

Making the Most of Reclaimed Water

We're using water wisely
by irrigating with
reclaimed water



Please don't drink the water



Department of
Natural Resources and Parks
Wastewater Treatment Division



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Water & Nutrients

Erich Marzolf, Ph.D

St. Johns River Water Management District

What is Reclaimed Water?

“Water reuse involves taking domestic wastewater, giving it a high degree of treatment, and using the resulting high-quality reclaimed water for a new, beneficial purpose. Extensive treatment and disinfection ensure that public health and environmental quality are protected.”

Source: FDEP website



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The Case for Reuse of Reclaimed Water

- There is an ongoing search for water sources other than aquifers (rivers, estuaries, oceans, reuse) to meet growing demand
- Reducing effluent disposal into water bodies helps reduce nutrient pollution
- Our wastewater has to go somewhere
- Since ~50% of domestic water goes for landscape irrigation, reclaimed water appears to be a good alternative to irrigating with potable water



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Impacts of Nutrient Pollution on Freshwaters in US

- 90% of rivers in 12 of 14 regions had excessive nitrogen and phosphorus
- 25% of freshwater threatened and endangered species are imperiled by eutrophication
- \$4.3B annual economic cost to US, although authors suggest this is an underestimate



Impacts of Nutrient Pollution on Freshwaters in US

- Nutrients are the #1 cause of water quality pollution for lakes, reservoirs and ponds
- 3.8 million acres of waters are eutrophic due to nutrient pollution



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Source: US EPA 2002 National Water Quality Inventory

Impacts of Nutrient Pollution in Florida

- 1,000 miles of rivers and streams are nutrient impaired
 - 16% of assessed miles
- 350,000 acres of lakes are nutrient impaired
 - 36% of assessed area
- 575,000 acres of estuaries are nutrient impaired
 - 25% of assessed area



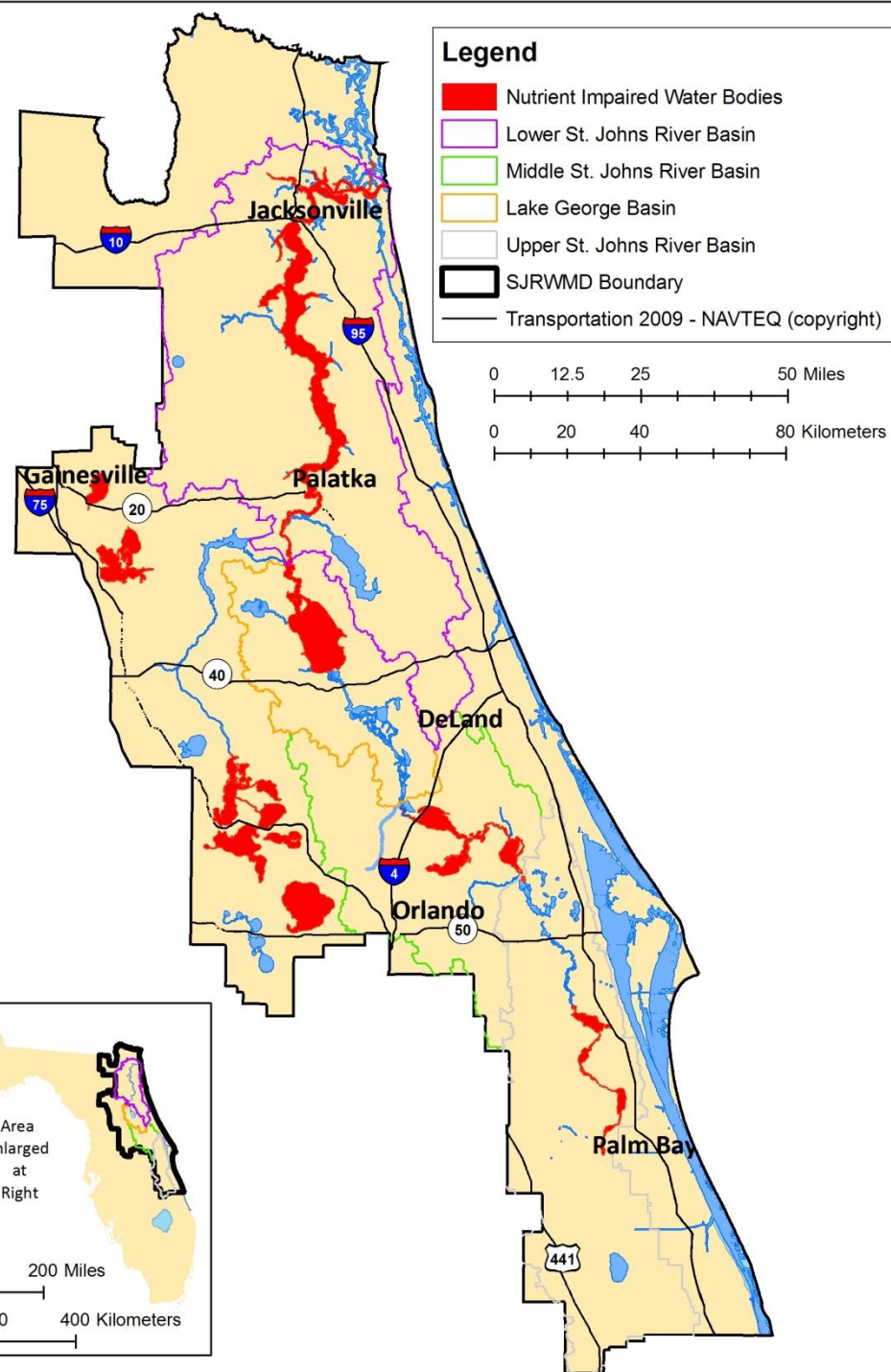
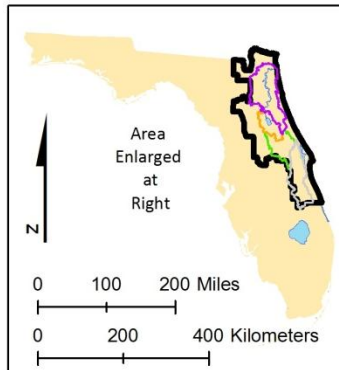
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Source: 2008 Florida Integrated Report
(http://www.dep.state.fl.us/water/docs/2008_Integrated_Report.pdf)

Impacts of Nutrient Pollution on the St. Johns River



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Fertilizer Use

- In 2007, agriculture applied 13,194,400 tons of nitrogen and 4,571,700 tons of phosphorus in the US
- From July 2006 through June 2007, 1,579,356 tons of N and/or P containing fertilizer was sold in FL

Sources:

<http://www.ers.usda.gov/Data/FertilizerUse/>

<http://www.flaes.org/pdf/Historical%20Total%20Fertilizer%20Summary%202008.pdf>



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Nutrient Distribution

**Grow More Plants;
Fertilize**



**Reduce Nutrient
Pollution**



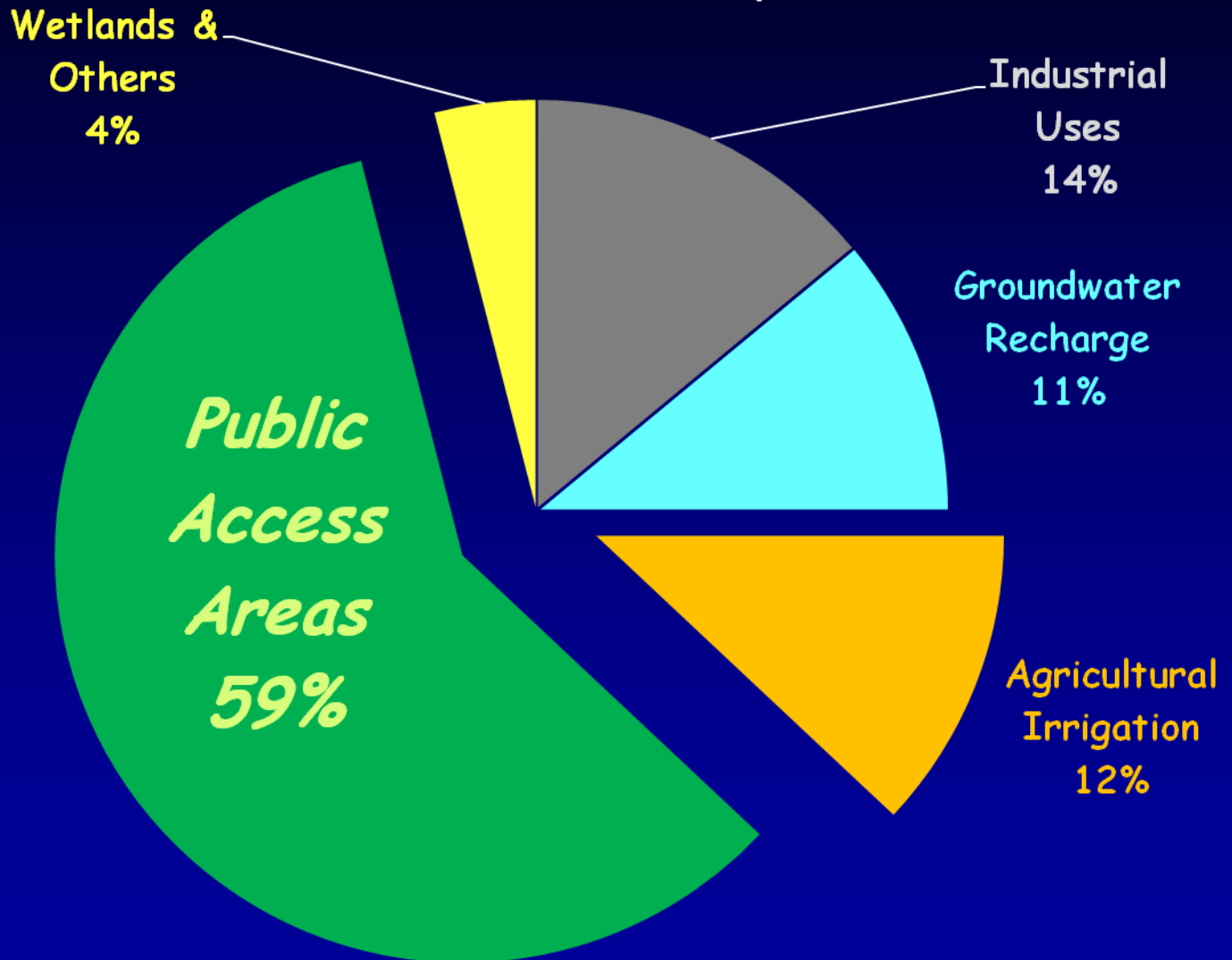
- Our nutrient impairment problems are in part, distribution problems
- Reuse is one way that nutrient distribution can create a better balance between need and supply, thus reducing pollution



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Reclaimed Water Use

Reclaimed Water Use by Flow (2007)



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Shanin Speas-Frost – FDEP Reuse Coordinator

Where Do The Nutrients in Reclaimed Water Go?

- Is there a potential for nutrients in reclaimed water to make it back to water bodies? **Yes!**
- Just like we can't ignore other activities which distribute nutrients on the ground (fertilizer, manure, septic systems, biosolids), reuse can't be ignored. We shouldn't assume that all nutrients distributed by reuse will be bound up by plants and soils.



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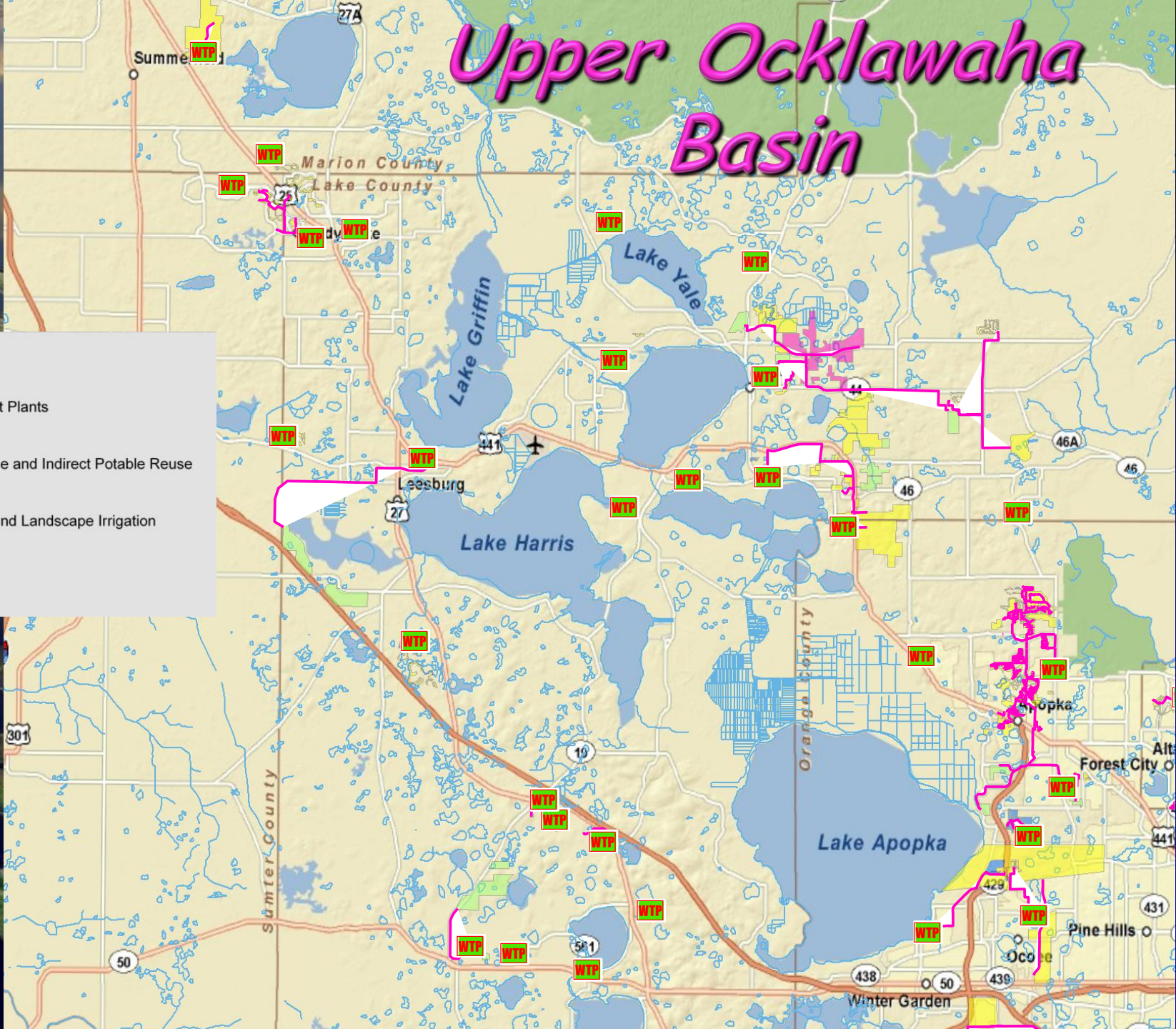
Upper Ocklawaha Basin

Legend

- Blue Spring Basin
- Wastewater Treatment Plants
- Agricultural Irrigation
- Groundwater Recharge and Indirect Potable Reuse
- Industrial
- Public Access Areas and Landscape Irrigation
- UNKNOWN
- Wetland
- Reuse Lines



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Nutrient Needs of Plants

What Reclaimed Water Concentration Meets Turf's Nutrient Demands?

*Where in Florida?
What kind of plants?*

MASS

FDACS (2008) rule
lbs/year

=

**RULE
CONCENTRATION**

VOLUME

Water Use
up to 3"/week

*Where in Florida?
Local irrigation rules*

For St. Augustine grass in central FL, irrigated at the District's revised potable water irrigation rate, the critical P concentration is ~0.65 mg P/L. For nitrogen the concentrations are a range, 6 to 9 mg N/L.



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What If Reclaimed Water Meets Turf's Nutrient Demands?

IF
REUSE **>** **RULE**
CONCENTRATION **CONCENTRATION**



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Fertilizer Needs by Reclaimed Customers

- Most reclaimed water will supply customers' lawns with enough Phosphorus and can use Phosphorus-free fertilizer.
- The need for additional Nitrogen fertilizer is more variable.
- Utilities have information necessary to inform their reuse customers of the mass of nutrients delivered.



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Potential Winners!



Environment (less pollution)



Homeowners (buy less fertilizer)



Taxpayers (buy less fertilizer)



Taxpayers (less pollution cleanup)



Utilities (TMDL credit for offset??)

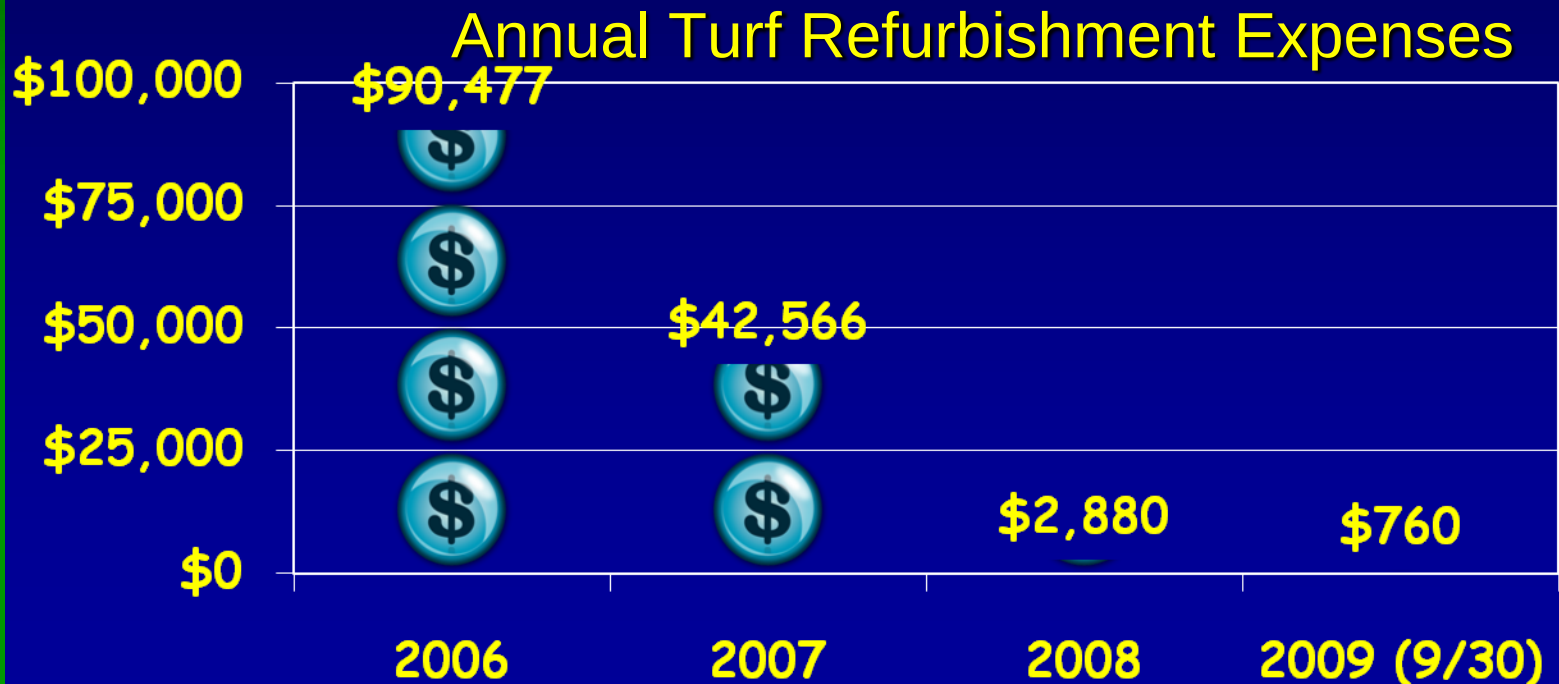


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Savings Example

Palmer Ranch Master Property Owners Association altered turf management on ~200 acres to account for reuse nutrients (based on soil, water and plant tissue data)

- Less prompt of unnecessary summer growth
- Reduced mowing saves \$16,000/yr
- Increase in turf health & appearance



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Irrigation Overspray

**Reuse
overspray
accumulates
on roadways
and in gutters.**



**Excess reuse
flows to storm
sewer system.**



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Irrigation Design



**Grand Haven
(Flagler Co.)
 $\text{PO}_4 \sim 4.5 \text{ mg/L}$
 $\text{DIN} \sim 8.9 \text{ mg/L}$**

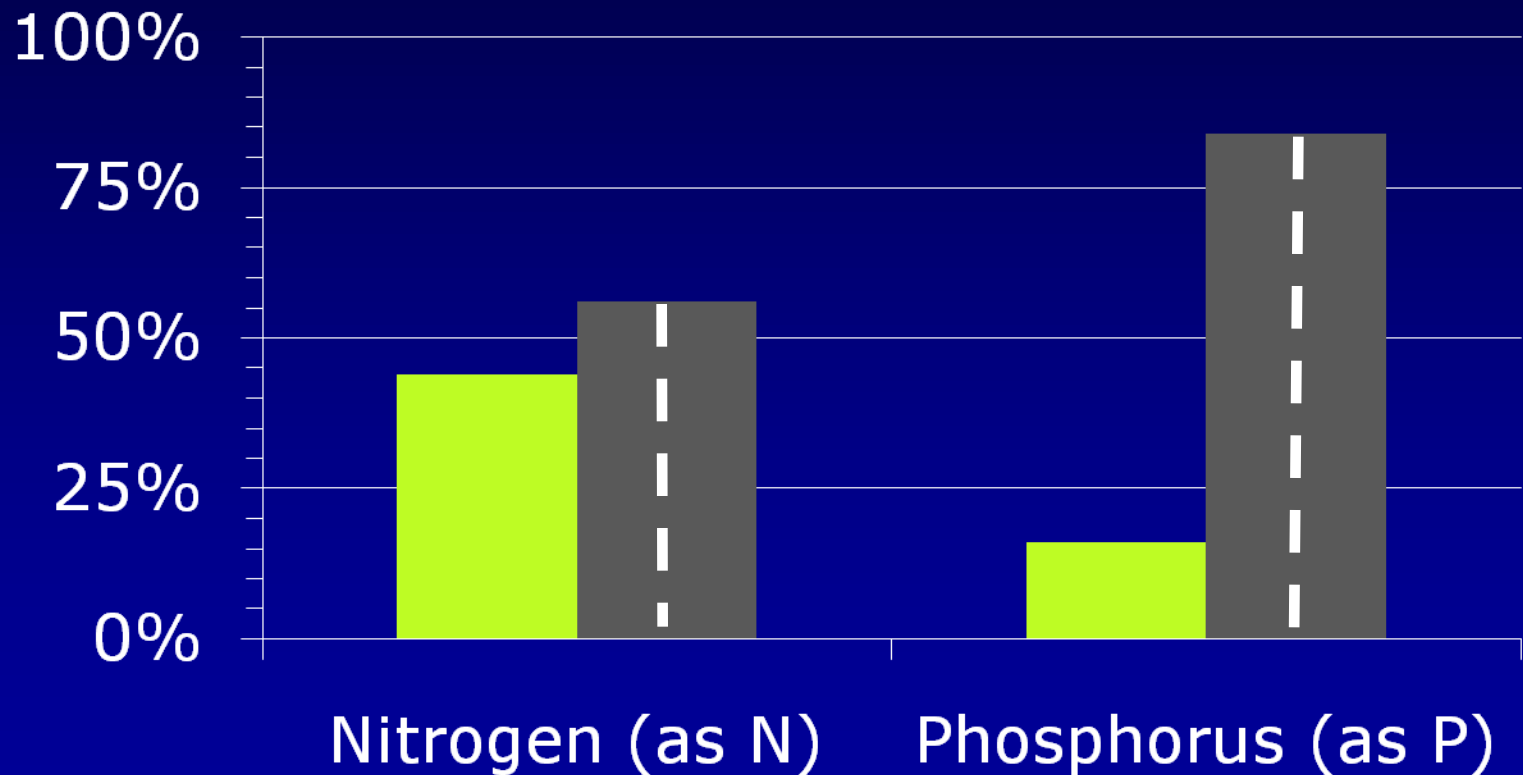


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Reuse Overspray Loads

Percent of Nutrient Runoff

- Lawn Load (95% of water)
- Overspray Load (5% of water)



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Good aim is important

Pollution Prevention Vs. Pollution Clean Up

- General Rule:
Prevention is cheaper
than Clean Up
- When evaluating
techniques to meet
nutrient load reductions
(TMDLs) costs should
matter to everyone
- Look for the easy, cheap
low hanging fruit



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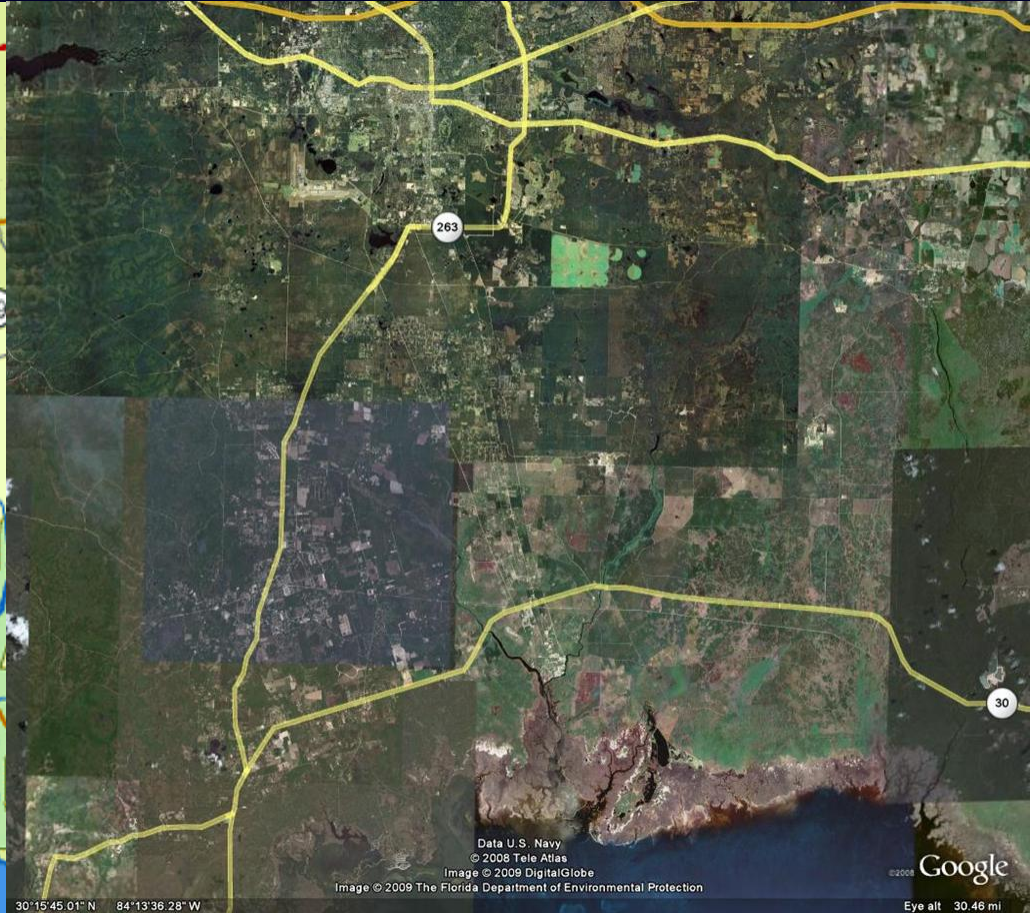
Recent Progress

- Fertilizer companies are creating and marketing P-free fertilizers
- FDEP is requiring Wastewater Treatment Plants to monitor and submit nutrient data as part of permit renewals
- UF/IFAS is developing a Scope of Work to develop Best Management Practices (BMPs) for reuse, including a fertilizer offset for reclaimed water.
- The recent Report by the Florida Senate Select Committee on Florida's Inlands Waters included the following, "Require the DEP to study the effects that reclaimed water have on nutrient loading in Florida's water bodies and report its findings to the Legislature. If it is determined that using reclaimed water has negative effects, then the DEP must provide recommendations in its report that eliminate such effects."



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Wakulla Springs



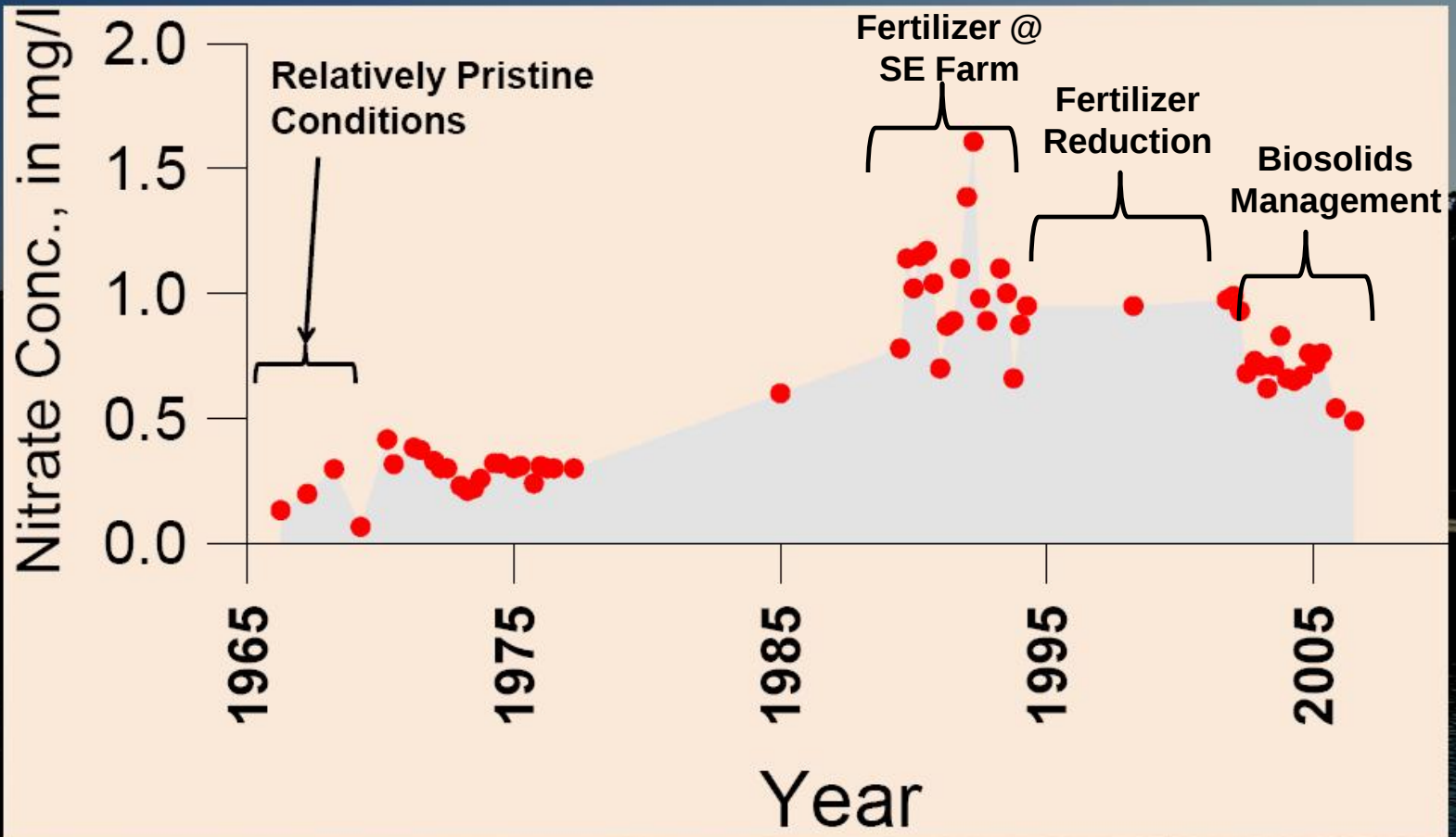
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Sources:

<http://www.floridasprings.org/exploration/featured/wakulla/text/protecting/map/>
& Google Earth

Wakulla Springs Nitrate Concentrations

Nitrate Concentrations in Wakulla Springs from 1965 to 2006



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Hal Davis, USGS, Feb 25, 2009.

County Code Example

PROPOSED AMENDMENT NO. 14

MARION COUNTY LAND DEVELOPMENT CODE

ARTICLE 6 - OVERLAY ZONES

*CREATING NEW ARTICLE 6.4, SPRINGS
PROTECTION OVERLAY ZONE*

(Silver & Rainbow Springs)

- (4) Any WWTF that provides Public Access Reuse shall institute a program to educate the end user about the value and benefits of Reuse. The program shall be designed to enable the user to easily calculate the amount of nitrogen was applied to the disposal area and, therefore, promote reduced use of purchased sources of nitrogen. The owners of the WWTF shall coordinate such program efforts with the Marion County Conservation Coordinator.



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Closing Thoughts

- Reuse was developed as an alternative to dumping effluent in water bodies. Our waste has to go somewhere.
- We can use reclaimed water as a means to better balance areas of nutrient need and nutrient pollution.
- View reuse as a means to offset both potable water and fertilizer demand.
- When using reclaimed water consider applying fertilizer best management practices (BMPs).
- Reuse is a relatively new approach and improvements are being made. We are learning from our experiences around Florida.



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Questions? Comments? Discussion?

Reuse &
Restoration



OR

Reuse  Restoration



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