

Sanibel Golf Course Fertilizer and Lake Management Recommendations Annual Report Card



October 2019



This report was specifically prepared for:

The Dunes Golf and Tennis Club

Introduction

Stormwater runoff from urban landscapes and golf courses is a major source of nutrients contributing to algae blooms and water quality impairments in Florida. Poor water quality not only impacts wildlife habitat and the quality of life for island residents, but it can directly impact our local economy by reducing property values and the overall experience of visitors to our island. As a result, protecting Sanibel's water quality is of paramount concern to the City of Sanibel.

The Florida Department of Environmental Protection (FDEP) is the state agency responsible for protecting Florida's waters. Waters that do not meet the state's water quality standards are deemed "impaired" under the Florida Impaired Waters Rule (Ch. 62-303, F.A.C.). To address these impairments, the FDEP is developing Total Maximum Daily Loads (TMDL) for each waterbody that does not meet minimum water quality standards. The TMDL is the maximum amount of a pollutant that a waterbody can assimilate on a daily basis without causing an imbalance in the natural flora and fauna. As part of the TMDL process, all local governments with impaired waterbodies within their jurisdiction will be required to participate in a Basin Management Action Plan (BMAP) process and will be required to address pollutant sources that are contributing to the impairment. In August 2017, the FDEP established a TMDL for the Sanibel Slough to address nutrient impairment in both the East and West Basins of the Slough system. To meet the target conditions set in the TMDL, a 26% reduction in existing total nitrogen (TN) loads and a 34% reduction in the existing total phosphorus (TP) loads are necessary in the West Basin. In the East Basin, a 54% reduction in existing TN loads and a 74% reduction in existing TP loads are necessary to achieve target conditions.

The City of Sanibel has taken several measures to improve water quality throughout the island. These measures include acquisition of environmentally sensitive lands, mangrove protection, native plant protection and sod limitations, beach and dune protection, conversion from septic to central sewer, responsible development through reductions in impervious surfaces and onsite stormwater management, implementation of the National Pollutant and Discharge Eliminations System Program, island-wide water quality monitoring, adoption of an urban fertilizer ordinance, and nutrient and lake management recommendations

for golf courses. In June 2017, the City launched the Sanibel Communities for Clean Water (SCCW) program, which aims to educate residents in regards to the role they play in protecting water quality, and what actions they can take to improve water quality in their community. While the City has taken a very proactive role in improving water quality, the Sanibel Slough and many residential and golf course lakes on Sanibel remain "impaired" for nutrients such as nitrogen and phosphorus. Managing stormwater runoff from golf courses on Sanibel is critical to ensuring that fertilizer and other chemicals used to maintain turfgrass do not inadvertently impact sensitive areas such as lakes, wetlands, and coastal waters. While we realize that each golf course is unique and was designed and permitted to function in a very specific way, all of the golf courses on Sanibel have the potential to discharge into natural waterbodies, either directly or indirectly. As a result, the City has taken additional measures to ensure that water leaving golf course lakes meet the water quality standards of the receiving waters.

In October 2008, in an effort to improve the quality of water discharged from Sanibel's golf courses, City Council adopted a list of Nutrient Management Recommendations that were based on the Florida Department of Environmental Protection's *Best Management Practices (BMPs) for the Enhancement of Environmental Quality on Florida Golf Courses (2008)*. These recommendations provide specific guidance for golf course managers on how to reduce fertilizer use and improve water quality within their respective golf course lakes. Since their adoption, City staff has worked closely with each golf course to provide technical assistance to help implement these recommendations.

The City Natural Resources staff met with Club Manager Brian Kautz and Superintendent Roy Jones of The Dunes Golf and Tennis Club in September 2019 to review the status of implementing the City's Golf Course Nutrient and Lake Management Recommendations. As a result of that meeting, the City has updated the annual "report card" for the Dunes.

A report card is provided annually to each golf course to help track progress and guide implementation of the City's recommendations. The report card uses a point system to evaluate performance. Each recommendation or best management practice (BMP) is scored from 0 to 5, based on the completeness of implementation. Out of 13 BMPs, a maximum of 65 points can be earned. The score is calculated as follows: 0–80%, Not in Compliance; 81–90%, Partially in Compliance; and 91–100%, Full Compliance.

The Dunes Golf and Tennis Club earned **61 out of 65 points**, for a score of **94%**. This is a **31% improvement since 2011, and the same score as 2018**. The Dunes is in **"Full Compliance"** with the City's BMP recommendations.

| BMP Matrix / Staff Recommendation | Score |
|---|-----------|
| Education | |
| Require that each superintendent ensure that all course employees are trained in the <i>Best Management Practices for the Enhancement of Environmental Quality on Florida Golf Courses</i> (FDEP 2007), including water quality related issues and environmentally sensitive areas around the golf course. | 5 |
| Lake Management | |
| Within 5 years of adoption, a minimum of 30% of the littoral zone of each golf course lake must be planted and maintained with submerged or emergent aquatic vegetation on a minimum of 3' centers. | 4 |
| Require that golf courses monitor the water quality in their lakes 2x/year (wet season/dry season) and provide the data to the City's Natural Resources Department. Minimum parameters should include dissolved oxygen (DO), total nitrogen (TN), total phosphorus (TP), chlorophyll a (chl-a), and copper (Cu). If nutrient or heavy metal concentrations are excessive, City staff will meet with golf course management staff to review and determine a mitigation plan. | 5 |
| Require that all fish kills and algae blooms are reported to the City's Natural Resources Department. | 5 |
| Fertilizer Management | |
| Limit soluble nitrogen applications to ½ lb/1,000ft ² | 5 |
| Identify and map environmentally sensitive areas within the golf course and identify no fertilizer buffer zones around all of the waterbodies and map drainage patterns. | 5 |
| Require 25-foot native plant or unfertilized grass buffers around environmentally sensitive areas such as lakes and wetlands, where practical. When a 25-foot buffer is impractical, a minimum 10-foot buffer is required. | 4 |
| Require that grass buffers around environmentally sensitive areas such as lakes and wetlands be mowed 2" higher than the other grass to slow and filter overland flow to waterbodies. | 4.5 |
| Require that all washdown facilities have runoff properly treated prior to discharge off of the site. | 5 |
| Require periodic inspections of fertilizer storage areas and washdown facilities by DNR staff. | 5 |
| Require that all golf courses on the island maintain annual fertilizer and copper sulfate logs and make them available to the City's Natural Resources Department. | 5 |
| Irrigation and Fertigation | |
| Require that all reuse water be setback 25-feet from all waterbodies and that all irrigation heads using reuse water or fertigation (application of fertilizer through an irrigation system) be setback 25-feet from a waterbody. When a 25-foot buffer is impractical, a minimum 10-foot buffer is required. | 3.5 |
| Require that golf courses quantify their water use and differentiate between reuse and potable water supplies. This information can be used to account for the nutrients in reuse water when making fertilizer calculations. | 5 |
| Total Points (out of a maximum of 65 points): | 61 |

Areas meeting the City's recommendations:

1. *Best Management Practices training for golf course staff.* In May 2011, The Dunes developed a formal BMP training program for golf course personnel. In October 2019, golf course employees participated in the annual training and have acknowledged they have been trained and understand the basic principles of the *Best Management Practices for the Enhancement of Environmental Quality on Florida Golf Courses*.
2. *Water quality monitoring and reporting.* Since October 2008, The Dunes has collected water quality data on a semi-annual basis and has provided the results to City staff. This data is used by staff to help track water quality in the golf course lakes. In April 2012, The Dunes contracted with the SCCF Marine Lab for water quality monitoring services. Monitoring includes water quality sampling, storm event sampling, mapping of drainage patterns, and recommendations on how to improve water quality in the golf course and community lakes. The 7th annual report was submitted in October 2019. According to the report: "Since monitoring began in 2012, the system exhibited both positive changes and negative swings. The period between 2012 and 2016 showed significant improvement throughout the stormwater system and trend analyses showed that total nitrogen, inorganic nitrogen, and chlorophyll a (algae) were declining significantly, as was the TSI score. During 2016, the positive trends reversed and nitrogen, phosphorus and chlorophyll a increased in the main body of The Dunes stormwater system indicating decreasing water quality. Currently, nitrogen and chlorophyll a are still increasing in the stormwater system while phosphorus has begun to trend downward." The report attributes the downward trend in phosphorus to possible irrigation system maintenance and spray head adjustments that may have limited the amount of nutrient-rich reuse irrigation water from entering surface waters and/or groundwater. The upward trends in nitrogen and chlorophyll a are likely due to regional short-term differences in weather and precipitation and their effects on groundwater.
3. *Reporting of fish kills and algae blooms in golf course lakes.* Three fish kill/algae bloom events were reported by the Dunes staff in 2019. A fish kill, consisting of snook only, was reported on August 13, 2019 in lakes on the back 9 and also in driving range lake. A water sample was taken to the SCCF Marine Lab to determine the presence of algae at the time of this fish kill. SCCF reported 153 ug/phycoerythrin/L, which is indicative of a cyanobacteria bloom. Another fish kill of approximately 60 fish total was reported on September 24, 2019. Species affected during this event included snook and tilapia. City Staff inspected the lakes during this fish kill and observed an algae bloom that appeared to composed of cyanobacteria. During fish kills, Dunes staff remove fish carcasses from the water, resulting in nutrient export from the water bodies. The City would encourage the Dunes to continue this practice to prevent the re-release of nutrients as fish decompose. Just prior to the report card meeting, a third algae bloom was reported to City staff. At the time of inspection,

several lakes were experiencing algae blooms (September 2019). No other blooms were reported throughout the reporting period. Efforts should be made to report all blooms to Natural Resources staff so that we may provide technical assistance on how to mitigate future blooms.

4. *Limit soluble nitrogen applications to ½ lb/1,000 ft².* Fertilizer data provided to the City by The Dunes staff demonstrates applications of soluble nitrogen are mostly limited to ½ lb/1000 ft². This minimizes the potential for runoff of soluble nitrogen into golf course lakes available to algae.
5. *Identify and map environmentally sensitive areas around golf course lakes.* Formal mapping was completed in July 2012. A map showing all environmentally sensitive areas was provided to City staff on June 14, 2012. A map showing drainage patterns was provided in SCCF's first quarter monitoring report (July 5, 2012).
6. *Require 25-foot native plant or unfertilized grass buffers or 10-foot buffers where 25-foot is impractical around environmentally sensitive areas.* At a minimum, 10-foot buffers have been established around most of the environmentally sensitive areas, including lakes and wetland areas. Additional vegetation buffers were added to two bulkhead areas in 2014; additional buffers should be installed along bulkheads where feasible. The failure of the bulkheads throughout the course has prompted Dunes staff to take immediate action to stabilize the shorelines. Rather than replacing the bulkheads, Dunes staff is choosing to contour the shoreline slopes to create beneficial littoral zone habitat. The redesigned shorelines have been densely planted with canna, bulrush, and cattails, which will help filter nutrients from runoff as it enters the waterbody. Over the past reporting year, the bulkhead along the fairway of hole 8 was removed and approximately 100ft of the shoreline was contoured and vegetated. The Dunes has plans to continue their efforts to create littoral shelves to replace failing bulkheads.
7. *Require that grass buffers around environmentally sensitive areas such as lakes and wetlands be mowed 2" higher than other grass to slow and filter runoff.* Grass is allowed to grow at least 2" higher than grass on greens, fairways and tees to slow water and nutrient runoff.
8. *Proper maintenance of washdown facilities and runoff.* The Dunes maintenance area and washdown facility were in good working order at the time of inspection and there were no signs of washdown water being discharged from the site.
9. *Allow City staff to conduct periodic inspections of golf course facilities.* The Dunes staff has been very cooperative and has provided full access to the golf course and all of its facilities for annual inspections. During the most recent inspection, all fertilizer and chemicals were properly stored and the maintenance facility and washdown area appeared to be in good working order.

10. *Maintain and make available fertilizer records and copper sulfate logs.* The Dunes maintains annual fertilizer and lake management records. This data was made available to City staff. For several years, the Dunes did not apply any phosphorus; however, in 2015, phosphorus applications began once again throughout the course. Phosphorus applications were made to the greens and tees in 2018 (1.04 lbs/1000 sf and 0.52 lbs/1000sf) and to the greens and tees in 2019 (0.66lbs/1000 sf and 0.14lbs/1000 sf). From September 2018-August 2019, as compared to the same period one year ago, nitrogen applications slightly increased on greens and fairways, but decreased by more than half the amount applied the previous reporting period on tees. The Dunes has not applied copper sulfate to its lakes for algae control since 2011.
11. *Quantify golf course water use and the source of water used.* The Dunes quantifies their water use; all water used to irrigate the course is reuse water provided by the City. From September 2018-August 2019, the average nightly irrigation was 137,073 gallons.

Areas for improvement:

1. *Planting of shoreline vegetation along golf course lakes to facilitate nutrient removal.* Within 5 years of adoption of the City's recommendations, all golf courses should have a minimum of 30% of the shoreline of each lake vegetated with submerged or emergent aquatic plants. Significant shoreline improvement has been achieved simply by reducing/eliminating shoreline mowing and discontinuing herbicide treatment within the lakes, allowing native submerged aquatic vegetation to establish. Although important, plantings on the upper lake banks (canna, sea-oxeye daisy) do not provide the same nutrient uptake benefit as submerged and emergent vegetation. It is important that The Dunes continue efforts to establish emergent vegetation particularly along the shoreline of holes #5, 6, 7, 8, 9, 10, 11, 16, 17, and 18.
2. *Require that all irrigation heads using reuse water be set back 25' from all waterbodies or 10' where 25' is impractical.* The current irrigation design includes several heads that are located within 10' of waterbodies and sensitive wetland areas. The Dunes staff, often informed by concerned residents, closely monitors these irrigation heads to prevent reuse water, which may also contain fertilizer (fertigation), from spraying directly into golf course lakes; new sprinkler heads are kept on-hand allowing for immediate replacement of malfunctioning heads. Complete redesign of the irrigation system would be needed to move heads a minimum of 10' from all waterbodies. The 2018 and 2019 annual water quality report suggests that reclaimed water used for irrigation is the main source of phosphorus loads for Sanibel based on water quality data gathered to date. The report states that for every 10,000 gallons of reclaimed water used for irrigation, 0.5lbs of nitrogen and 0.2lbs of phosphorus are applied to the landscape. Additional strategies identified in the 2018 and 2019 reports to reduce runoff from reuse water should continue to be implemented, including eliminating irrigation during periods when turf is

already saturated with water, not spraying on roads, cart paths, driveways or directly into the waterbody, and rigorously checking the system for leaks.

3. *Additional buffer zones along the bulkheads should be considered in order to meet the minimum 10-foot buffer requirement.* In looking to address aging and failing bulkheads, The Dunes has considered and implemented (specifically at tee #1 and along the fairway of hole 8) options to eliminate bulkheads and redesign the areas to establish more gradual slopes that may ultimately be planted with native species and improve uptake of nutrients from the course before entering the adjacent lakes. Where this type of redesign is not feasible, additional vegetation buffers or installation of a "Beemat" or other floating treatment wetland system should be considered.
4. *Consider soil phosphorus storage capacity testing.* Since SCCF began monitoring water quality in The Dunes, phosphorus concentrations have consistently remained above state numerical nutrient criteria (impaired), which is likely due to the high concentrations of phosphorus in the reclaimed water used for irrigation. According to the 2017 annual report, although phosphorus is typically adsorbed to soil particles or used by vegetation, it is likely that soils in the golf course are saturated with phosphorus and act as a source rather than a sink from long term use of reclaimed water. Therefore, it is highly recommended that The Dunes perform soil phosphorus storage capacity tests to better understand how the application of additional phosphorus may effect nutrient concentrations in runoff and groundwater. The results of the testing may suggest that phosphorus applications are unnecessary, and golf course phosphorus needs can be met through phosphorus sources already present in the soils. The continued use of nutrient-rich reclaimed water will also help to meet the phosphorus demands.

Additional Noteworthy Efforts

1. In 2017, Lake 4 in The Dunes began accumulating large quantities of floating vegetation. Rather than using chemicals to treat this vegetation, which would result in the release of nutrients via decomposition, The Dunes contracted a lake management company to mechanically remove algae with a Truxor algae-harvesting workboat. Over the last two years (2018 and 2019) the Dunes has continued to contract for Truxor vegetation harvesting and removal. In 2019, the Truxor performed two days of mechanical vegetation removal, removing 100 cubic yards of vegetative material from the lakes. This practice has undoubtedly resulted in a large export of nutrients and a reduction of internal loading in the waterbody.
2. Working in conjunction with The Dunes Homeowners Association, 13 aeration systems, each equipped with three diffusers, were purchased for placement in all stormwater lakes throughout the course. The oxygen delivered from the aeration systems will promote bacterial decomposition of nutrient-rich bottom sediments, help to bind phosphorus to naturally occurring iron making it

unavailable to algae, and enhance fish and wildlife habitat. At the time of the 2018 inspection, only a portion of the systems were online and functioning. As of this year, all 13 systems, equipped with 44 diffusers total, are online and running.