Nutrient Management:
Landscape Fertilizer Ordinances

Dr. J. Bryan Unruh
Professor and Associate Director
University of Florida – IFAS
West Florida Research and Education Center

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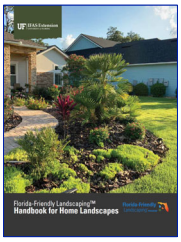
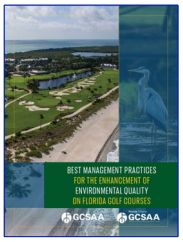
J. Bryan Unruh, Ph.D.

- January 1996 – Joined the faculty at the University of Florida.
- January 2000 – First Fertilizer Ordinance – St. Johns County, FL
- July 2000 – Hosted the first meeting of the Turfgrass Best Management Practices development group.
  - GI-BMP development initiated in September 2000; published in 2002.
- June 2003 – Hosted the inaugural meeting to develop Florida Golf Course BMP Manual
  - Published in 2007.
- February 2006 – Launched the Florida Sod Production BMP Manual.
  - Published in 2008.
- April 2024 – Launched the Florida Sports Turf BMP Manual





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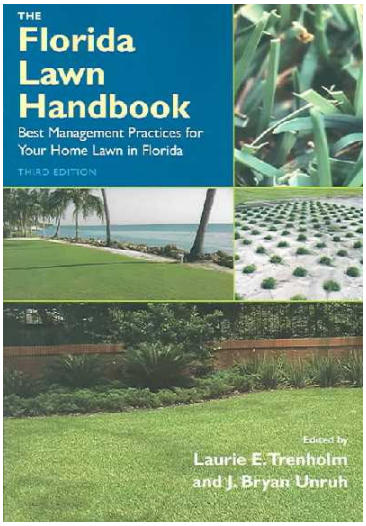

"Do not fertilize when rain is imminent."

This statement led to numerous fertilizer "black out" or restrictive ordinances – typically May through October.

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J. Bryan Unruh, Ph.D.

"As scientists, we are often prone to say, "Show me the data." Unfortunately, the data that we have in hand is limited. It is limited to a few studies primarily conducted in only one region of the state; hardly enough to serve as the basis for which these important BMPs can be based upon."

- **Dr. J. Bryan Unruh**
  BMP Development Meeting
  Orlando, Florida
  September 13, 2000

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Florida Department of Environmental Protection Funded Study

There is increasing concern about the effects that lawn and landscape management practices may have on natural water resources, particularly in a state with abundant water resources, encroaching urbanization, shallow water tables, karst soils, and other fragile ecosystems and habitats. Like other agricultural industries in Florida, Best Management Practices (BMPs) have been developed for the Green Industries in Florida in an attempt to mitigate any potential nonpoint source pollution of water resources from fertilization and other landscape maintenance practices. With the development and ensuing regulation of the BMPs, there was a need to quantify nutrient loading from these practices under different conditions and sites and to verify the currently recommended rates of nitrogen and phosphorus for use on lawn grass species throughout the state.

This research was undertaken by the University of Florida Institute of Food and Agricultural Sciences (UF-IFAS) with $4.2 million in funding from the Florida Department of Environmental Protection (FDEP). The research was conducted in 3 locations statewide: the Ft. Lauderdale Research and Education Center, the Plant Science Research and Education Unit in Citra and the West Florida Research and Education Center in Jay. The research consisted of multiple projects, some of which were common to all locations. Over 120,000 water samples were taken along with 1,000,000 data points.

Turfgrass Nutrient Management Symposium

On January 15, 2013, a symposium was held at the Frank Stronach Plant Science Research and Education Center in Citra, Florida. The Symposium was comprised of presentations on the Results of the Evaluation of Urban Warm-Season Turfgrass Fertilization and Irrigation Best Management Practices to Minimize Nutrient Leaching Project, funded by the Florida Department of Environmental Protection. Each presentation was recorded along with a Q&A session, and comments from Andy Rackley, Director, Agricultural Environmental Services, Florida Department of Agriculture and Consumer Services. These recordings can be viewed at: http://training.ifas.ufl.edu/research/turfgrass_nutrient_symp2013/.

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Nutrient Leaching Peer-Reviewed Scientific Papers

1. Nitrogen required for acceptable centipedegrass quality, color, growth rate, and nitrate leaching (Int. Turfgrass Soc. Res. J. 13:1-8)
2. Annual nitrogen requirement of bahiagrass lawns lawns maintained in sub-tropical climates (Int. Turfgrass Soc. Res. J. 13:1-9)
3. Nitrate Leaching from Soluble Nitrogen applied to 'Floratam' St. Augustinegrass and common centipedegrass during dormancy (Crop Sci. 56(2):837-844)
4. Nitrogen rate required for acceptable St. Augustinegrass Nitrogen rate required for acceptable St. Augustinegrass and associated nitrate leaching (Crop Sci. 56(1):439-451)
5. Nitrate Leaching and Turf Quality in Established 'Floratam' St. Augustinegrass and 'Empire' Zoysiagrass (J. of Environmental Quality)
6. Nitrate Leaching and Turf Quality in Newly Sodded St. Augustinegrass (J. of Plant Nutrition)
7. Orthophosphate Leaching in St. Augustinegrass and Zoysiagras
8. Effects of Sod Type, Irrigation, and Fertilization on Nitrate-Nitrog
   Augustinegrass Sod (Crop Science)
9. Nitrate Leaching, Turf Quality, and Growth Rate of 'Floratam' St.

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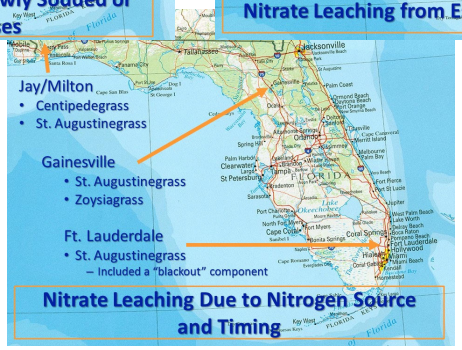

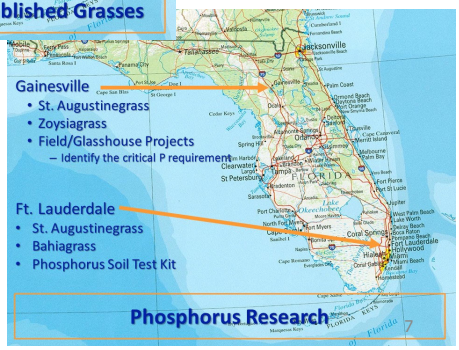

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Nutrition and Fertilization Best Management Practices

- The goal of a proper nutrient management plan should be to apply the minimum necessary nutrients to achieve acceptable quality and performance and to apply these nutrients in a manner that maximizes their plant uptake.

Inputs:		Outputs:
Minerals from Soil →		→ Clipping Removal
Fertilization & Reclaimed Water →	*Plant-Available Nutrient Pool*	→ Gaseous Loss
Atmospheric Deposition →		→ Conversion to Unavailable Forms
Deposition of Organic Residues →		→ Leaching/Runoff Loss

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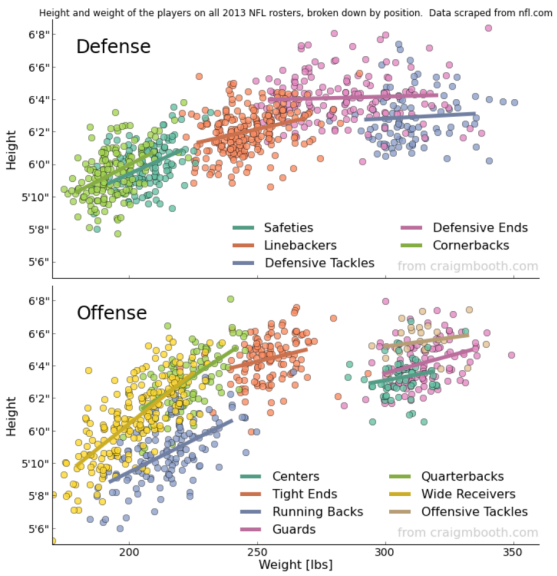


https://i.imgur.com/FBFKSdB.png
https://www.casino.org/blog/heaviest-nfl-players/

- Football players need about 50 calories per 2.2 pounds during the season.
  - 300-pound lineman = 6,818 calories
- *What happens when a lineman eats this many calories in the off-season?*

UF/IFAS Turfgrass Recommendations

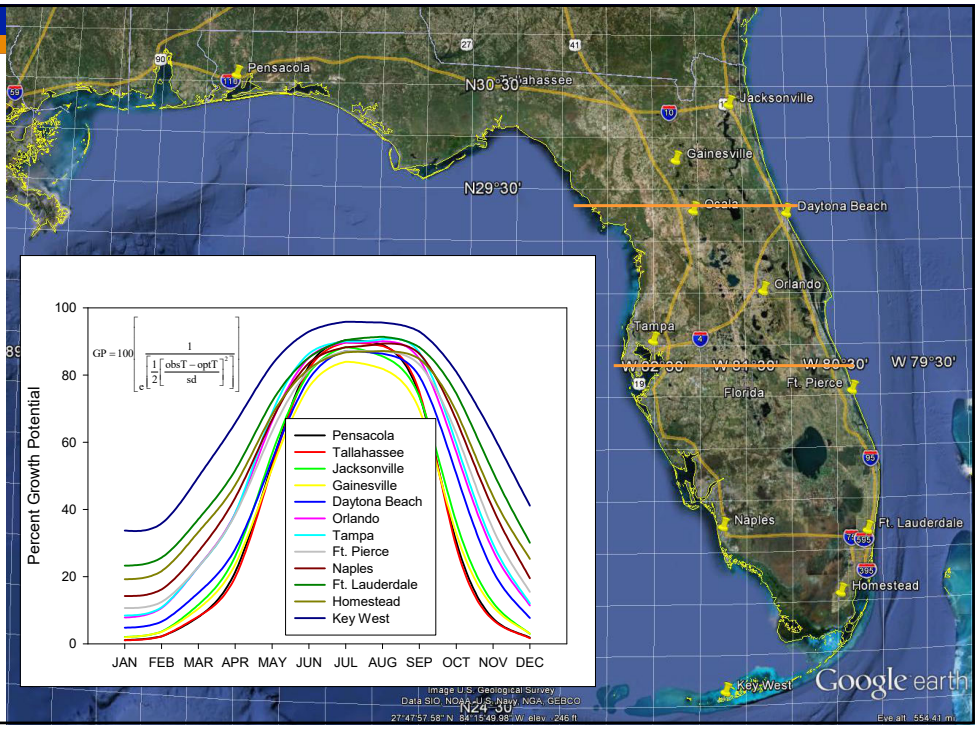
Table 1. Fertilization Guidelines for Established Turfgrass Lawns			
	Nitrogen Recommendations (lbs 1,000 ft^{-2} year^{-1})[1, 2]		
	North Florida	Central Florida	South Florida
Bahiagrass	1.0 – 2.0	1.0 – 2.0	1.0 – 2.0
Bermudagrass	3.0 – 5.0	4.0 – 6.0	5.0 – 7.0
Centipedegrass	0.4 – 2.0	0.4 – 3.0	0.4 – 3.0
St. Augustinegrass	2.0 – 4.0	2.0 – 5.0	4.0 – 6.0
Zoysiagrass	2.0 – 3.0	2.0 – 4.0	2.5 – 4.5

[1]Because homeowner preferences for lawn quality and maintenance level will vary; we recommend a range of fertility rates for each grass and location. Additionally, effects within a localized region (i.e., micro-environmental influences -- such as shade, drought, soil conditions, and irrigation) will necessitate that a range of fertility rates be used.

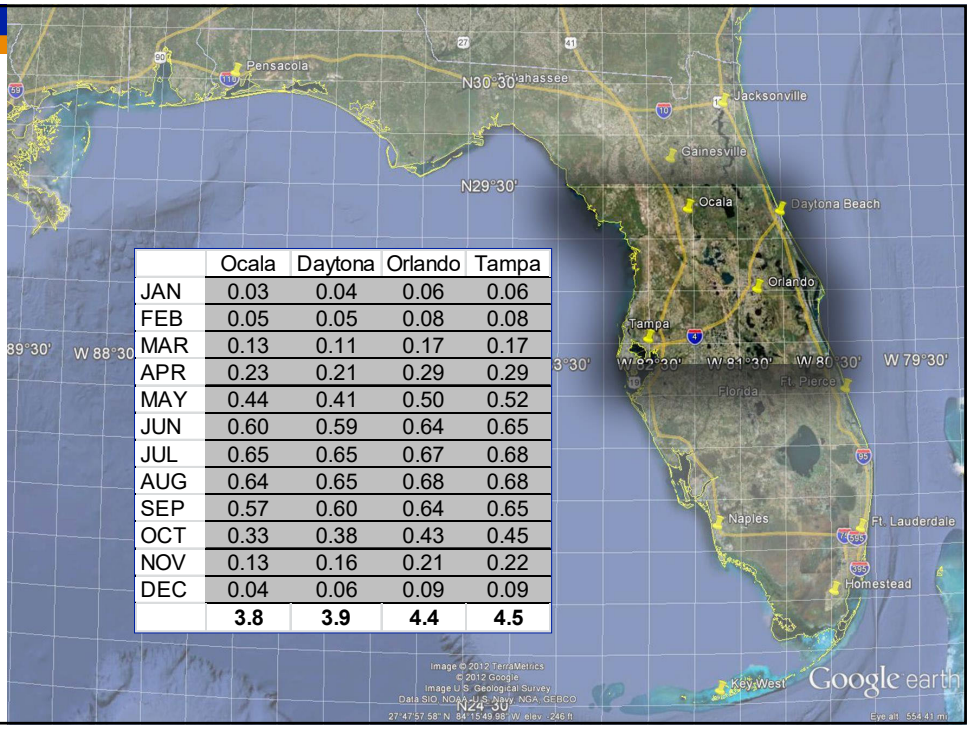
[2]These recommendations assume that grass clippings are left on the lawn.

We do NOT test for soil nitrogen!!!

Growth Potential Modeling



Growth Potential Modeling



	Ocala	Daytona	Orlando	Tampa
JAN	0.03	0.04	0.06	0.06
FEB	0.05	0.05	0.08	0.08
MAR	0.13	0.11	0.17	0.17
APR	0.23	0.21	0.29	0.29
MAY	0.44	0.41	0.50	0.52
JUN	0.60	0.59	0.64	0.65
JUL	0.65	0.65	0.67	0.68
AUG	0.64	0.65	0.68	0.68
SEP	0.57	0.60	0.64	0.65
OCT	0.33	0.38	0.43	0.45
NOV	0.13	0.16	0.21	0.22
DEC	0.04	0.06	0.09	0.09
	3.8	**3.9**	**4.4**	**4.5**

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UF/IFAS Recommended Fertilizer Rates

Old Recommendations

	North		Central		South	
	Low	High	Low	High	Low	High
	---------- lbs N / Year ----------					
Bahiagrass	2	3	2	4	2	4
Centipedegrass	1	2	2	3	2	3
St. Augustinegrass	2	4	2	5	4	6
Zoysiagrass	3	5	3	6	4	6

New Recommendations

	North		Central		South	
	Low	High	Low	High	Low	High
	---------- lbs N / Year ----------					
Bahiagrass	1	3	1	3	1	4
Centipedegrass	0.4	2	0.4	3	0.4	3
St. Augustinegrass	2	4	2	5	4	6
Zoysiagrass	2	3	2	4	2.5	4.5

% Rate Reductions

	North		Central		South	
	Low	High	Low	High	Low	High
Bahiagrass	50	0	50	25	50	0
Centipedegrass	60	0	80	0	80	0
St. Augustinegrass	0	0	0	0	0	0
Zoysiagrass	33	40	33	33	38	25

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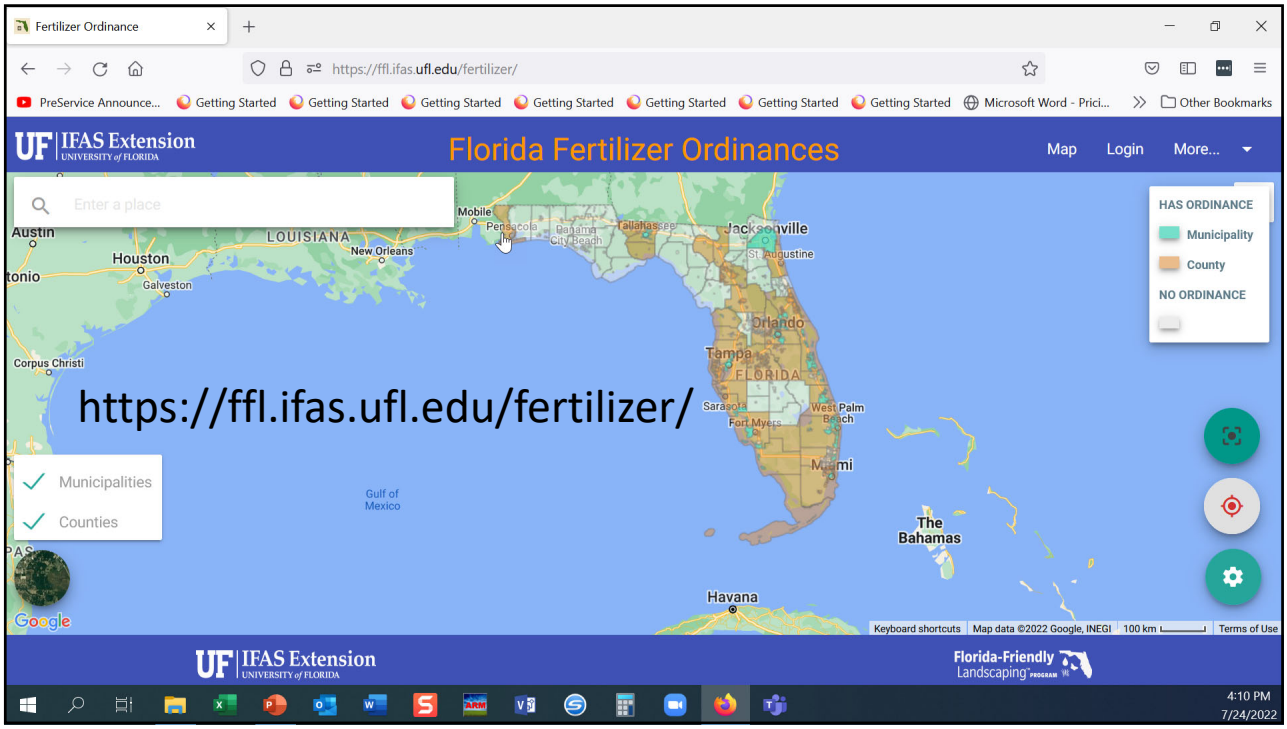

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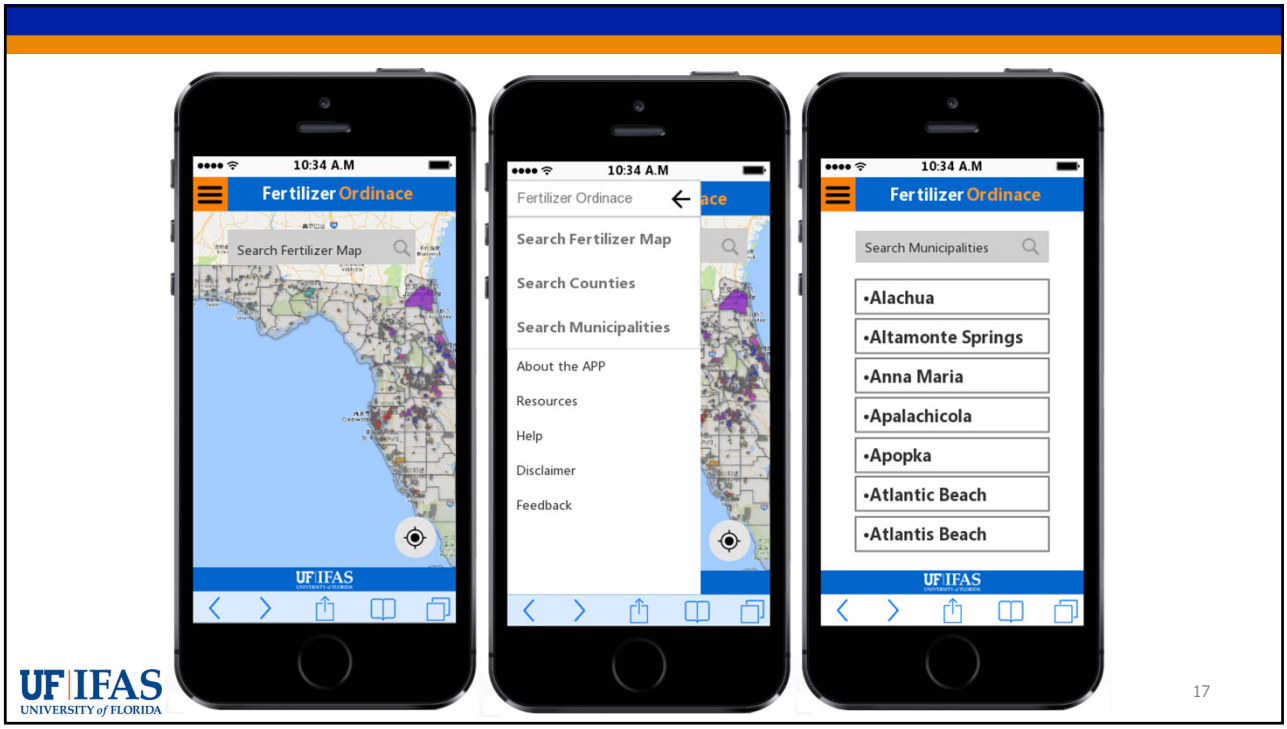
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•Atlantic Beach
•Atlantis Beach
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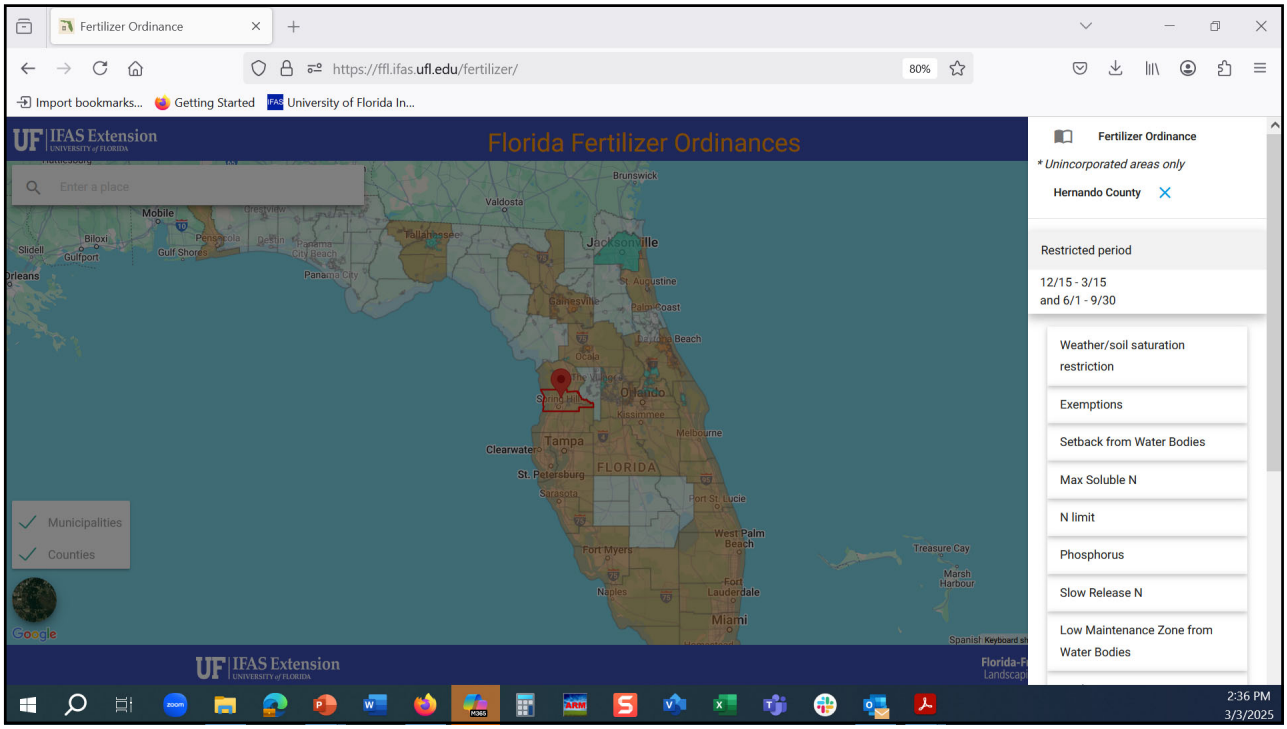
Fertilizer Ordinance
https://ffl.ifas.ufl.edu/fertilizer/
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Import bookmarks...
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University of Florida In...
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Florida Fertilizer Ordinances
Enter a place
Municipalities
Counties
Fertilizer Ordinance
* Unincorporated areas only
Hernando County
Restricted period
12/15 - 3/15
and 6/1 - 9/30
Weather/soil saturation restriction
Exemptions
Setback from Water Bodies
Max Soluble N
N limit
Phosphorus
Slow Release N
Low Maintenance Zone from Water Bodies
UF IFAS Extension
2:36 PM
3/3/2025

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Hernando County Fertilizer Ordinance

- Original Adoption: November 12, 2013
- Revised: May 23, 2023
  - The use of urban turf fertilizers containing nitrogen is prohibited from December 15th through March 15th and from June 1st through September 30th.
  - Commercial applicators are no longer exempt from the prohibitions and time frames regarding applying urban turf fertilizers containing nitrogen.
  - Fertilizers cannot be applied within 25 feet of adjacent wetlands or surface waters.
  - Commercial businesses that sell fertilizers are required to post county-provided signage stating the restrictions during the prohibited time frames.
  - Homeowners and commercial applicators are encouraged to utilize summer-friendly lawn enrichment products from June through September. This could include foliage sprays containing iron for a "green-up" treatment. Applications of potassium, magnesium, and compost products, such as Comand, can also be utilized.

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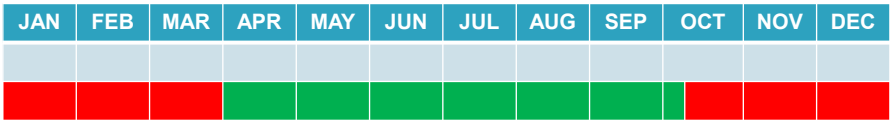
https://www.hernandocounty.us/Home/Components/News/News/7821/274

Fertilizer Restrictive Ordinances

- Hernando County = Central Florida Recommendations
  - UF Recommendation: Early April through early October.



  - Restrictive Ordinance: "The use of urban turf fertilizers containing nitrogen is prohibited from December 15th through March 15th and from June 1st through September 30th."

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https://www.hernandocounty.us/Home/Components/News/News/7821/274


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Source: Dr. A. J. Lindsey, UF

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Summer 2024
Source: Dr. A. J. Lindsey, UF

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journal homepage: www.elsevier.com/locate/scitotenv

ELSEVIER

Check for updates

Sources and concentrations of nutrients in surface runoff from waterfront homes with different landscape practices

Lisa S. Krimsky [a,*], Mary G. Lusk [b], Holly Abeels [c], Linda Seals [c,1]

[a] University of Florida/Institute of Food and Agricultural Sciences, Indian River Research and Education Center, 2199 South Rock Road, Fort Pierce, FL 34945, United States
[b] University of Florida/Institute of Food and Agricultural Sciences, Gulf Coast Research and Education Center, 14625 Co Rd 672, Wimauma, FL 33598, United States
[c] University of Florida/Institute of Food and Agricultural Sciences, Brevard County, 3695 Lake Drive, Cocoa, FL 32926, United States

HIGHLIGHTS

- The study examined source and concentration of nutrients in residential lawn runoff.
- Fertilizer control methods did not reduce the concentration of nutrients in runoff.
- 53–65% of NO_3^- in runoff is from soil nutrient pools and atmospheric deposition.
- Nutrient management at the community level needs to address multiple sources.

GRAPHICAL ABSTRACT

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Water quality
Stable isotopes

ABSTRACT

Development along Florida's coastal waterways has led to significant degradation in water quality over time. Numerous sources have contributed to increased nutrient loads in surface waters. Nitrogen (N) and phosphorus (P) pollution from urban fertilizer use has been addressed at the state, county, and municipality level yet the success of these efforts is rarely evaluated. This study aimed to validate these efforts by assessing the source and concentration of nutrients from surface water associated with waterfront homes with or without Florida Friendly Landscaping™, a nonstructural best management practice. The objectives were: to compare nutrient concentrations in runoff from differing landscape designs; compare the NO_3^- isotopic signature to that of known N sources; and evaluate the impact of a fertilizer ordinance blackout that is in effect during the wet season. Results from the study indicate no statistical reduction in the nutrient concentration of lawn runoff from either landscape design or the implementation of a fertilizer blackout ordinance. Results show that the sources of N in home landscapes are highly variable and cannot be solely attributed to fertilizer sources and highlight the influence of atmospheric depositions and soil nutrient pools which contribute 53–65% of the nitrate in lawn runoff. Nutrient management strategies need to address multiple sources of urban nutrients and mitigation efforts will not be immediate.

1. Introduction

Lawns are a dominant landscape in many urban neighborhoods. In the United States, the monocultured lawn first took root in the nineteenth century and became synonymous with post World War II suburbia (Fraser et al., 2013; Whitney, 2010). Today, lawn aesthetics have become part of American social culture, and the manicured lawn has

* Corresponding author.
E-mail addresses: lkrimsky@ufl.edu (L.S. Krimsky), Mary.lusk@ufl.edu (M.G. Lusk), habeels@ufl.edu (H. Abeels), lseals@ufl.edu (L. Seals).
[1] University of Florida/Institute of Food and Agricultural Sciences, Indian River Research and Education Center, 2199 South Rock Road, Fort Pierce, FL 34945, United States.

https://doi.org/10.1016/j.scitotenv.2020.142320

- "Results confirm that lawn soils might be a contributing source of nutrients in runoff. . . Nutrient pools and nutrient supply rates were high variability by lawn."
- "Nutrient concentration from lawns was always higher or equal to that of rainfall, yet we did not see the expected influence of landscape management or a fertilizer ordinance blackout period."
- "This study highlights how homeowner behavior (fertilization and irrigation rates, pet waste clean-up, and using a professional landscape service, etc.) can influence the source and concentration of nutrients in lawn runoff."
- ". . . nutrient management strategies in residential communities should address multiple sources of nutrients and management should be coupled with comprehensive outreach and education to residents and community associations."

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LIMNOLOGY AND OCEANOGRAPHY
Letters

ASLO
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LETTER

Impacts of residential fertilizer ordinances on Florida lacustrine water quality

Samuel J. Smidt, Diego Aviles, E. Fay Belshe, Alexander J. Reisinger*
Department of Soil, Water, and Ecosystem Sciences, University of Florida, Gainesville, Florida

Scientific Significance Statement

Residential fertilizer ordinances are widely adopted in populated coastal regions as a best management practice for mitigating nutrient loading to prevent toxic algal blooms, groundwater contamination, and other ecosystem disruptions. However, few studies have analyzed the impacts of these ordinances, leaving a critical knowledge gap between ordinance design/implementation and their impacts on environmental systems. Moreover, the impacts of these ordinances at larger spatial (e.g., statewide) and temporal scales (e.g., decades) remain largely unknown. Here, we analyze long-term ordinance impacts on four water quality metrics (total phosphorus, total nitrogen, chlorophyll *a*, and Secchi depth) across Florida lakes under different ordinances. Results show fertilizer ordinances favorably impact water quality metrics and winter fertilizer bans are the most comprehensive and effective relative to other ordinance types.

Abstract

Despite the assumption that residential fertilizer ordinances improve regional water quality, their impacts across space and time largely remain unknown. Here, we analyze changes in water quality of lakes throughout the State of Florida from 1987 to 2018, comparing trends in water quality parameters before and after implementation of county-wide fertilizer ordinances. We used a large dataset of publicly collected water quality data and linear mixed models to analyze ordinance impacts on total nitrogen, total phosphorus, chlorophyll *a*, and Secchi depth across 160 lakes throughout Florida. We further analyze water quality impacts relative to the type of ordinance (winter fertilizer ban, summer ban, nonseasonal ban, no ban). We found fertilizer ordinances favorably impacted lacustrine water quality, and winter (dry season) fertilizer bans had the greatest effect across all water quality metrics. Results of this study can be used to support the effectiveness of fertilizer ordinances across humid tropical and subtropical climate regions.

*Correspondence: ssmidt@ufl.edu

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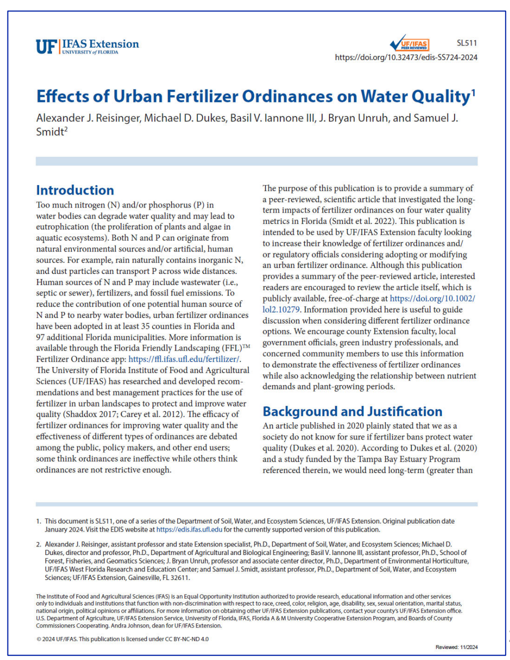
Author Contribution Statement: SJS advised the study and coordinated the development and writing of the manuscript. DA conducted the LAKEWATCH data filtering and drafted the manuscript. EFB conducted the modeling and contributed to the writing. AJR advised the modeling and coordinated the writing of the manuscript.

Data Availability Statement: Data and metadata are available through CUAHSI Hydroshare: http://www.hydroshare.org/resource/bed4ba048c044f09aaa25451d213b540

Additional Supporting Information may be found in the online version of this article.



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SL511
https://doi.org/10.32473/edis-SS724-2024

Effects of Urban Fertilizer Ordinances on Water Quality[1]

Alexander J. Reisinger, Michael D. Dukes, Basil V. Iannone III, J. Bryan Unruh, and Samuel J. Smidt[2]

Introduction

Too much nitrogen (N) and/or phosphorus (P) in water bodies can degrade water quality and may lead to eutrophication (the proliferation of plants and algae in aquatic ecosystems). Both N and P can originate from natural environmental sources and/or artificial, human sources. For example, rain naturally contains inorganic N, and dust particles can transport P across wide distances. Human sources of N and P may include wastewater (i.e., septic or sewer), fertilizers, and fossil fuel emissions. To reduce the contribution of one potential human source of N and P to nearby water bodies, urban fertilizer ordinances have been adopted in at least 35 counties in Florida and 97 additional Florida municipalities. More information is available through the Florida Friendly Landscaping (FFL)™ Fertilizer Ordinance app: https://ffl.ifas.ufl.edu/fertilizer/. The University of Florida Institute of Food and Agricultural Sciences (UF/IFAS) has researched and developed recommendations and best management practices for the use of fertilizer in urban landscapes to protect and improve water quality (Shaddox 2017; Carey et al. 2012). The efficacy of fertilizer ordinances for improving water quality and the effectiveness of different types of ordinances are debated among the public, policy makers, and other end users; some think ordinances are ineffective while others think ordinances are not restrictive enough.

The purpose of this publication is to provide a summary of a peer-reviewed, scientific article that investigated the long-term impacts of fertilizer ordinances on four water quality metrics in Florida (Smidt et al. 2022). This publication is intended to be used by UF/IFAS Extension faculty looking to increase their knowledge of fertilizer ordinances and/or regulatory officials considering adopting or modifying an urban fertilizer ordinance. Although this publication provides a summary of the peer-reviewed article, interested readers are encouraged to review the article itself, which is publicly available, free-of-charge at https://doi.org/10.1002/lol2.10279. Information provided here is useful to guide discussion when considering different fertilizer ordinance options. We encourage county Extension faculty, local government officials, green industry professionals, and concerned community members to use this information to demonstrate the effectiveness of fertilizer ordinances while also acknowledging the relationship between nutrient demands and plant-growing periods.

Background and Justification

An article published in 2020 plainly stated that we as a society do not know for sure if fertilizer bans protect water quality (Dukes et al. 2020). According to Dukes et al. (2020) and a study funded by the Tampa Bay Estuary Program referenced therein, we would need long-term (greater than

1. This document is SL511, one of a series of the Department of Soil, Water, and Ecosystem Sciences, UF/IFAS Extension. Original publication date January 2024. Visit the EDIS website at https://edis.ifas.ufl.edu for the currently supported version of this publication.
2. Alexander J. Reisinger, assistant professor and state Extension specialist, Ph.D., Department of Soil, Water, and Ecosystem Sciences; Michael D. Dukes, director and professor, Ph.D., Department of Agricultural and Biological Engineering; Basil V. Iannone III, assistant professor, Ph.D., School of Forest, Fisheries, and Geomatics Sciences; J. Bryan Unruh, professor and associate center director, Ph.D., Department of Environmental Horticulture, UF/IFAS West Florida Research and Education Center; and Samuel J. Smidt, assistant professor, Ph.D., Department of Soil, Water, and Ecosystem Sciences; UF/IFAS Extension, Gainesville, FL 32611.

Reviewed: 11/2024

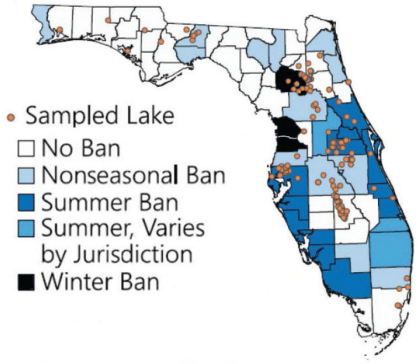

Figure 2. Florida site map of county fertilizer ordinances by type (different shades of blue). Individual lake locations used in this study are represented by (orange) circles.
Credits: Adapted from Smidt et al. (2022)

- Lakes with five years of data collected in 2000-2009; and five years of data collected in 2010-2019.
- Categorized each lake by their county's residential fertilizer ordinance:
  - Summer ban ("wet" season; June – Oct)
  - Winter ban (typically Nov. – Feb)
  - Non-seasonal (add'l restrictions)
  - No ban
- 160 lakes; 3,750 total water samples

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What impact do ordinances have?

Table 1. Ordinance impacts on water quality trends for different ordinance types and water quality responses. The direction (degradation, improvement, no change) and effect size (small, medium, large) are all denoted for each ordinance-response combination. Statistical significance is denoted by asterisks. Non-significant effects are denoted where relevant.

Ban type	Ordinance impact on water quality trend			
	Total phosphorus	Total nitrogen	Chlorophylla	Secchi depth
No ban	Small degradation **	No change	No change	Small improvement *
Non-seasonal	Small improvement *	Small improvement **	No change	Small effect, but not significant
Summer	Medium improvement **	No change	Small effect, but not significant	Medium improvement **
Winter	Large improvement **	Large improvement **	Large improvement **	Large improvement **

* =statistically significant effect at $p < 0.05$
** = statistically significant effect at $p < 0.01$

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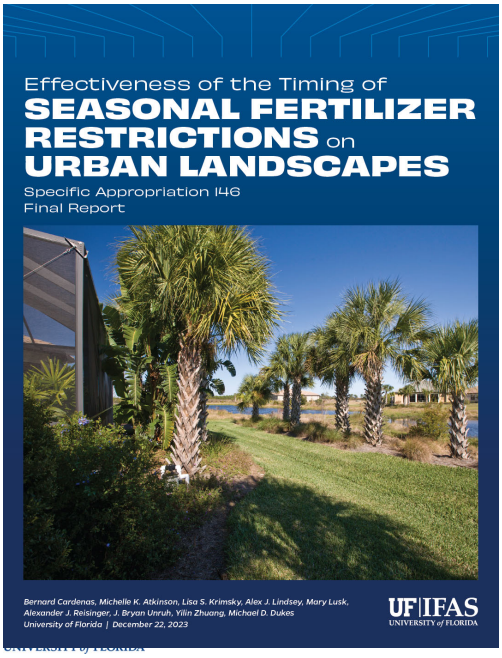

Summary

"The existing evidence to date does not conclusively indicate that fertilizer ordinances are effective in solving water quality problems. This is not necessarily indicative of the ordinances not achieving their intended goals; rather, the current lack of comprehensive evidence makes it challenging to assess the ecological impact of these ordinances."

- Nutrients must be applied based on the plant's ability to assimilate them.
  - This should supersede any calendar-based regimen.
- Healthy, dense turf is the key to minimizing environmental impact of applied nutrients (i.e., fertilizer and reclaimed water) and intercepted nutrients (i.e., atmospheric deposition, stormwater runoff, and pet waste).

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@jbunruh

J. Bryan Unruh, Ph.D.
West Florida Research and Education Center
University of Florida/IFAS
jbu@ufl.edu

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