USE OF RECLAIMED WATER TO OFFSET FERTILIZER APPLICATION: A COST-EFFECTIVE POLLUTION PREVENTION MANAGEMENT PRACTICE?

Erich Marzolf, Ph.D., Director Division of Water and Land Resources

## Past Wastewater Nutrient Flow

#### Wastewater management used to be a pretty simple point source



## **Present Wastewater Nutrient Flow**



## Wastewater Phosphorus Options



### Lake Jesup Response to Point Source Elimination

- Large point source reductions improve water quality quickly and substantially
- Nonpoint source reductions are more challenging and time consuming
- Particularly as development continues (may include reuse)



### **Reclaimed Water**

- Reclaimed water is a critical water resource
- Reuse is a useful alternative to point source discharges
- Some / Many locations are approaching full water utilization, but pay attention to wet weather "events"
- but....
- Nutrient implications poorly addressed
- Most locations have room for improvement
- Few examples of specific guidance on how to account for the nutrients delivered to reuse users

### **Reuse Irrigation Management**



**1. Expensive Point Source** 

2. Overspray greatly exacerbates nutrient runoff

3. Fertilizer-free buffer to protect pond is missing

Grand Haven (Flagler Co.) PO<sub>4</sub> ~ 4.5 mg/L Dissolved Inorganic N ~ 8.9 mg/L

Photos by Dr. Mark Clark, UF

# **Estimated Overspray Loadings**

**Percent of Nutrient Runoff** 

■ Lawn Irrigation (95% of water)

Overspray (5% of water)



Source: Dr. Harvey Harper, PE Environmental Research & Design





Good aim is important

# **Reclaimed Over Irrigation**

Florida Department of Environmental Protection Reports Monthly Medians Jan-Oct 2019

Total Phosphorus 2.75 mg/L Total Nitrogen 5.3 mg/L



**University of Florida** 

# **Residential Fertilization Practices in the Wekiva Springshed**

Table 8: Frequency of fertilizer application (Last 12 months) with outliersremoved

<b>Population Segment</b>	Average Annual Fertilizer Application Rate	(n)		
All (Overall average)	3.53	(525)		
Internal fertilizers (homeowner applied)	2.88	(341)		
External fertilizers (lawn care company applied)	4.76	(183)		
Homes using reclaimed water	4.56	(50)		
Wekiya Residential Fertilizer Practices 2009				

http://www.dep.state.fl.us/water/wekiva/docs/wekiva-survey\_fr0310.pdf

## How Many Open Loops?



### **Over Spray = Wasted Water**

**Purple Pipe + Over Spray = Pollution** 

#### **Ornamental Peanut = No Water**

### Legume = No Fertilizer

### Built in Summer 2019



## **Better Options**

- Specific guidance on reducing fertilizer use when irrigating with reclaimed water
- Phosphorus Recovery at Water Reclamation Facilities

Biosolids (B, A, AA) Resource Recovery Effluent / Reclaimed Water

# **Incorporate Reclaimed Water's Nutrients in Fertilization Plans**

#### Palmer Ranch Master Property Owners Association

- ~200 acres to account for reuse nutrients
- Less fertilizer applied
- Less prompt of unnecessary summer growth = reduced mowing = \$16,000/yr savings
- Increase in turf health and appearance

#### **Annual Turf Refurbishment Expenses**



Pers. Comm. Rick Barth, President, Palmer Ranch Master Property Owners Association, Inc.

# **Erich's Dream Utility Bill**



Significant portion of watershed uses reuse for irrigation Many areas adjacent to either the lake or tributaries July Utility Bill – Marzolf

Monthly Reclaimed water usage = 11 kgal Parcel area =  $10,000 \text{ ft}^2$ Irrigated Area Estimate ~35% =  $3,500 \text{ ft}^2$ 



Reclaimed Water Nutrients Delivered in last 12 months

	Fertilizer Equivalents Delivered (lb)	Pounds per 1,000 ft <sup>2</sup>	% of Annual Recommendation
Nitrogen	11	3.1	103
Phosphorus	2.3	0.66	132

#### **Turf Fertilizer Application Recommendations:**

Nitrogen Phosphorus

0 pounds 0 pounds

### No Need to Apply Fertilizer Next Month

# **Reclaimed Nutrient Offset**

- We're selling customers reclaimed water but not telling them all the benefits.
- **Apply Less Fertilizer**
- Save money by not buying unnecessary fertilizer
- Healthier and cheaper turf management
- Reduce nutrient runoff and improve water quality
- Safer water supply and improved recreation
- Increase property values
- Could utilities earn BMAP credits by providing clear actionable recommendations to their customers???



# **Cost-Share with Clay Counties Utilities**

- Pay-For-Performance
  Phosphorus Removal
- Additional phosphorus removal at the Fleming Island Regional wastewater plant
- Treated effluent will be treated via a vegetated filtration bed using an engineered media to remove phosphorus



## **Future Wastewater Phosphorus Flow**



### **Questions?**



