

# Water Conservation Potential for Maturing Residential Landscapes in Southwest Florida

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## Introduction

- Landscape irrigation can comprise more than half of residential water use in Florida<sup>2</sup>
- Poor quality urban soils can exacerbate the need for landscape irrigation
- Past studies outside of FL have shown that soil quality tends to improve over time
- Improved soil quality in mature landscapes may reduce need for irrigation

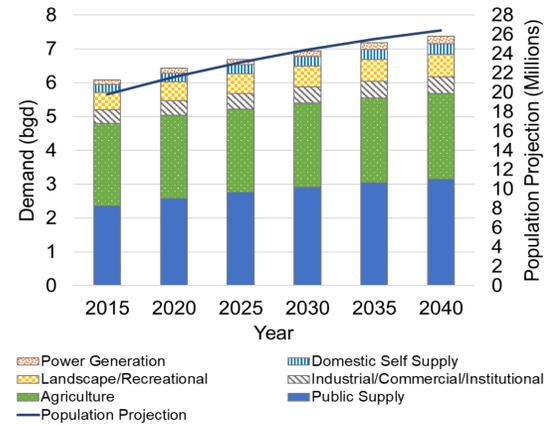


Figure 1. Projected water demand (billion gal day<sup>-1</sup>; bgd) and population growth in Florida from 2015 to 2040<sup>1</sup>.

### Objectives:

1. Quantify the effect of landscape age on soil particle size, organic matter, bulk density, and available water capacity in a Southwest Florida residential development.
2. Estimate irrigation requirements using soil properties and weather data as input variables in a long-term water balance model
3. Compare the modeled irrigation requirements with estimated current water across lawns of different ages.

## Methods

- **Study site:** Lakewood Ranch, FL (Manatee County)
- **Soil sample collection:** 50 residential lots, 0–22-year lot age, 5 samples from each lawns and landscaping beds, divided into 0-15 and 15-30 cm depths
- **Soil sample analysis:** particle size, bulk density, organic matter, available water capacity
- **Current irrigation water use:** estimated from non-potable water metering
- **Net irrigation requirements:** predicted by 23-year water balance model
- **Irrigation efficiency:** estimated by comparing current irrigation use to net irrigation requirements



Figure 2. Soil sample collection process for lawns and landscaping beds.

## Results

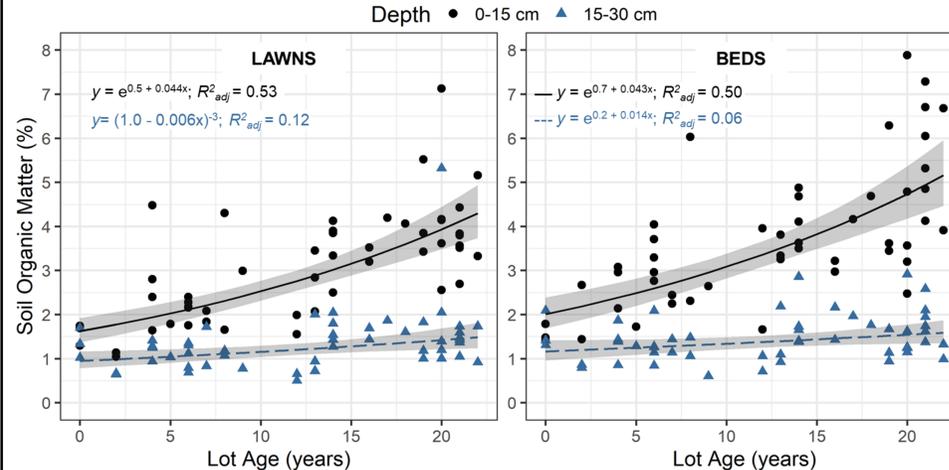


Figure 3. Soil organic matter versus lot age for samples collected from lawns and landscaping beds at depths of 0-15 and 15-30 cm.

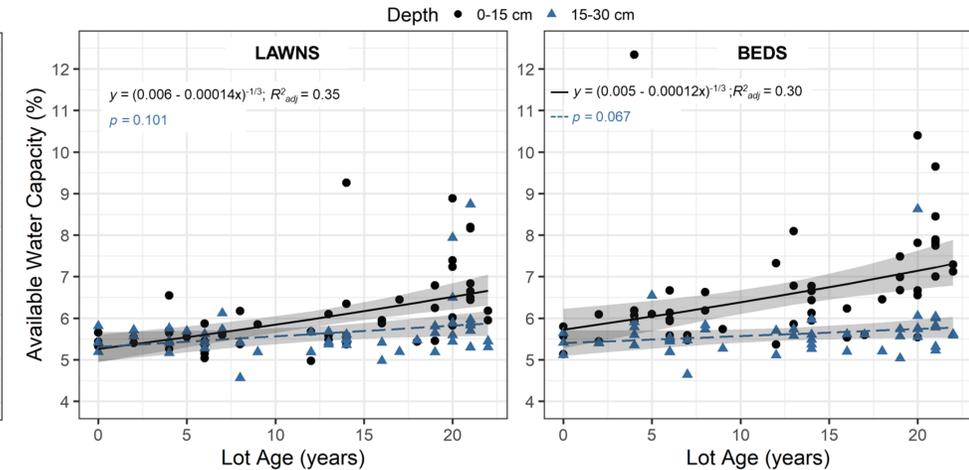


Figure 5. Model-predicted available water capacity versus lot age for soil samples collected from lawns and landscaping beds at depths of 0-15 and 15-30 cm.

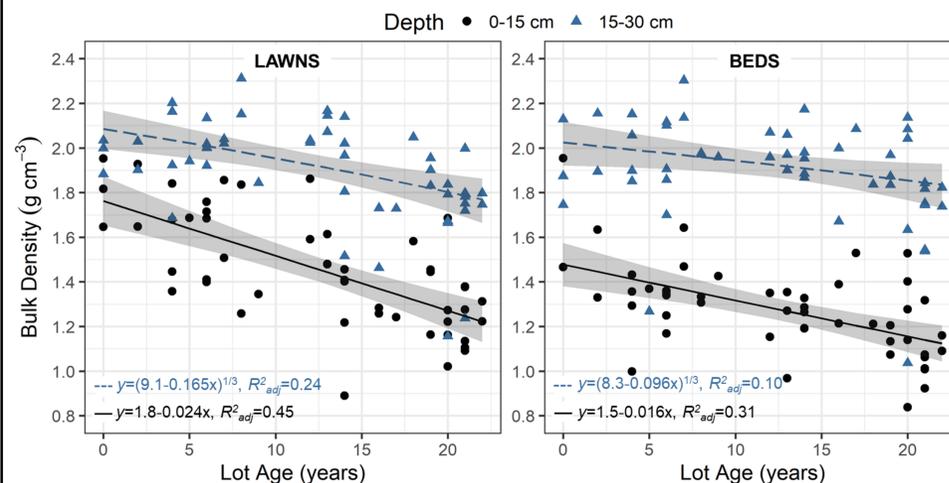


Figure 4. Soil bulk density versus lot age for samples collected from lawns and landscaping beds at depths of 0-15 and 15-30 cm.

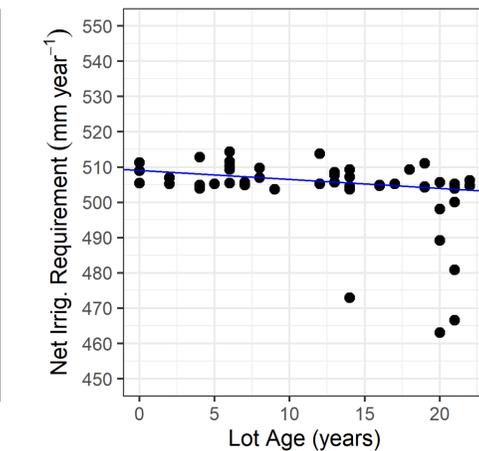


Figure 6. Theoretical net irrigation requirements for turfgrass based on water balance model results versus lot age.

- Significant associations between changes in soil properties and lot age were prominent in the upper 0-15 cm of the soil profile
- Between 0- and 22-year-old lots in both lawns and landscaping beds, mean bulk density decreased by 0.44 g cm<sup>-3</sup> (160% change), mean SOM increased by 3% (28% change), and mean AWC increased by 1.3% (25% change)
- A practical change in turfgrass irrigation requirements was not associated with lot age
- Irrigation efficiency was 47% for average home in the study

## Conclusions

- Results provide evidence for a positive relationship between soil quality and lot age in Southwest Florida residential lawns and landscaping beds with a sandy soil texture
- Increased AWC in older lots indicated a possibility for reduced landscape irrigation, but results from the water-balance model suggest that theoretical irrigation requirements do not practically change between 0- and 22-year-old lots (509 and 503 mm yr<sup>-1</sup>, respectively)
- Mean irrigation efficiency of only 47% indicates potential for water conservation through improvements in landscape irrigation efficiency

## References

- <sup>1</sup> Florida Department of Environmental Protection. (2019). *Regional Water Supply Planning 2019 Annual Report*. <https://fddep.maps.arcgis.com/apps/MapSeries/index.html?appid=04f84e6ae64c45e292e5b3db82f045e3>
- <sup>2</sup> Haley, M. B., Dukes, M. D., & Miller, G. L. (2007). Residential Irrigation Water Use in Central Florida. *Journal of Irrigation and Drainage Engineering*, 133(5), 427–434. [https://doi.org/10.1061/\(asce\)0733-9437\(2007\)133:5\(427\)](https://doi.org/10.1061/(asce)0733-9437(2007)133:5(427))

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