

Robert Trent Jones Golf Course Plots Data-driven Path to Reduce Carbon Emissions



Challenge

Balance the environmental and economic benefits of reduced inputs with the potential disruption of golfer play.

Solution

Use GPS data loggers to track golfer movement across the landscape to identify low traffic areas that can be naturalized.

Results

Balance the environmental and economic benefits of reduced inputs with the potential disruption of golfer play.

Robert Trent Jones Golf Course

The Robert Trent Jones golf course at Cornell University is an 18-hole golf facility in Ithaca, NY. The golf course has slowly suffered severe infrastructure decline, which has triggered restoration efforts to restore the property's function and architectural design intent. A primary goal of the restoration effort is to mitigate the impacts of climate change, adapt the course to a warming climate, and significantly reduce resource use by optimizing the maintenance operation.

Challenge

Golf course "rough" constitutes the largest managed area, often representing more than 50 percent of the landscape. Rough areas are mowed higher than other playable areas to increase the difficulty of play when striking an errant golf shot. Many rough areas are beyond the bounds of standard golf ball dispersion patterns and are remote to play. Remote or "far-rough" areas offer unique opportunities to naturalize the landscape through increased mowing height of cut and reduced mowing frequency. Relaxed mowing regimes lead to reduced fossil fuel emissions while enhancing the biodiversity of the golf landscape.

An example of a naturalized area is depicted in Figure 1.

A delicate balance must be struck between the environmental/economic benefits of reduced inputs and the potential for decreasing pace of play when golfers search for errant drives. Typically, golf course superintendents rely on intuition and trial-and-error when identifying natural areas. Often, feedback from golfers who naturally have ambiguous and biased perspectives are used when developing these areas. A data-driven approach that quantifies course playing habits could assist in identifying and developing potential naturalized areas with less subjectivity.

Solutions

For more than 100 years, operational tools developed by the United States Golf Association (USGA) have been available to assist superintendents and golfers with quantifying course performance. Data collection tools such as the Stimpmeter and Tru-Firm provide numerical measures of putting surface characteristics that enhance course management.

Recently, the USGA launched DEACON, an innovative golf course management tool created to help operators improve the golfer experience by delivering better playing conditions while optimizing and prioritizing critical resource consumption. DEACON can generate pace of play reports and GPS heat mapping that identifies golfer movement on the property. Visualizing this movement provides actionable data for determining far rough areas.

Identifying areas provides strong justification for reduced maintenance and increased biodiversity with minimal disruption to play.

The DEACON service uses pocket-size GPS devices that track golfer movement across each hole on the property, with timestamps to determine pacing and location. Data uploaded to a geographical information system (GIS) platform is processed and visualized into traces and heat maps.

The USGA GPS golfer tracking service was deployed on 185 golfers at the Robert Trent Jones golf course over four days in 2021. During that time, demographics were recorded (age, gender, and golfing handicap), and golfers were paired with a unique GPS tracker.

Results

Data from the USGA DEACON tool is provided on a course map that visualizes low visitation areas (Figure 2). A thorough review of the data identified sparsely trafficked areas of the course and suggested that **8.1 acres of currently mowed rough could be naturalized**.

Carbon emission savings can be realized when areas are naturalized and maintenance relaxed. Mowing calculations were made using current mowing frequency in comparison to projected reduced mowing frequency of naturalized areas.

The following assumptions were used when calculating environmental and economic savings:



Figure 1: The 11th hole at Dinsmore Golf Course, where installed naturalized areas help reduce mowing requirements and provide aesthetic and strategic value for golfers



Figure 2: Results of Golfers' Mapping with Yellow-Outlined Areas Identified as sparse traffic zones (8.1 acres)

- Routinely mowed rough areas at RTJ during a normal growing season receive 30 mowing events per year
- Routinely mowed rough areas are mowed at a rate of 9 acres/hr, using 1.7 gallons of diesel fuel/hr.
- Naturalized rough areas receive 3 mowing events per year
- Naturalized mowing events are mowed at a rate of 6.45 acres/hr, using 2 gallons of diesel fuel/hr.
- [Carbon-dioxide emissions equal 19.5 lbs CO2 per gallon of gas](#)

Based on these assumptions for the Robert Trent Jones Golf Course, naturalizing 8.1 acres of mowed rough areas reduces annual carbon emissions by 864 pounds. Other resource reductions (water, fertilizer, pesticides) would also be realized and analyzed as part of a separate project.

Partners



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