

Future Directions for Golf Course Water Use Regulation: A Regulator's Perspective

The future of golf course water use and regulation in one of the nation's highest ET use areas.

BY CINDY SHIMOKUSU

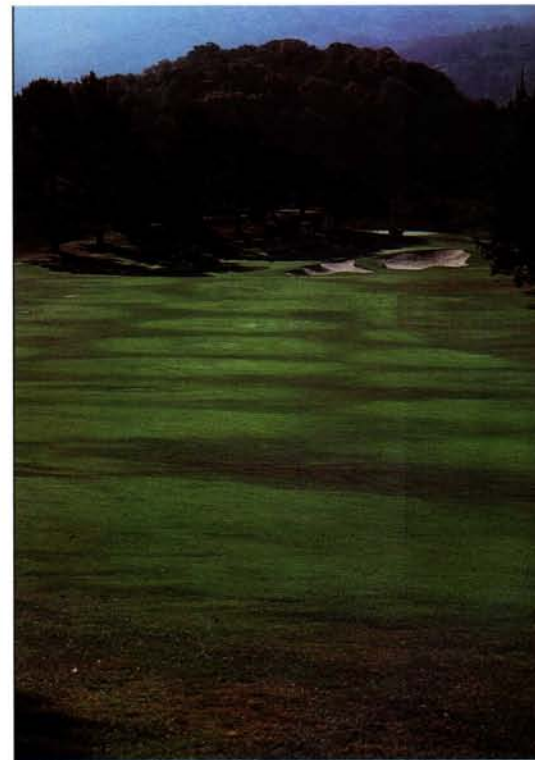
Tucson, Arizona, and the region surrounding it, is one of five Active Management Areas (AMA) administered by the Arizona Department of Water Resources (ADWR) set up to regulate water use in the state. Although the maximum annual water allotments assigned to each course have been in place for more than 20 years, it is clear that more research and dialogue are needed to determine if golf courses have in fact maximized their efficiency potential or if increased irrigation effectiveness is reasonable and achievable.

Golf course operators in the Tucson AMA are intimately familiar with ADWR's annual allotments, which are revised every ten years. Through the revision process, the science behind the application rates on which the allotments are based is scrutinized. Many studies, including some funded by ADWR, have been conducted on the needs of high-quality turfgrass in Arizona. Unfortunately, we still lack consensus regarding the exact amount of water a golf course needs to operate. ADWR believes that our regulations are close, but the complexity of this question impedes a precise answer. Existing studies have narrowed the answer, but we have yet to examine fully such issues as the effect of irrigation inefficiency, the economic impact of reductions in overseeding, and the transferability of plot-sized studies to full-sized courses. All of these factors

introduce uncertainty, and definitive answers are needed.

Golf courses in the Tucson AMA reported using approximately 21,000 acre-feet in 2002 (the most recent year of complete data), up from about 12,000 acre-feet in 1985. We also know that the total number of golf courses in the Tucson AMA has increased from 24 in 1985 to 38 in 2004, yet we do not know precisely where the irrigation water is being applied.

If a golf course meets its allotment, is it because that course applied the appropriate amount of water to its turf, or is it because they deficit-irrigated the low-water-use landscaping and applied extra water to the turf or lakes? Alternatively, the compliance might be attributed to inaccurate metering and reporting methods. A third possibility is that the course was constructed before 1985 and has retained its full original water allotment, even after turf or water body acres are removed. If a course exceeds its maximum annual allotment, is it because the course is inefficient and over-applied water to its turf, or does it have a leaky lake? Exceeding the maximum allotment could also be due to exceptionally hot, dry weather (i.e., higher ET demand). While ADWR closely tracks weather and each course's acreage and total water use, we still lack the necessary data to differentiate between these various factors. Moreover, we suspect that golf course managers similarly lack the data to determine



Golf course water use is conspicuous and in the public eye. In addition to developing a water management plan, golf course superintendents need to ensure that water is efficiently used. Poor irrigation system distribution results in inefficiency and over- or under-watering of the turfgrass.

which factors most influence their total water use because irrigation systems typically are not configured to offer this data.

We believe the following scenarios exist at different times and places:

- New courses in the Tucson AMA and possibly throughout the western United States are having more difficulty

meeting their allotments than older courses.

- Hot, dry weather in successive years contributes greatly to a course failing to meet its allotment.

- Lack of irrigation system distribution uniformity contributes to inefficiency and over-watering on some parts of most courses.

- Data are lacking to determine the individual impacts of each factor.

- We suspect golf course managers can only guess which factors most influence their total water use because most irrigation systems are not configured to offer such detailed data.

It is clear that the regulators, scientists, golf course designers, irrigation manufacturers, and golf course owners and operators need to build better relationships. We all will benefit from open dialog about the appropriate role for golf in helping to meet the Tucson AMA's water management goal, which is defined as safe-yield. Safe-yield is a long-term regional balance between groundwater withdrawals and natural and artificial recharge. It also is the Tucson AMA's statutorily mandated goal with which the AMA must comply by the year 2025. Although golf is not the largest water user in the AMA, it is certainly a significant user and must contribute, along with all other major water users, in reducing demand for limited water supplies in this arid region. On the other hand, ADWR must continue to recognize that water is an essential element for golf courses and that golf is an important contributor to the state and regional economy. A balance must be maintained in establishing water use requirements.

Generally speaking, the ADWR and the golf industry must explore options for additional enhancement of golf-related water efficiency while also ensuring that water restrictions do not compromise the industry's ability to profit. Technology continues to evolve and offer further opportunities for conservation. Development of conservation-oriented management practices such as

Figure 1
Tucson, Arizona, Active Management Area (AMA)
Third Management Plan Turf Conservation Requirements

For All Facilities: Conditions and restrictions apply depending on the year that the turf, water surface, and low-water-use landscaped areas were installed at the golf course. See TMP Tucson Section 6-301 through 6-305.		Application Rate: (Acre-feet per acre per calendar year)
Turf Acres	4.6	
Water Surface Acres	5.8	
Low-Water-Use Landscaped Area	1.5	

irrigation best management practices that are accepted as industry standards may be one avenue for improving efficiency. New technologies and products that improve area measurement and water application precision, such as global positioning satellite (GPS) surveying computer applications, offer promising improvements in irrigation system performance, including increased distribution uniformity for existing systems. New water treatment options may prove useful for reducing leaching requirements and enhancing the ability of grass to use water. Lower-water-use turfgrass varieties also continue to be developed. Industry and regulatory demand for, and support of, more research and development of these types of products and services will improve water application precision. Explicit partnerships between ADWR, the golf industry, universities, and

manufacturers could further intensify the process. Furthermore, partnerships between courses and university researchers that allow golf-course-scale studies, as opposed to small-plot studies, could help answer fundamental questions about irrigation efficiency and limitations on conservation improvements.

Aside from the regulatory focus, the golf industry also must improve its ability to communicate with the public about its water resource stewardship. ADWR understands and appreciates that most golf courses in the AMAs have been making significant progress toward improving water use efficiency and transitioning to use of renewable water supplies. In spite of these achievements, we regularly hear from the public that "until golf courses are required to conserve, why should I do more — the water I save only allows more golf

Figure 2
Current Water and Irrigated Acre Regulatory Limits by State for Golf Courses

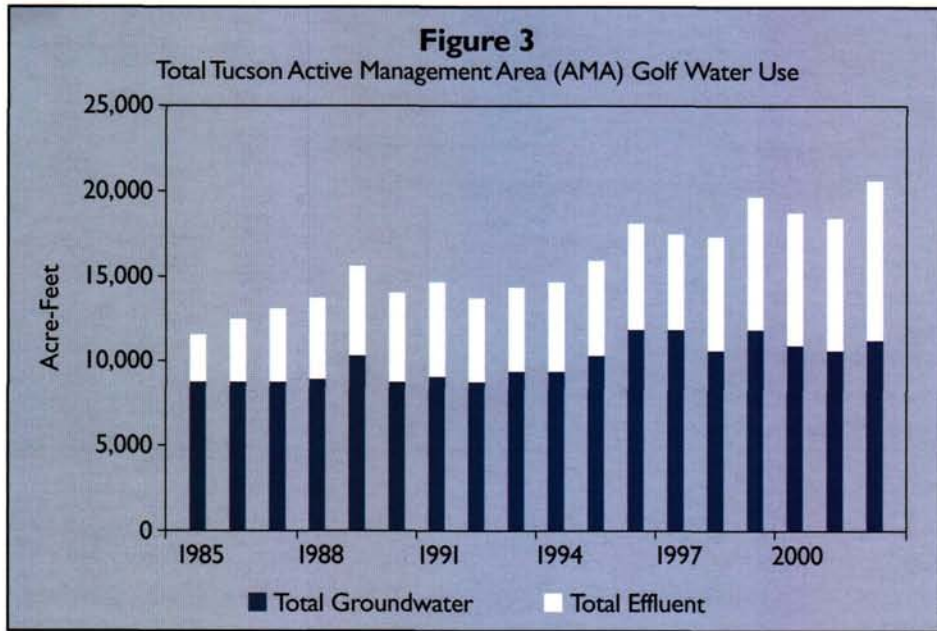
Regulatory Limit	Arizona¹	California²	Nevada³
Maximum acre feet* of water per acre, per golf course, per calendar year	4.6 to 4.9 acre feet	2.3 to 6.36 acre feet	5.7 to 7.4 acre feet
Maximum irrigated acres per golf course	90 acres	110 acres	90 to 110 acres

¹Arizona data from Tucson Active Management Area and Phoenix Active Management Area. Data shown are from the Third Management Plan Turf Conservation Requirements.

²California data from Long Beach (coastal), Riverside (inland), and Palm Springs (desert). Figures include both optimal turf and water conservation turf water use levels.

³Nevada data for drought watch and drought alert levels mandated for Las Vegas.

*1 acre foot of water is the amount of water needed to cover 1 acre area 1 foot deep. 1 acre foot of water equals 325,850 gallons.



- Most golf courses in Arizona are doing a good job of conserving water.
- ADWR would like to pursue program improvements for the Fourth Management Plan and does not anticipate any major new allotment reductions.
- Consideration may be given for greater flexibility and account adjustments if the existing program cannot sufficiently accommodate prolonged periods of hot, dry weather.
- ADWR and the golf industry must confront the issue of golf's role in reducing total water demand during drought and supply shortages.
- ADWR is eager to establish a dialog with researchers and industry representatives to identify concerns and define research questions.

We know that we don't have all the answers and that we will need help getting answers. There is great value in partnerships between regulatory agencies and regulated users, and we look forward to working with the golf industry to evaluate and improve Arizona's turf water conservation program.

CINDY SHIMOKUSU *has been Tucson Active Management Area Director for the Arizona Department of Water Resources since 1995.*

courses to be built." This sentiment is especially pervasive in the Tucson AMA, where many people already have a strong conservation ethic. Because a golf course's water use is so conspicuous and in the public eye, it is the golf industry's responsibility, especially during a drought, to ensure that golf courses are as water-efficient as possible and to communicate with and demonstrate to the public that water conservation is a high priority within the industry. ADWR frequently distributes information to help the public understand golf's relatively minor part of overall water demands, but the golf industry must also educate the public about its conservation efforts.

Through my participation in the 2003 USGA Regional Conference at Phoenix Country Club, I heard the following concerns from the Arizona golf industry:

- Fears of possible future ADWR-imposed new water-use restrictions.
- Frustrations with current regulations that appear to place undue burden on some courses but ask very little of others.
- Belief that golf contributes more than its share toward water conservation in Arizona.

I do not dispute most of what I heard, and I agree that little evidence

exists to support additional water-use reductions beyond those already in place for new courses. I agree that golf is more closely regulated than most other water users in Arizona and that the turf regulations favor older courses and more strictly limit newer ones. This is consistent with Arizona law, which grandfathered existing uses when the 1980 Groundwater Management Act was adopted.

Hopefully, the golf industry also heard the following perspectives voiced by the ADWR representatives at the USGA Conference:

