

A large graphic featuring a golf course scene with a green, a water hazard, and a sand trap. Overlaid on the right side is a large white '100' with 'USGA' in a smaller font inside the second zero, and 'GREEN SECTION' in a white sans-serif font below it.

# 100 USGA GREEN SECTION

COURSE CONSULTING SERVICE

## Onsite Visit Report

### Recreation Centers at Sun City

Sun City, Arizona

Visit Date: November 13, 2020

Present:

Darla Akins, Secretary  
Dale Lehrer, Vice President  
Dan Schroeder, Board President  
Sue Wilson, Treasurer  
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The USGA Green Section develops and disseminates sustainable management practices that produce better playing conditions for better golf.

# Executive Summary

Thank you for your kind hospitality and the invitation to return to the Recreation Centers at Sun City (RCSC) to conduct a Course Consulting Service visit on behalf of the USGA Green Section. Due to the COVID-19 pandemic, all golf course capital improvement projects were deferred until next year. The pandemic also surprisingly led to a significant increase in golf rounds and revenue. One of the negative aspects of all the increased rounds was that cart traffic doubled and therefore led to more soil compaction and turf damage in localized areas where carts leave and reenter the cart path at the beginning and end of each golf hole. Despite this, it was good to see that all courses were overseeded successfully, although there were a few areas of thin overseed density, as should be expected. During this full-day course tour, we were able to see seven of the eight golf courses. A brief summary of the topics discussed during this course tour is included below:

- **Water use and turf reduction.** There are significant changes looming on the horizon with regard to the Arizona Department of Water Resources Fifth Management Plan. Early discussions indicate that courses with turf in excess of 90 acres will see a significant reduction in water allocation for this excess turf. As such, the biggest and most important set of projects for RCSC over the next decade will be turf reduction, with the goal to reduce irrigated turf on each golf course to 80 to 90 acres. In this report, we will discuss the importance of turf reduction as well as several other strategies to reduce water use, such as upgrading to new grasses as they become commercially available and implementing drip irrigation on teeing grounds.
- **Weed control.** Weed infestation has plagued these golf courses for years and in this report, we will stress a fundamentally sound and robust weed control program for all eight golf courses in 2021. It was great to see that Mr. Dulaney was able to see significant progress on the South Course in one year with an improved pre-emergence and postemergence weed control program.
- **Putting greens.** In general, all putting greens we were able to observe were in good health, and it is good to report that there are no major concerns. There are a few localized areas with poor early establishment of the overseed grass, but no widespread issues.
- **Fairways.** It was good to hear the transition from overseed grass to bermudagrass went well this summer despite unfavorable weather conditions. It is also good to report that all fairways we were able to observe were in good condition and there are no significant issues. In this report, we will discuss a more simplistic fairway aeration program and deep irrigation events.
- **Tees.** We discussed the importance of tee leveling on approximately a seven-year rotation, which is about every year for your eight golf courses. While not all tees will need to be leveled, in general, par-3 tees, No. 1 and No. 10 tees and those on which players typically use irons are the most likely to become crowned and in need of leveling.
- **Bunkers.** Due to the COVID-19 pandemic, the bunker renovation on the Lakes West Golf Course was deferred until 2021. It will be important to modify the bunker liner construction to provide free drainage from the sand to the drain tile. We can discuss this in more detail as this project approaches. We also discussed the importance of sand depth in the existing bunkers, with a goal to supply 8 to 9 inches of sand on bunker floors in order to encourage drier conditions and therefore a reduction in algae.

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# Water Use and Turf Reduction

## Observations

### 1. Fifth Management Plan

The Arizona Department of Water Resources has held a number of meetings for the purpose of developing the Fifth Management Plan, which will likely be implemented within five to six years. Early indications are that this Fifth Management Plan will allocate significantly less water for turf in excess of 90 acres per golf course. A golf course with 70 to 80 acres of turf will likely not see any significant water use reductions, but those courses with turf in excess of 90 acres will see significant reductions in their water allotment.

Proposed Method: Two Categories						
Category	Under 90 Acres		Over 90 Acres		Reduce Withdrawals of Groundwater	Equitable
	Rate	Limit	Rate	Limit		
Turf Category 1	5.84 AF/Ac	3.6 Acres/Hole	5.84 AF/Ac	2.8 Acres/Hole	✓	✓
Turf Category 2	4.22 AF/Ac	3.6 to 5 Acres/Hole	4.22 AF/Ac	2.8 to 5 Acres/Hole		
Turf Category 3	0 AF/Ac	Not allowed	2.5 AF/Ac	5 Acres/Hole		
Water Surface Acres	6.2 AF/Ac		6.2 AF/Ac			
Turf Category 1: Overseeded acres Turf Category 2: Non-overseeded acres Turf Category 3: Acres in excess of 5 Acres/Hole or 90 Acres/18 Holes						

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The AZ Department of Water Resources in the early planning process is proposing the above water allocation for courses with irrigated turf acres under and over 90 acres. In the scenario above, for a course over 90 acres (such as South with 240 acres), the water allotment would be 294.3 acre feet for 50.4 acres of overseeded turf, 167.1 acre feet for nonoverseeded turf (totaling 90 acres) and the remaining 150 acres would receive 2.5 acre feet per acre for 375 acre feet – for a total water allotment of 836.4 acre feet annually for 240 turf acres. It is important to note that 2.5 acre feet per acre is not enough water to produce high-quality nonoverseeded bermudagrass turf.

## Recommendations

### 1. Turf Reduction

It is great to report that there are already plans in place to reduce turf at RCSC, with plans to begin on the South Golf Course, where there are approximately 240 acres of irrigated turf. Unfortunately, these plans are not aggressive enough to reduce irrigated turf to the desired number of about 80 to 90 acres.

- If a plan were implemented to reduce turf on South to 80 acres, this would leave approximately 160 acres of desert landscaping. This seems like a waste of space. It sure seems as if there is an excellent opportunity here to utilize this space for alternative purposes such as hiking or biking trails, picnic areas, disk golf or maybe areas that attract different wildlife with a variety of habitat throughout the property.

## **2. Turf Removal and Drip Irrigation**

One area where there is little need for turf is around teeing grounds (other than the two sets of forward tees where there should be turf in between the tees and the fairway). It is likely 15 to 20 acres of turf could be removed easily around tees and further water use reduction could be achieved through the installation of drip irrigation on all teeing grounds. This is now a proven practice and can deliver water savings of 60 to 80% when compared to overhead irrigation. Drip irrigation would also significantly reduce or eliminate water applied beyond the tees into the new desert areas, which only attract weeds.

## **3. New Grasses**

There will eventually be a new warm-season grass such as bermudagrass, zoysiagrass, or even kikuyugrass that will retain its green color and exhibit some growth year-round. This grass will be more drought tolerant than any current grass that is commercially available and will offer significant water savings as well as savings for the cost of overseeding. The USGA has committed over \$500,000 just over the past three years to turf breeding efforts at five different universities across the southern portion of the United States to develop such a grass. Unfortunately, this research should have begun 15 to 20 years ago but, nonetheless, it has begun and the breeders are confident that this grass will be available within the next 10 to 15 years.

# Weed Control

## Observations

### **1. Widespread Purple Nutsedge**

Purple nutsedge is an extremely problematic weed given its proliferation and extreme difficulty to control. Unfortunately, all the courses at RCSC are plagued with this weed, which has been deemed the world's number one weed. This weed is especially problematic in and around green surrounds at RCSC.

### **2. Crabgrass and Goosegrass**

The summer grasses, crabgrass and especially goosegrass, have also been especially problematic at these golf courses. Fortunately, these weeds are much easier to control than purple nutsedge, and it is good to report that Mr. Dulaney made significant progress controlling these weedy grasses this year on the South Golf Course.

### **3. Liverseed Weed**

There is an abundance of liverseed weed. This annual warm-season grassy weed can be fairly easy to control, similar to crabgrass and goosegrass.



## 4. Green Kyllinga

Green kyllinga, a sedgeweed, has been problematic in the Lakes East and West greens. It is good to report that Mr. Hyppa was able to achieve some good control this year with multiple Monument® applications.

## Recommendations

### 1. Zone Defense

Dr. Jim Brosnan at the University of Tennessee strongly recommends using what he calls a “zone defense” for weed control, meaning he recommends using a combination of pre-emergence and postemergence products and products with different chemistry classes to offer efficient weed control. As an example, Dr. Brosnan and his team at University of Tennessee recommend the following program for weed control in nonoverseeded bermudagrass:

- First application in mid-February with Reward® at 2 pints per acre and Princep® at 2 quarts per acre plus a nonionic surfactant. An alternative is Finale® at 4 quarts per acre.
- The second week of March, apply prodiamine at 37 ounces per acre. An alternative is Echelon® at 36 ounces per acre.
- The second week of May, apply granular Ronstar® at 150 pounds per acre.
- The second week of May, apply GameOn™ at 3.5 pints per acre for broadleaf weed control. Another postemergence option is Solitare® applied at 32 ounces per acre for both broadleaf and grassy (crabgrass) weed control.
- In October, apply Freehand® at 200 pounds per acre. Another option is Tribute® Total at 1 ounce per acre in early November.

Although you do not need to follow this exact program, this is a great example of a program that rotates different chemistries and combines both pre-emergence and postemergence herbicide products for effective weed control.

### 2. Nutsedge Control

Unfortunately, pre-emergence products do not work on purple nutsedge and therefore you must rely solely on a postemergence program. Mr. Dulaney had success with Celero® this year, and it is suggested for all the courses at RCSC to utilize Celero at least twice, if not three times, every year for the next two to three years to improve control. You may also consider using a new product called Vexis® (pyrimisulfan in a granular form) for spot treatments on purple nutsedge.

### 3. Specticle®

There was some discussion about using Specticle, which is an excellent pre-emergence herbicide product. You are encouraged to utilize this product in the fall or spring for effective cool-season or warm-season weed control. However, it is strongly advised to avoid using more than once per year given that twice-annual applications have shown damage on common bermudagrass. Additionally, after approximately four years of use, Specticle should be removed from the herbicide program for approximately two years before it can be reintroduced to avoid weed resistance.

#### 4. Green Kyllinga

Kai Umeda with the University of Arizona conducted a recent herbicide trial for green kyllinga control. He found that the sulfonyleurea herbicides such as Monument performed the best. Use the high rates and multiple applications for best control.

## Putting Greens

### Observations

#### 1. General Condition

The seven golf courses we were able to visit have greens that, in general, are in good condition. While each course can make improvements, there are no glaring infrastructure problems in greens, and I do not foresee any major projects to improve the putting green rootzones for the purposes of agronomic health.

#### 2. Sand Topdressing

A combination of sand topdressing, judicious nitrogen inputs, and minimal but adequate watering is the key to properly managing organic matter in putting greens.

#### 3. Overseeding

It was good to see the courses are using a blend of different seed varieties for overseeding. They are generally using 70 to 80% ryegrass, 10 to 30% *Poa trivialis*, and some have included colonial bentgrass in the mix due to shortages of *Poa trivialis* that are impacting availability and driving up costs. This is consistent with what other courses are doing in Southern Arizona and the Coachella Valley. In general, the density of the overseeding was good across the golf courses, but there are a few courses with some thin overseeding conditions. It is good to report steps toward improvement have already been taken.

#### 4. South Course Greens

The overseeding on the South putting greens is in good condition with a mixture of *Poa trivialis* and perennial ryegrass. Mr. Dulaney is progressively lowering mowing heights to achieve improved ball roll and speed. Despite issues with disease due to the very hot weather during overseeding, the overseeding density on the greens is good and will only improve with time.

#### 5. North Course Greens

In general, the overseeding on the North putting greens is good, but there are a few areas where the seed moved due to excessive water applied early after seeding. The worst of these is on No. 17 green. On this green, you can see the seed washed from upper areas and accumulated in the lower areas. It was good to see that new superintendent Mike Murphy has already employed the necessary steps for improvement. He has conducted vertical mowing at light intensity in several directions to thin the areas where seed accumulated and to create channels in which to establish new seed where there is thin turf density. Additionally, the greens have been seeded and topdressed with sand.

## 6. Lakes East Greens

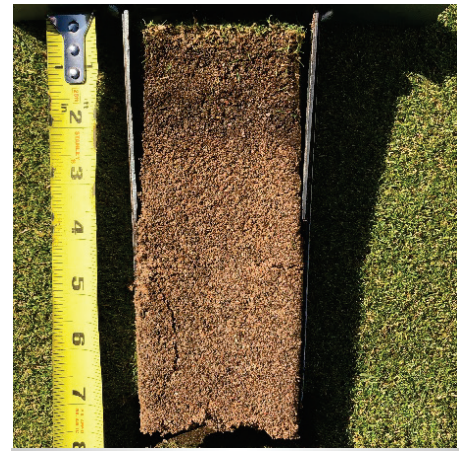
On the Lakes East greens, colonial bentgrass was used at 10% of the mixture, 20% *Poa trivialis* and 70% perennial ryegrass. In general, the overseeding density on these greens is good. We did see the remnants of the green kyllinga, and it was great to hear that the greens were sprayed with Monument several times during the summer months with good suppression.

## 7. Lakes West Greens

The Lakes West greens have good turf density for the overseeding mixture. We did observe some elevated organic matter levels at depth in these greens, consistent with what we have seen in previous visits.

## 8. Riverview Greens

The Riverview greens exhibited good overseeding turf density. We did observe elevated organic matter levels within the top 2 inches. While the organic levels do not appear to be excessive, it will be useful to dilute this layer with sand.



The original rootzone is in good condition, but there is a zone of elevated organic matter in the surface of the Riverview greens, extending to a depth of about 2 inches.

## 9. Willowcreek Greens

We observed algae at the surface along the perimeters of the Willowcreek greens where water is accumulating at the very surface of the greens. At only two years old, these are fairly new greens and there has been no core aeration thus far. There is indication of a developing organic matter layer in the top 0.5 inch. While, in general, the overseeding density is good, there will be the need to employ steps to reduce the algae and encourage better water penetration into greens and to allow the greens to dry out in between irrigation events.



There is a developing organic matter layer in the surface of the Willowcreek greens and indication of surface algae along isolated areas in green perimeters.



## 10. Willowbrook Greens

We observed seed that ran on the Willowbrook greens, similar to that observed on the North putting greens. It was reported that there may be overlap with the greens heads and collar heads that may have caused the seed to wash in the early days after overseeding. We also observed a fair amount of purple nutsedge in green surrounds.

## Recommendations

### 1. Immediate Improvements

As stated above, in general, the overseed quality is good on putting greens, but there are a few courses with some localized thin areas where seed accumulated from excessive watering. Please implement the following steps for immediate improvement on these putting greens:

- **Vertical mowing.** Utilize light-intensity vertical mowing in multiple directions to create sand channels for seed incorporation into thin areas where seed accumulated. Set the blades approximately 0.080 to 0.100 inches below the bottom of the rollers with non-carbide tip blades.
- **Sand topdressing.** Lightly sand topdress localized areas on greens with thin turf density with the West Coast 30/70 sand or the West Coast Premium sand. Light and frequent is the key here, and the rate should be approximately 40 to 50 pounds per 1,000 square feet.
- **Spiking.** You may also consider using a spiking machine to create small voids in which to incorporate seed. This is a very effective strategy, and although it will take four to five weeks to really see the seedlings mature, it will eventually yield good results.
- **Fertility.** Continue to spray the greens on a weekly basis with approximately 0.2 to 0.5 (in split applications) pounds of nitrogen per 1,000 square feet with urea or calcium nitrate as the nitrogen source. There is no need to use expensive fertilizers here. Keep it simple and focus on the fundamentals.
- **Watering.** Water management is tricky with the greens open for play and the need to maintain adequate surface moisture to germinate the new seed. Ideally, the greens would be kept on the drier side now, but hand watered with a shower nozzle in seeded areas. However, this may not be practical given your high play volume and limited labor resources. That being the case, you will need to use light watering on a frequent schedule and find gaps in play during the day to add additional water. One- to two-minute run times should be adequate throughout the day.
- **Algae control.** With the frequent watering, you will likely see surface algae, and some was already evident on the day of the course tour. To mitigate algae, use mancozeb and chlorothalonil on a routine schedule every two weeks for the next four to six weeks. You may also hand spike these areas and sand topdress. You may also consider using very small-diameter solid tines to improve water infiltration. On greens that are more established such as the Willow Creek greens, allow the surface to dry out in between irrigation events. Ideally, overhead watering would be reduced to two to four nights per week.

## 2. Sand Topdressing

Research and field observations have shown that courses in this climate where turf grows year-round will need approximately 3,000 pounds of sand per 1,000 square feet per year, which is equivalent to about 30 cubic feet of sand per 1,000 square feet per year. This total includes sand applied at aeration, sand applied at overseeding, and sand applied during routine sand topdressing events. We discussed using several different sand types throughout the year.

- The coarse USGA construction sand can be used to fill the holes during aeration and at overseeding.
- The remainder of the summer, you may consider using the West Coast Premium sand, which contains fewer coarse particles than the construction sand.
- From November through April or May, it is recommended to use the West Coast 30/70 sand for routine sand topdressing events. This sand can be applied at a rate of 50 to 125 pounds of sand per 1,000 square feet or about 0.50 to 1.25 cubic feet of sand per 1,000 square feet.
- It is recommended for all courses to quantify the amount of sand applied during each topdressing event and calculate a running cumulative total for the year.
- For more information on sand topdressing and a method to quantify the amount of sand applied during topdressing events, see [Light and Frequent Topdressing Programs](#) and [A New Method for Quantifying Sand](#).

# Fairways

## Observations

### 1. Transition

It was great to hear from the course superintendents that the transition process from overseeding to bermudagrass recovery went relatively seamlessly this year despite very hot and dry weather conditions with essentially no rain. It is clear the “transition” seed mixture is working as planned without the need for chemicals to remove the ryegrass.

### 2. Overseeding

The hottest summer on record continued into the fall through the overseed process. These high temperatures encouraged bermudagrass growth and recovery during the overseed process. Despite the aggressive bermudagrass growth, it was good to see consistently good overseed density and quality among the seven courses visited.

### 3. Elevated Compaction

With four golf carts per person rather than two this year, the amount of compaction increased, especially in areas where golf carts generally leave the cart path entering the hole and reenter the cart path toward the end of each hole. While we did not necessarily see any direct turf injury in the middle of fairways, turf damage was evident in heavily trafficked areas from compaction. It appears that golf courses may continue the trend with single-rider carts due to the continuing pandemic, and courses have recognized faster pace of play.



Despite well above average fall temperatures, the overseed quality on fairways among the courses is consistently good.

## Recommendations

### 1. Fighting Compaction

Research on fairway aeration has revealed that whether using a slicing tine, solid tine or hollow tine, the benefits from such an event typically only last about four to six weeks. Benefits include reduction in bulk density (a measure of compaction), improved infiltration rate, and improved salt leaching.

- Given the short-term benefits from aeration, it is clear that multiple aeration events are needed annually, likely 8 to 12 events. It is not practical to conduct this many core aeration events given the intense labor associated with this operation. As such, **it is recommended to switch to solid-tine aeration only. The solid-tine operation is faster, does not require cleanup, and typically the tines last longer than hollow tines.**
- We also discussed the Imants® RotoKnife machine which offers similar benefit to solid-tine aeration. This machine can be run at a fast pace of 8 to 10 miles an hour, and therefore it is easy to keep ahead of play in the morning.

## Tees

### Observations

#### 1. Crowning

Over time, tees become crowned due to continuous sand filling of divots in the middle of the tees. This process is expedited on par-3 tees and short par-4 holes where players typically use irons and take divots. This crowning occurs on every golf course, and it is not surprising to see crowned tees on the golf courses at RCSC.

- When the crowning becomes more severe, it can affect golf shots with uphill or downhill lies, depending on where the player tees up their ball on the teeing ground.
- For more on this topic, click on the video on [Why do Tees Become Uneven?](#)

## Recommendations

### 1. Tee Leveling

Given that sand replacement in bunkers is scheduled about every seven to ten years, you may wish to schedule tee leveling at the same time as bunker sand replacement.

- Likely, not all tees will need leveling, but the ones with severe mounds will need to be stripped and releveled. The sod can then either be replaced, or new sod purchased, depending on the quality of the sod.
- If the crowning is only slight, you may consider using large hollow-tine aeration, making two or three passes over the tees, watering and leveling with a 2- to 3-ton asphalt roller.

## Bunkers

### Observations

#### 1. Delayed Lakes West Renovation

Due to the COVID-19 pandemic and uncertainty about revenue, capital improvement projects were deferred this year, one of which was the bunker renovation on the Lakes West Golf Course.

#### 2. Smoothing Bunker Faces

It was good to see a popular technique smoothing bunker faces rather than raking is being utilized at RCSC. This strategy firms the surface on the slopes of bunkers, which encourages inbound golf balls to bounce from their impact position and run down into the low-lying areas. This strategy also helps to discourage fried-egg lies in bunker faces. However, this strategy can also lead to algae formation and weed infestation in bunker faces if not maintained properly.

## Recommendations

### 1. Bunker Renovation

The courses have had success using the Better Billy Bunker™ liner method in previous bunker renovations. You may consider continuing to use this liner, but it is strongly recommended to modify the design in order to yield free drainage from the sand all the way to the drainpipe with no layer of liner in between the sand and the drainpipe. The drainpipe should be placed on top of the liner. I will be happy to discuss this in greater detail as you move closer to the renovation in 2021.

### 2. Turning Over Bunker Faces

It is recommended to continue to use the smoothing technique on bunker faces, but it is recommended to establish a routine to hard rake/aggressively rake the bunker faces two times per month to eliminate weeds and algae formation. This will also provide a cleaner, more attractive appearance.



# Conclusion

I would like to thank Ms. Ek, Mr. Duthu, the golf course superintendents and the Board of Directors at RCSC for their continued support of the USGA Green Section. It was a pleasure to return to RCSC in the fall of 2020 following overseeding, a time which I have not had the opportunity to see the golf courses. In general, the courses exhibit good quality overseeding despite a very challenging fall in which to conduct the overseed process due to extreme heat and lack of rainfall. The most important topic for the long-term sustainability of these golf courses will be water use and the need to implement water reduction strategies such as turf reduction. While this strategy may not be entirely popular with the golfing members and residents, it is better than the alternative which a handful of courses in Southern Arizona have faced and that is foreclosure and entirely shutting the water off to the golf course. Plans are in place to avoid these issues and to help maintain one of the primary assets of this community. Best wishes for a successful winter and early spring season. I look forward to returning to RCSC in early summer of 2021.

Respectfully submitted,



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USGA Green Section

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## Additional Considerations

The USGA appreciates your support of the Course Consulting Service. Please visit the [Green Section Record](#) to access regional updates that detail agronomist observations across the region. Also, please visit the [Water Resource Center](#) to learn about golf's use of water and how your facility can help conserve and protect our most important natural resource.

### USGA Green Section Record and @USGAGrnSection on Twitter

If you would like to receive the USGA's electronic publication, the *Green Section Record*, [click here](#). It is free, informative and sent directly to you via email every two weeks. Also, be sure to follow us on Twitter at @USGAGrnSection for additional golf course management information, course care articles, and field observations from USGA agronomists.

## About the USGA Course Consulting Service

As a not-for-profit agency that is free from commercial connections, the USGA Course Consulting Service is dedicated to providing impartial, expert guidance on decisions that can affect the playing quality, operational efficiency and sustainability of your course.

First started in 1953, the USGA Course Consulting Service permits individual facilities to reap the benefits of on-site visits by highly skilled USGA agronomists located in Green Section offices throughout the country.



For questions regarding this report or any other aspect of the USGA Course Consulting Service, please do not hesitate to contact our office.

