



Dr. Clint Waltz

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Grass & Soil Surveillance via Unmanned Aerial Vehicle

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UAV: Applications and Opportunities in Turf

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Turfgrass Specialist
University of Georgia

Why Turfgrass?

Benefits

★ Permanent Vegetative Cover

✓ Filter

✓ Protect water quality

✎ Bare soil – a 2-inch rain event can generate 5 tons of soil loss / acre

✓ Slows down runoff

✓ Traps dust & smoke



Legal Stuff

FAA

★ Exemptions

✓ 333

✓ Hobby vs. Commercial

? Agricultural Research

★ Technology ahead of regulations

State Laws

What's in a name?

Names and Connotations

- ★ Drone
 - ✓ Negative connotation
 - ✓ Industry moving away from
- ★ UAV
 - ✓ Unmanned Aerial Vehicle
- ★ UAS
 - ✓ Unmanned Aerial System



Types

Basic Platforms

- ★ Fixed wing
 - ✓ Greater payload
 - ✓ Longer flight time
- ★ Multi-rotor
 - ✓ Ease of operation
 - ✓ Minimal area for launch



Who is using UAVs?

Current users in Turf

★ Golf Courses

- ✓ Photographs
- ✓ Course conditions
- ✓ Historical record
- ✓ As built
- ✓ Locating in-ground utilities



Who could use UAVs?

Potential users in Turf

- ★ Sod production
- ★ Sports field
- ★ Certification
- ? Lawn care



What can a UAV do?

Carry a Payload

★ Cameras

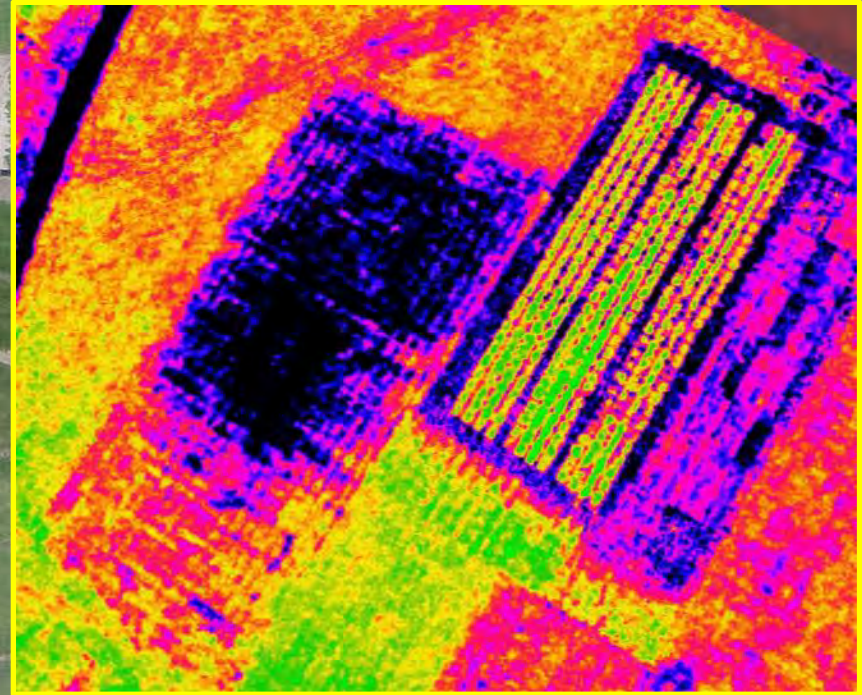
✓ Visual

✓ NIR

✓ NDVI

✓ Thermal

✓ Hyperspectral



What can a UAV do?

Carry a Payload

? Pesticides or water

✓ Limitations

✓ Weight

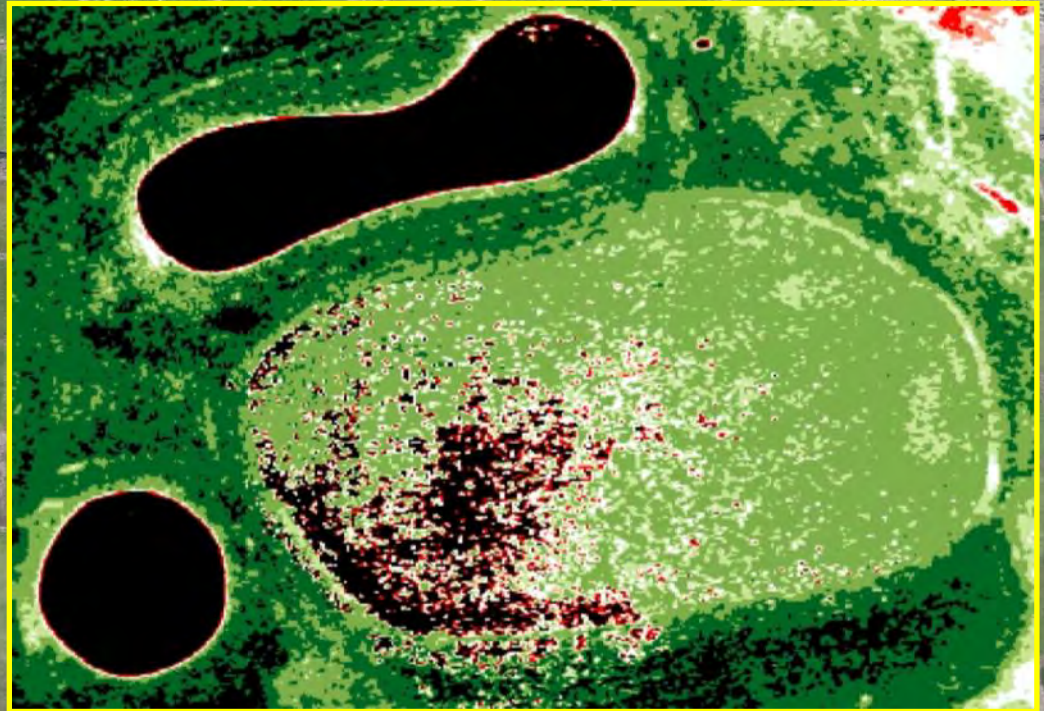
✓ Volume



What can a UAV do?

Identify & Explain Problem Areas

- ★ Traffic
- ★ Fertility
- ★ Disease
- ★ Water



Technology & Research

What do we need to know?

★ Calibration to trigger a mgt. response

- ✓ Fertility
- ✓ Disease
- ✓ Water
- ✓ Species identification



Technology & Research

What do we need to know?

★ Quantify an issue

✓ Disease

? Early detection

? Reduced pesticide rates

? Reduced pesticide cost



Technology & Research

What do we need to know?

★ Green in green

✓ Weeds

✓ Broadleaf vs. grassy

✓ Pixels

? Allow to flower



Legal Stuff

Challenges

- ★ Line of sight
 - ✓ Technology is available
 - ✓ Labor savings
- ★ Technology ahead of regulations

Important Dates in 2016

A man in a red polo shirt and a straw hat with a black band is speaking to a large group of people outdoors. The group, consisting of men and women of various ages, is standing on a grassy field. Some people are wearing lanyards with badges. In the background, there are trees and a clear blue sky. The scene appears to be a professional or educational gathering.

Southeastern Turf Conference – April 26

UGA Turfgrass Research Field Day – August 4

EDGE Expo – December

For other local programs contact your CEA

Thank You



twitter 
@GeorgiaTurf

www.GeorgiaTurf.com



Kevin Burke

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The Atlanta BeltLine and the Transformation of Atlanta

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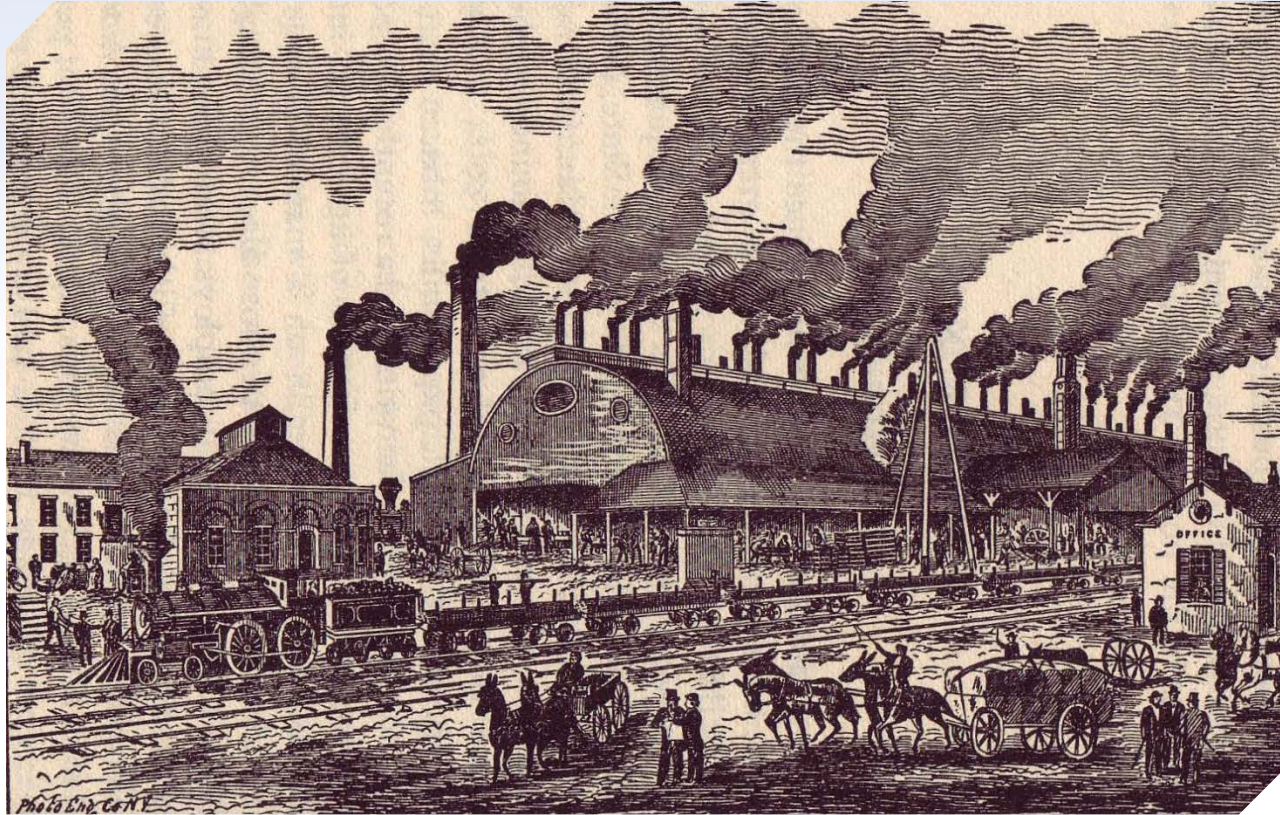
Learning Objectives

Leave with a better understanding regarding one of the largest urban redevelopment projects in the country

Recognize the boatload of opportunities for irrigation needs



Atlanta's Origins: Terminus



Atlanta's Origins: Terminus



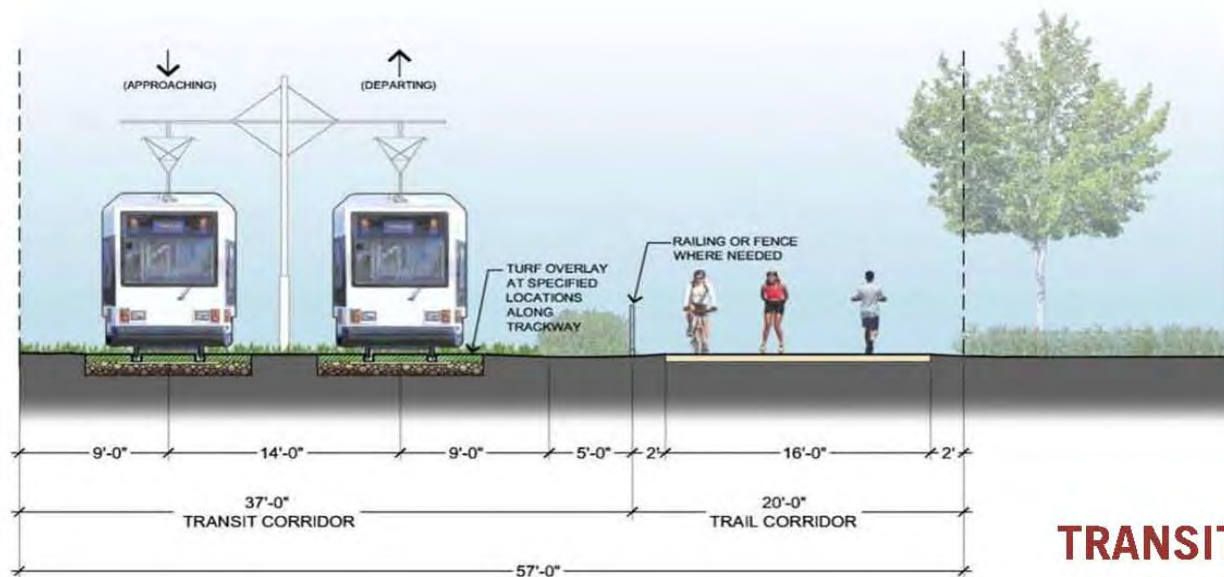
**RAILROAD
HISTORY**



Metro Atlanta's Growth & Sprawl



Restorative Solutions



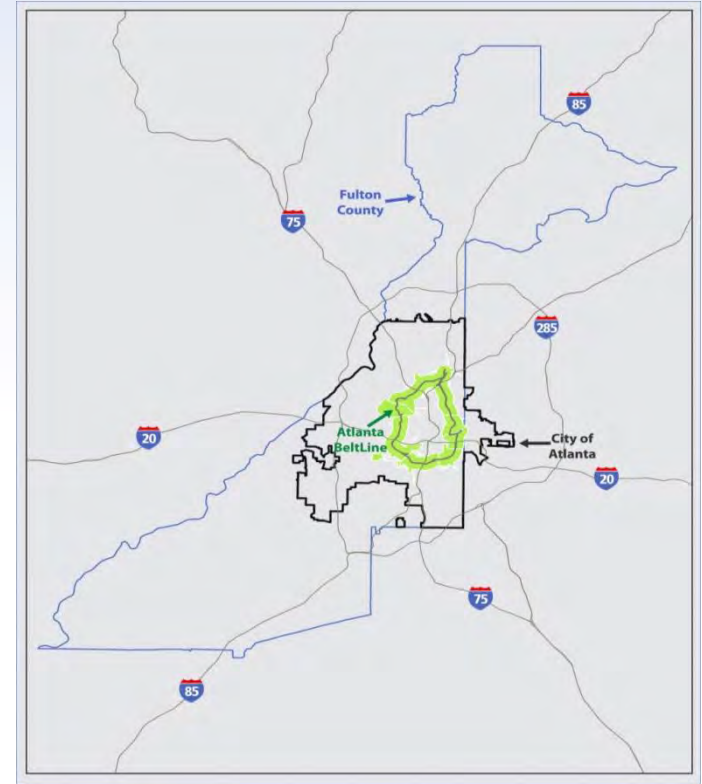
**TRANSIT + TRAIL
DIMENSIONS**

Restorative Solutions



Where is the Atlanta BeltLine?

- In the heart of the Atlanta region
- Connects many of Atlanta's cultural landmarks and institutional destinations
- Connects four historic freight rail rights of way encircling the center of town



Where is the Atlanta BeltLine

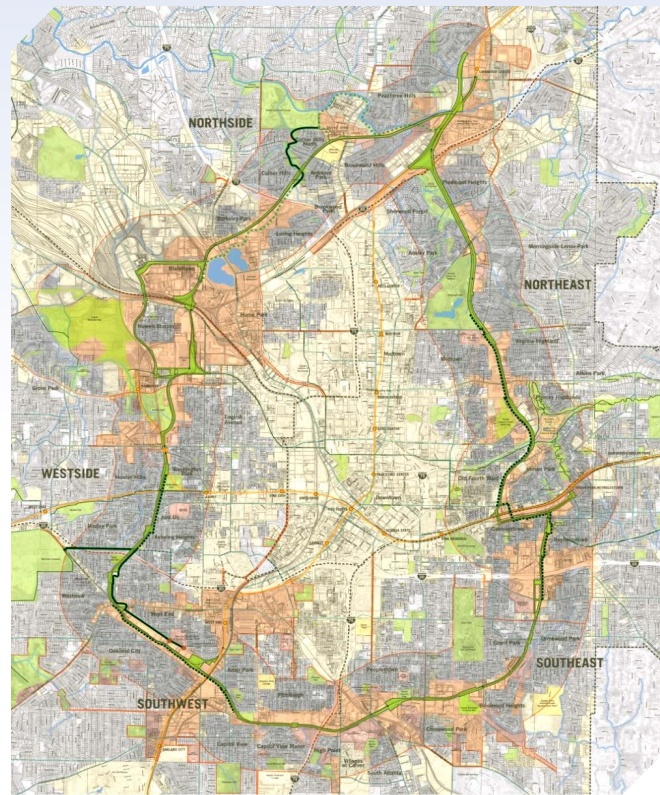


**22 MILES OF
VARIATION, UNIQUE
PLACES & CONDITIONS**



What is the Atlanta BeltLine?

- Connects 45 neighborhoods
- 22% of City of Atlanta population lives in the planning area
- 19% of the City's land mass is inside the mile wide 15,000 acre planning area
- 6,500 acre TAD



What is the Atlanta BeltLine?



1,300 ACRES
of New
Greenspace
(w/700 ADDITIONAL
ACRES REBUILT)



22 MILES
of Transit &
Transportation
Infrastructure



33 MILES
of Trails



46 MILES
Streetscapes &
Complete Streets

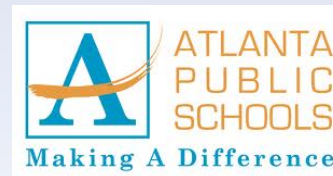


5,600 UNITS
of Affordable
Workforce
Housing
(AS PART OF
28,000 TOTAL
UNITS)



**30,000 JOBS &
\$10-20B**
Economic
Development

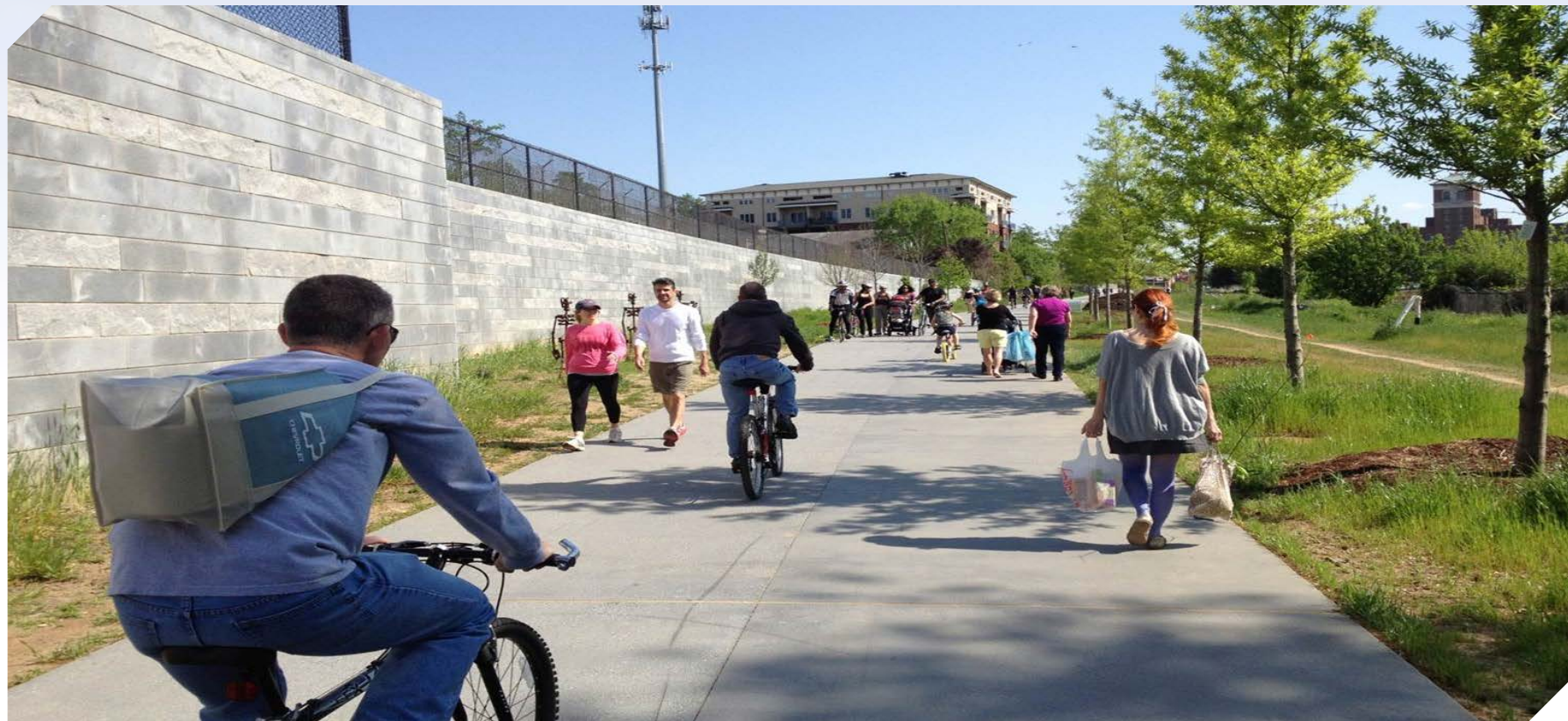
Partners



Eastside Trail



Eastside Trail



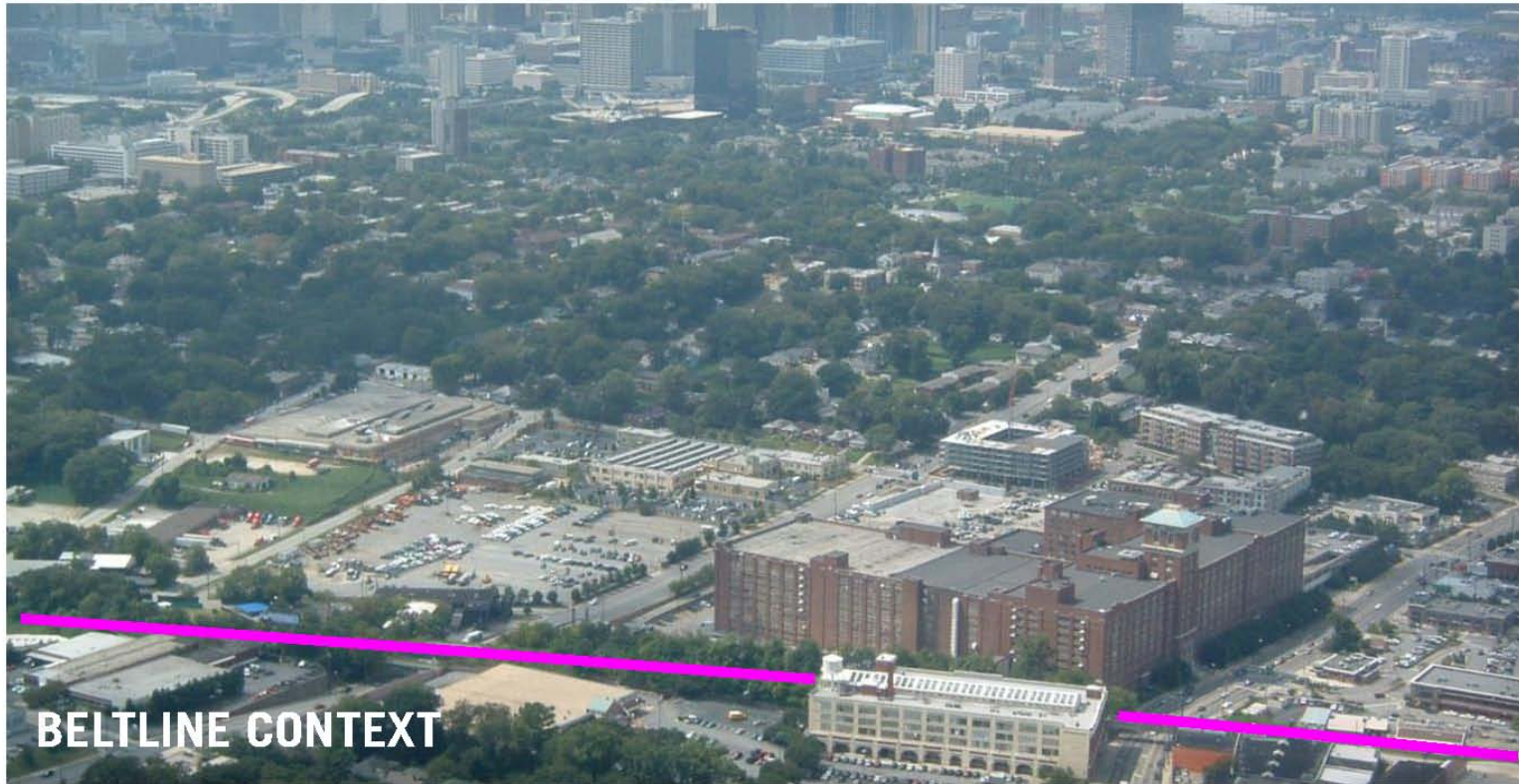
Eastside Trail



Eastside Trail



Historic 4th Ward Park



Historic 4th Ward Park



Historic 4th Ward Park



Historic 4th Ward Park

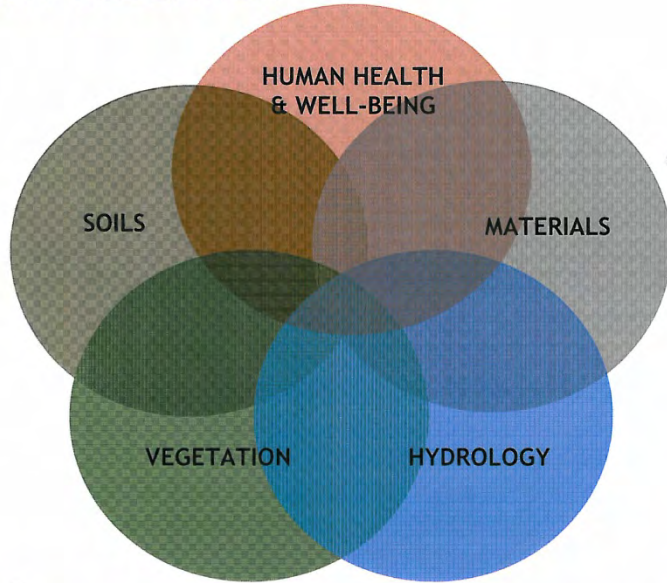


Historic 4th Ward Park



Historic 4th Ward Park

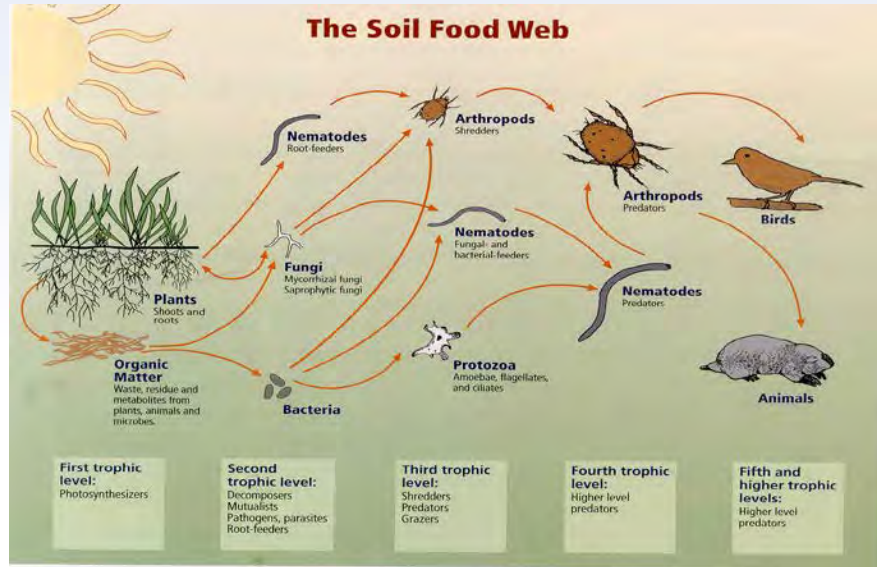
CURRENT RESEARCH



© 2009 Sustainable Sites Initiative

- The Sustainable Sites Initiative has a Prerequisite 8.1 for a “Plan for Sustainable Site Maintenance”
- An Organic Land Care approach fits perfectly into this base parameter
- Atlanta BeltLine Inc is utilizing an OLC program on all our public spaces
- OLC seeks to establish a vibrant and almost self-sustaining soil microbiology to create an environment that should need few if any inputs.

Historic 4th Ward Park



Historic 4th Ward Park



Historic 4th Ward Park

"As I sit in the park, I see picnickers, drawers, readers, lovers and friends. There are babies, laptops, bicycles, dogs blankets, and ducks. All of this in what was a parking lot not so many years ago."

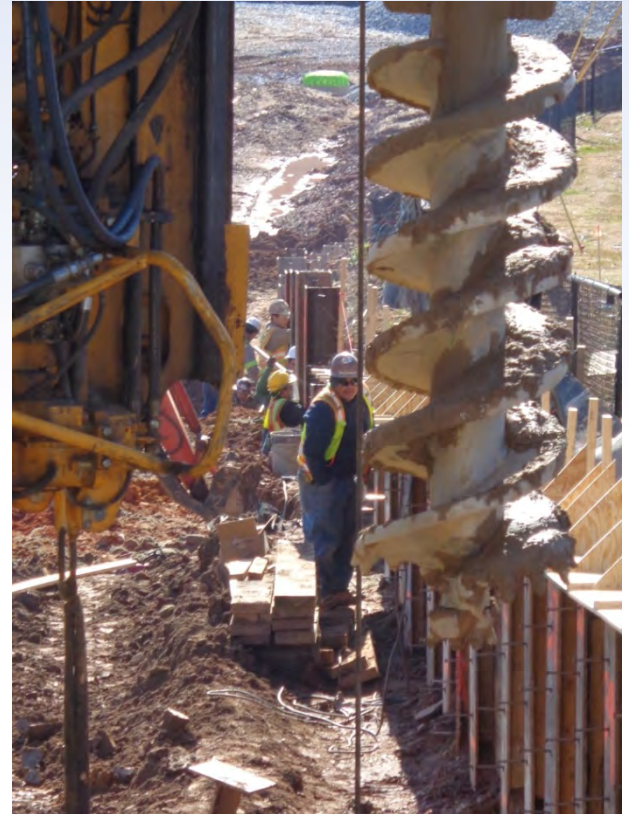


Westside Trail

- 3 mile multi-use trail from Washington Park (Lena Street) to University Avenue
- \$43M project cost
- Fully funded and under construction



Westside Trail



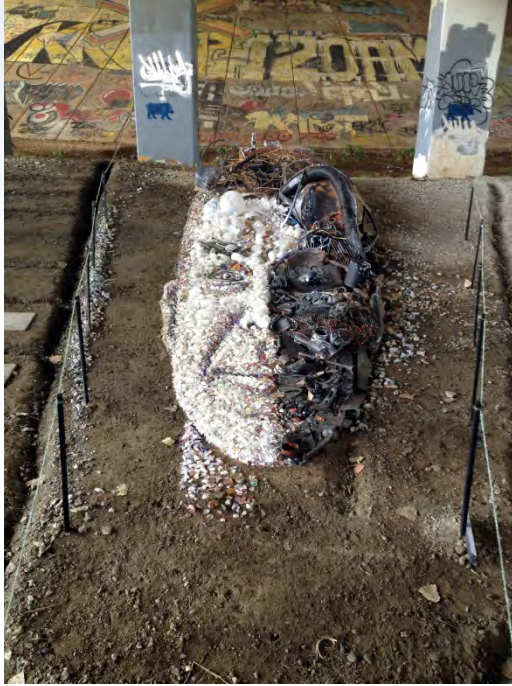
Westside Trail



Westside Trail



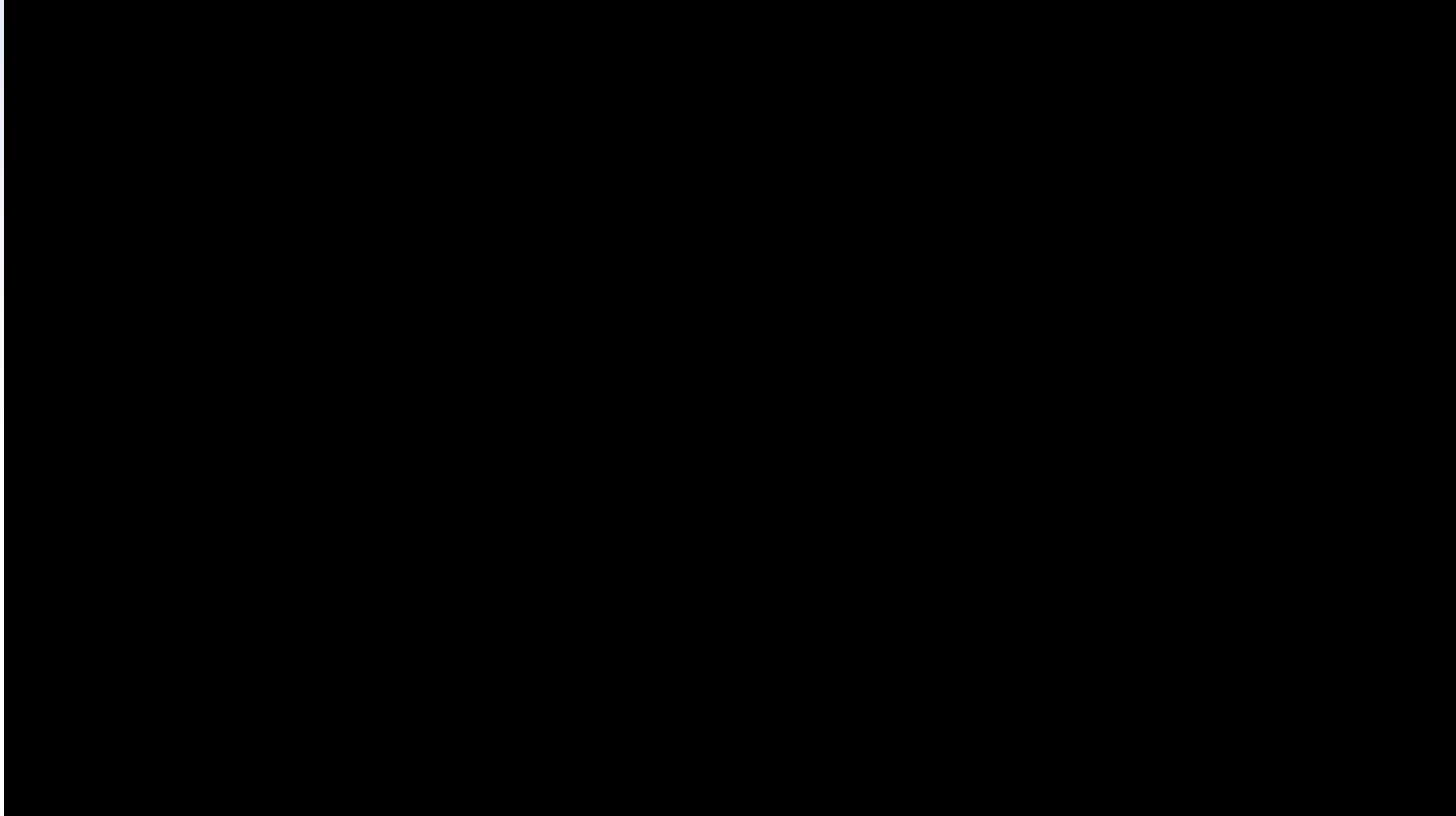
Art on the Atlanta BeltLine



Lantern Parade



Testimonial



Questions and Answers





Mark Esoda

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Starting with an open hand: Working with regulators and legislators

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“Water for Food or Water for Fun”

Senator John Bulloch

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History – The Short Version

- 1988 – Drought leads to Legislation
- Late 90's – Drought leads to Rule changes – Law suits from neighbors over water
- 2000's more legislation – Planning and metering, Outdoor Water Rules
- Rules had Golf restricted even during non drought times – no other green industry



More History

- Golf Reacts with 3 point effort
- 2004 – Memorandum of agreement
- 2006/2007 – Drought brings sense of urgency to State
- 2007 – Drought level 4 declared – Golf is “Greens only”
- Late 2007 – EPD Director Carol Couch signs executive order giving golf relief



Just a little more history

- 2008 – Golf is the only industry to get a commendation from the Governor for water conservation
- 2009 – Legislation is passed regulating water use for all – Golf is exempt!
- New drought rules are being formulated and golf is getting what they asked for – 15% reduction using a 30 year average!



Governor's Commendation



How did we get in this mess?

- Growth
- No increased storage
- Environmental Issues – Endangered Species – 3 ridge fatback mussel
- Law suits with Florida and Alabama
- Economics
- Downstream economics
- No coordination of efforts – Local, State and Federal



What did golf do to get out of the mess?

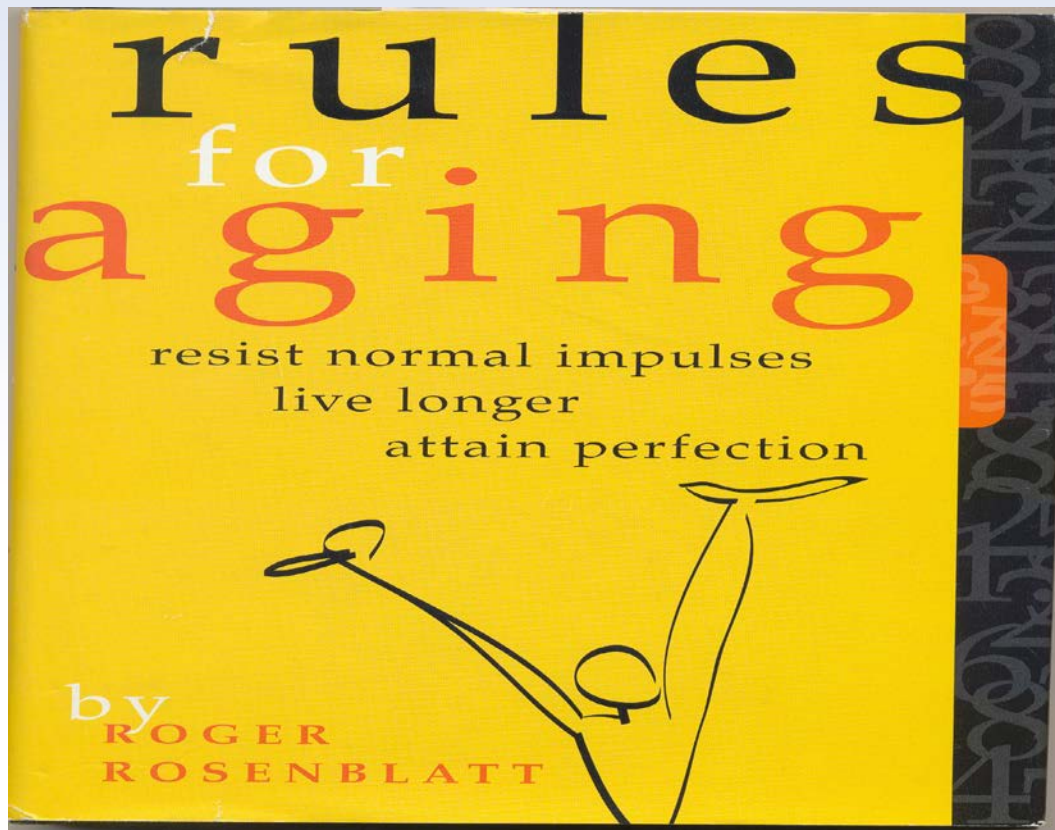
- Advocate for ourselves – strength in numbers?
- Prepared to go to the legislators
- Prepared to go to regulators
- Insert Superintendents into the process



Advocate for ourselves

- Formed an Allied golf group to stand up for golf





“Rules for aging”

- No body is thinking about you – Yes, I know, you are certain that your friends are becoming your enemies, that everyone is of the opinion that you have put on weight, you have lost your touch, lost your mind and furthermore you are convinced they are plotting against you. I promise nobody is thinking about you. They are thinking about themselves – just like YOU.



Allied Golf Group

- Formed when the Urban Ag Industry failed to produce results
- Includes Owners, Managers, Pros, State Golf Association and Superintendents
- Led by Wade Thomas
- Formed the Water Task Force
- Pooled resources

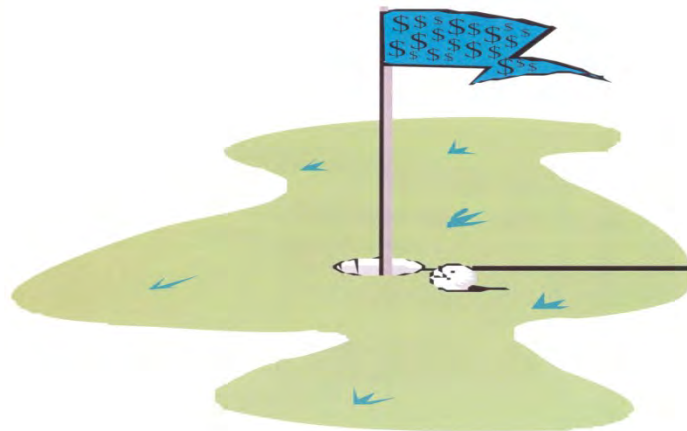


Water Task Force

- Negotiated revisions to the outdoor water rules
- Negotiated adding Turf Grass water quality to Reuse Guidelines
- Produced Georgia Golf is Green
- Produced a handbook on the Reuse Guidelines
- Produced and Economic survey (PGA)



Georgia Golf: Keeping Georgia Green

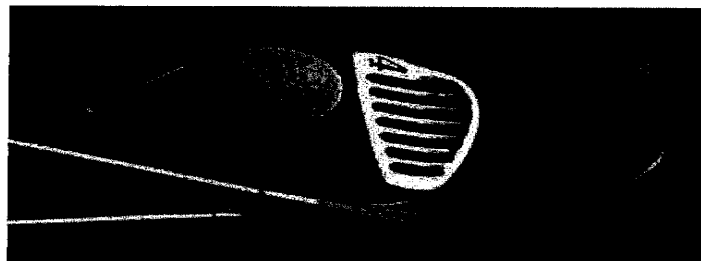


Georgia's Water Reuse Guidelines

**Georgia Golf Course Superintendents Association
Georgia State Golf Association
Georgia Section, Professional Golf Association
Georgia Chapter, Club Managers Association**



An Economic Impact Study of the Golf Industry on the State of Georgia



Prepared by:

Office of Sports Business Research

Dr. Rankin Cooter, Director
Dustin Papendick, Graduate Assistant
Nakia Washington, Graduate Assistant

Prepared for:

**Georgia Section, PGA of America
Georgia State Golf Association
Georgia Golf Course Superintendents' Association
Georgia Chapter, Club Managers' Association of America**

January 2003



Lobby Efforts of the Allied Golf Group

- Interviewed Lobby firms and hired Georgia Links
- Started grass roots campaigning
- Trying to form a golf caucus
- Support of Golf friendly candidates



Technical Efforts in State Water Planning

- Representation on the Technical Advisory committee for Conservation
- Representation on the Technical Advisory committee for Reuse
- Representation on the State Wide Advisory Council



Outreach

- Asked to participate in various efforts
 - Water Wise, Ga. Chamber of Commerce, etc.
- Internal and External communication at each facility
- Community – Water providers, Local businesses



Water Conservation Implementation Plan

- First to produce benchmarks and time frames in outdoor industries
 - Water Loss
 - Reporting
 - Audits
- Asked to be a template for other industries



BMP Memorandum of agreement

75% of GGCSA Member courses on BMPs for
Water Conservation by May 2007

Currently 97% of GGCSA Member Courses on
BMPs





The Fist

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The Fist

- Getting people to do things is hard especially if they don't want to!



What for? Who Cares?

- “Whiskey is for Drinkin and Water is for Fightin!” Mark Twain



Water is complicated

- Water quantity
- Water quality
- Ownership vs. Management
- Right to water
- Right to business
- Definitions – consumptive use, reuse, returns, water budgets



Thoughts on Advocacy

- Who is doing it and what are they saying?
- Business/Economy
- Environment
- Consequences of lost water
 - Environment
 - Increased impervious surface
 - Time to recover from lost grass – car wash



Legislative Advocacy

- Recognize your limitations
- Hire a professional
- Support candidates
- Listen to your advocate but be sure and ask questions
- Reporting
- Non session work



Regulatory Advocacy

- Government
- Culture and preconceived notions
- Relationships – short term employment
- Bring Solutions that help them
- Foolish consistencies – Tin Cup



Issues

- Fragile culture – Leadership
- Heavy lifting
- Patience
- Exit strategies – Any strategy
- Name your poison to meet the regulator's goals
- Do you align with other commodities?
- Cash + Time



A Better Future

- Change will happen
- Influence the regulation
- Consequences of inaction – Georgia Golf was regulated even during non drought times
- Public Relations benefits
- Spill over into Water quality issues, Pesticides, Fertilizers
- GCS considered a professional – A and CGCS



Too Much Water



Too little



Just Right!



- “What we call man’s power over nature turns out to be a power exercised by some men over other men with nature as its instrument.”

C.S. Lewis, *The Abolition of Man*, 1947





Thank you!

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Kathy Nguyen

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2007-2009 Drought Review

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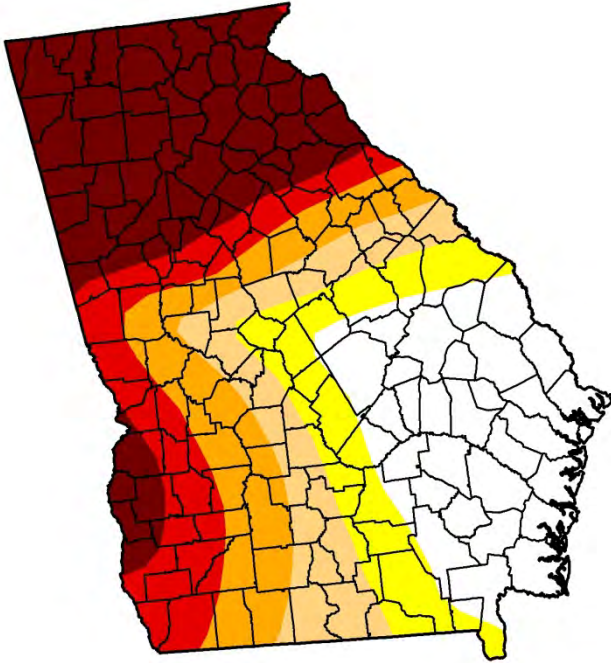
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Drought Whose Idea Was This?

- Drought Began September 2005
- Hydrologic Drought Classified in Spring of 2006
- Level 1 Declared Late Spring 2006
- Level 2 Declared Spring 2007
- Level 4 Declared September 28, 2007
- Executive Order October 2007
- Amended Level 4 February 2008

It's the DROUGHT



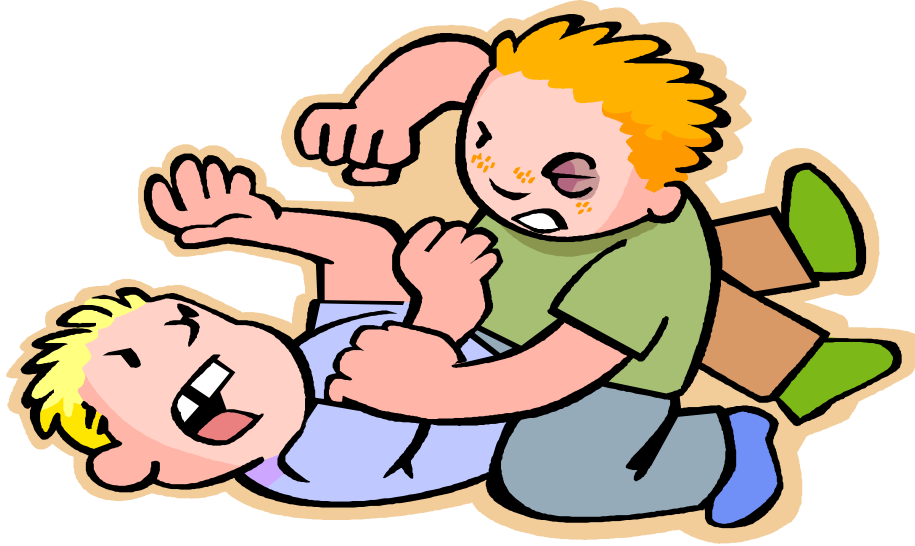
October 2, 2007

- Fall 2005- Decreased Rainfall.
- Spring 2006 – Hydrologic Drought. (Level 1 Declared)
- July 2007- Surpassed every indicator for level 4 Drought.
- September 28, 2007 – Declared Level 4 Drought
- Broken gauge at Lanier in Summer lost 22 billion gallons of water
- Peak of drought 100 mgd evaporative loss in Lanier

How Do You Tell The Story?

- Corps Drains Lake Lanier Like a Bath Tub!
- GA EPD Says 90 Days of Drinking Water Left in Lanier.
- Climatologist Says Drought of the Century No End in Sight!
- Judge To Decide If Atlanta Has Any Rights to Lanier.
- Local Utilities Say: Let Your Lawn Die.
- Cost of Georgia's Drought: Pike Nursery Declares Chapter 11.

Whiskey is for Drinking...Water is for
Fighting!



What Do You Do?



What Are the Challenges?

- Preserving Water for our Primary Responsibility.
- Understanding our Base Demand.
- Understanding our Peak Demand.
- Understanding the Customers Who are Affected.
- Understanding Changing Rules – communicating them to customers
- Shaving Peak Demand.
- Working together with those with Different Interests.

Preserving Water



Allatoona Lake October 2007

Restrictions: An Immediate Impact

- CCMWA Service Area Water Use Comparison
 - August 2006 – 113 MGD
 - October 2006 – 100.9 MGD
 - 11% Reduction
 - August 2007 – 124.9 MGD
 - October 2007 – 86.5 MGD
 - 31% Reduction

Enforcement

- Water Cops – Patrols began at 4 AM
- Patrols Ended at 11 PM
- Irrigation Accounts 1 strike - locked off
- Entire field service staff and myself were deputized for enforcement
- Neighbor vs. neighbor
- Both reporting line and web form – 1,000's of reports a day
- Enormous overtime costs
- Water Ban Committee – Reviewed every fine and enforcement strategy

The 2008 Legislative Session

(The Good, the Bad, and the Ugly)

- State-wide Water Plan Passes – We had a plan to make ...a plan.
 - Sept 2011 – Water Plans submitted to the state.
 - January 2012 – All water plans approved by the state.
- Reservoir Bill Passes – with an incentive for a sales tax holiday on WaterSense Products & \$40 Million in Water Supply Project Grants.
 - Reservoir Money was Eliminated 3 Months Later with Budget Woes.
 - New Governor 2011 Set aside \$300 million for water supply development over 3 years.
- Legislation to redraw the state line and stick Metro Atlanta's "Drinking Straw" in the Tennessee River.
- House Bill 1281 Passes by 80%
 - New Drought Response Plan (Adopted June 2015)

The Media



This is what Success Feels Like?

- We did not run out of water
- We did not have to employ our emergency back up supply plan
- We provided for public health and safety
- There was a lot of environmental damage – especially tree loss
- There were relationships that were destroyed
- The Water Industry in Georgia definitely lost the respect of some
- The industry lost bright talented people
- The state lost a tremendous amount of \$
- We struggle with the image left behind: Atlanta can't manage their water.

Drought Restrictions are Not

- Water Conservation.
- A Permanent Solution.
- The Answer.
- Without Consequences.
- Easy to Implement.
- Easily Accepted.

Impact\$

- Revenue Impacts for utilities
 - Ranged 4%-25% immediate and sustained revenue loss
 - In Just 5 of the largest water utilities over \$100 million in capital programs were postponed
 - Several smaller utilities could not meet their bond payment and SRF loan obligations
- Green Industry Impacts
 - Over \$2 billion in lost income
 - 24,000 employees laid off
 - More than 1,000 landscape related businesses closed their doors
- What people remember: Atlanta Ran out of Water
 - The stigma remains

What Can We Do?

- Understand the peak demands on our systems.
- Understand the Value of Reducing those Demands.
- Partner with Green Industry Professionals.
- Prepare Joint Education Documents for Consumers.
- Support the Use of Certified Professionals.
- Learn Landscape and Irrigation BMPs to share with your customers.

Efficient Outdoor Use

Whose Responsibility is It

- Both Industries.
- Water Industry
 - Lessening Impact of Peak Usage
 - Targeting Consumptive Water Use.
 - Lessening Non-point Source Pollution.
- Green Industry
 - Lessen the Severity of Future Restrictions.
 - Save the Customer's Investment.
 - Increase Your Business

Two Voices are Better than One

- Get on the Same Page.
- Share Education Materials.
- Give Joint Workshops.
- Use Each Other for Input and Technical Review.
- Talk about what is possible.
- Have a Realistic Plan moving forward.
- Remember Mutual Respect.

New Way of Looking at Water

- Economic Driver for State.
- Unlike Any other commodity.
 - Significant Environmental Impact.
 - Highly Regulated.
 - A Public Good
 - Essential to all users.
- Costly
 - Societal
 - Financial

Water Has a Value

- True Cost Pricing vs. Marginal Pricing Based upon Historical Sales.
- Build O&M Cost Recovery into the Average Residential Use, Not Assumed Peak Demand.
- Prepare Financially for Efficiency, an incremental decrease in overall water use, coinciding with expanding service demands.
- Efficiency and Conservation are very different from temporary curtailments of water use.
- The Greater the Value the easier to Sell Efficiency to Your Customers.

Lesson's Learned

- Must be very clear in defining drought and emergency response as opposed to conservation
- Need to address as many possible contingencies in advance
- Political leadership must buy-in
- Consistency for all affected utilities in messaging and in implementation.
- There is no way to plan for every possibility – have a network and process for coming to a consensus on these issues
- Work the media plan
- Be clear on the contingency or back up plan
- Have a revenue plan
- Talk to the stakeholders affected before...once the die is cast it is too late tempers are too heated.

What's the Take Away

- Our Customers – One in the Same! **DON'T UNDERSTAND WATER!**
- When Both Industries Carry forth the Same Message it is Stronger.
- Shift the focus of the Customer and the Industry from Cheap and Fast to Efficient and Right.
- Start Requiring More – Landscape Ordinances, Certifications. (based on sound science)
- Site Preparation Requirements. (Results in significant water savings and plant stability and establishment)
- Landscape is Important and so is the Efficient use of a Limited Natural Resource.

Kathy Nguyen
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Cobb County Water System

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