Golf Association contacted Penny Falcon, the conservation coordinator with LADWP to arrange a meeting. Penny Falcon set

Figure 3. Irrigation was steadily reduced to 60% of ETo at Friendly Hills Country Club to favor firm and fast playing conditions while tolerating an off-color appearance in some areas. The green committee supported the decision to use less water .



the tone for the initial group meeting with her opening remarks. “I have some good news and some bad news. The good news is that our records indicate that the golf courses in our service area are the most efficient users of water. The bad news is we are going to cut your water use by 15% and at the same time raise your rates. We’re here today to see how we can come up with solutions that work with your businesses and still achieve the 15% water use reduction.” What transpired from that initial meeting was a new partnership between the golf community and the LADWP that became the Golf Water Task Force.

The golf course superintendents in attendance did not dispute the 15% reduction but wanted the flexibility to manage water applications without restrictions imposed by the new ordinance. A compromise was reached by instituting an “Alternative Means of Compliance Program” that removed the restrictions but the golf courses would have to agree to reducing water by a total of 20%. The next question was, 20% of what? Historical water use records from LADWP were shared with the superintendents and the task force agreed to use the baseline year of 2006/ 2007 and model water budgets using the software program Landscape Water Manager developed by Cal Poly San Luis Obispo.

The Golf Water Task Force activities have expanded over the past two years to include regular meetings to review water use data and status of the conservation program, training sessions for golf course irrigators, and efforts toward the development of a water stewardship program.

There have been several positive outcomes since the inception of the Golf Water Task Force:

- All 35 golf courses exceeded the 20% goal in 2011 and are on track to do the same in 2012.
- Ongoing discussions are based on objective monthly water use data. This has further confirmed with the LADWP that golf courses are using water as efficiently as possible.
- The new ordinance and the task force have added an element of accountability. Golf course superintendents are monitoring water use more carefully and staying on track to meet the 20% goal.
- Golf courses in the area have taken further initiative to improve water use efficiency with better system maintenance, sprinkler nozzle replacement, and turf reduction projects.

Conclusion

These case studies highlight golf courses that have taken big steps to reduce their water use using different approaches. Pasatiempo Golf Club focused on turf reduction in combination with a carefully designed irrigation system. Friendly Hills Country Club took the approach of reducing water applications evenly over the entire course and promoting firm and fast playing conditions. The LADWP Golf Water Task Force provides a good example of cooperative dialog and arriving at practical solutions to comply with water use regulations. In each case, golf course conditions were preserved or enhanced as a result of these water reduction strategies.