Sanibel Golf Course Fertilizer and Lake Management Recommendations
Annual Report Card

July 2012

This report was specifically prepared for:

The Dunes Golf and Tennis Club

Introduction

Stormwater runoff from urban landscapes and golf courses are 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. It is anticipated that over the next few years a TMDL will be developed for the Sanibel River and the coastal waters surrounding Sanibel Island.

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. While the City has taken a very proactive role in improving water quality, the Sanibel River 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 ensure that that fertilizer and other chemicals used to maintain turf do not inadvertently impact sensitive areas such as lakes, wetlands, and coastal waters. While we realize that 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. 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 an effort to improve the quality of water discharged from Sanibel's golf courses, in October 2008 City Council adopted a list of Nutrient Management Recommendations that were based on the Florida Department of Environmental Protection's *Best Management Practices 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 to help improve water quality within their respective golf course lakes. Over the past three and half years since their adoption, City staff has worked closely with each of the golf courses to provide technical assistance to help implement these recommendations with varying levels of success.

On July 26, 2012, City Natural Resources Department staff met with Leilani Sivsov, Club Manager, and Mitch Miller, Superintendent, from the Dunes Golf Club 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 and shoreline vegetation map for the Dunes golf course (see attached documents). This Annual Report Card has been developed for each of the island's golf courses to provide feedback on progress towards implementing the City's recommendations. This report will be provided to each golf course on an annual basis to help track progress and guide implementation.

This Report Card uses a point system to evaluate performance. For each recommendation or best management practice (BMP) implemented, 1-5 points are awarded based on the level of implementation. Out of a total of 13 BMPS, a maximum of 65 points can be awarded. The score is calculated as follows: 0 – 80% - Not in Compliance, 81 – 90% - Partially in Compliance, 91 – 100% - Full Compliance.

The Dunes Golf Club received **59** out of a total of 65 points, resulting in a score of **91%**. This indicates that the Dunes golf course is in **"Full Compliance"** with the City's recommendations (see report card below for details). **This year's score represents a 28% improvement over last year.**

BMP Matrix / Staff Recommendation	Score
Education	
Require that each superintendent ensure that all course employees are trained in the *Best Management Practices for the Enhancement of Environmental Quality on Florida Golf Courses* (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.	3.5
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.	2
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):	**59**

Areas currently 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. As of March 21, 2012, all employees (total of 14) have been through the 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 golf course 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 your golf course lakes. This year, the Dunes contracted with the SCCF Marine Lab to monitor the lakes. The 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 first quarterly report was completed July 5th.

3.) Reporting of fish kills and algae blooms in golf course lakes. All fish kills and algae blooms were reported to City staff.

4.) Limit soluble nitrogen applications to ½ lb/1,000 ft^2. Golf course staff has indicated that they currently limit application of soluble nitrogen to ½ lb/1,000 ft^2. 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 drainage patterns was provided July 5, 2012, in SCCF's first quarter monitoring report. A map showing all environmentally sensitive areas was provided to City staff on June 14, 2012.

6.) Require 25-foot native plant or unfertilized grass buffers or 10-foot buffers where 25-foot is impractical around environmentally sensitive areas. Minimum 10' buffers have been established around most of the environmentally sensitive areas, including lakes and wetland areas. Additional buffers should be installed along bulkheads, if feasible.

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. Additional buffers should be installed along bulkheads, if feasible.

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. The retention area where washdown effluent is held

should be excavated to reduce organics and increase capacity in the upcoming year.

9.) Allow City staff to conduct periodic inspections of golf course facilities. Dunes staff has been very cooperative and have 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, including copper sulfate logs. This data was made available to City staff.

11.) Quantify golf course water use and the source of water used. The Dunes quantifies their water use and all water used to irrigate the course is reuse water provided by the City.

Areas needing 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 are supposed to have a minimum of 30% of the shoreline of each lake vegetated with submerged or emergent aquatic plants. Because aquatic shoreline vegetation is one of the easiest ways to remove nutrients, it is critical that each lake be vegetated with submerged or emergent vegetation. Once established, a maintenance program should be implemented to harvest 10-20% of the mature plants annually to help facilitate nutrient removal. Over the past three years, the Dunes has planted a significant amount of shoreline vegetation. In 2012, more than 2,500 linear feet of emergent vegetation was installed along holes #13, #14, and #15; however, due to high salinities caused by tidal water flowing into the lake over the weir, the plants appear stressed and will likely be slow to colonize. While emergent vegetation has been difficult to establish, the Dunes has ceased herbicide treatment of the lake vegetation and submerged aquatic vegetation, primarily widgeon grass, has colonized a large portion of the lake shoreline. Staff should continue to exclude herbicide treatment of the lakes and continue planting emergent vegetation to meet the minimum 30% shoreline vegetation requirement within all lakes where high salinity is not a concern.

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. Dunes staff should continue to closely monitor these irrigation heads and make adjustments to prevent re-use water, which also contains fertilizer (fertigation), from spraying directly into golf course lakes. A complete redesign of the irrigation system would be needed to move heads a minimum of 10' from all waterbodies.

Progress on 2011–2012 Interim Goals

The Dunes golf course 2011–2012 interim goals included:

1. Implement a formal BMP training program and require that all golf course employees complete the training by July 2012.
2. Continue planting submerged or emergent shoreline vegetation along the golf course lake adjacent to holes #13 and #14, identified on the map provided by the Dunes golf course staff.
3. Address all malfunctioning irrigation heads that are spraying into lakes and plant vegetation where appropriate to reduce potential for overspray into lakes.

The Dunes has implemented formal BMP training for all of their golf course personnel. A total of 14 employees have attended formal BMP training conducted by the Golf Course Superintendent, Mitch Miller.

This year, the Dunes planted more than 2,500 linear feet of emergent plants along the shoreline of holes #13, #14, and #15. The Dunes has also discontinued herbicide treatment within their lakes, which has allowed native submerged aquatic vegetation to establish along a large portion of the shoreline.

Dunes staff conducts periodic inspections of their irrigation system to ensure that malfunctioning irrigation heads do not spray reuse/fertigation water into the golf course lakes.

Interim goals for 2012–2013 include:

1. Continue planting of emergent aquatic vegetation in lakes where salinity will not inhibit growth. The lake shoreline along holes #5, 6, 7, 8, 9, 10, 11, 16, 17, and 18 should be planted with suitable emergent aquatic vegetation.
2. Additional buffer zones along the bulkheads should be considered in order to meet the minimum 10' buffer requirement. This could be achieved by slightly reducing the grade adjacent to the bulkheads and allowing turf to grow to a minimum height of 2" higher than surrounding turf.
3. The retention area adjacent to the maintenance facility where the washdown effluent is held should be excavated to reduce organic material and increase capacity.

Compliance with Golf Course Nutrient and Lake Management Recommendations

Adopted by Sanibel City Council October 2008 - Updated July 30, 2012

Staff Recommendation	Dunes Golf Course
Education	
Require that each superintendent ensure that all course employees are trained in the *Best Management Practices for the Enhancement of Environmental Quality on Florida Golf Courses* (FDEP 2007), including water quality related issues and environmentally sensitive areas around the golf course.	In May 2011, the Dunes developed a formal BMP training program for golf course personnel. As of March 21, 2012, all employees (total of 14) have been through the training and have acknowledged they have been trained and understand the BMPs.
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.	Over the past three years, the Dunes has planted a significant amount of shoreline vegetation. In 2012, more than 2,500 linear feet of emergent vegetation was installed along holes #13, #14, and #15; however, due to high salinities caused by tidal water flowing into the lake over the weir, the plants appear stressed and will likely be slow to colonize. While emergent vegetation has been difficult to establish, the Dunes has ceased herbicide treatment of the lake vegetation and submerged aquatic vegetation, primarily widgeon grass, has colonized a large portion of the lake shoreline.
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.	Data provided twice a year to the City's Natural Resources Department. Dunes staff reviews water quality with Natural Resources Department staff annually. This year, the Dunes contracted with the SCCF Marine Lab to monitor the lakes. The 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.
Require that all fish kills and algae blooms are reported to the City's Natural Resources Department.	All fish kills and algae blooms have been reported
Fertilizer Management	
Limit soluble nitrogen applications to ½ lb/1000ft^2	Currently limit soluble nitrogen applications to 1/2 lb/1000 ft2 since 2009
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.	Formal mapping was completed in July 2012. A map showing drainage patterns was provided July 5, 2012, in SCCF's first quarter monitoring report. A map showing all environmentally sensitive areas was provided to City staff on June 14, 2012.
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.	Minimum 10' buffers have been established around most of the environmentally sensitive areas, including lakes and wetland areas. Additional buffers should be installed along bulkheads, if feasible.
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.	Grass is allowed to grow at least 2" higher than grass on greens, fairways and tees to slow water and nutrient runoff. Additional buffers should be installed along bulkheads, if feasible.
Require that all washdown facilities have runoff properly treated prior to discharge off of the site.	In compliance and inspected by the Natural Resources Department Annually.
Require periodic inspections of fertilizer storage areas and washdown facilities by DNR staff.	In compliance and inspected by the Natural Resources Department Annually.
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.	The Dunes maintains annual fertilizer and lake management records, including copper sulfate logs. This data was made available to City staff.
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.	Irrigation system heads need updated. Heads applying reuse water and/or fertigation occasionally malfunction and may be contributing to poor lake water qulaity. Need to fix heads and install buffers to redirect water from malfunctioning heads.
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.	The current irrigation design includes several heads that are located within 10' of waterbodies and sensitive wetland areas. A complete redesign of the irrigation system would be needed to move heads a minimum of 10' from all waterbodies.