Water Resource Management Efforts

January 26, 2011

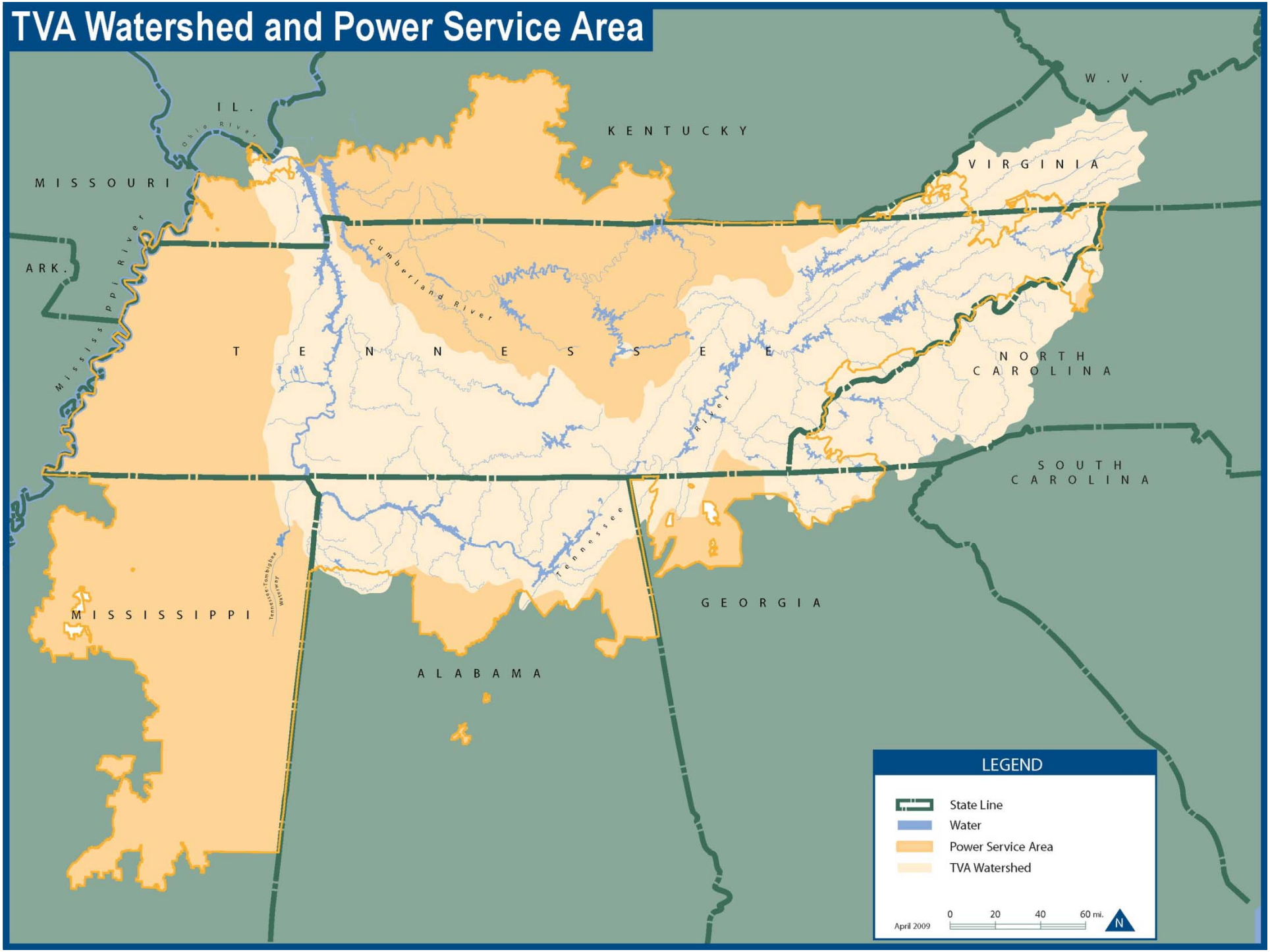
Overview

- TVA Background
- Water Resource Programs
- Partnerships in Alabama
- TVA Natural Resource Plan

TVA Background

- Federal Corporation
- Regional Development Agency
- Nation's Largest Public Power Provider
- Manages Nation's 5th Largest River System
- Financially Self-Sufficient

TVA Watershed and Power Service Area



Water Resource Programs

1. Stream and Reservoir Monitoring
2. Tennessee Valley Clean Marina Initiative
3. Shoreline Stabilization
4. Targeted Watershed Initiatives

Stream and Reservoir Monitoring

Stream and Tailwater

- Assesses ~550 stream sites
- Conducted on 5-year rotation
- Uses biotic indicators (fish and aquatic insects)

Reservoir

- Assesses 31 reservoirs
- Conducted on 2-year rotation
- Multi-component

Tennessee Valley Clean Marina Initiative

Provides information about:

- Sewage management
- Fuel management
- Solid waste recycling
- Stormwater management
- Public education

Shoreline Stabilization

- Reduces erosion
- Protects and improves water quality
- Protects significant cultural resources
- Enhances aquatic and wildlife habitat

Targeted Watershed Initiatives

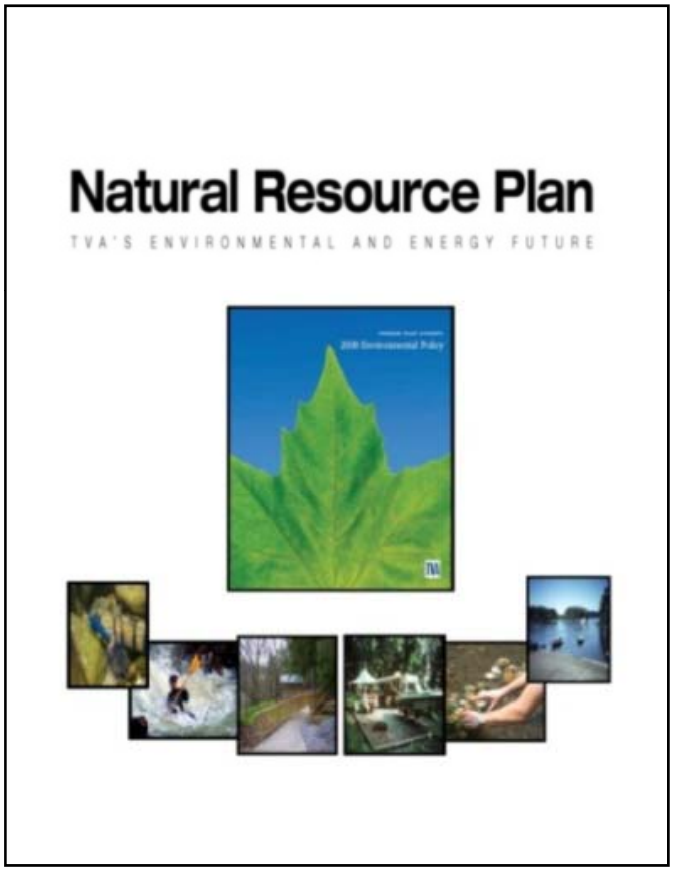
- Target efforts
- Develop local, regional, and national partnerships
- Develop restoration plans
- Secure funding
- Implement restoration projects

Briar Fork/Beaverdam

- Developed Strong Partnership
- Received $600,000
- Implemented Multiple Projects
- Improved Water Quality

TVA's Natural Resource Plan

- Biological and Cultural Resources
- Water Resources
- Recreation
- Lands Planning



TVA Water Resources

- Understand TN River System
- Collaborate with Partners
- Protect and Improve Water Resources

"Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has."

Margaret Mead

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TVA Home Page - www.tva.gov

Matching NPS Pollutants & BMP Installation

2011 Alabama Nonpoint Source Conference

Montgomery, Alabama

Eve Brantley, PhD

Department of Agronomy and Soils, Auburn University

Alabama Cooperative Extension System

ATTENTION!
Coyote trapping in progress.
This trail is closed to the public.
Should an issue involving traps be encountered between 6:00am-4:30pm, call Animal Control 334-501-3090.
After hours, call Auburn Police Dept. 334-501-3100.
City of Auburn
ATTENTION!
The City of Auburn will not be responsible for injury to people or pets who trespass into restricted areas.

What are the Questions?

Causes

- Metals
- Sedimentation
- Pathogens
- Nutrients

Courtesy E. Reutebuch

What are the Questions?

Sources

- Urban Development
- Agriculture
- Surface Mining
- Municipal
- Atmospheric Deposition
- Unknown

What are the Answers?

What are the Answers?

Non-structural

- Planning
- Planning
- Planning

Non-structural

- Cluster development
- Minimize disturbance
- Minimize impervious cover
- Disconnect and distribute stormwater
- Protect or enhance open space, wetlands, and streamside forests

NEMO, Randall Arendt

What Are the Answers?

Structural

- Infiltration
- Volume reduction (green roof, rainwater harvesting)
- Runoff Quality
- Restoration

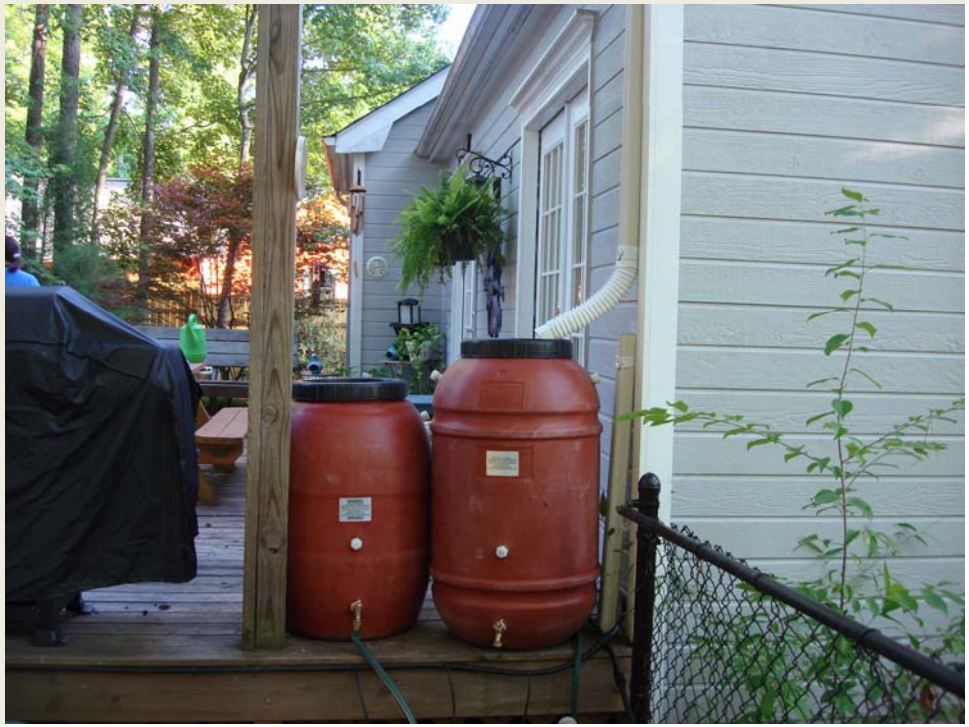
Structural

- Infiltration
  - Infiltration trench
  - Bioretention
  - Vegetation swale
  - Vegetation filter strip

Structural

- Reduce peak volume
  - Green roof
  - Stormwater harvest and reuse

www.healthsafe.uab.edu/



Structural

- Runoff quality
  - Constructed wetland
  - Wet pond
  - Filters

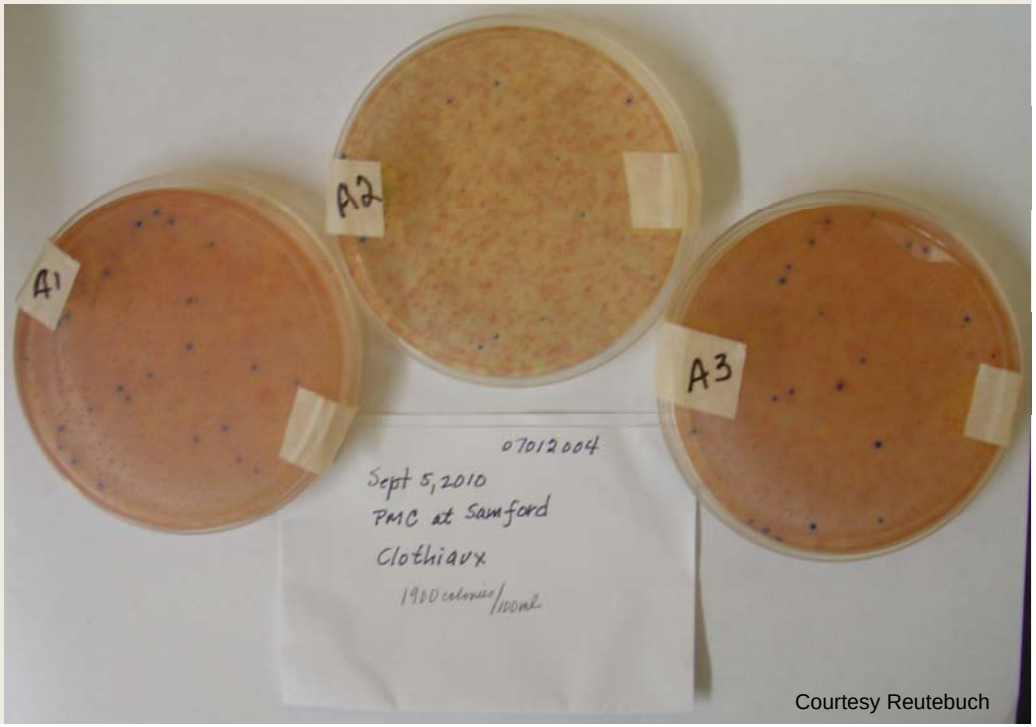
Structural

- Restoration
  - Streamside forest
  - In-stream
  - Floodplain
  - Soil improvement

Selecting Practices

Matching Practices

- Bacteria
  - Leading cause of water impairment
  - Over 10,000 stream segments impacted nationally



Courtesy Reutebuch

International Stormwater BMP Database

Bacteria

- Focus first on source control
- Practices that minimize runoff volumes should reduce bacteria loading from urban runoff
- Wet ponds and various types of media filters should be effective

International Stormwater BMP Database

Nutrients

- As of 2010, over 14,000 water bodies across the country were listed as impaired for nutrients, organic enrichment, algal growth, and/or ammonia.
- Phosphorus and nitrogen

International Stormwater BMP Database

Nutrients

- Phosphorus
  - Generally particulate-bound.
  - BMPs with permanent polls that encourage sedimentation and filtration provide removal for phosphorus
  - Minimize re-suspension of particulates and avoid using media that has phosphorus in it

Nutrients

- Nitrogen
  - BMPs that allow for aerobic and anaerobic zones should assist in removal of inorganic and organic nitrogen
  - Pool followed by vegetated swale or media filter, internal water storage in bioretention

International Stormwater BMP Database

Who wants to learn even more about pollutant removal efficiencies?

Google

http://www.google.com/

Apple – Start Apple Yahoo! Google Maps YouTube Wikipedia News (1902) Popular

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Google

stormwater bmp pollutant removal

Search

Instant is on

About 48,000 results (0.16 seconds)

Advanced search

Everything
Images
Videos
News
Shopping
More

Auburn, AL
Change location

Show search tools

Scholarly articles for **stormwater bmp pollutant removal**

Determining urban **stormwater BMP** effectiveness - Strecker - Cited by 82
... **Removal** Performance Database for **Stormwater** ... - Winer - Cited by 46
Pollutant removal by a **stormwater** dry detention pond - Stanley - Cited by 35

[PDF] Appendix B. **BMP Pollutant Removal** Efficiency
File Format: PDF/Adobe Acrobat - Quick View
Pollutant Removal Efficiencies for **Best Management Practices** for Use in Pollutant ... **BMP**. Notes. Lit. Ref. TSS. TN. TP. **Stormwater**. Ponds. Wet Pond. E. F ...
des.nh.gov/organization/divisions/.../**stormwater**/.../wd-08-20b_apxb.pdf - Similar

[PDF] National **Pollutant Removal** Performance Database
File Format: PDF/Adobe Acrobat - Quick View
removal values for each major group of **stormwater BMPs**. The data are presented as box and whisker plots for the various **pollutants** found in stormwater ...
www.**stormwater**ok.net/.../CWP-07%20Natl%20**Pollutant**%20**Removal**%20Perform%20Database.pdf - Similar

[PDF] **Stormwater Pollutant Removal** Criteria
File Format: PDF/Adobe Acrobat - Quick View
New Jersey **Stormwater Best Management Practices** Manual • Chapter 4: Stormwater **Pollutant Removal** Criteria • February 2004 • Page 4-2 ...
www.state.nj.us/dep/**stormwater**/**bmp**_manual/NJ_SW**BMP**_4%20print.pdf

Downloads | **Stormwater** Management Publications
National **Pollutant Removal** Performance Database for Stormwater Treatment Practices, ...
Stormwater BMP Design Supplement for Cold Climates (D. Caraco, ...
www.cwp.org/.../cat.../76-**stormwater**-management-publications.html - Cached

[PDF] Cost and **Pollutant Removal** of **Storm-Water** Treatment Practices
File Format: PDF/Adobe Acrobat - Quick View
by PT Weiss - 2007 - Cited by 15 - Related articles
Feb 19, 2009 ... off that will be treated by the **storm-water BMP**, the **pollutant** load that reaches the **storm-water BMP**, and the **removal** performance ...
www.natsys-inc.com/.../cost-and-**pollutant-removal**-of-**storm-water**-treatment-practices_weiss_gulliver_erickson_2007.pdf

Storm Water BMP - Best Management Practice for Storm Water
Storm water BMP chambers are less expensive, quicker and easier to install ... and technologically advanced storage and **pollutant removal** solution that is ...
www.stormchambers.com/stormchamber.html - Cached - Similar

Ads

Stormwater Solutions
Proven, Effective & Economical Solution For **Stormwater** Treatment
www.filterra.com

Storm Drain Inlet Filters
Filter metals oil pathogens trash
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www.clear**waterbmp**.com

Stormwater Treatment
Removes Hydrocarbons & **Pollutants** to Meet NPDES Phase 2 Requirements
www.remfilters.com

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International Stormwater BMP Database

Median of Average Influent and Effluent Concentrations of Best Management Practices

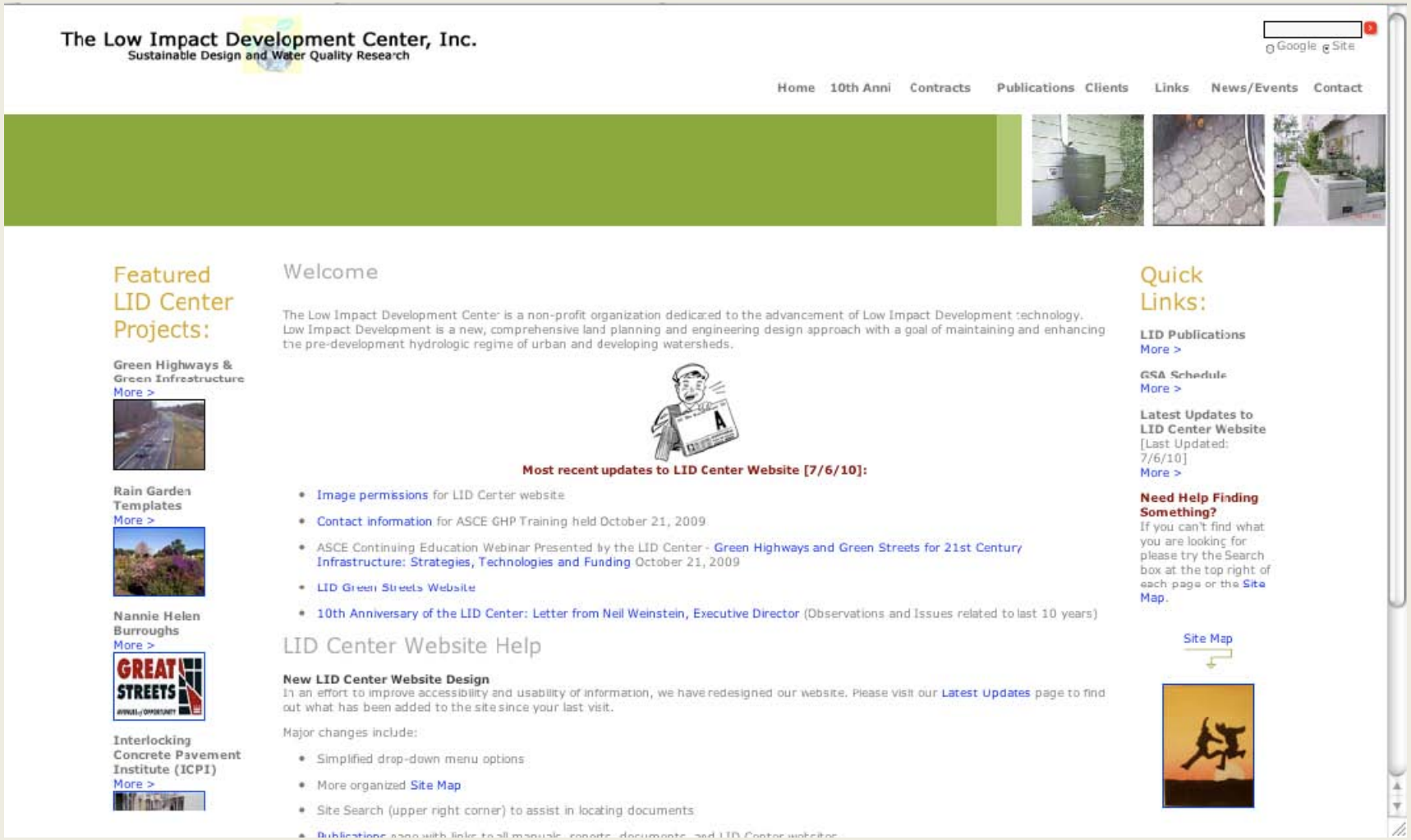
Constituents	Sample Location	Detention Pond (n=35)[1]	Wet Pond (n=46)[1]	Wetland Basin (n=19)[1]	Biofilter (n=67)[1]	Media Filter (n=30)[1]	Hydrodynamic Devices (n=32)[1]	Porous Pavement (n=6)[1]
Suspended Solids (mg/L)	Influent	72.65 (41.70-103.59)	34.13 (19.16-49.10)	37.76 (18.10-53.39)	52.15 (41.41-62.88)	43.27 (27.25-59.30)	39.81 (21.95-76.27)	xx
	Effluent	31.04 (16.07-46.01)	13.37 (7.29-19.45)	17.77 (9.26-26.29)	23.92 (15.07-32.78)	15.66 (9.74-21.58)	37.67 (21.28-54.02)	18.96 (5.90-45.72)
Total Cadmium (µg/L)	Influent	0.71 (0.45-1.28)	0.49 (0.20-0.79)	0.36 (0.11-0.60)	0.54 (0.40-0.67)	0.25 (0.12-0.49)	0.74 (0.37-1.11)	xx
	Effluent	0.47 (0.25-0.67)	0.27 (0.12-0.61)	0.24 (0.11-0.55)	0.30 (0.26-0.35)	0.19 (0.1-0.37)	0.57 (0.25-1.33)	xx
Dissolved Cadmium (µg/L)	Influent	0.24 (0.15-0.33)	0.19 (0.10-0.28)	xx	0.25 (0.21-0.28)	0.16 (0.11-0.21)	0.33 (0.11-0.55)	xx
	Effluent	0.25 (0.17-0.38)	0.11 (0.09-0.15)	xx	0.21 (0.19-0.23)	0.13 (0.10-0.16)	0.31 (0.13-0.71)	xx
Total Copper (µg/L)	Influent	20.14 (8.41-31.79)	8.91 (5.29-12.52)	5.65 (2.67-38.61)	31.93 (25.25-38.61)	14.57 (10.87-18.27)	15.42 (9.20-21.63)	xx
	Effluent	12.10 (5.41-18.80)	6.36 (4.70-8.01)	4.23 (0.82-7.63)	10.68 (7.88-13.60)	10.25 (8.21-12.29)	14.17 (8.33-20.01)	2.78 (0.88-8.78)
Dissolved Copper (µg/L)	Influent	6.66 (0.73-12.59)	7.33 (5.40-9.26)	xx	14.15 (10.14-18.16)	7.75 (4.55-10.96)	13.59 (9.82-17.36)	xx
	Effluent	7.37 (3.28-11.45)	4.37 (3.73-5.73)	xx	8.40 (5.85-11.45)	9.00 (7.28-10.72)	13.92 (4.40-23.44)	xx
Total Chromium (µg/L)	Influent	7.36 (5.49-9.88)	6.00 (3.58-10.06)	xx	5.63 (4.49-7.05)	2.18 (1.66-2.86)	4.07 (2.39-6.91)	xx
	Effluent	3.10 (2.10-4.84)	1.44 (0.79-2.66)	xx	4.64 (3.06-6.98)	1.48 (0.82-2.70)	3.52 (2.14-5.80)	xx
Total Lead (µg/L)	Influent	25.01 (12.06-37.95)	14.36 (8.32-20.40)	4.82 (1.43-11.89)	19.53 (10.11-28.95)	11.32 (6.09-16.55)	16.12 (5.70-30.53)	xx
	Effluent	15.77 (4.67-26.87)	5.32 (1.63-9.01)	3.26 (2.31-4.22)	6.70 (2.81-10.59)	3.78 (1.06-6.44)	10.56 (4.27-16.85)	7.98 (1.84-37.98)
Dissolved Lead (µg/L)	Influent	1.25 (0.33-2.17)	3.40 (1.12-5.68)	0.50 (0.33-0.67)	2.25 (0.77-3.74)	1.44 (1.05-1.82)	1.69 (0.83-2.95)	xx
	Effluent	2.06 (0.93-3.19)	2.48 (0.96-5.36)	0.87 (0.85-0.89)	1.96 (1.26-2.67)	1.18 (0.77-1.60)	3.34 (2.22-4.47)	xx
Total Zinc (µg/L)	Influent	111.56 (51.50-171.63)	60.75 (45.23-76.27)	47.07 (24.47-90.51)	176.71 (128.20-225.15)	92.34 (52.29-132.40)	119.06 (73.50-164.67)	xx
	Effluent	60.20 (20.70-99.70)	29.35 (21.13-37.58)	30.71 (12.80-48.59)	39.83 (28.01-51.58)	37.60 (18.80-56.40)	80.17 (52.72-107.61)	19.60 (5.91-46.84)
Dissolved Zinc (µg/L)	Influent	28.11 (5.20-75.10)	47.46 (37.65-57.27)	xx	59.31 (32.49-79.18)	69.27 (37.97-100.58)	35.93 (4.96-66.90)	xx
	Effluent	25.84 (10.75-40.93)	32.86 (17.70-48.01)	xx	25.40 (18.71-32.09)	51.25 (29.04-73.46)	42.46 (10.38-74.55)	xx
Total Phosphorus (mg/L)	Influent	0.19 (0.17-0.22)	0.21 (0.13-0.29)	0.27 (0.11-0.43)	0.25 (0.22-0.28)	0.20 (0.15-0.26)	0.24 (0.01-0.46)	xx
	Effluent	0.19 (0.12-0.27)	0.12 (0.09-0.16)	0.14 (0.04-0.24)	0.34 (0.26-0.41)	0.14 (0.11-0.16)	0.26 (0.12-0.48)	0.09 (0.05-0.15)
Dissolved Phosphorus (mg/L)	Influent	0.09 (0.06-0.13)	0.09 (0.06-0.13)	0.10 (0.04-0.22)	0.09 (0.07-0.11)	0.09 (0.03-0.14)	0.06 (0.01-0.11)	xx
	Effluent	0.12 (0.07-0.18)	0.08 (0.04-0.11)	0.17 (0.03-0.31)	0.44 (0.21-0.67)	0.09 (0.07-0.11)	0.09 (0.04-0.13)	xx
Total Nitrogen (mg/L)	Influent	1.25 (0.83-1.66)	1.64 (1.39-1.94)	2.12 (1.58-2.66)	0.94 (0.94-1.69)	1.31 (1.19-1.42)	1.25 (0.33-2.16)	xx
	Effluent	2.72 (1.81-3.63)	1.43 (1.17-1.68)	1.15 (0.82-1.82)	0.78 (0.53-1.03)	0.78 (0.62-0.89)	2.01 (1.37-2.65)	xx
Nitrate-Nitrogen (mg/L)	Influent	0.70 (0.35-1.05)	0.36 (0.21-0.51)	0.22 (0.01-0.47)	0.59 (0.44-0.73)	0.41 (0.30-0.51)	0.40 (0.06-0.73)	xx
	Effluent	0.58 (0.25-0.91)	0.23 (0.13-0.37)	0.13 (0.07-0.20)	0.60 (0.41-0.79)	0.82 (0.60-1.05)	0.51 (0.09-1.34)	xx
TKN (mg/L)	Influent	1.45 (0.97-1.94)	1.26 (1.03-1.49)	1.15 (0.81-1.49)	1.80 (1.62-1.99)	1.52 (1.07-1.96)	1.09 (0.52-1.67)	xx
	Effluent	1.89 (1.58-2.19)	1.09 (0.87-1.31)	1.05 (0.82-1.34)	1.51 (1.24-1.78)	1.55 (1.22-1.83)	1.46 (0.87-2.47)	1.23 (0.44-3.44)

[1] Actual number of BMPs reporting a particular constituent may be greater or less than the number reported in this table, which was based on number of studies reported in database based on BMP category.

Notes: xx- Lack of sufficient data to report median and confidence interval. Values in parenthesis are the 95% confidence intervals about the median. Differences in median influent and effluent concentrations does not necessarily indicate that there was a statistically significant difference between influent and effluent. See "Analysis of Treatment System Performance, International Stormwater BMP Database (1997-2007) (Geosyntec and WWE 2007) for more detailed information. Source: International Stormwater BMP Database June 2008 (www.bmpdatabase.org)

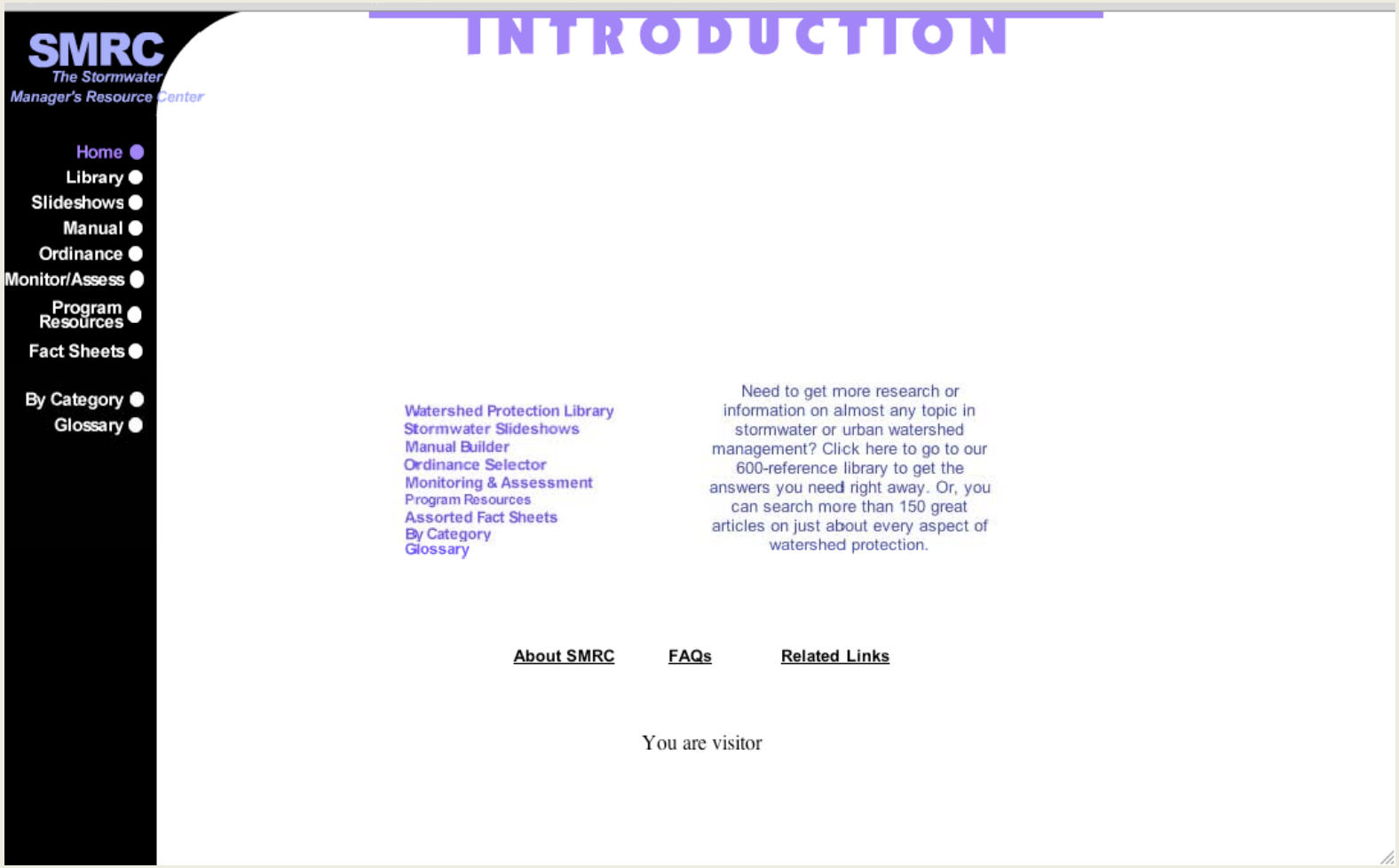
Low Impact Development Center

www.lowimpactdevelopment.org/



Stormwater Manager's Resource Center

www.stormwatercenter.net/



What is next?

Case Study

- Nitrogen (NO_2 and NO_3) loads reduced by 64%
- Phosphorus loads reduced by 28%
- Estimated sediment retention 500 million tons / year
- Statistically significant decrease in fecal coliforms
- Urban watershed ~ 30% impervious in some sub-watersheds

Ecosystem Restoration

1. 600 m stream &floodplain restoration
2. 1.6 ha stormwater reservoir & wetland complex
3. 0.5 ha Surface flow treatment wetland

PRE-RESTORATION STREAM CHANNEL

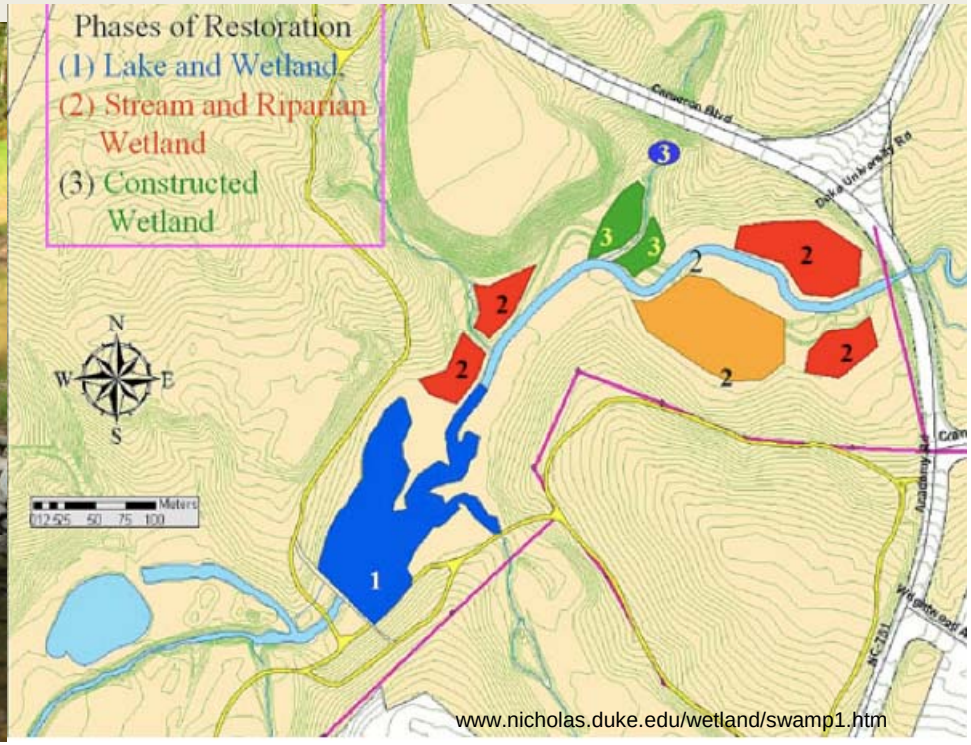
RESTORED STREAM CHANNEL

www.nicholas.duke.edu/wetland/swamp1.htm

Richardson, C.J. et al., Integrated stream and wetland restoration: A watershed approach to improved water quality on the landscape. Ecol. Eng. (2010)

Other Benefits

- Reduced downstream water pulses and stream erosion
- Wetland biogeochemistry transformations improved stream quality (aka ecosystem services) (aka I just like saying wetland biogeochemistry transformations)



www.nicholas.duke.edu/wetland/swamp1.htm

Ecosystem Functions

- Eco = House

Living

Primary producers

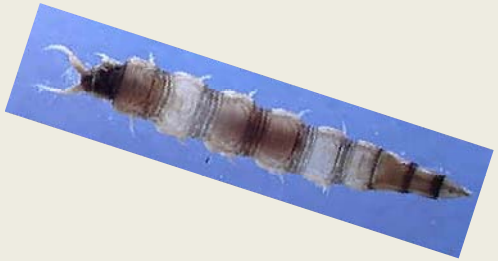
Herbivores

Carnivores

Omnivores

Detritivores

www.sprcentre.co.uk/



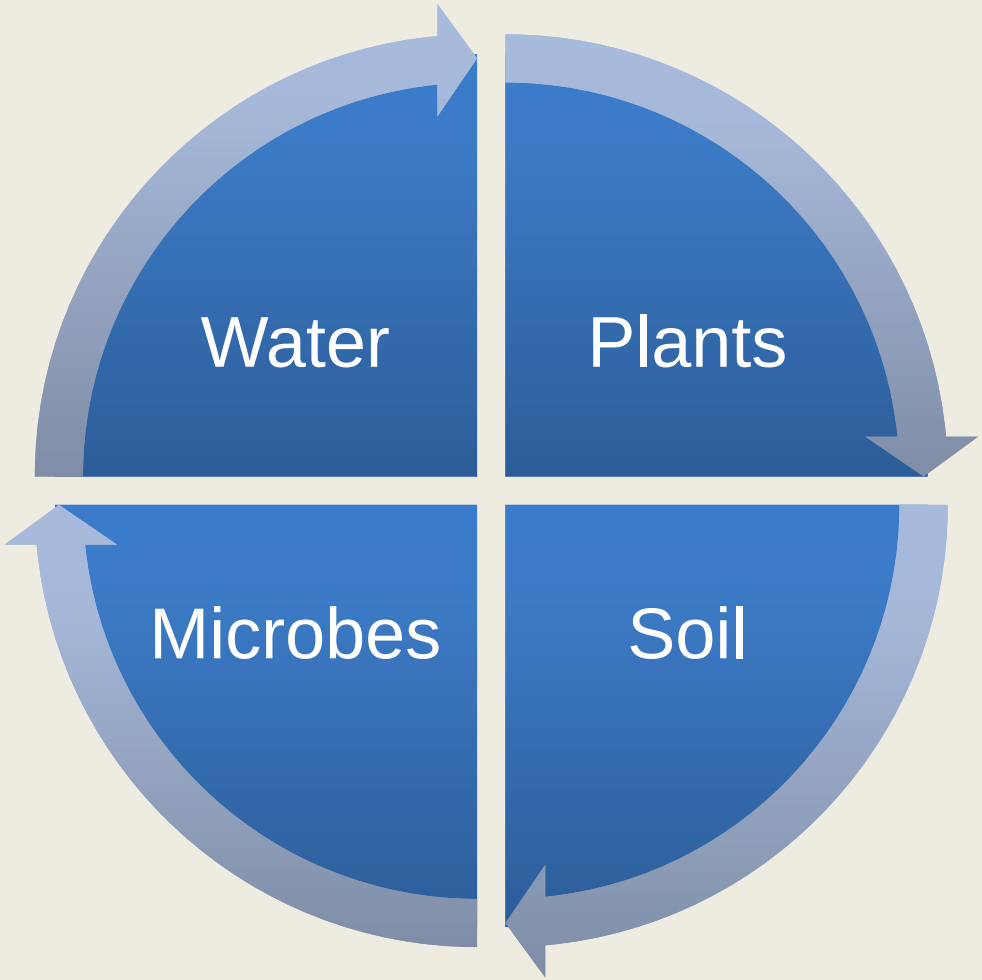
Ecosystem Functions

- Eco = House

Nonliving Influences

- Sunlight
- Temperature
- Precipitation
- Chemical reactions

Balance



Ecosystem Functions & Services

- When the functions benefit society = services
  - Pollutant transformation
  - Water supply
  - Flood control
  - Food production
  - Biodiversity
  - Carbon sequestration

Meaningful Ecosystem Restoration

- Understand causes and sources
- Assess impacts
- Develop realistic goals
- Combine structural and non-structural practices
- Measurable improvement of functions

02.26.2010

Watershed Change(s)

Hydrology Alterations

Increased Sediment Load

Stream Response

Ecosystem
Function Impact

Courtesy Dan Ballard

Watershed Approach

Do People Care?

1. Topic is not something common citizens wish to take the time to study and understand.

2. Problem appears to be so large and complicated that it’s outside of the scope of interest or action by current citizens.

3. Concerns about the current costs of action.

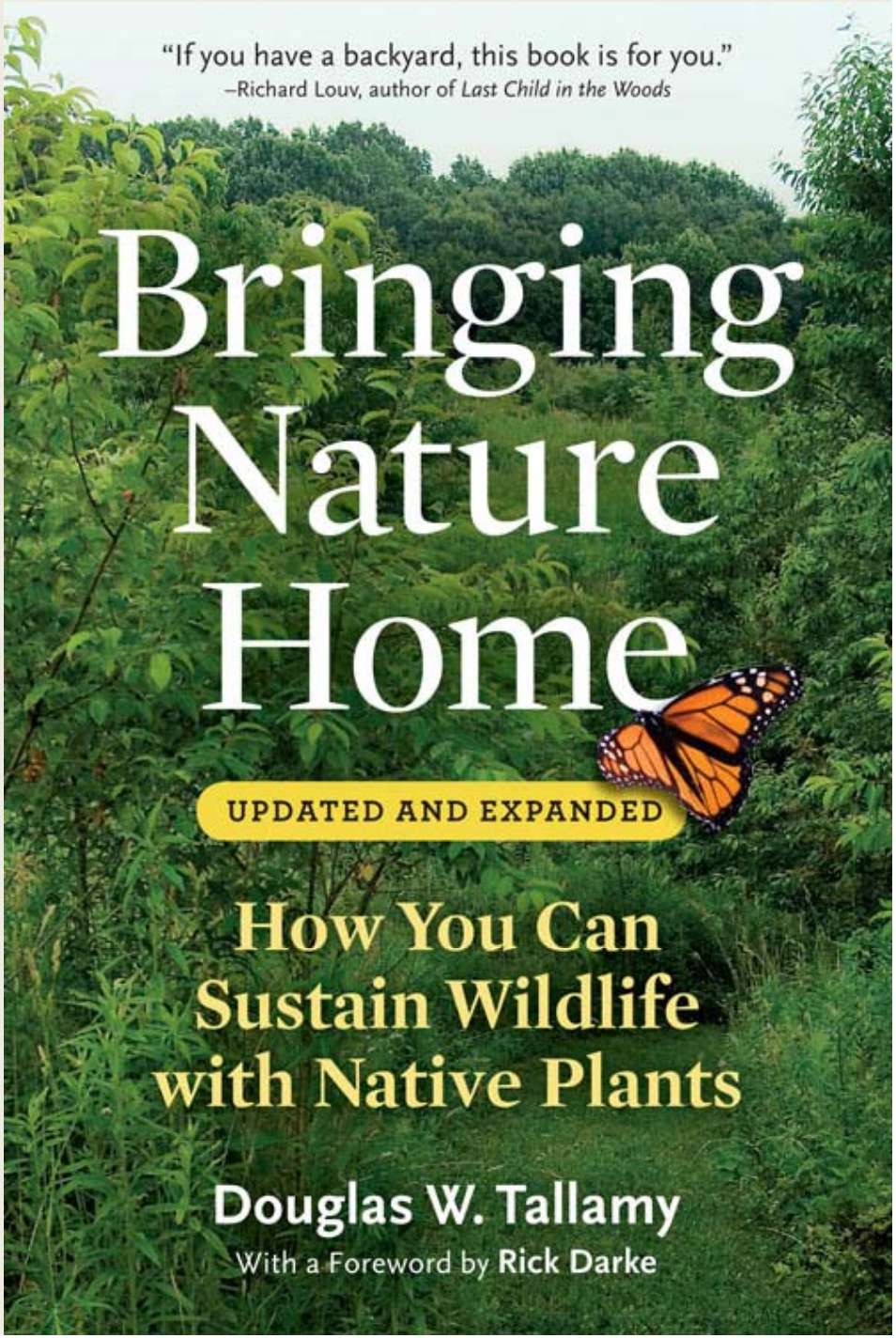
Research, Demonstration, & Education

- Seeing helps with understanding
- If a picture is worth a thousand words …

MUFFLER

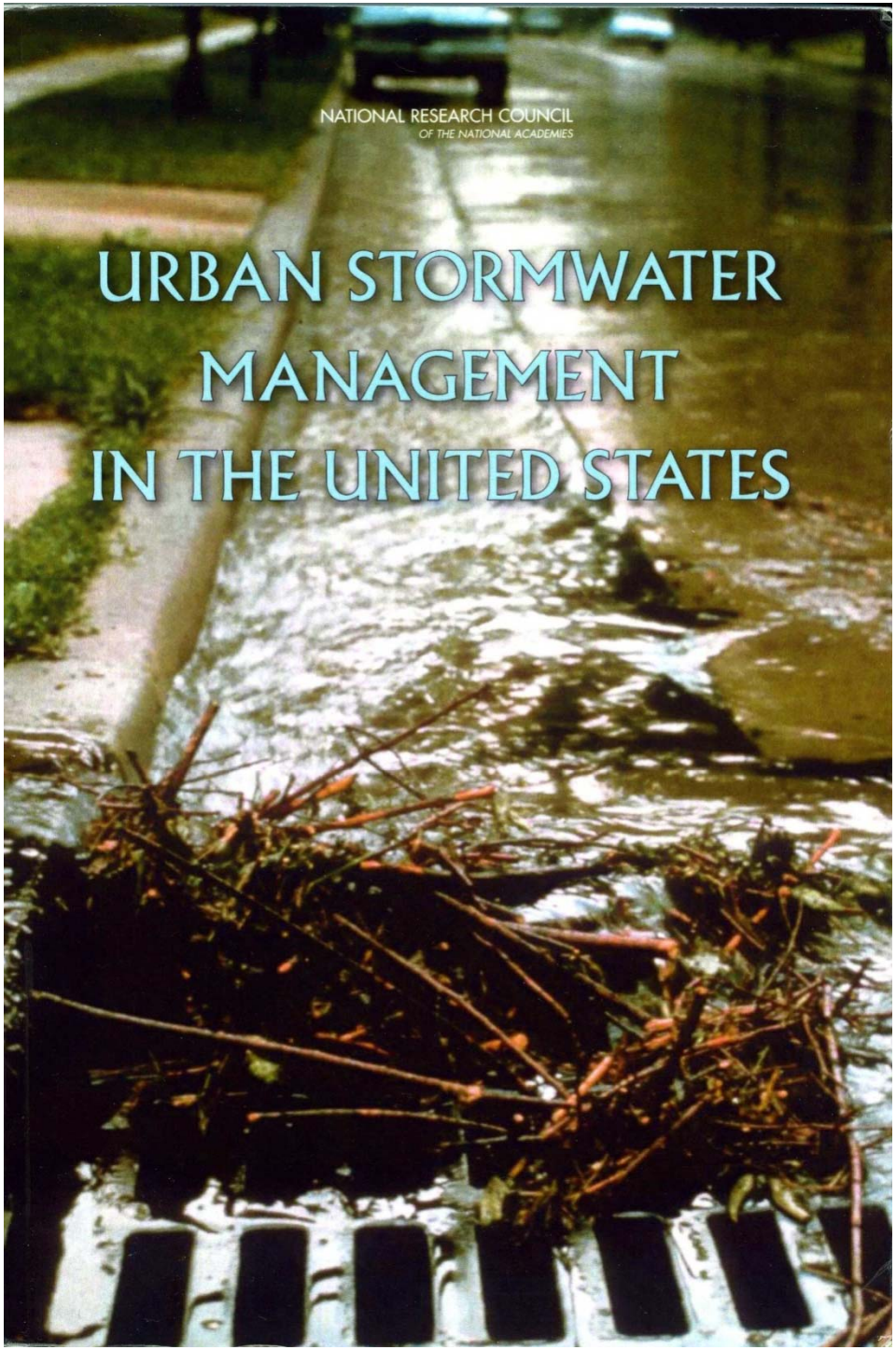
sell
h School

Something we can all do.



Costs & Pollutant Removal Benefits of Stormwater Controls

Bob Pitt
Cudworth Professor of Environmental Engineering
The University of Alabama
Tuscaloosa, AL 35487



Urban Stormwater Management in the United States, 2009. Technical Committee Report Prepared under the Water Science and Technology Board, National Research Council

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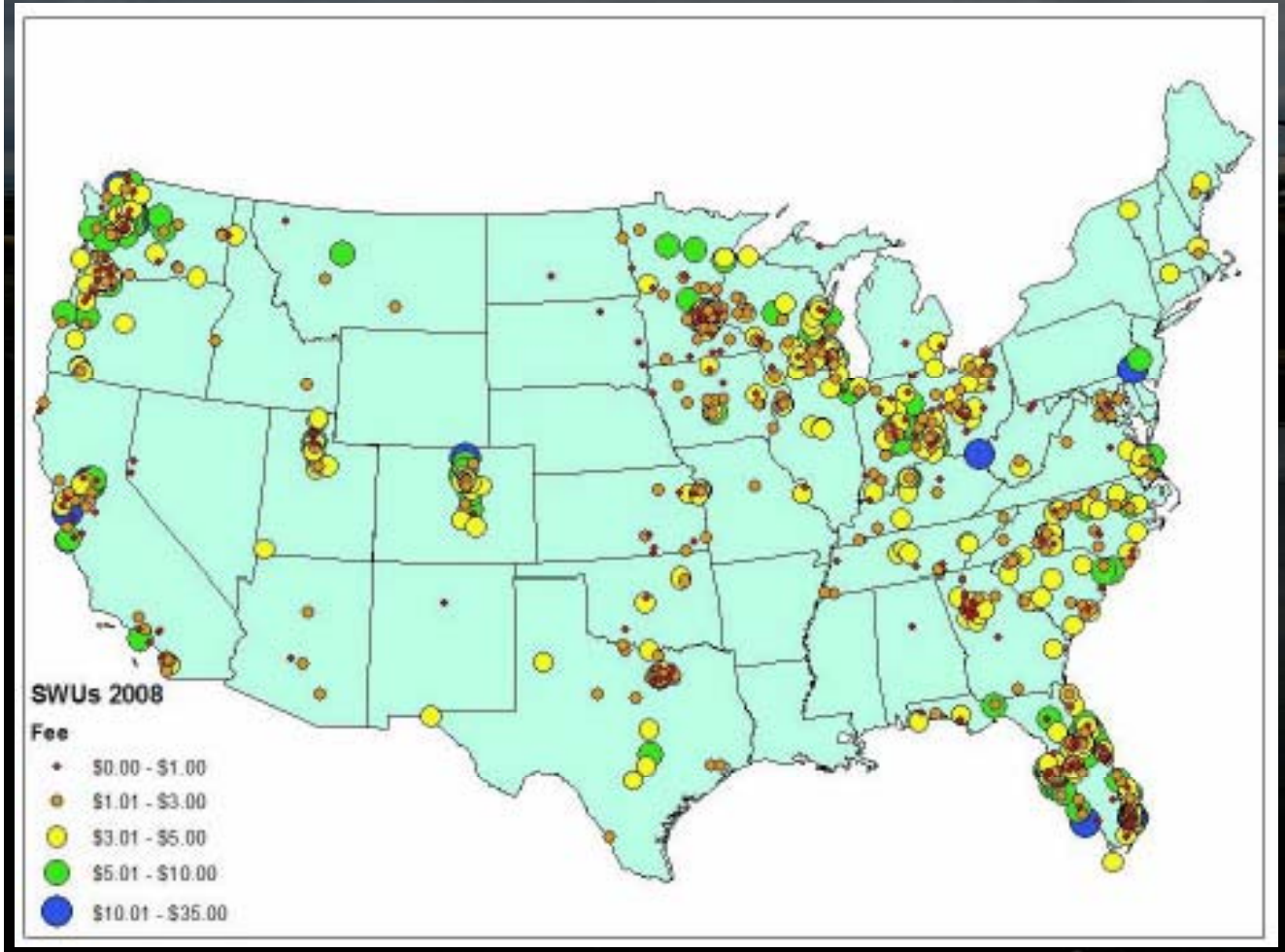
Wendy Wagner, University of Texas School of Law

William E. Wenk, Wenk Associates, Inc.

Federal Regulations, State Programs, and Local Codes (Chapter 2)

- EPA Stormwater Program: 100,000s permits for municipalities, industries, construction
- Committee survey to better understand monitoring requirements, compliance, staffing, etc.



Distribution of stormwater utility fees (Western Kentucky University Stormwater Utility Survey, Campbell and Back 2008). Up to $35 per month; typical costs are $3 to 5 per month.

Stormwater Control Measures (SCMs) (Chapter 5)

- 20 broad categories of SCMs
  - Characteristics, applicability, goals, effectiveness, cost
- Organized as they might be applied from rooftop to stream

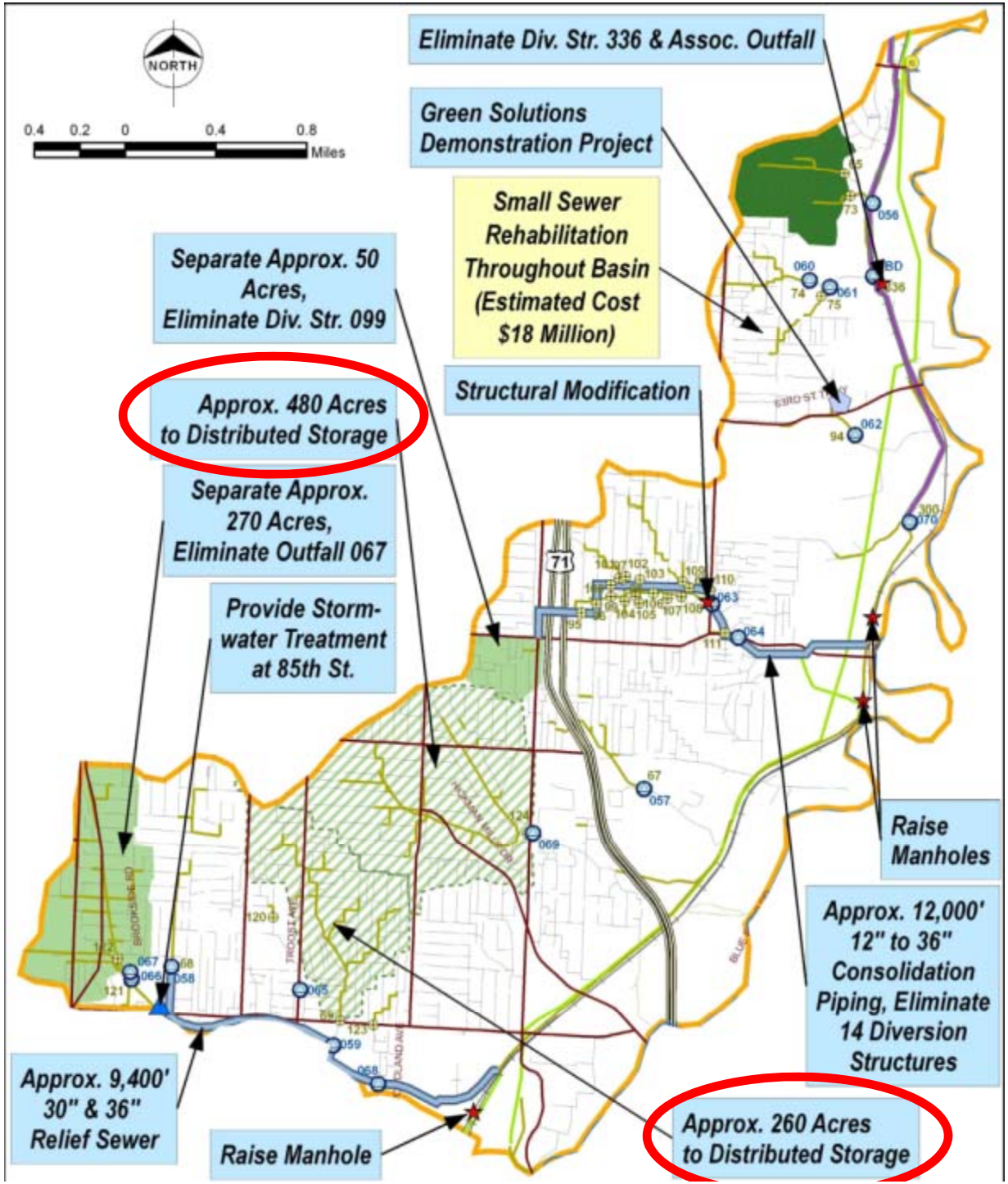
TABLE 5-1 Summary of Stormwater Control Measures—When, Where, and Who

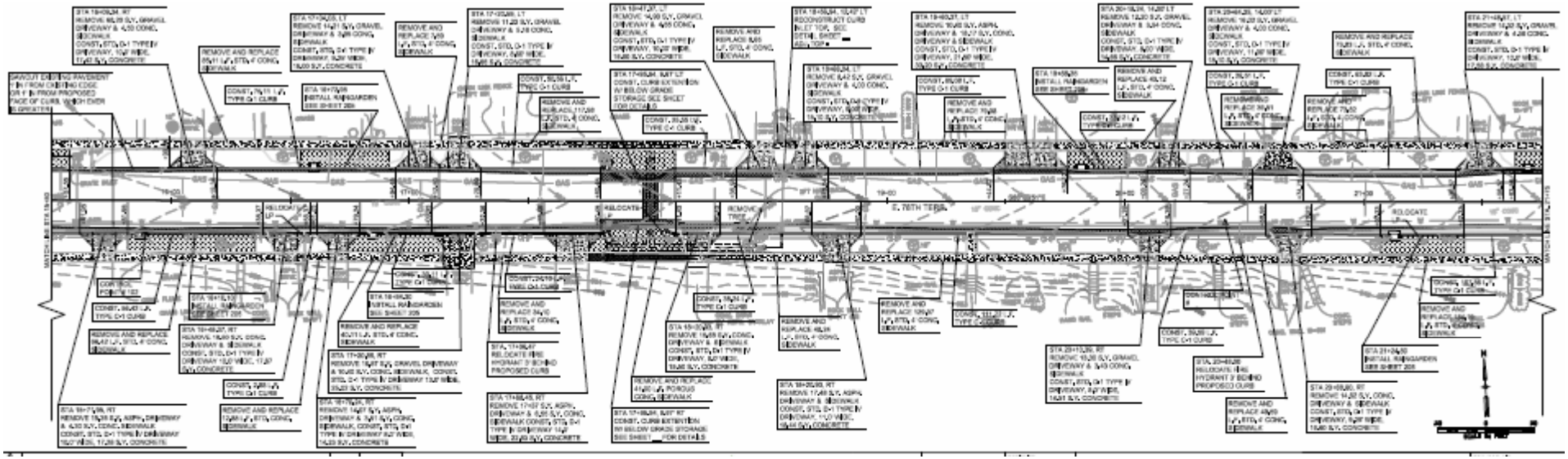
Stormwater Control Measure	When	Where	Who
Product Substitution	Continuous	National, state, regional	Regulatory agencies
Watershed and Land-Use Planning	Planning stage	Watershed	Local planning agencies
Conservation of Natural Areas	Site and watershed planning stage	Site, watershed	Developer, local planning agency
Impervious Cover Minimization	Site planning stage	Site	Developer, local review authority
Earthwork Minimization	Grading plan	Site	Developer, local review authority
Erosion and Sediment Control	Construction	Site	Developer, local review authority
Reforestation and Soil Conservation	Site planning and construction	Site	Developer, local review authority
Pollution Prevention SCMs for Stormwater Hotspots	Post-construction or retrofit	Site	Operators and local and state permitting agencies
Runoff Volume Reduction—Rainwater harvesting	Post-construction or retrofit	Rooftop	Developer, local planning agency and review authority
Runoff Volume Reduction—Vegetated	Post-construction or retrofit	Site	Developer, local planning agency and review authority
Runoff Volume Reduction—Subsurface	Post-construction or retrofit	Site	Developer, local planning agency and review authority
Peak Reduction and Runoff Treatment	Post-construction or retrofit	Site	Developer, local planning agency and review authority
Runoff Treatment	Post-construction or retrofit	Site	Developer, local planning agency and review authority
Aquatic Buffers and Managed Floodplains	Planning, construction and post-construction	Stream corridor	Developer, local planning agency and review authority, landowners
Stream Rehabilitation	Postdevelopment	Stream corridor	Local planning agency and review authority
Municipal Housekeeping	Postdevelopment	Streets and storm-water infrastructure	MS4 Permittee
Illicit Discharge Detection and Elimination	Postdevelopment	Stormwater infrastructure	MS4 Permittee
Stormwater Education	Postdevelopment	Stormwater infrastructure	MS4 Permittee
Residential Stewardship	Postdevelopment	Stormwater infrastructure	MS4 Permittee

Note: Nonstructural SCMs are in italics.

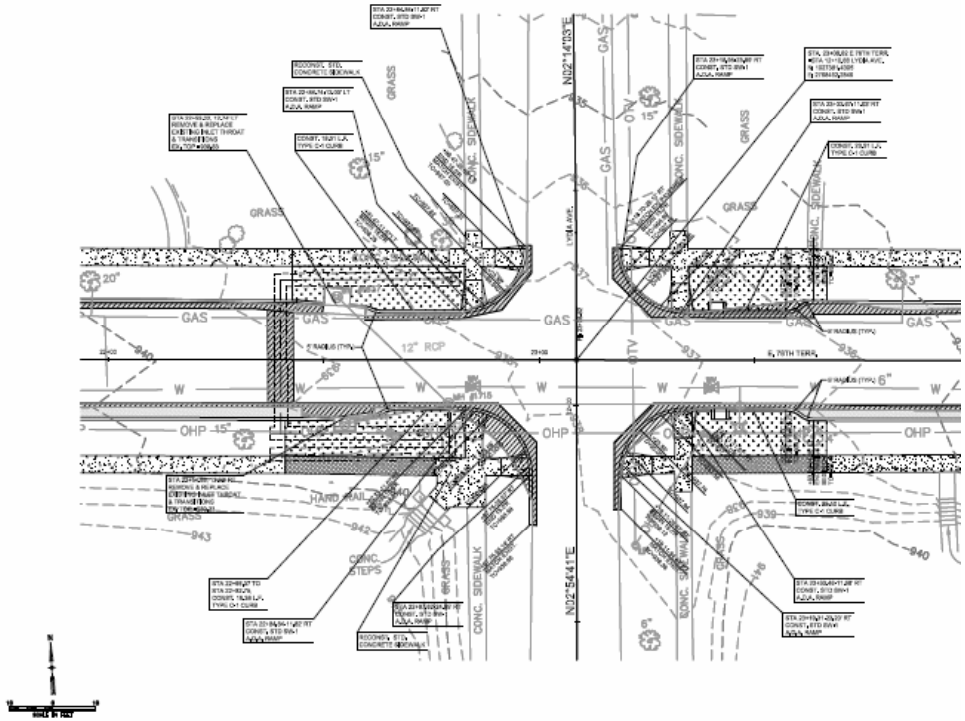
Many of the US's largest stormwater control programs are currently being conducted as part of CSO control programs.

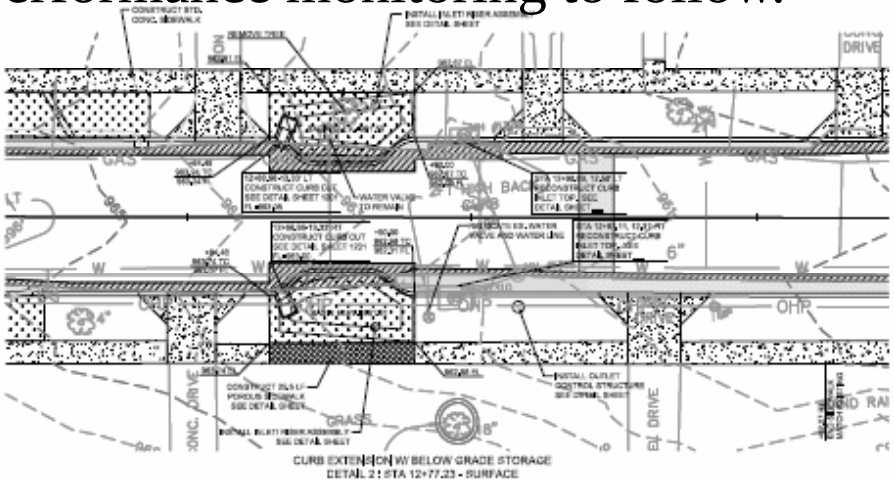
Kansas City's Revised Middle Blue River Plan with Distributed Storage and Green Infrastructure (first time required in consent decree).



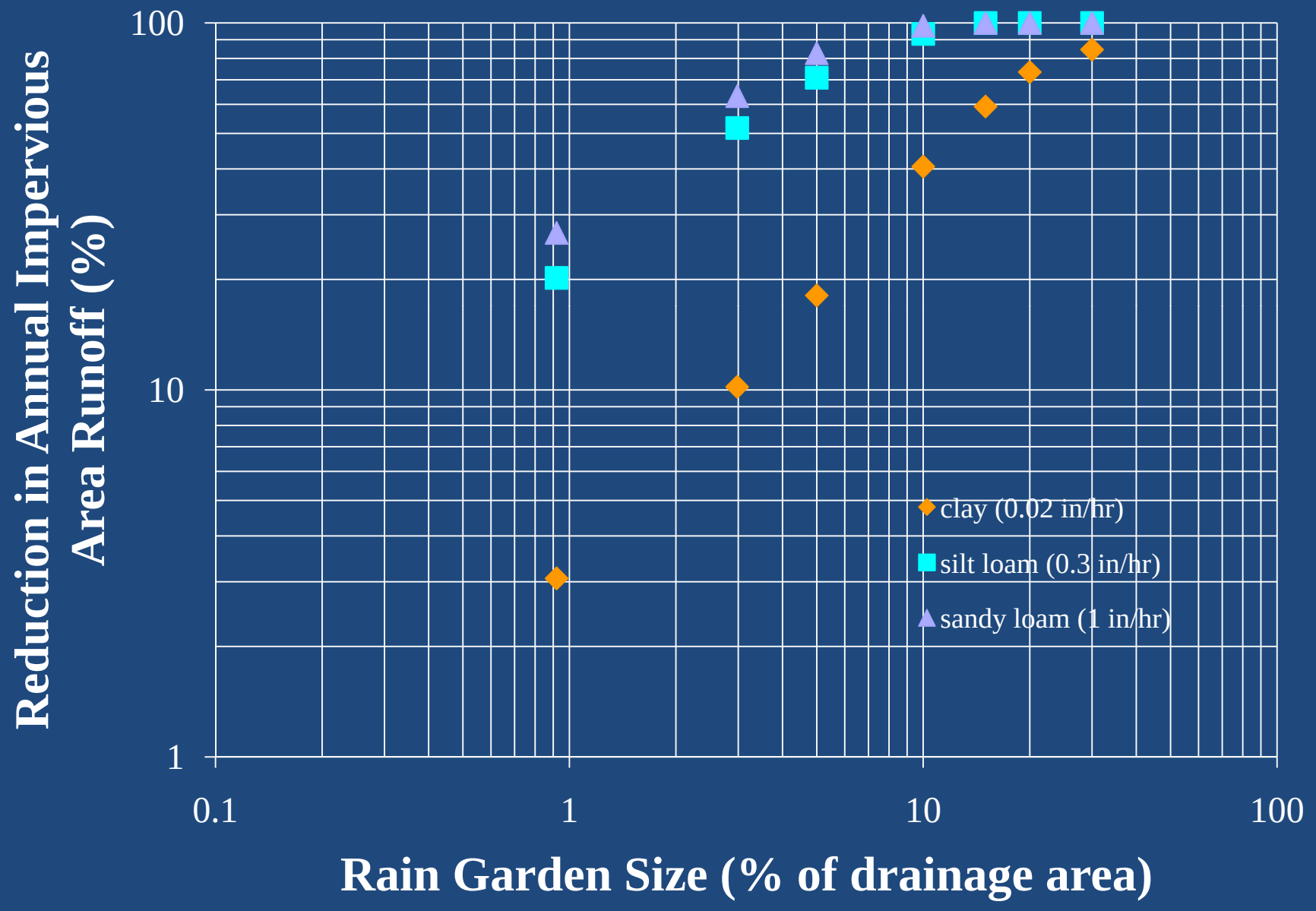


Examples from “65%” plans prepared by URS for project streets. Plans reviewed and modeled by project team, and construction will occur in spring and summer of 2011; performance monitoring to follow.





Annual Runoff Reductions from Paved Areas or Roofs for Different Sized Rain Gardens for Various Soils



Economic Viability of Green Infrastructure in Kansas City

($21,700/acre; other watersheds in area can cost $50,000/acre, but still less than gray controls)

	Control Components for One Example Subarea in Kansas City (preliminary costs, project going out to bid early 2011):	Est. Capital Cost ($M)	Storage Provided (M gal)	Unit Capital Cost ($/gal Stored)
Gray Controls Only	Outfall 059 (475 acres; 19% imperviousness): 1 M gal Storage Tank 0.5 MGD Pumping Station 17 MGD Screening 2,000 ft 48-in. Sewer 500 ft 8-in. Force Main Odor Control	20.0	1.0	20.00
Green Solutions	Stormwater Inlet Retrofits	0.7	0.1	2.00-7.00
	Porous Pavement Parking Lots	1.9	0.325	5.50
	Curb Extension Swales	4.1	0.30	11.00
	Porous Pavement in Street ROW	3.6	0.40	11.00
	Green Solution Totals	10.3	1.125	9.00

USGS
science for a changing world

In cooperation with the Wisconsin Department of Natural Resources

A Comparison of Runoff Quantity and Quality from Two Small Basins Undergoing Implementation of Conventional- and Low-Impact-Development (LID) Strategies: Cross Plains, Wisconsin, Water Years 1999–2005

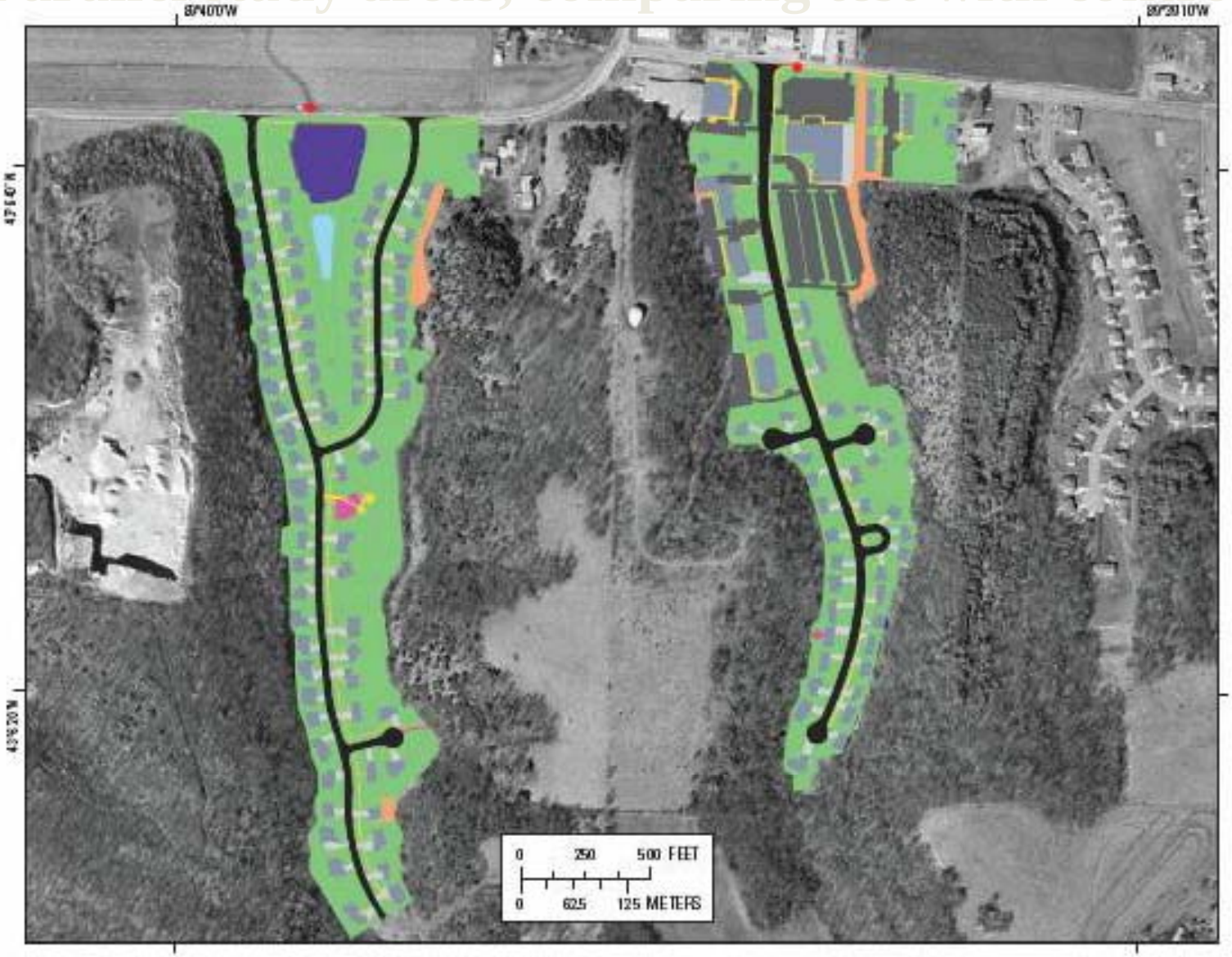
Scientific Investigations Report 2008–5008

U.S. Department of the Interior
U.S. Geological Survey

The most comprehensive full-scale study comparing advanced stormwater controls available.

Available at: http://pubs.usgs.gov/sir/2008/5008/pdf/sir_2008-5008.pdf

Parallel study areas, comparing test with control site



Base from Dane County Land Information Office Orthophotography, 1:10,000, 2005, Wisconsin Transverse Mercator projection, NAD 83/91.
Orthophoto from U.S. Geological Survey, 1:12,000, 2000, Wisconsin Transverse Mercator projection, NAD 83/91.

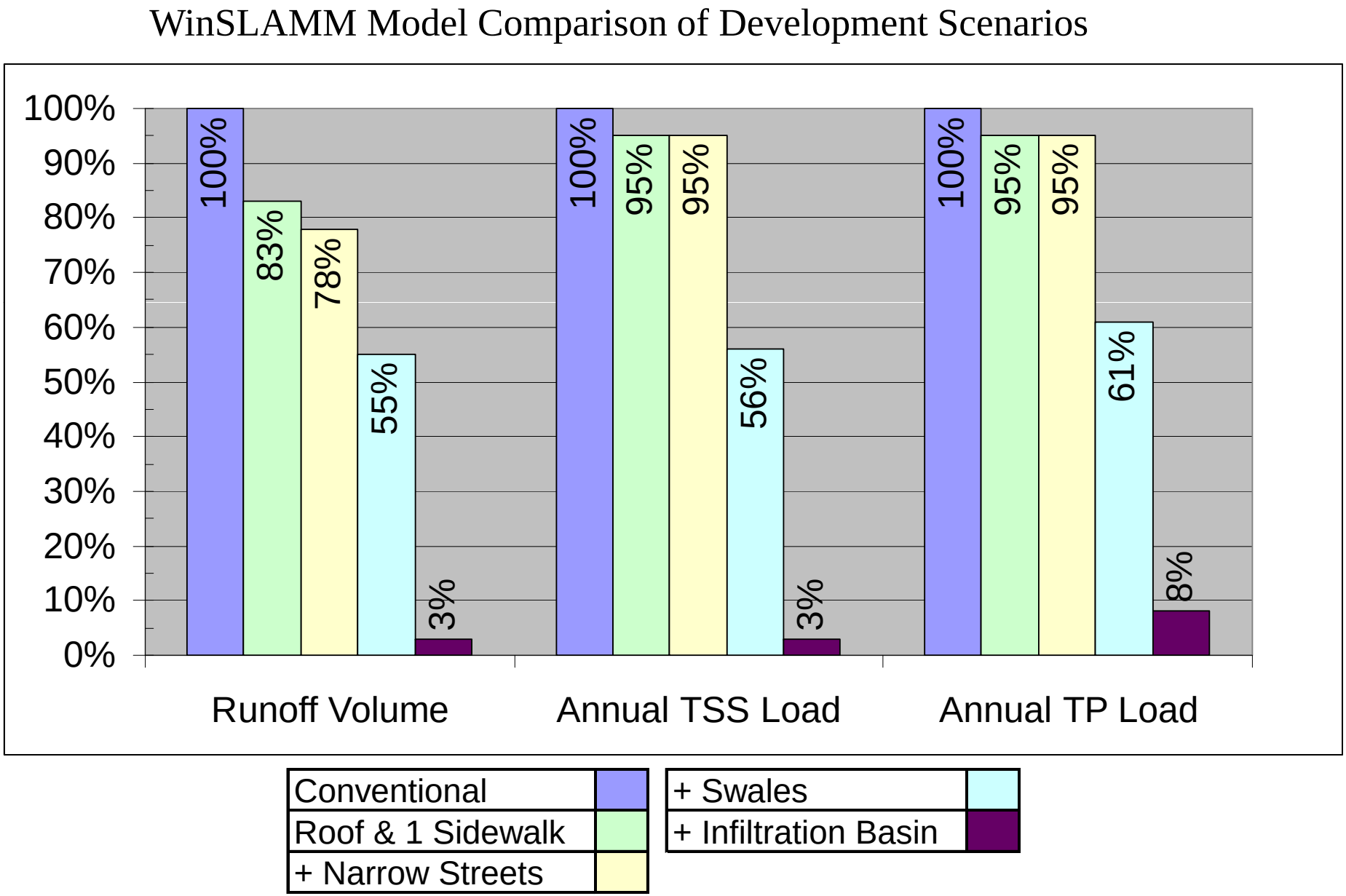
Figure 2. Land use in the low-impact-development (left) and conventional-development (right) basins and location of water-quality monitoring s

WISCONSIN
Dane County
Cross Plains
Madison

Market St
Infiltration Basin
Wet Pond

Roof Disconnect
Single Sidewalk
Swale Drainage
Narrower Streets

WinSLAMM Modeling Results



Monitored Performance of Controls at Cross Plains Conservation Design Development

Water Year	Construction Phase	Rainfall (inches)	Volume Leaving Basin (inches)	Percent of Volume Retained (%)
1999	Pre-construction	33.3	0.46	99%
2000	Active construction	33.9	4.27	87%
2001	Active construction	38.3	3.68	90%
2002	Active construction (site is approximately 75% built-out)	29.4	0.96	97%

WI DNR and USGS data

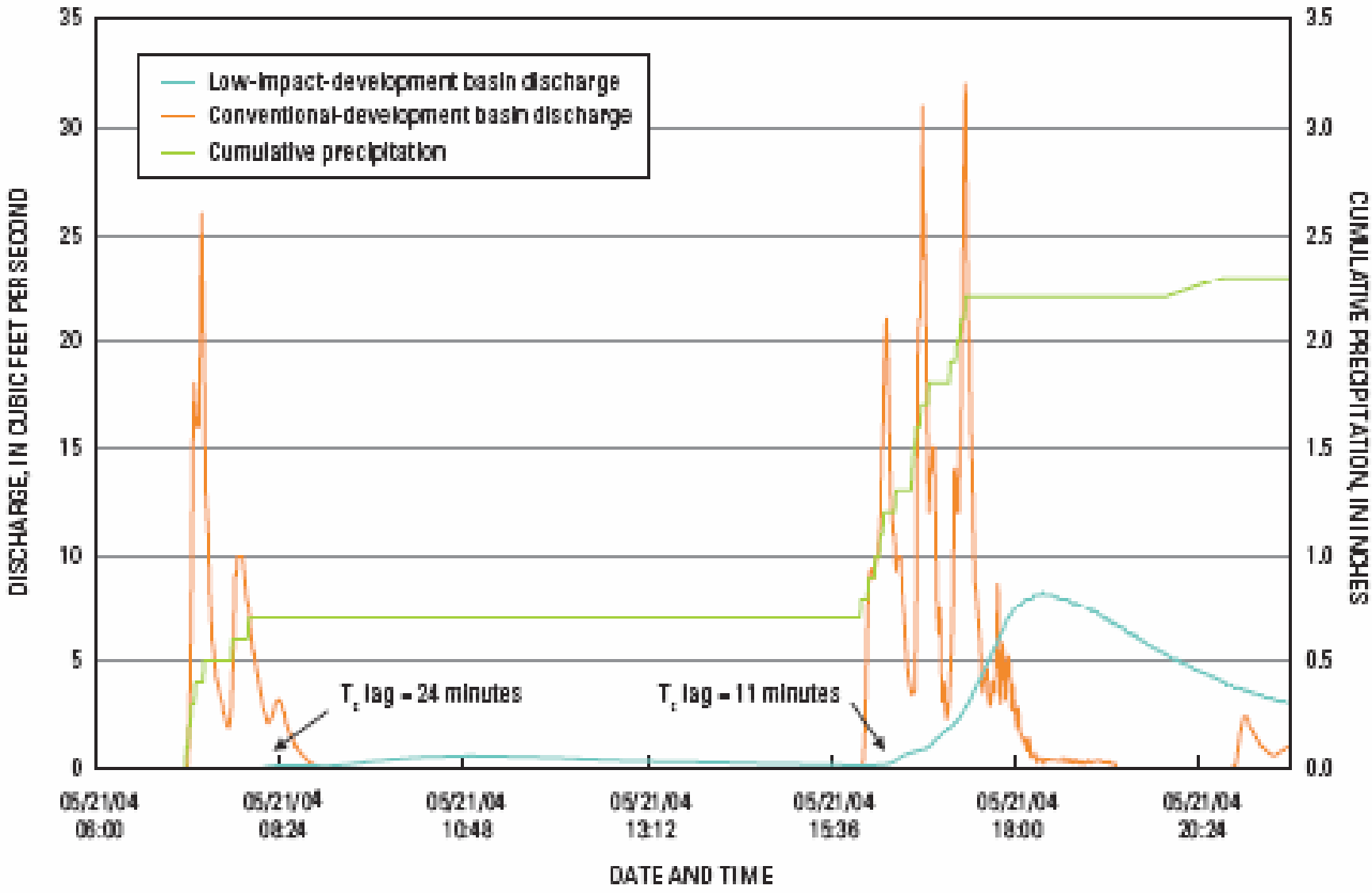
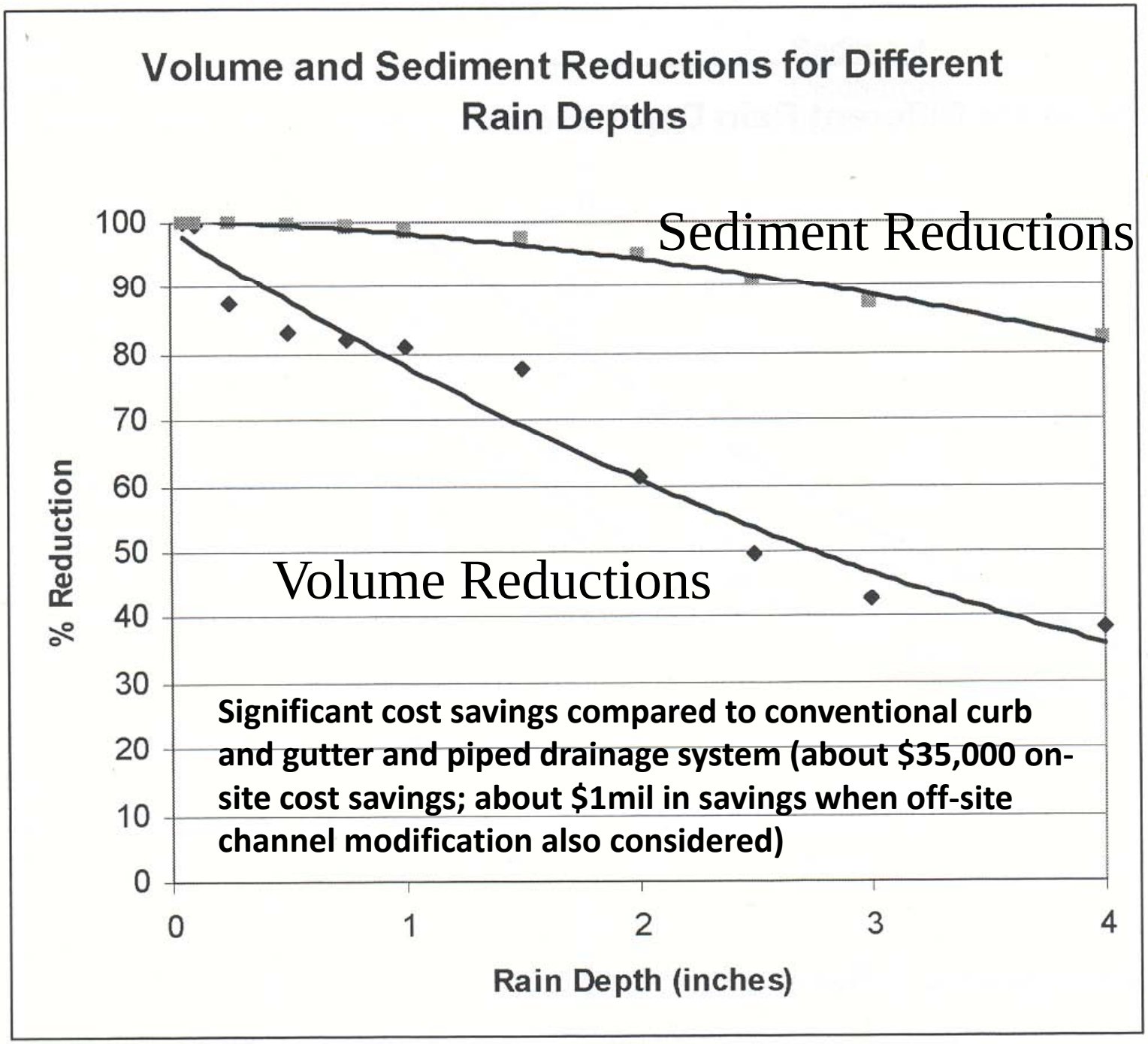


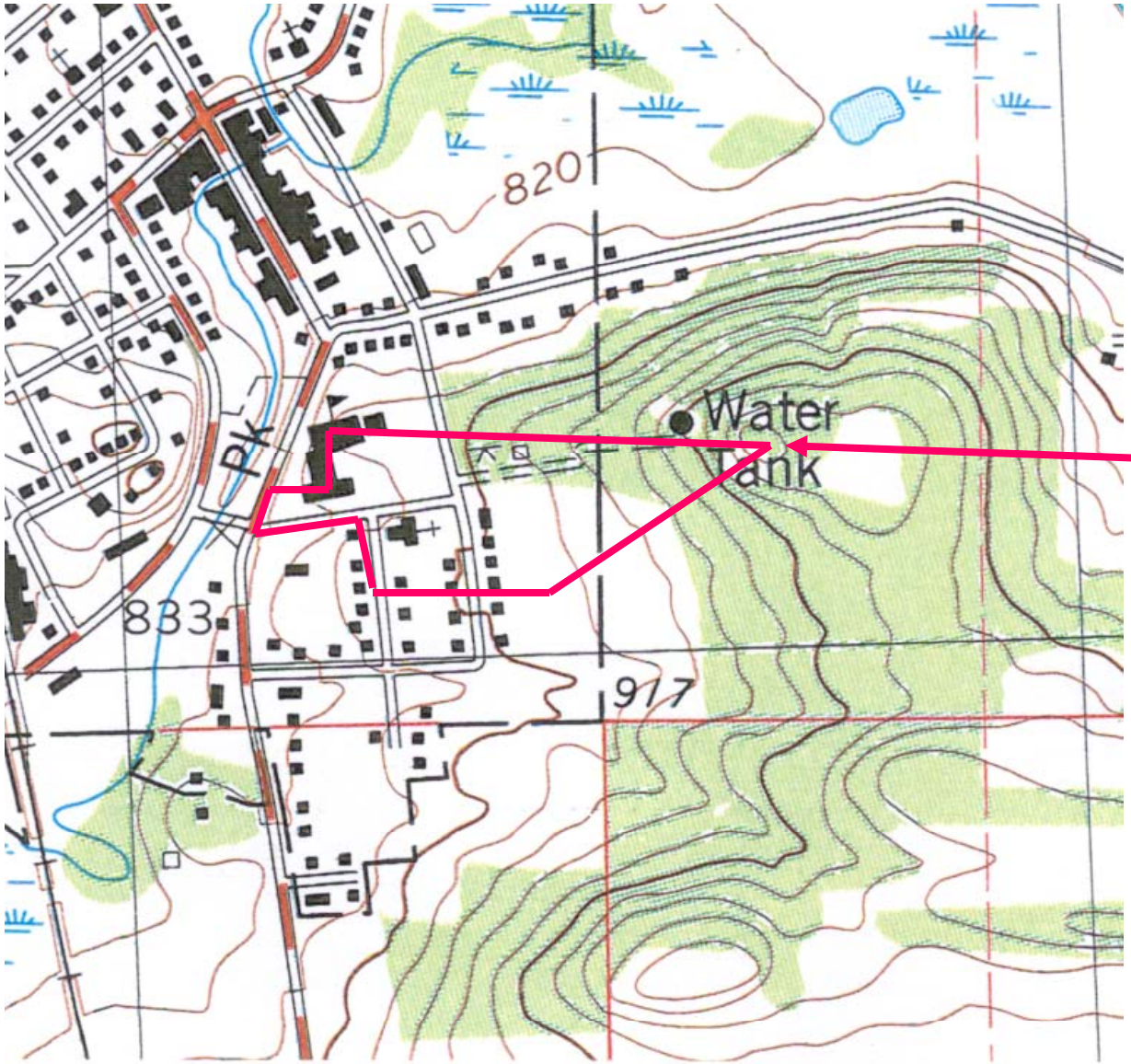
Figure 10. Hydrologic response of low-impact-development (LID) and conventional-development basins to two consecutive precipitation events, Cross Plains, Wis. [T_c, time of concentration]

North Huntsville Industrial Park

- On-site bioretention swales
- Level spreaders
- Large regional swales
- Wet detention ponds
- Critical source area controls
- Pollution prevention (no zinc from galvanized metals!)
- Buffers around sinkholes
- Extensive trail system linking water features and open space


Volume and Sediment Reductions for Different Rain Depths
Sediment Reductions
Volume Reductions
% Reduction
100
90
80
70
60
50
40
30
20
10
0
0
1
2
3
4
Rain Depth (inches)
Significant cost savings compared to conventional curb and gutter and piped drainage system (about $35,000 on-site cost savings; about $1mil in savings when off-site channel modification also considered)

Lodi, Wisconsin, Transportation Area Rain Garden



Drainage Basin Area = 16 acres

Paved Area = 20%

City of Lodi, Columbia County WI

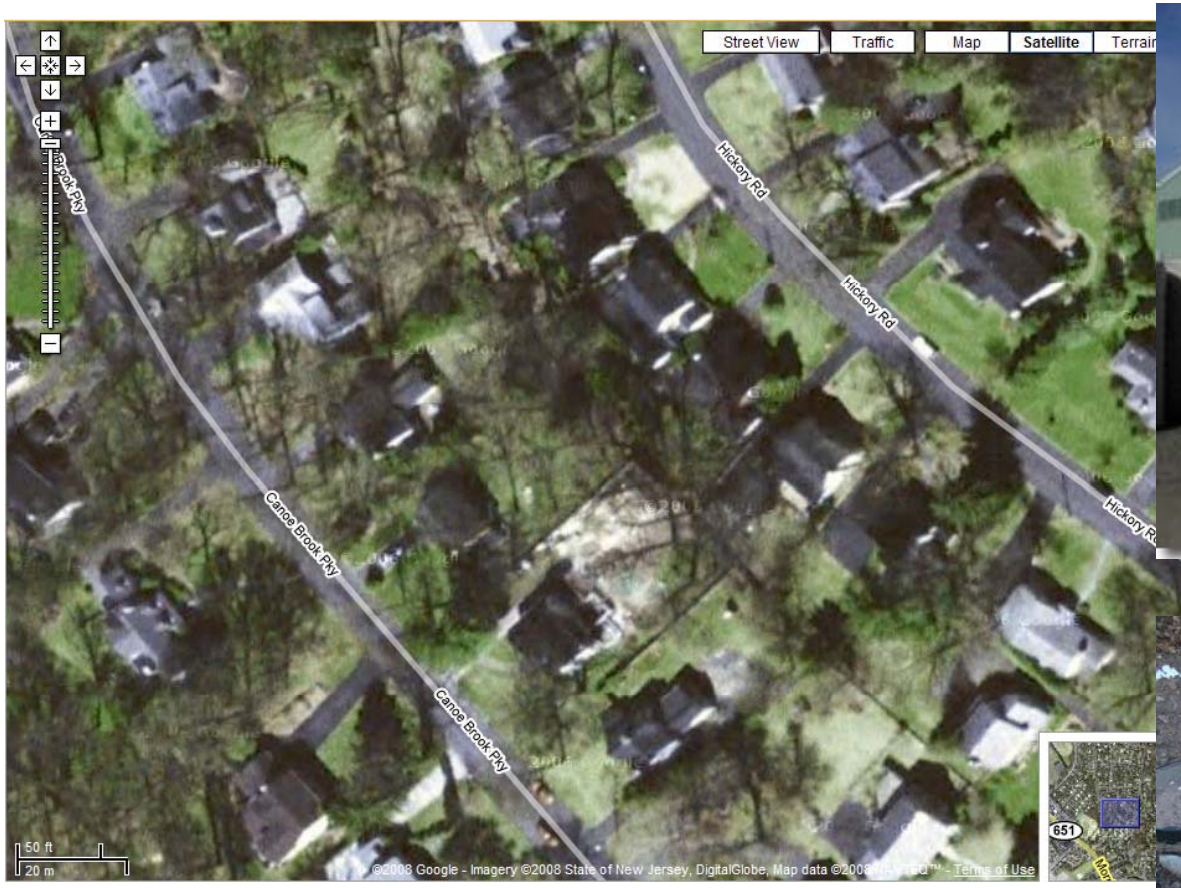
Cell A
Cell B
Cell C

Lodi, WI, Rain Garden Costs*

Pipe Underdrain and Endwalls	$700
Flow Regulation Structure	$3,000
Plants	$2,200
Shrubs	$450
Backfill	$11,600
Excavation	$2,200
Select Crushed Material/Riprap	$3,850
Storm Sewer and Manholes	$3,500
Total $4.70/sf	$27,500

*** 16 acre drainage area, 20% imperviousness, or $1,700 per acre**

On-going Millburn, NJ, Monitoring Project to Evaluate Performance and Groundwater Problems Associated with Required Dry Wells



Home restoration using underground water storage tanks for landscaping irrigation instead of dry wells. Monthly water costs of $500 allow payback in about 5 years.

Typical Bioretention Costs

- Retrofit Site
  - $100,000 per acre of imperviousness
  - Engineered soil is 5% of total device cost
- Redevelopment Site
  - $50,000 per acre of imperviousness
  - Engineered soil is 10% of total device cost
- New Development Site
  - $35,000 per acre of imperviousness
  - Engineered soil is 15% of total device cost

Model Input/Output

WinSLAMM Model Output

File View

Runoff Volume | Particulate Solids | Pollutants | **Output Summary**

Output Summary

File Name: C:\Files\SLAMM\WinSLAMM\Test Files\Cost Files\Cost Analysis - W from Caroline v93.dat

Drainage System and Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Source Area Total without Controls	5.282E+06	<== Percent Reduction Basis Value	0.70	114.6		
Outfall Total without Controls					37756	Percent Reduction <== Basis Value
Current File Output: Total Before Drainage System	5.282E+06	0.01 %	0.70	114.6	37755	
Current File Output: Total After Drainage System	5.282E+06	0.01 %	0.70	114.6	37755	
Current File Output: Total After Outfall Controls	5.240E+06	0.80 %	0.69	23.46	7669	79.69 %
Current File Output: Annualized Total After Outfall Controls	5.255E+06				7690	

Total Area Modeled (ac) 65.00 Years in Model Run: 1.00

Print Output Summary to Text File

Total Control Practice Costs

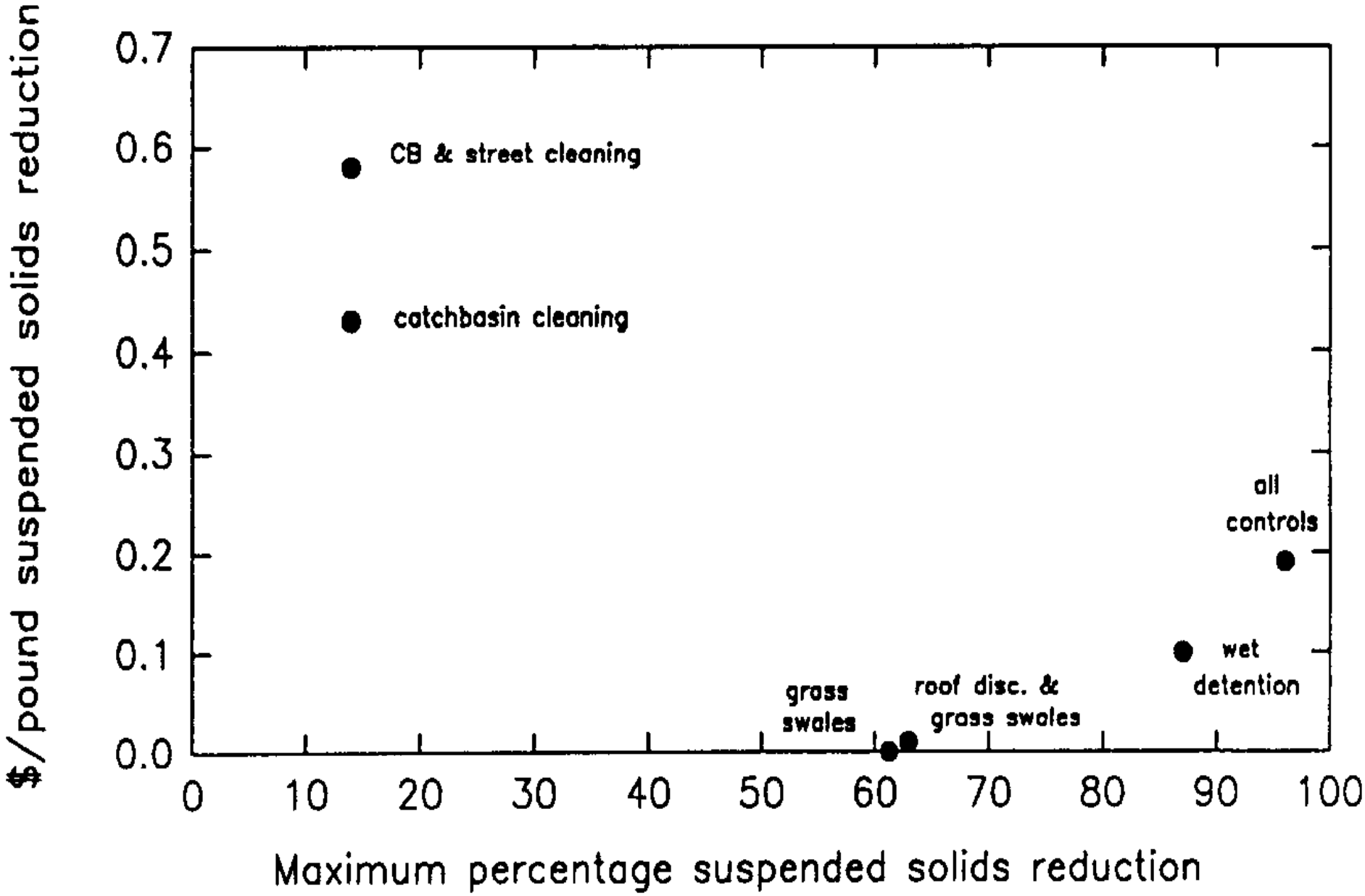
Capital Cost	$ 366535
Land Cost	$ 300000
Annual Maintenance Cost	$ 7124
Present Value of All Costs	$ 755327
Annualized Value of All Costs	$ 60609

Cost Analysis Results

Perform Flow Duration Curve Calculations

	Calculated Rv	Biological Condition of Receiving Water
Without Controls	0.70	Poor
With Controls	0.69	Poor

Cost-Benefit Analysis for Various Stormwater Controls, WinSLAMM



Relative Costs and Effectivenesses of Controls

	Costs (capital costs in parentheses)	Effectiveness
Inappropriate discharge control (designed for retrofit)	Low	High
Erosion control	Low to mod.	Low to moderate
Floatable and litter control	Low to mod.	Low to high
Public works practices (street and catchbasin cleaning)	Moderate to high	Usually low
Critical source control (designed for retrofit)	High ($10,000 to $50,000 per paved acre)	Low to high
Low impact development (costly to retrofit)	Low to high (cost savings to $50,000 per watershed acre)	Moderate to high
Public education (on-going)	Low to mod.	?????
Wet detention ponds (costly and hard to retrofit)	Mod. To high ($1,000 to $10,000 per watershed acre)	Usually high

Performance Data and Cost Sources for Stormwater Controls

- *Costs of Urban Stormwater Control Practices* (Narayanan and Pitt, 2006*)*: http://www.unix.eng.ua.edu/~rpitt/Publications/StormwaterTreatability/Arvind%20and%20Pitt%20stormwater%20cost%20report.pdf

- *International BMP Database* (ASCE/WERF/EPA, continuously updated): http://www.bmpdatabase.org/

Appropriate Combinations of Controls

- No single type of control is adequate for all problems
- Only infiltration reduces water flows, along with soluble and particulate pollutants. Only applicable in conditions having minimal groundwater contamination potential.
- Sedimentation practices reduce particulate pollutants and may help control dry weather flows. They do not consistently reduce concentrations of soluble pollutants, nor do they generally solve regional drainage and flooding problems.
- A combination of biofiltration and sedimentation practices is usually needed, at both critical source areas and at critical outfalls.

ADEM
22nd Annual NPS Conference
January 26,2011

Evaluation of Stormwater Quality Improvement through Pervious Concrete Pavement

Michael Hein, Professor
McWhorter School of Building Science
Auburn University

Outline

- What is Pervious Concrete?
- History, Uses & Benefits
- 2009 Field Study Research Project
  - Objectives
  - Methodology
  - Installation
  - Water Quality Testing
  - Research Findings
- Future Study

Pervious Concrete: What is it?

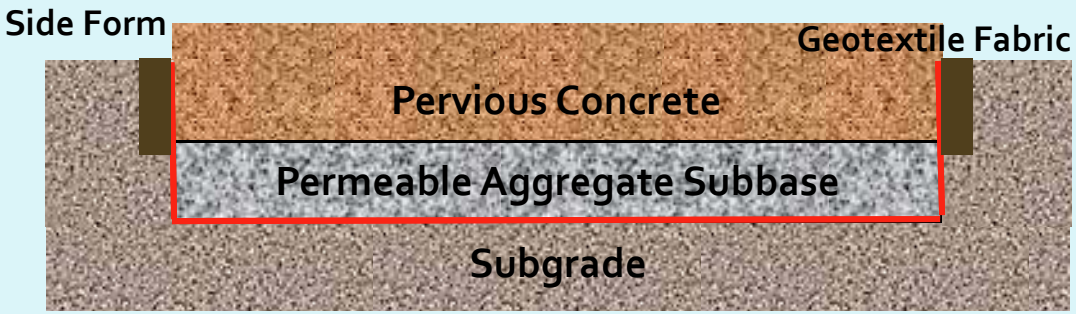
A highly porous concrete that readily passes water.

Conventional Concrete
(IR = 0)

Pervious Concrete
(IR = 100- 1,000 in/hr)

PC: A Sustainable Paving System

….can be the essential component of a sustainable development plan designed to control both quantity and quality of stormwater runoff.



Pervious Concrete: What's in it?

- Mixture consists of:
  - Minimum of fine aggregate (sand)
  - Uniform size coarse aggregate (gravel)
  - Stiff mixture of cement paste (clings to aggregate)
  - Chemical Admixtures (modifies properties)

Fresh PC: "Oatmeal" Consistency

Pervious Concrete: What is it?

- When mixed and placed properly, hardened pervious concrete:
  - Connected pores (15%-25%)
  - Hardens into a solid mass
    - Durable
    - Strong ($f_c' = 3{,}000$ psi)
  - Drains water (100 to 1,000 in/hr)

Hardened PC: "Rice Crispy Treat"

Pervious Concrete: History

- 1850's First use in Europe
- 1970's First PC in Florida
- 1980's
  - Widespread Application in SE
  - Adopted by EPA as BMP for treating stormwater runoff
- 1990's West Coast
- 2000's
  - PC in Alabama (2003 AU campus)
  - PC in cold climates
  - Application throughout U.S.

Pervious concrete walkway installed in 2006.
Donald E. Davis Arboretum, Auburn University, AL

Pervious Concrete: Applications

- Residential roads, alleys, driveways
- Sidewalks and paths
- Parking lots
- Tree grates
- Pool decks
- Slope stabilization
- Noise barriers
- Well linings
- Seawalls

Pervious concrete inserts in conventional concrete driveway. Donald E. Davis Arboretum, Auburn University, AL; 2009

Pervious Concrete: Benefits

- Reduces Stormwater runoff
- Recharges groundwater
- More efficient land use – minimizes need for catch basins, retention ponds, swales, other stormwater management devices
- Improves runoff water quality
- Sound absorption
- Safer pavements – reduces noise, water spray, skids
- Cooler– absorbs and stores less heat
- EPA Best Management Practice (BMP) for managing stormwater runoff

Pervious Concrete: Runoff quality

Florida Aquarium, Tampa
Ferguson, Porous Pavements, 2005

Florida Aquarium Parking Lot

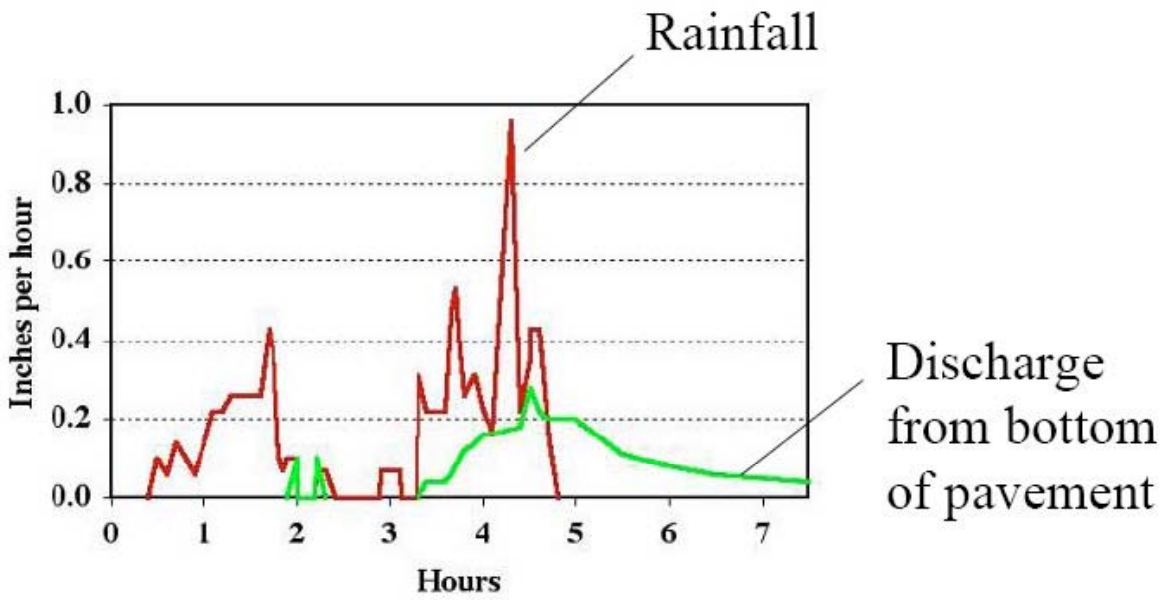
Pervious Concrete Paving
compared with
Conventional Concrete Paving

Constituent	Total Load Reduction
Total Phosphorous	42%
Total Copper	47%
Nitrogen	52%
Iron	68%

Ferguson, Porous Pavements, 2005

PC Benefits: Stormwater Detention

Porous pavement reduces storm flow



(*Pratt et al., 1989*)

Ferguson, Porous Pavements, 2005

AU Arboretum : A Problem

1. Storm water sheeting

2. Storm water accumulating

3. Storm water runoff

4. Runoff growing

AU Arboretum : The Solution

Spring 2009

2009 Research Project: Objectives

1. Establish benefits of PC pavement in mitigating negative effects of stormwater runoff quality.

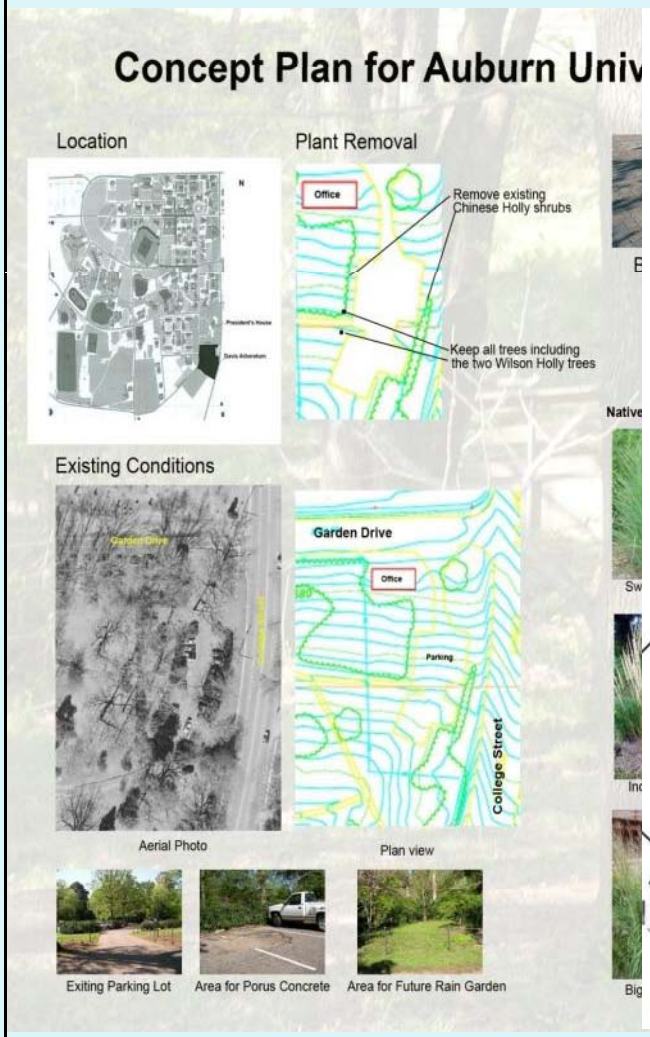
2. Establish baseline measurement of infiltration over time, and track changes in infiltration over eight month period.

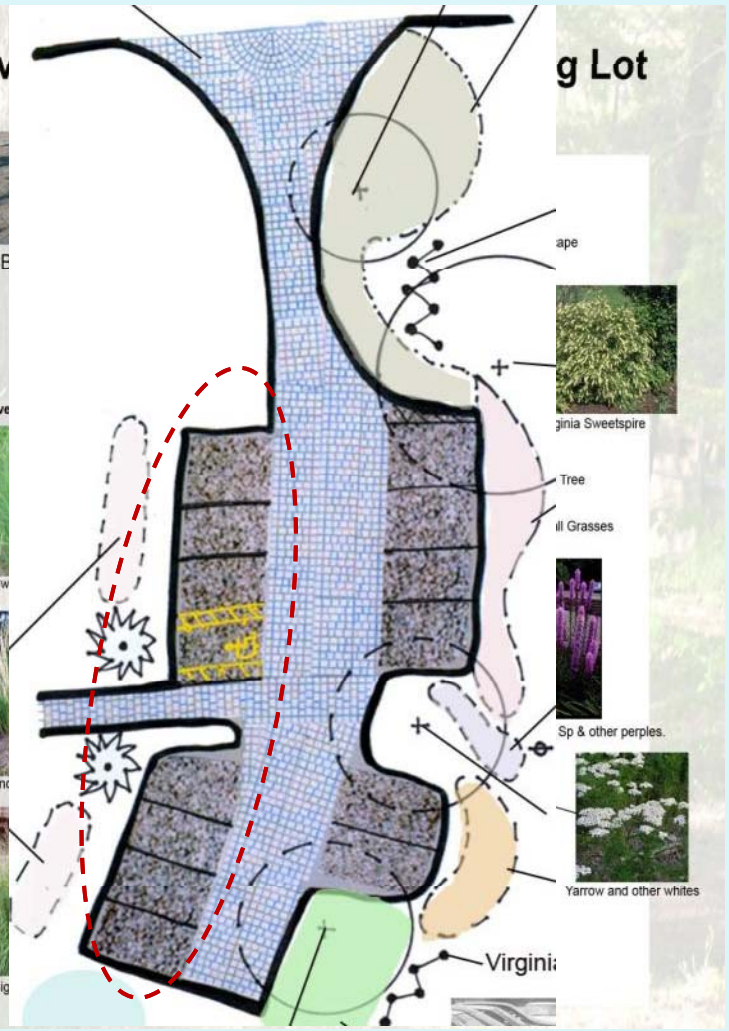
2009 Research Project: Benefits

- AU Students and faculty Collaborate with AU facilities, AU Arboretum, and Industry
  - Design Experience
  - Materials Selection
  - Construction Techniques
- Data gathered from side-by-side study
  - PC pavement effectively filters harmful impurities from stormwater runoff
  - PC pavement infiltration rates decrease over time

AU Arboretum Parking: Installation

1. **Plan**
2. Layout
3. Demolition
4. Excavate
5. Place filter fabric
6. Install piping
7. Backfill / subbase
8. Install forms
9. Deposit concrete
10. Strike-off
11. Compress lift
12. Form joints
13. Cure ASAP





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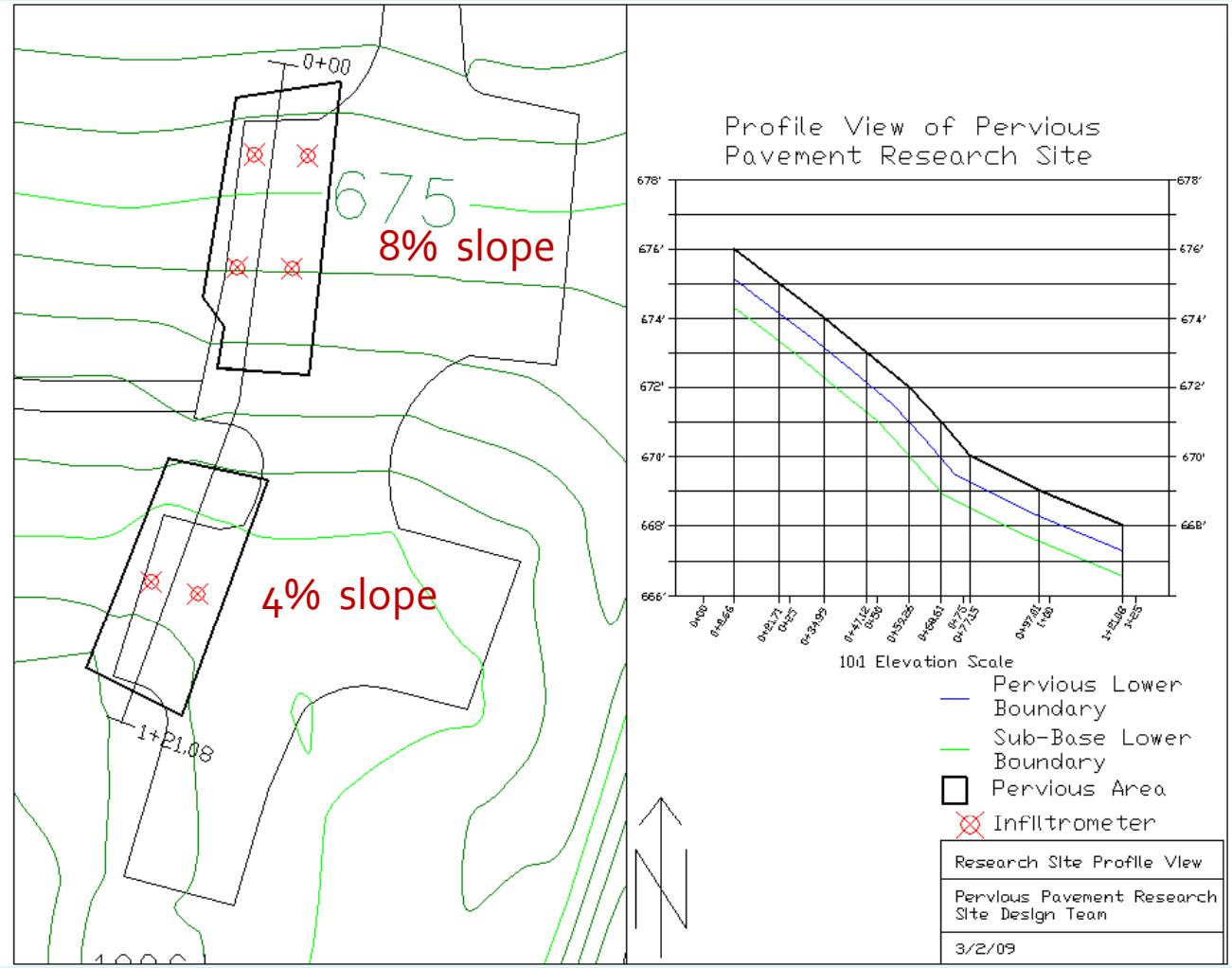

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Test Batch before placement

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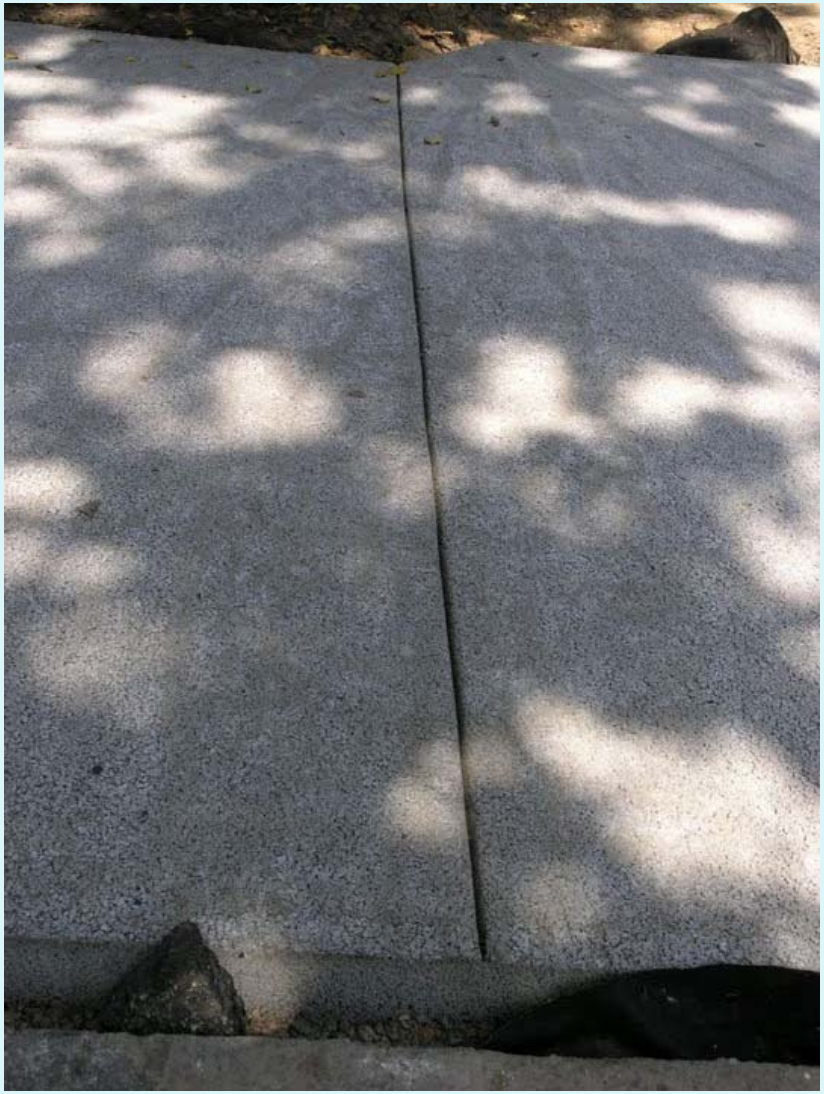
Arboretum Parking: Finished Slab



Arboretum Parking: Finished Slab

PC Testing: Stormwater quality

Runoff Collection
Impervious Surface

Leachate Collection
Pervious Concrete

Stormwater Collection

WRRI Research Project: Methodology

- Water samples analyzed at a private laboratory
- Nutrients measured
  - Total Kjeldahl nitrogen and phosphorus.
  - Metal concentrations: aluminum, boron, copper, iron, manganese, sodium, and zinc
  - Total Suspended Solids
  - Oil and Grease
  - In-house measurements of pH, alkalinity, hardness, turbidity, conductivity, ORP

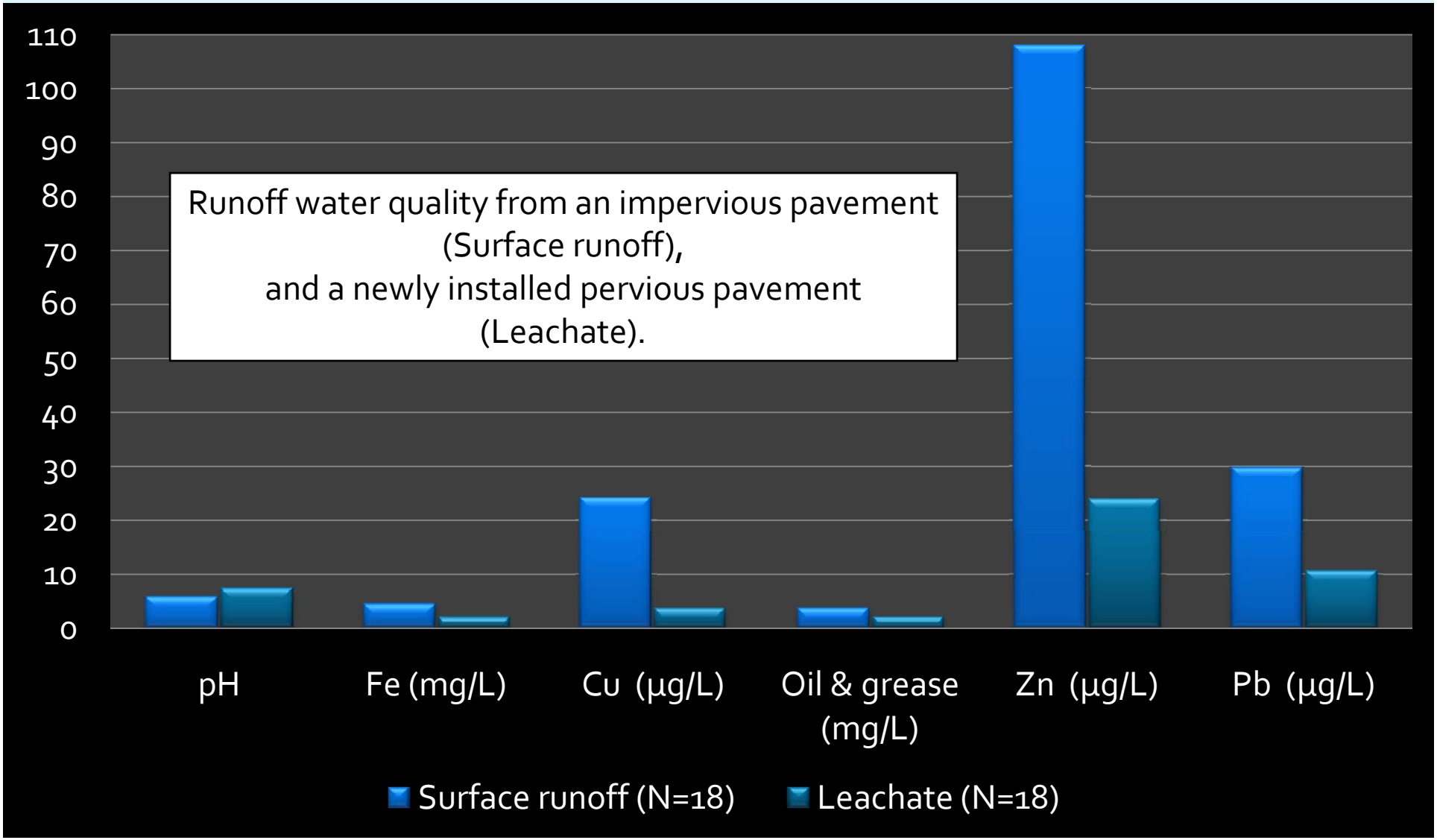
Stormwater Quality Improvement

Runoff Quality in the AU Arboretum
Pervious Concrete Paving compared with
Conventional Asphalt Paving

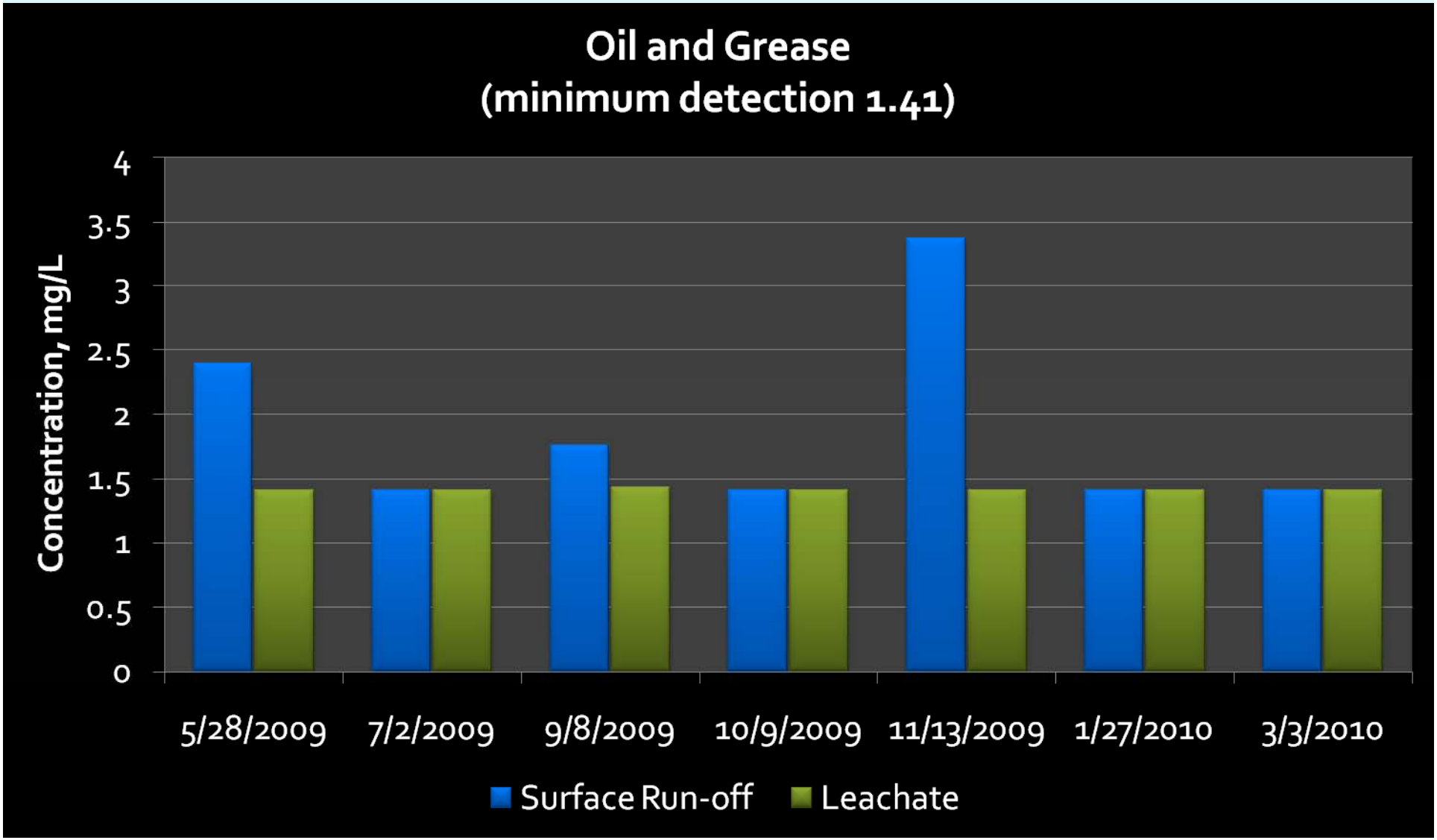
Laboratory Analyses	Fe µg/L	Cu µg/L	TSS mg/L	Oil & Grease mg/L	Zn µg/L	Pb µg/L
Rainwater (N=20)	- 57%	- 85%	- 82%	- 44%	- 78%	- 64%
Stormwater (N=7)	- 20%	- 53%	- 26%	- 25%	- 65%	- 22%

In-house Analyses	pH	Conductivity µs/cm	Turbidity NTU	Alkalinity mg/L	Hardness mg/L
Rainwater (N=18)	+ 28%	+ 204%	+ 89%	+ 494%	+36%
Stormwater (N=6)	+ 13%	+ 139%	+ 75%	+ 259%	- 6.5%

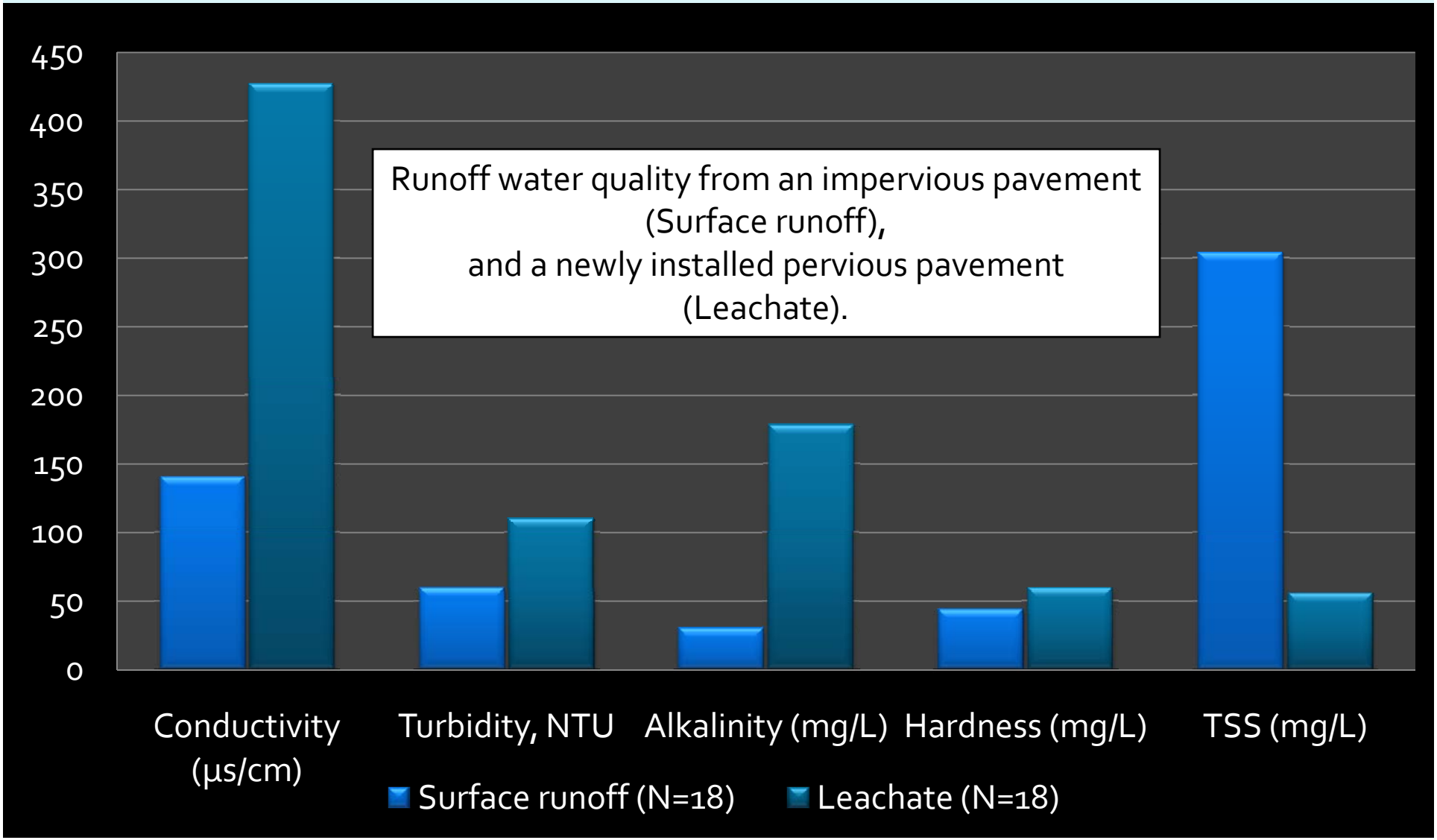
Stormwater Quality Improvement



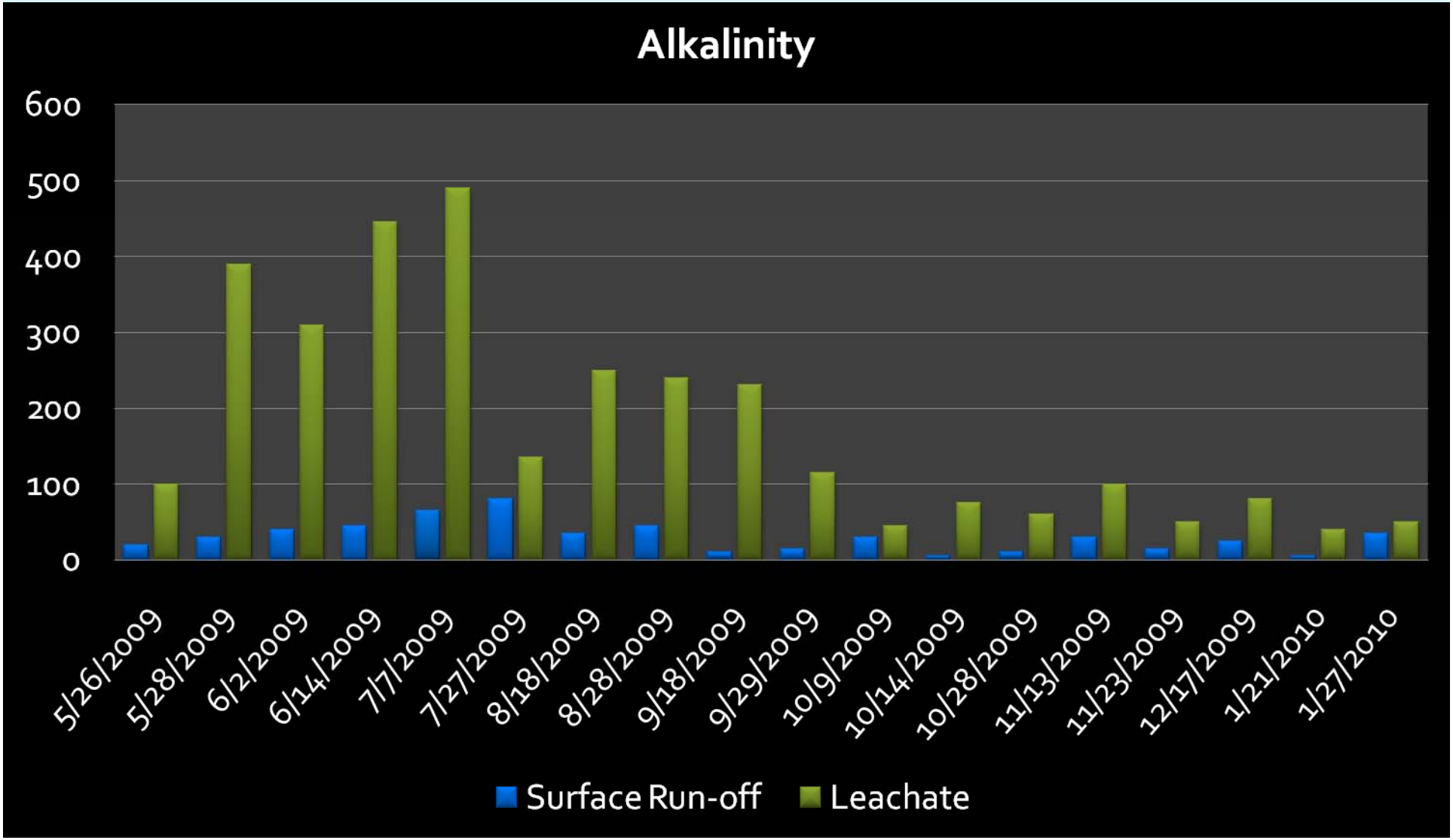
Stormwater Quality Improvement



Stormwater Quality Comparison



Stormwater Quality Comparison



PC Infiltration Tetsing: Infiltrometer

- Test Infiltration rates through new PC system at regular intervals over 8 month period
  - Unconfined open pavement
  - 8" diameter confined sample through full depth
  - Tested bimonthly

Single Ring Infiltrometer Test (SRIT)

Pervious Concrete Infiltration Test

Embedded Ring Installation

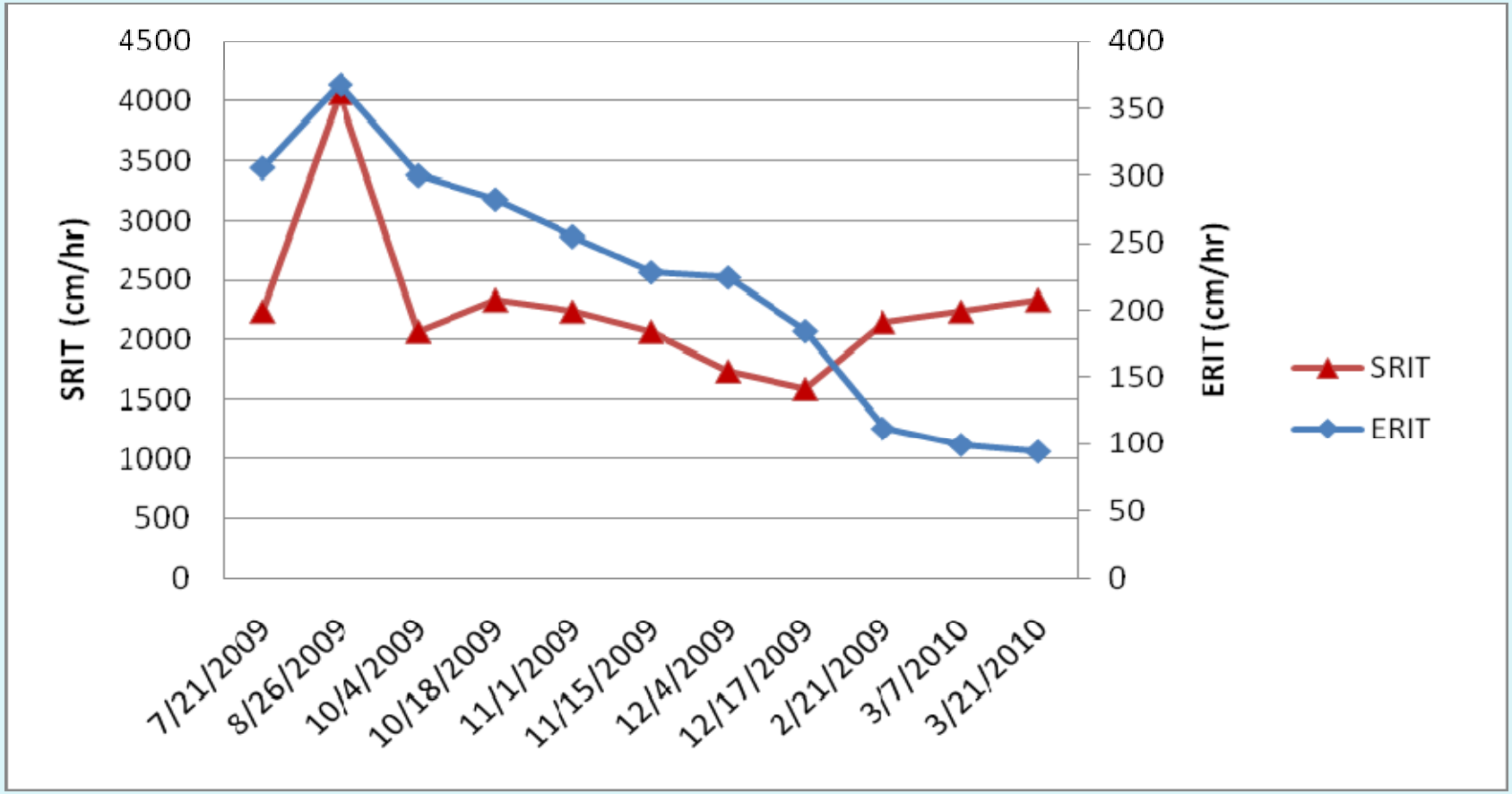
Embedded Ring Infiltration Test (ERIT)

Average Surface Infiltration Rates

Site and treatment		Average Incremental SIR* (ASTM, 2003)		
		cm hr^{-1}	in hr-1	N
Site 1:	Embedded ring	236	93	13
	Open pavement	2274	895	13
Site 2:	Embedded ring	39	15	13
	Open pavement	2384	939	13
Site 3:	Embedded ring	54	21	13
	Open pavement	1867	735	13
Site 4:	Embedded ring	72	28	13
	Open pavement	749	295	13

Average surface infiltration rate (SIR) for embedded ring infiltration test (ERIT) and surface ring infiltration test (SRIT), Arboretum parking lot, Auburn, AL.
* *Surface infiltration tests conducted from July 21, 2009 until March 21, 2010.*

Surface Infiltration Rates over Time



Average surface infiltration rates at site #1 in Arboretum PC parking lot, Auburn University over 8-month period immediately following construction.
SRIT=surface ring infiltrometer rate. ERIT=embedded ring infiltrometer rate.

Future Study

- Field Studies
  - Longer Term Stormwater Quality Study
  - PC pavement clogging and effective cleaning methods
  - Heat Island Temperature Study
  - Infiltration Study of existing PC pavements
  - Velocity and Stormwater Detention through PC
  - PC pavement durability study
  - PC vs. other porous pavements
- Lab Studies
  - Permeability vs. Aggregate size distribution and compaction
  - Porosity variation with depth
  - Clogging and cleaning of PC samples

ADEM
22nd Annual NPS Conference
January 26, 2011

Questions ?

Evaluation of Stormwater Quality Improvement through Pervious Concrete Pavement

Michael Hein, Professor
McWhorter School of Building Science
Auburn University

ADEM

Water Quality Management Planning Grants

Nonpoint Source Conference

January 26, 2011

adem.alabama.gov

Overview

- ❑Regulatory Background
- ❑Water Quality Management Planning
- ❑Objectives
- ❑Process
- ❑Past Activities / Current Projects
- ❑Submitting Proposals

> **Adventure is just bad planning.**
> **Roald Amundsen**

ADEM Regulatory Background

- **The Clean Water Act**
  - **Section 205(j)(1)**
    - ✓ **Annual funding to the states**
  - **Section 205(j)(2)**
    - ✓ **How the funds are to be spent**
  - **Section 205(j)(3)**
    - ✓ **Coordination with RPCPOs and pass-through funding**
  - **Section 604(b)**
    - ✓ **Reservation of funds for planning – allotment formula**

Water Quality Management Planning

- Identify cost effective, locally acceptable measures to maintain or restore water quality
- Plan to obtain State and local financial and regulatory commitments to carry our measures to maintain or restore water quality
- Identify sources and causes of water quality problems
- Planning for wastewater treatment facilities / continuing planning process

Objectives of Sect. 604(b) Grants

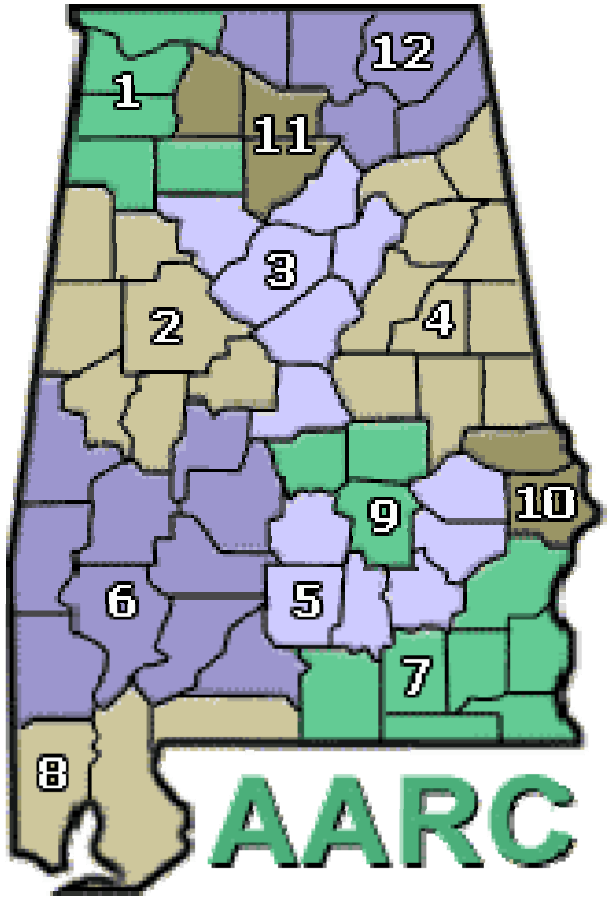
- To assist States, Regional Public Comprehensive Planning Organizations (RPCPOs), and Interstate Organizations (IOs) in carrying out water quality management (WQM) planning

- To determine the nature and extent of point and non-point source water pollution and to develop WQM plans

- The watershed approach is emphasized in developing State work plans

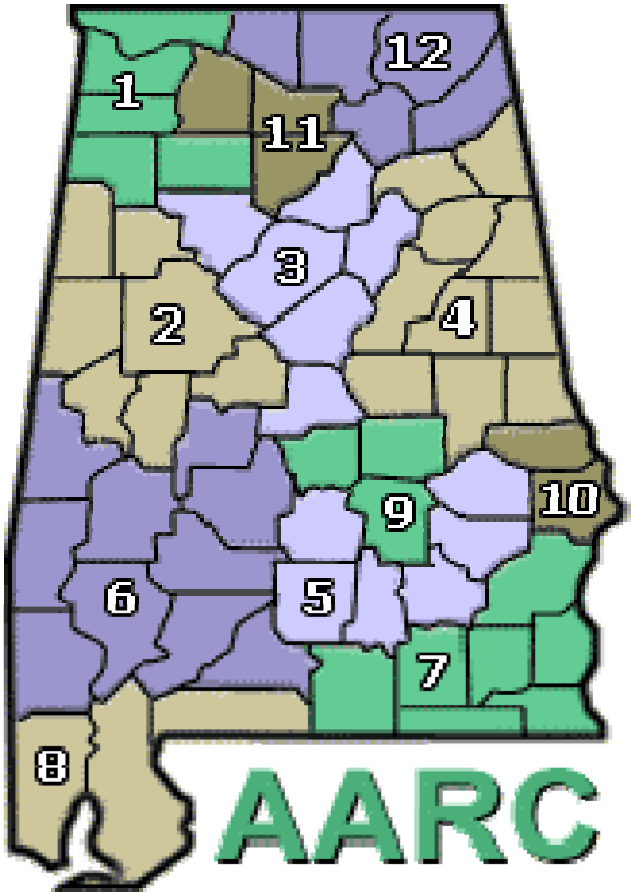
RPCPOs in Alabama

1. Northwest Alabama Council of Local Governments
2. West Alabama Regional Commission
3. Regional Planning Commission of Greater Birmingham
4. East Alabama Regional Planning and Development Commission
5. South Central Alabama Development Commission



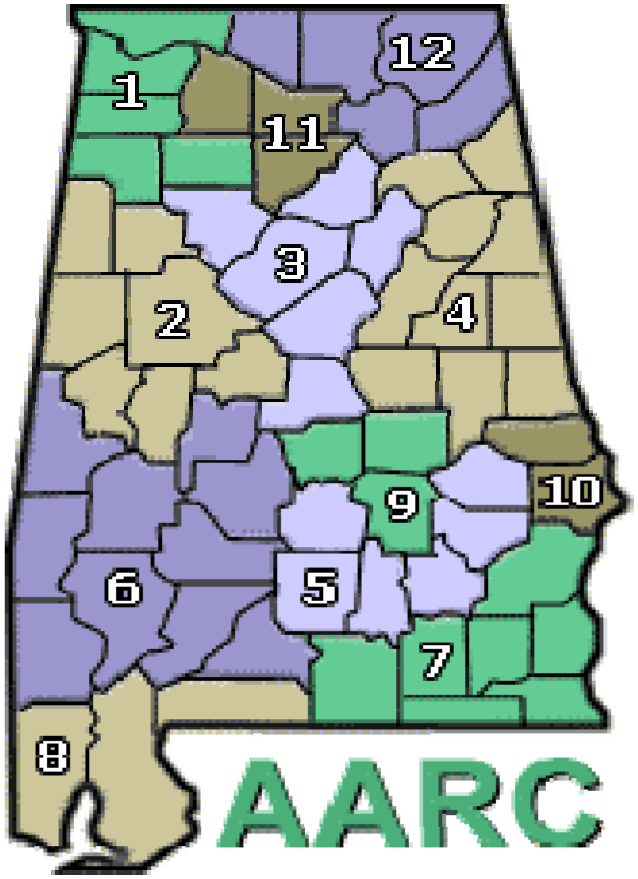
RPCPOs in Alabama

6. Alabama-Tombigbee Regional Commission
7. Southeast Alabama Regional Planning and Development Commission
8. South Alabama Regional Planning Commission
9. Central Alabama Regional Planning and Development Commission



RPCPOs in Alabama

10. Lee-Russell Council of Governments
11. North-central Alabama Regional Council of Governments
12. Top of Alabama Regional Council of Governments



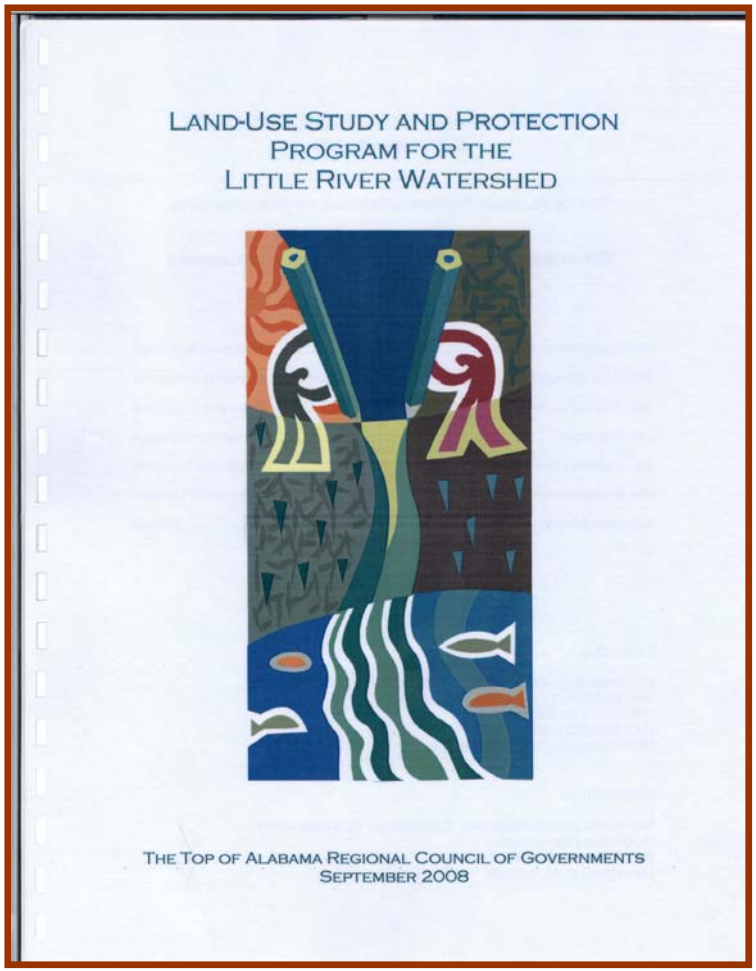
Everywhere is within walking distance if you have the time.

Steven Wright

604(b) Pass-through Funds

- **Under Section 205(j)(3), States are required to allocate at least 40% of the awarded funds to eligible planning agencies**
- **Unless the Governor says pass-through funds won't...**
  1. Result in significant participation by planning agencies in WQM planning
  2. Significantly assist in development and implementation of the State's WQM plan

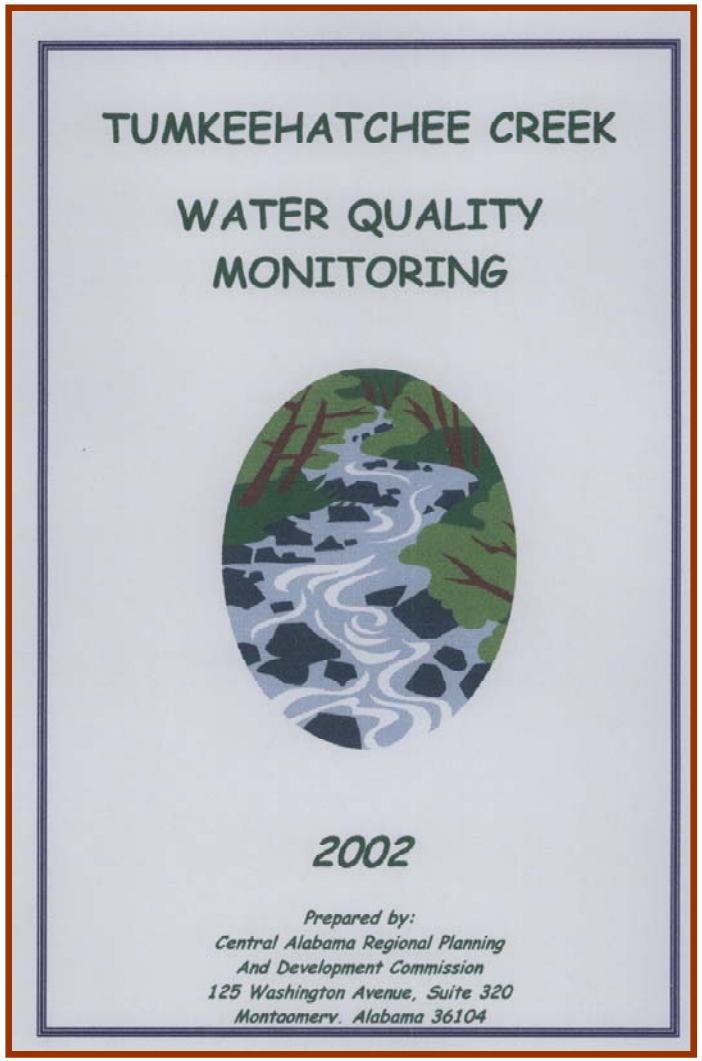
Examples…



Comprehensive land-use study and strategy to protect the Little River Watershed

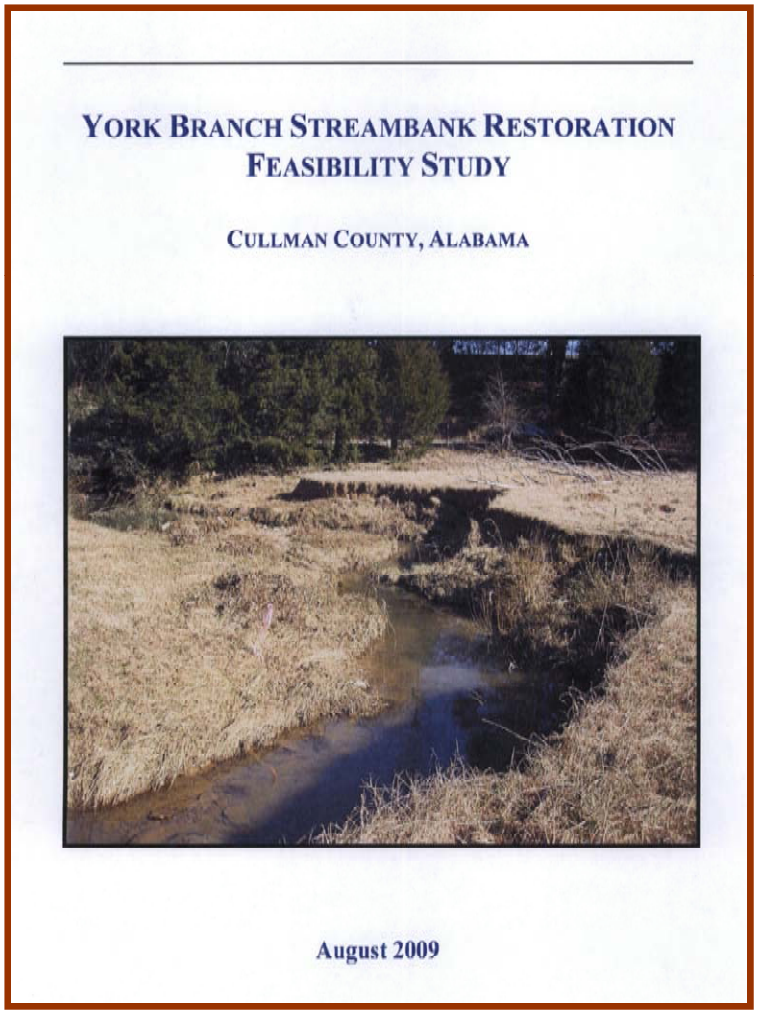
> **A man who carries a cat by the tail learns something he can learn in no other way.**
>
> **Mark Twain**

Examples…



Water quality study of nonpoint source pollution impacts in the Tumkeehatchee Creek Watershed

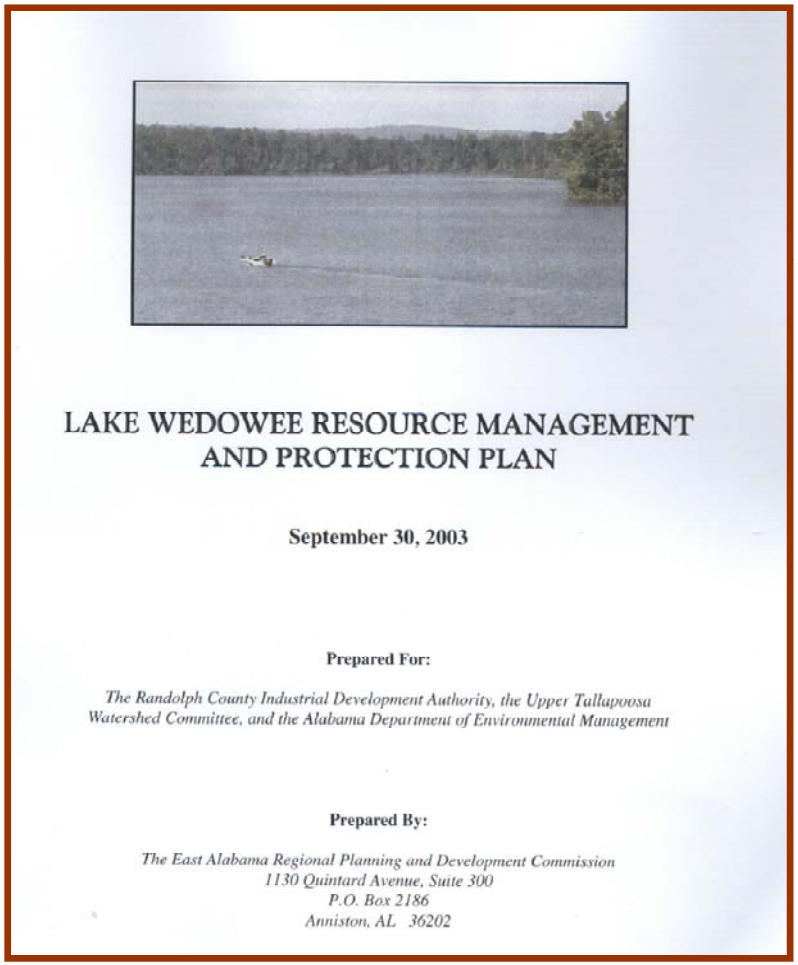
Examples…



Evaluate the potential for streambank restoration in York Branch and make cost-based restoration recommendations

> **Few things are harder to put up with than the annoyance of a good example.**
>
> **Mark Twain**

Examples…



LAKE WEDOWEE RESOURCE MANAGEMENT
AND PROTECTION PLAN

September 30, 2003

Prepared For:

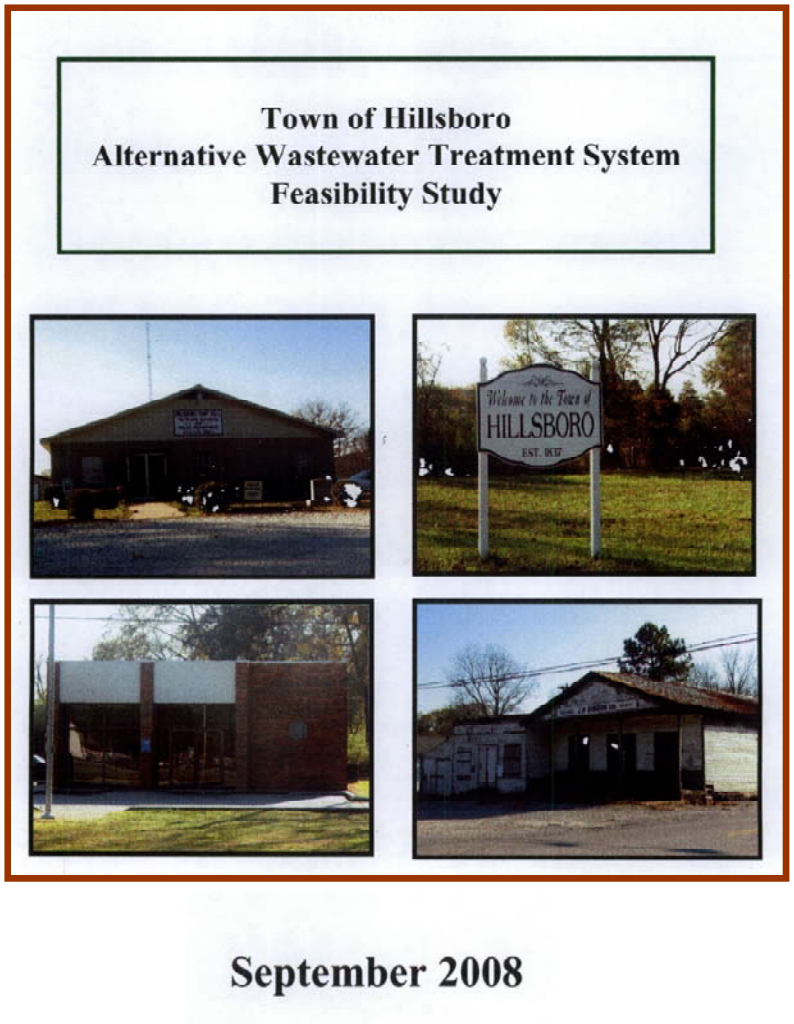
The Randolph County Industrial Development Authority, the Upper Tallapoosa Watershed Committee, and the Alabama Department of Environmental Management

Prepared By:

The East Alabama Regional Planning and Development Commission
1130 Quintard Avenue, Suite 300
P.O. Box 2186
Anniston, AL 36202

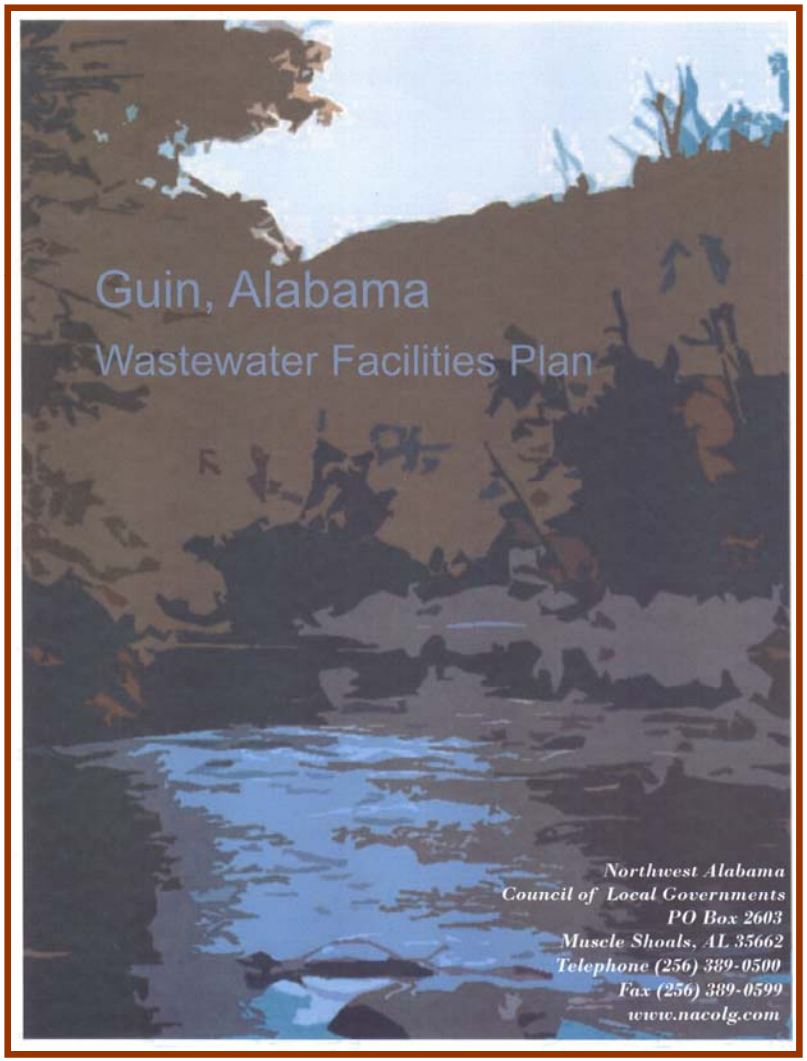
Guide for local governments in the Lake Wedowee area to help ensure that future development will enhance and complement the quality of the lake environment

Examples…



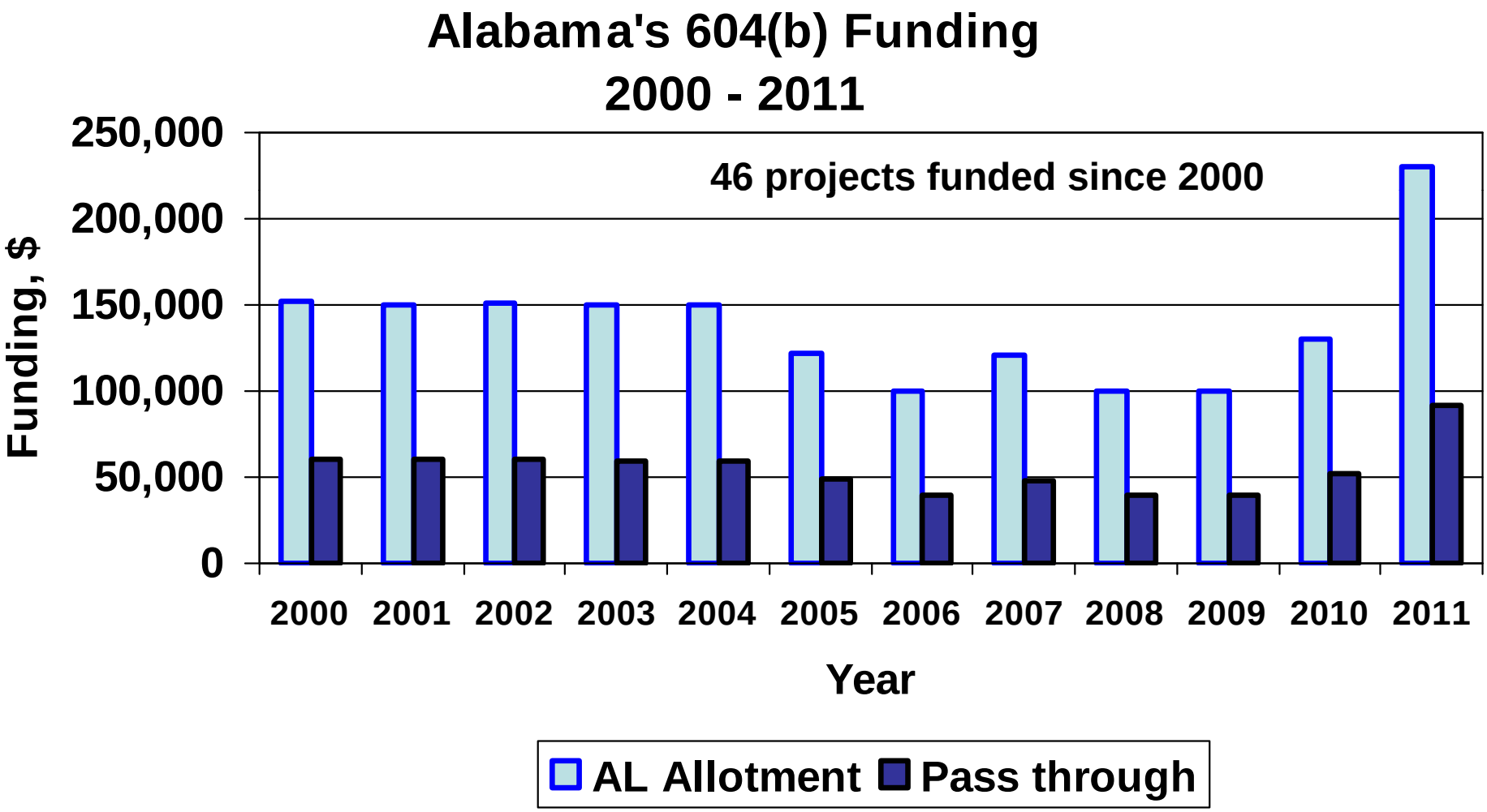
Feasibility study for an alternative wastewater treatment system for the Town of Hillsboro to address failing septic tank problems

Examples…



Characterize population, economy, and land use trends and present alternatives for sanitary sewer collection and treatment

Funding Amounts

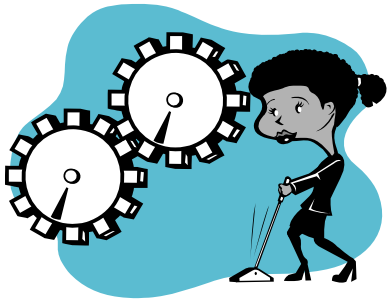


604(b) Funding Priorities

- TMDLs – Implementation / Source Identification
- Nonpoint Source Management
- General Watershed Planning
- Nutrient Management
- Implementation of Mobile Bay NEP Objectives

The 604(b) Process

1. Funding Announcement / Meeting
2. Project Proposals Submitted
3. Project Proposal Review and Selection
4. Contracts Between ADEM and Agencies
5. Agencies Complete Projects and Submit Final Reports



Conclusion

- **FY2011 Pass-through - $92,000**
- **Proposal Solicitation**

Questions???

604(b) Program Coordinator

Chris Bettger

Phone – (334) 274-4165

Email – jbettger@adem.state.al.us

> **It ain't what you don't know that gets you into trouble. It's what you know for sure that just ain't so.**
>
> **Mark Twain**

Building Partnerships for Protecting and Improving Water Quality

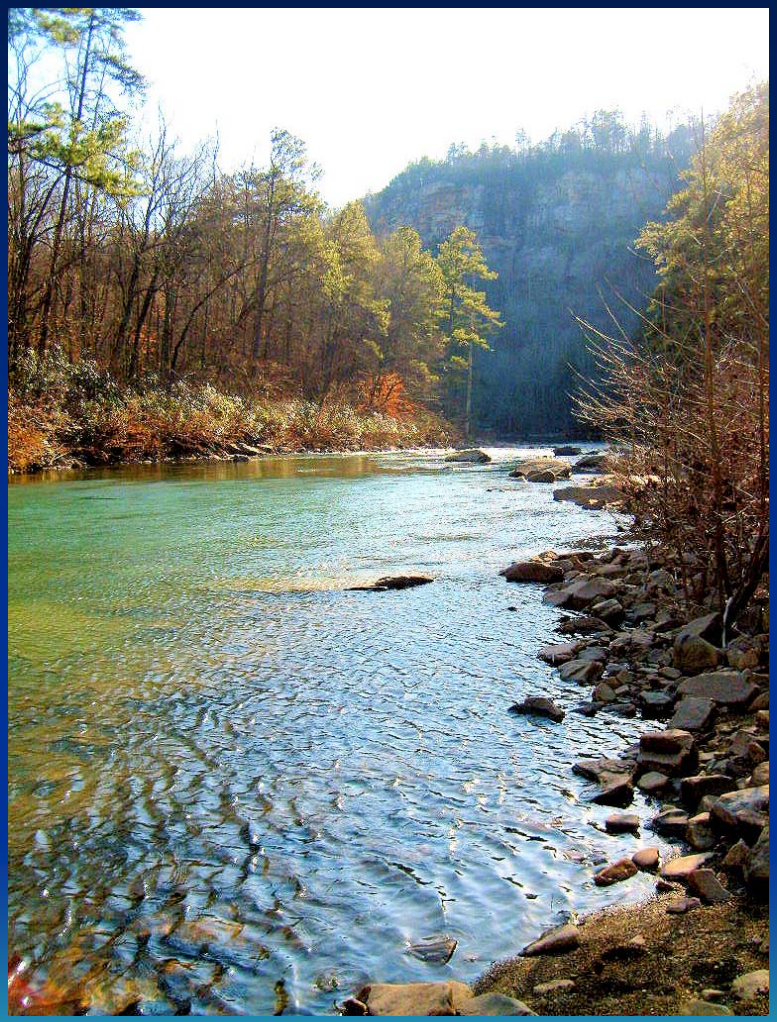
Twenty-Second Annual
Nonpoint Source Conference
January 26, 2011

Top of Alabama Regional Council of Governments

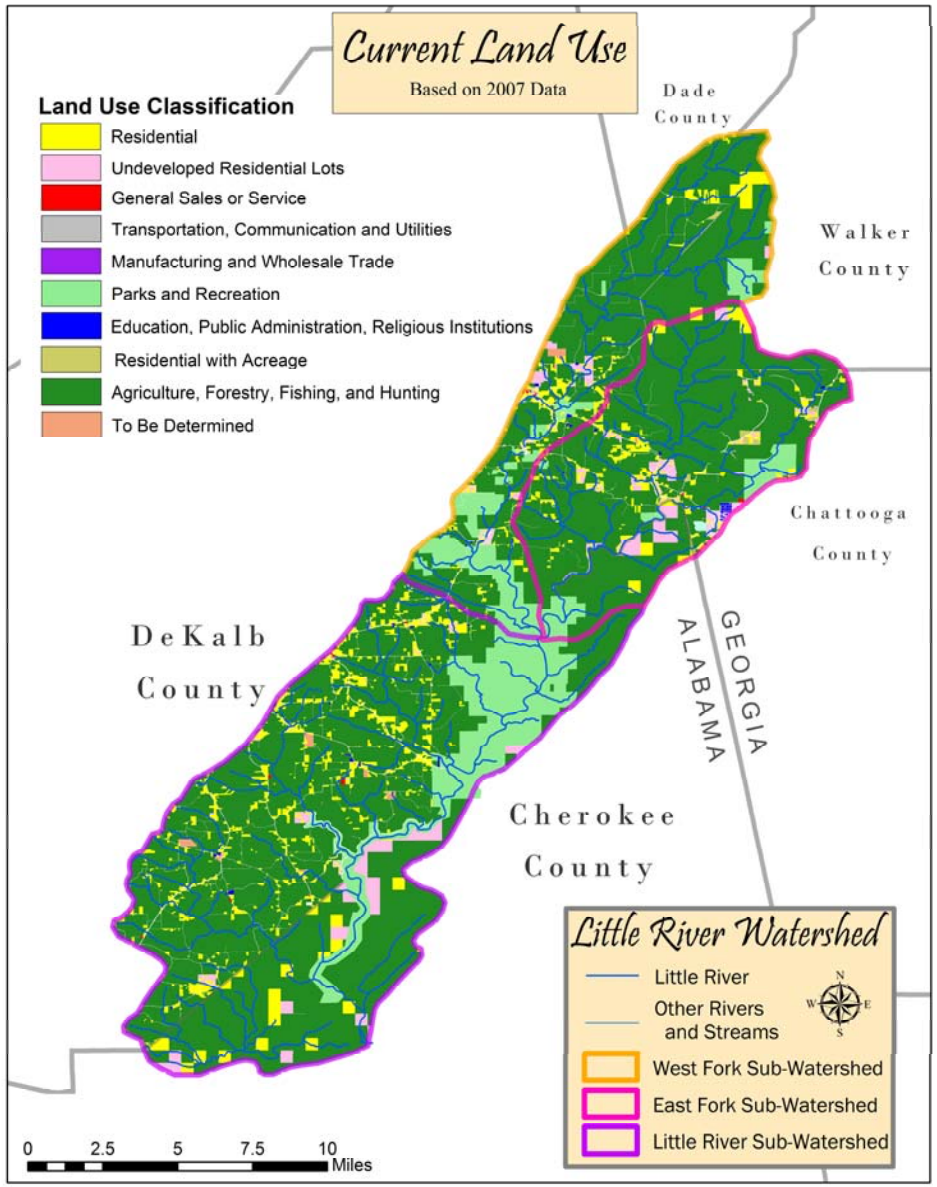
Creating capacity using 604 (b) funds for watershed protection and to improve water quality

TARCOG has completed several planning projects since 2005 that have led to other grants and educational events to protect water quality.

- 2005 West Fork Little River Watershed Study
- 2006 Little River Watershed Study
- 2007 East Fork Little River Watershed Study



2008 Land Use Study and Protection Program



Top of Alabama Regional Council of Governments
September 2008

NEMO Training

- 2009 Web-based Reporting System of Watershed Disturbances within the TARCOG Region
- Southeast Watershed Quality Assistance Network
- Green from the Start, Stormwater Management and Erosion & Sediment Control Seminar April 2009
- Keeping Your Home Green and Safe (Wildland Urban Interface Workshop)
- Participated in Earth Day events across region

➢ 2010 Rural Development Guidelines with Special Consideration for Watershed Protection

DeKalb County
Rural Development Guidelines

With Special Consideration for Watershed Protection

Introduction

The 2008 Land Use Study and Protection Program for the Little River Watershed revealed that development had escalated in the rural areas of DeKalb County threatening water quality, scenic views and the rural character of the area. It was recommended that Rural Development Guidelines be created for developers, local officials, and the general public. This project has been funded with 604(b) funds administered by Alabama Department of Environmental Management and implemented by the Top of Alabama Regional Council of Governments.

http://tarcog.org/environment.html

1 Preserve Rural Character

- Use Open Space Development that incorporates smaller lot sizes to minimize land disturbance, reduce construction costs, conserve natural areas, and provide recreational space and promote watershed protection. The design requires a permanent dedication of 40% or more of the total development parcel as open space.
- Roads should follow the contours of the land.
- Existing rural structures (barns, silos, stone walls etc.) should be preserved.
- Protect farming by using the Farm and Ranch Land Protection Program in Alabama which provides matching funds to purchase development rights to keep productive farm and ranchland in agricultural use.
- New construction should complement existing community character and architecture.

2 Maintain Erosion and Sediment Control at Development Sites

- Erosion control are techniques that prevent soil from leaving its original location. Sediment control are techniques that capture soil after it has been displaced from its original location.
- Use proper Best Management Practices as stated in the Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on construction sites.

http://swcc.alabama.gov/pages/erosion_handbook.aspx

3 Respect Scenic Resources

- Scenic views should remain unblocked or uninterrupted.
- Sacrifice enhanced private views for scenic public views of amenities and open space.
- Buffers should be used between agricultural and residential uses.
- Conserve forested slopes, trees and native vegetation at development sites.
- Manage community parks, street rights-of-way, parking, and other landscaped areas to promote natural vegetation.
- Protect your land with a conservation easement.

www.alabamabyways.com
http://lookoutmountainconservancy.org/

4 Incorporate Mountain and Steep Slope Strategies

- In steep slope areas, the development site should be limited to no more than 10 percent of total project area.
- At least 50 percent of the entire steep slope development site should be preserved as forestland.
- The Firewise program should be utilized for any homes on steep slopes.
- Only selective timber harvesting should take place on steep slopes.

ftp://landofskygis.org/MountainRidgeSteepSlope/LandofSky-MRSSPS-final-report.pdf
http://www.forestry.alabama.gov/WUI/homeowner_resources.aspx?bv=1&s=9
http://www.forestry.state.al.us/PDFs/Selling_Your_Timber_color.pdf

5 Protect Water Quality

- Keep a minimum 35 feet natural vegetated buffer on all perennial streams, intermittent streams and wetlands.
- Leave floodplains intact.
- No development within 1,000 feet of a public well
- Zone 1 (Steamside) Protect integrity of stream
- Zone 2 (Middle) Distance between upland development and stream
- Zone 3 (Outer) Filter runoff

www.adem.state.al.us

Benefits

- Scenic views are preserved which draws tourism and businesses to the area.
- Clean water for drinking, fishing, and swimming.
- Farms and forests remain productive and profitable.
- Wildlife remains stable.
- Preserves our way of life for now and the future.

Rain Barrel Workshops with the Clean Water Partnership

Fish Barrier Survey with U.S. Fish & Wildlife In the Paint Rock Watershed

- 2011 Watershed Management Plan for Guess Creek
- Guess Creek, is listed on the 303(d) list for unknown toxicity, organic enrichment and pathogens.

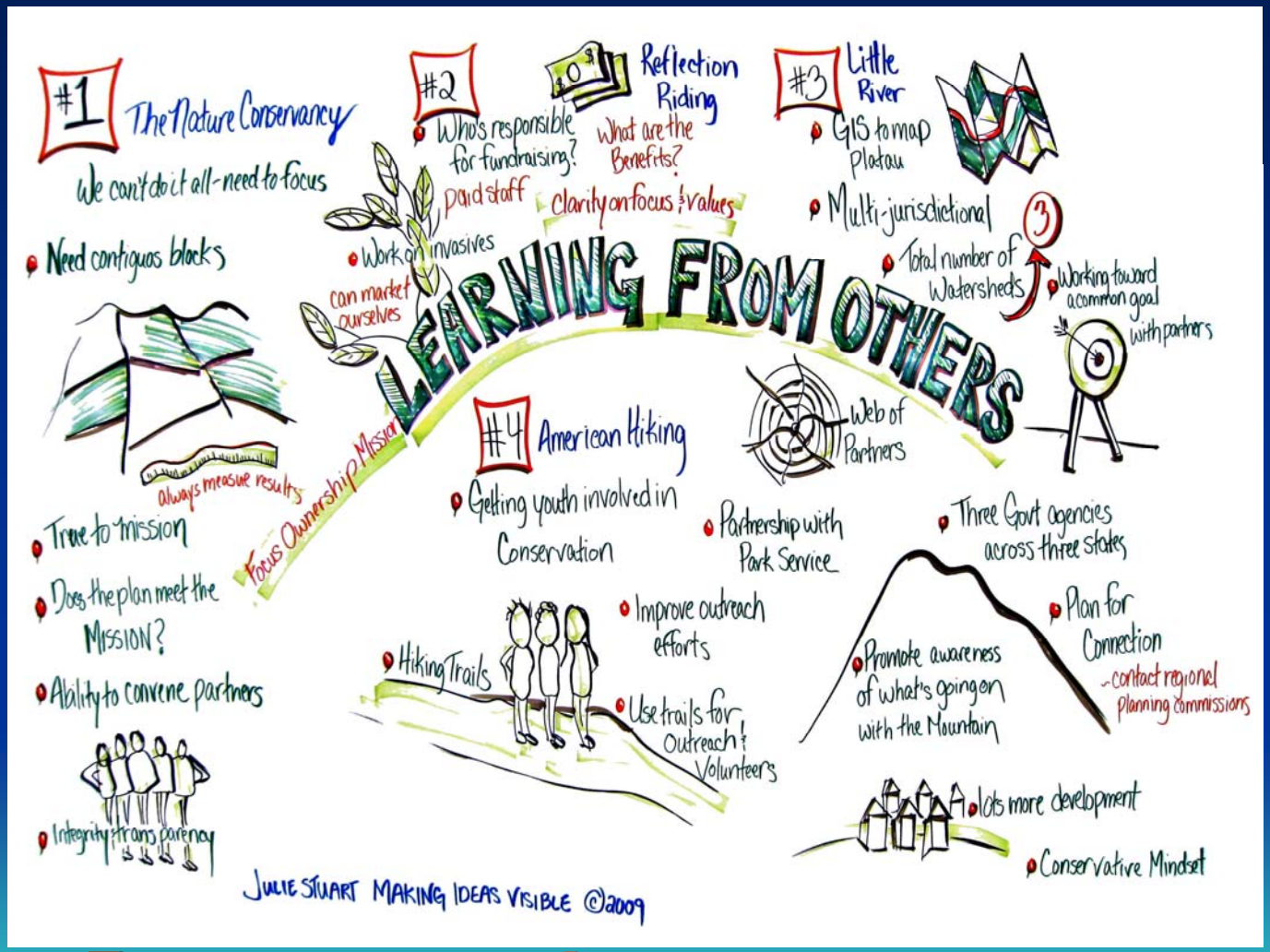
- The Nature Conservancy will implement a project with 319 funds on Guess Creek to help restore it to fully support its designated uses.

- Hardened Steam Crossing
- Hardened Feeding Area
- Alternative Watering Source
- Riparian Forest Buffer
- Stream Bank Stabilization
- Critical Area Planting
- Cattle Exclusionary Fencing
- Field Border
- Pasture & Hay Planting (Native Grasses)
- Runoff Management

A watershed management plan is necessary to proceed with the project and give guidance in having it removed from the State's 303(d) list of impaired waters.

By partnering with different organizations the 604 (b) funds used for planning lead to implementation of projects that protect and improve water quality.

Doing NOT Being



Courtesy of Lookout Mountain Conservancy

Things to Remember

Share your strengths through Partnerships, Affiliations
Stay true to your mission, values and ethics
Be open to explore new and different partnerships
Be open to learn from others
Change when change is needed.
Share your organization's expertise
Listen
Be cooperative vs. competitive in your work. There's enough work for all of us to do!

Contact Information:

Kimberly A. Olin Hammond

Top of Alabama Regional Council of Governments

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Huntsville, AL 35805

(256) 716-2482 kim.hammond@adss.alabama.gov

ADEM

State Revolving Fund Programs

Aubrey White, Chief
General Services Branch
Permits & Services Division

adem.alabama.gov

Why use the SRF?

Local governments can achieve significant savings by financing water quality and drinking water projects with the SRF.

What is the SRF?

CWSRF - Clean Water State Revolving Fund

DWSRF - Drinking Water State Revolving Fund

SRF Requirements

- The SRF program is only available to public bodies
- The applicant must demonstrate an ability to repay the loan
- Environmental review
- High-ranking project

SRF Advantages

- Low interest rate
- Fixed rate, 20-year term
- Level debt service
- No trustee or rebate expenses
- No closing costs
- No payments during construction
- Can match other grant programs

Principal Forgiveness

- Applied to green projects only
- 2009: ARRA
- 2010: Base Program
- 2011: ?

SRF Drawbacks

- Annual cycle
- Limited funding available
- Expenses are reimbursed
- Engineering design must be complete at application stage
- Davis-Bacon wage rates
- Cross-cutters

Eligible Projects - DWSRF

- Treatment
- Storage
- Source (Well)
- Water transmission/distribution mains
- System consolidation projects

Green Projects - DWSRF

- Water efficiency
- Some water meters
- Renewable energy components of drinking water infrastructure
- Energy efficiency projects
- Sustainability plans

Projects Not DWSRF Eligible

- Growth
- Dams, reservoirs, and water rights
- Fire protection
- Non-viable PWS systems
- O & M expenses
- Land purchase

POTW Projects - CWSRF

- Collection system rehabilitation/upgrade
- Pumping stations
- Treatment plants
- Growth projects (will rank low)
- Constructed wetlands/land application

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CWSRF for 2011

adem.alabama.gov

The New CWSRF

Not just POTW's!

- Non-point source
- Estuary
- Agricultural runoff
- Stormwater harvesting

The New CWSRF

- Purchase of land or easements that have a direct water quality benefit
- And more (must have water quality benefits)

Green Infrastructure

- Green streets and parking
- Green roofs
- Street tree programs
- Stormwater harvesting and reuse
- Riparian buffers
- Streambank restoration

Water Efficiency Projects

- Water efficient devices
- Some water meters
- Water reuse
- Irrigation retrofits

Energy Efficiency Projects

<u>POTW's Only</u>

- Renewable energy
- Energy efficient retrofits
- Energy audits and studies

Environmentally Innovative Projects

- Decentralized wastewater treatment
- Some constructed wetlands
- POTW climate change/greenhouse gas projects
- Utility asset management plans
- ????

New CWSRF Priority System

Ranking Factors

1. Enforcement: 50 Points
2. Water Quality Improvement: 135 Points
3. Water/Energy Efficiency: 65 Points
4. Stormwater Management: 50 Points
5. Agricultural/Non-Point Source: 35 Points
6. Sustainability (Bonus): 90 Points
7. Growth (Bonus): 50 Points

SRF Timeline

- Preapplication due December 31
- Full application due May 1
- Credit review & environmental review complete in July
- Loans close late summer - fall

ADEM Website

adem.alabama.gov

- General Information
- Regulations
- Applications and assistance
- Forms
- Reports

For More Information:

Aubrey White, Chief
General Services Branch
ADEM
P.O. Box 301463
Montgomery, AL 36130-1463
Telephone: (334) 271-7711
Email: ahw@adem.state.al.us

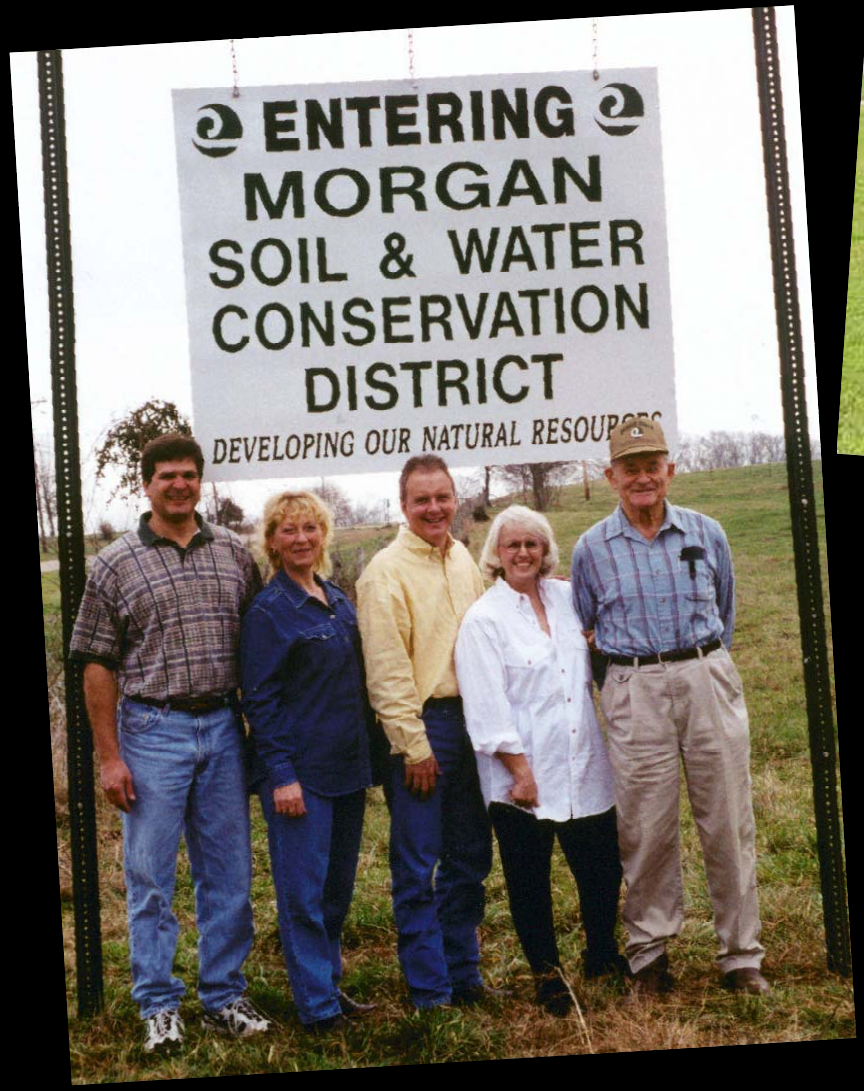
Alabama NRCS

Partners in Water Conservation

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Who We Are, What We Do

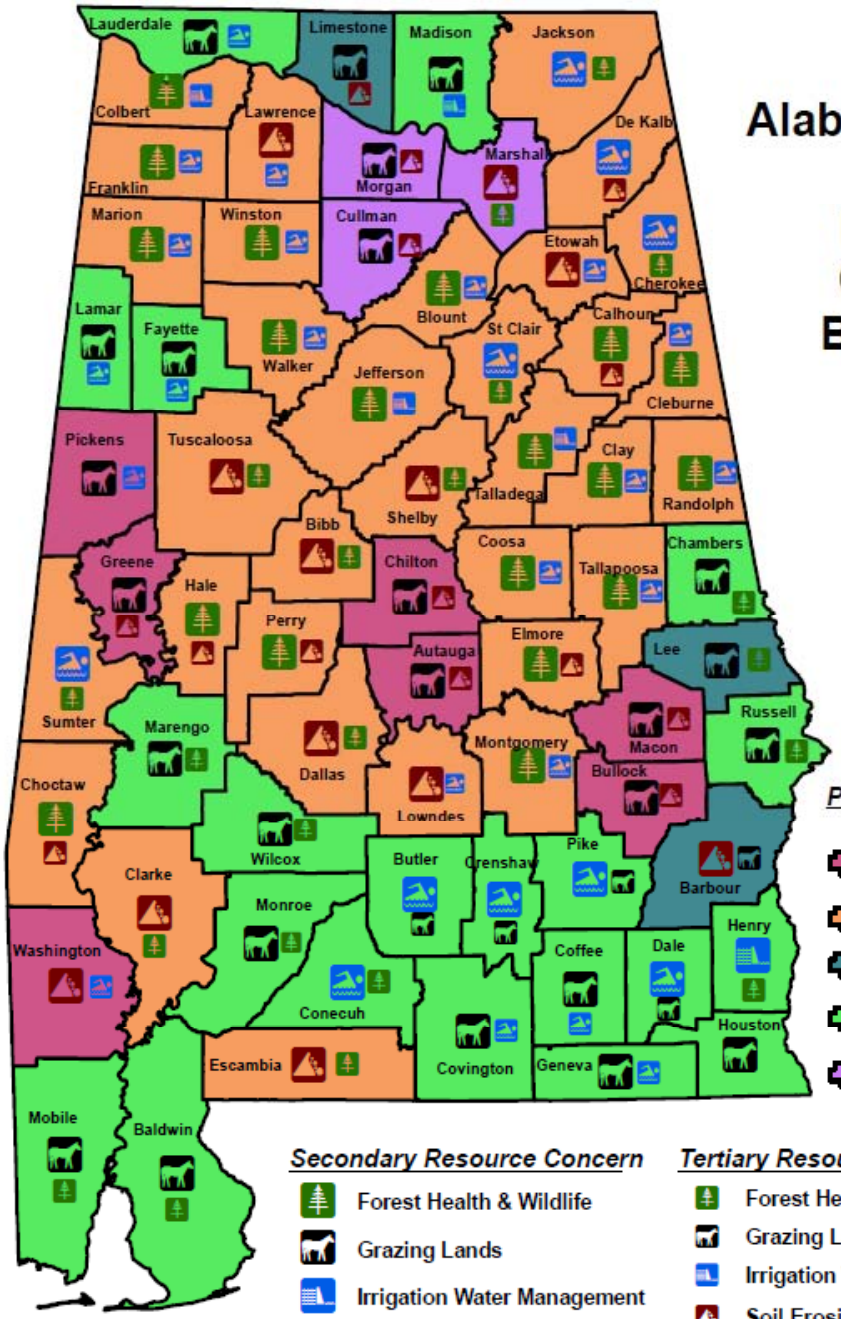
USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service



USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Alabama 2011 EQIP Resource Concerns By County

December 2010



1:2,225,000

Primary Resource Concern

- Forest Health & Wildlife
- Grazing Lands
- Irrigation Water Management
- Soil Erosion/ Soil Quality
- Water Quality/ Animal Waste

Secondary Resource Concern

- Forest Health & Wildlife
- Grazing Lands
- Irrigation Water Management
- Soil Erosion/Soil Quality
- Water Quality/Animal Waste

Tertiary Resource Concern

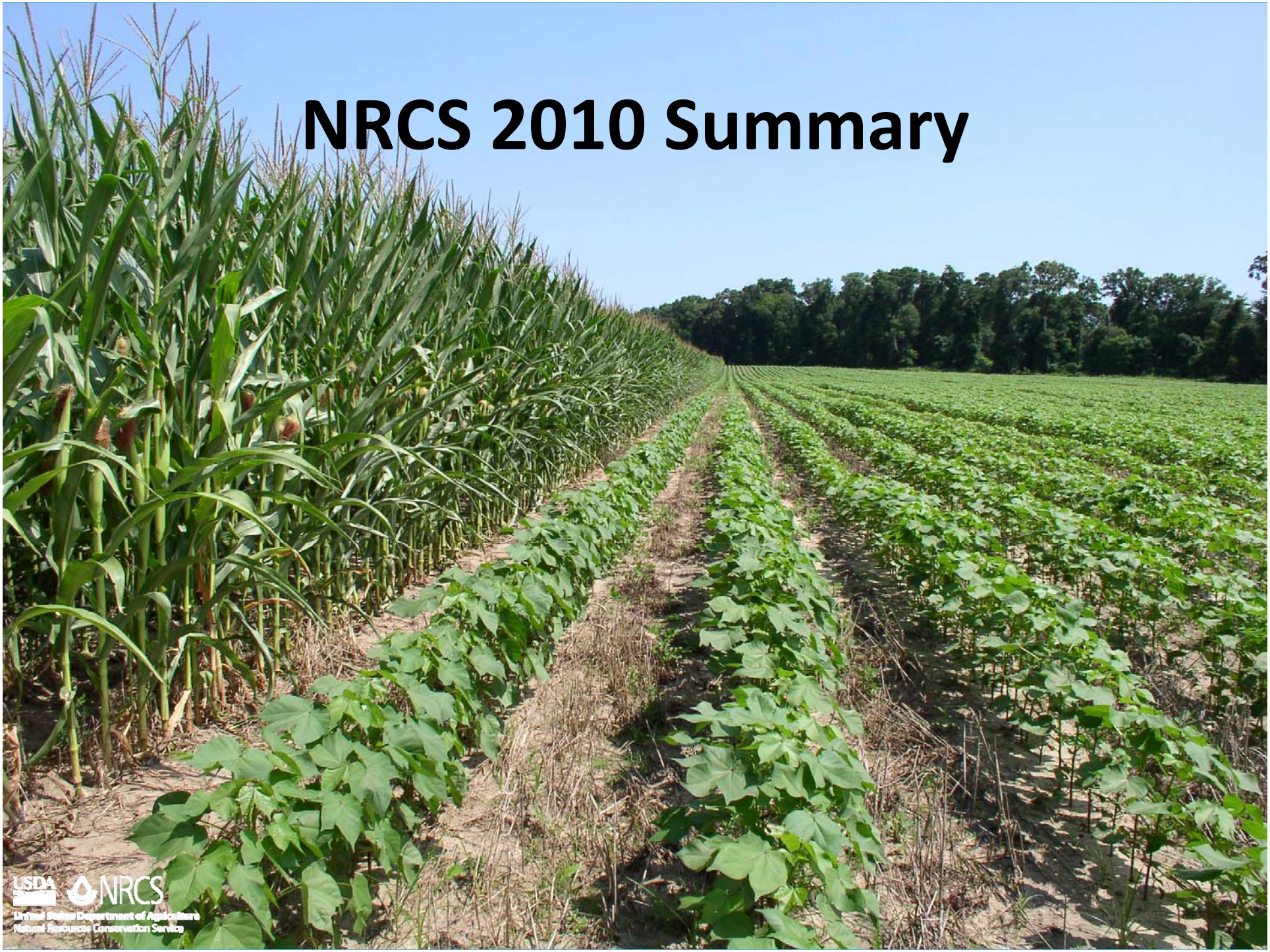
- Forest Health & Wildlife
- Grazing Lands
- Irrigation Water Management
- Soil Erosion/Soil Quality
- Water Quality/Animal Waste

NRCS Natural Resources Conservation Service

Water Quality Objectives

- Decrease erosion and sedimentation
- Reduce nutrient runoff
- Reduce pesticide runoff
- Improve management of animal waste
- Restore wetlands for wildlife habitat and flood water storage
- Reduce storm water runoff

NRCS 2010 Summary



USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

USDA
NRCS
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Natural Resources Conservation Service

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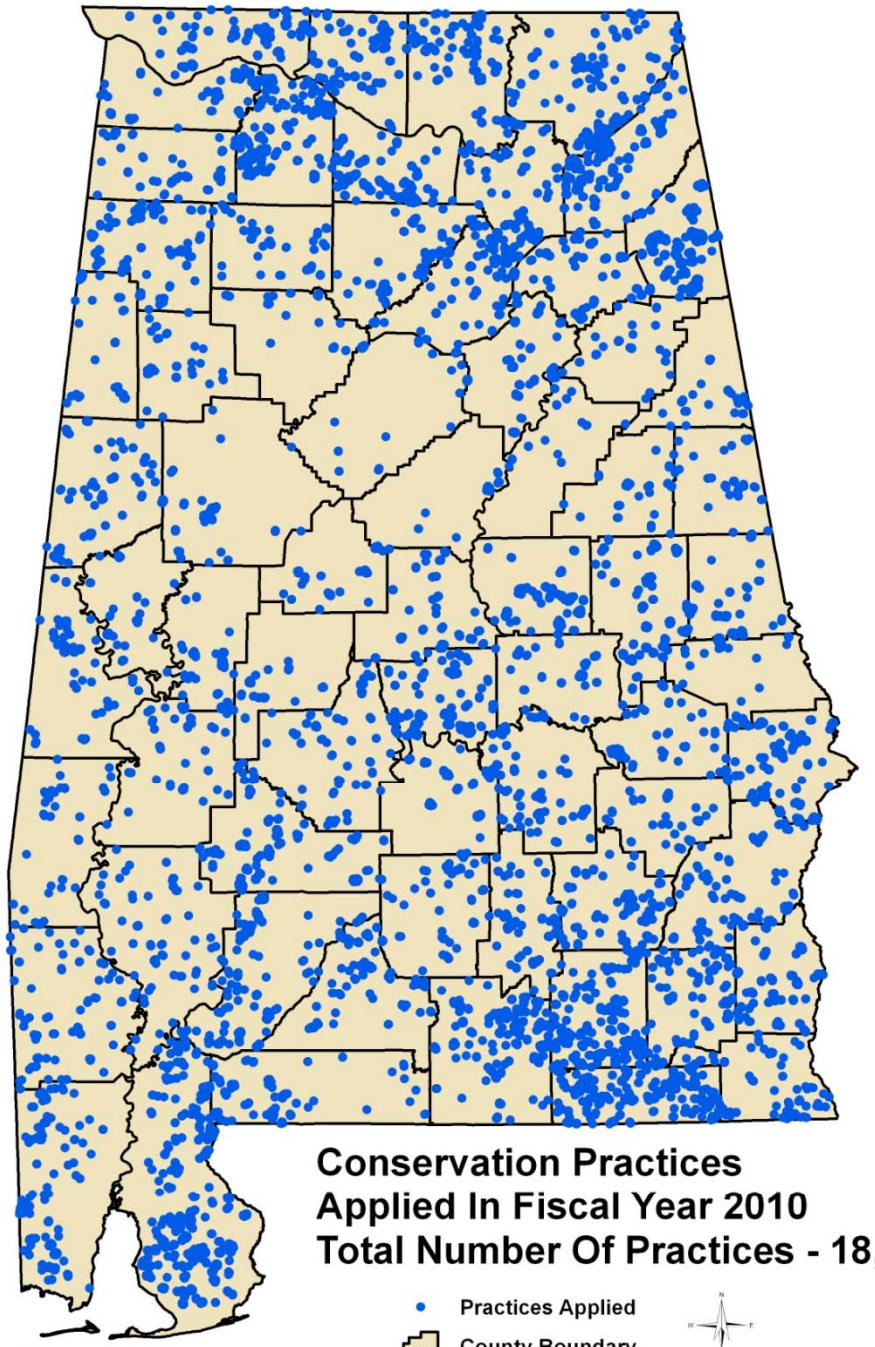
Natural Resources Conservation Service

EQIP: Top 10 Water Quality Practices

- Waste Storage Facility
- Composting Facility
- Pest Management
- Nutrient Management
- Riparian Forest Buffer
- Access Control--Exclusion
- Residue Management no-till/strip-till
- Field Border
- Filter Strips
- Grassed Waterway

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

USDA
NRCS
United States Department of Agriculture
Natural Resources Conservation Service



Conservation Practices Applied In Fiscal Year 2010
Total Number Of Practices - 18,462

Practices Applied

County Boundary

1:2,175,000

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

NRCS Natural Resources Conservation Service

RC&D: Water Quality Accomplishments

- 1,671 acres of fish and wildlife habitat protected or improved (non-federal land)
- 94 segments of rivers and streams improved or restored
- 730 feet of shoreline protected
- 12 watershed or area-wide conservation plans developed
- 41 animal agriculture operations assisted
- 411 environmental education training sessions

Little Shades Creek, Before

USDA
NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Special Initiatives

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

No Farmer
Left Behind
Snell Farms
Skipperville, AL
USDA
NRCS
United States Department of Agriculture
Natural Resources Conservation Service

USDA
NRCS
United States Department of Agriculture
Natural Resources Conservation Service

USDA
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United States Department of Agriculture
Natural Resources Conservation Service

USDA NRCS

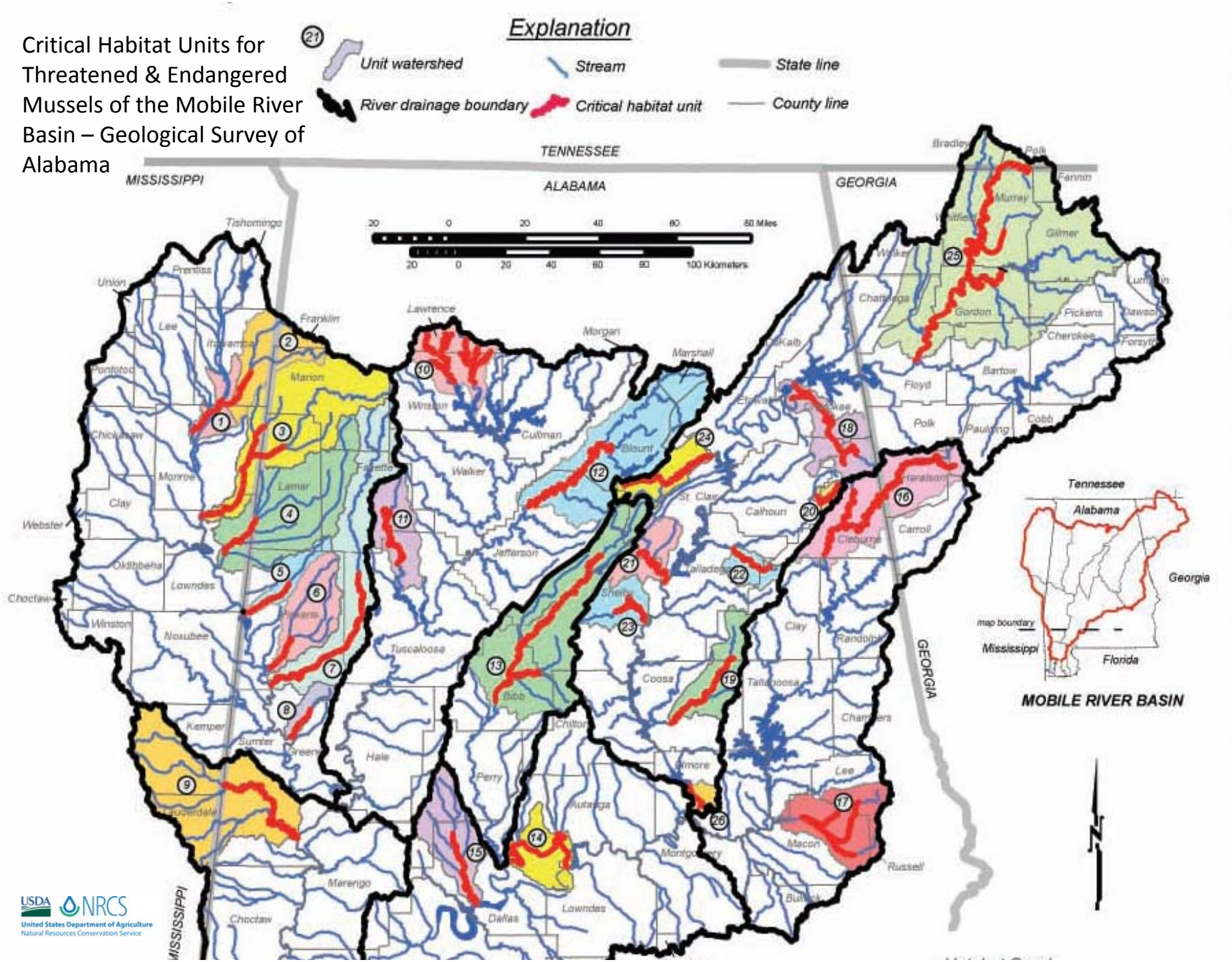
United States Department of Agriculture
Natural Resources Conservation Service

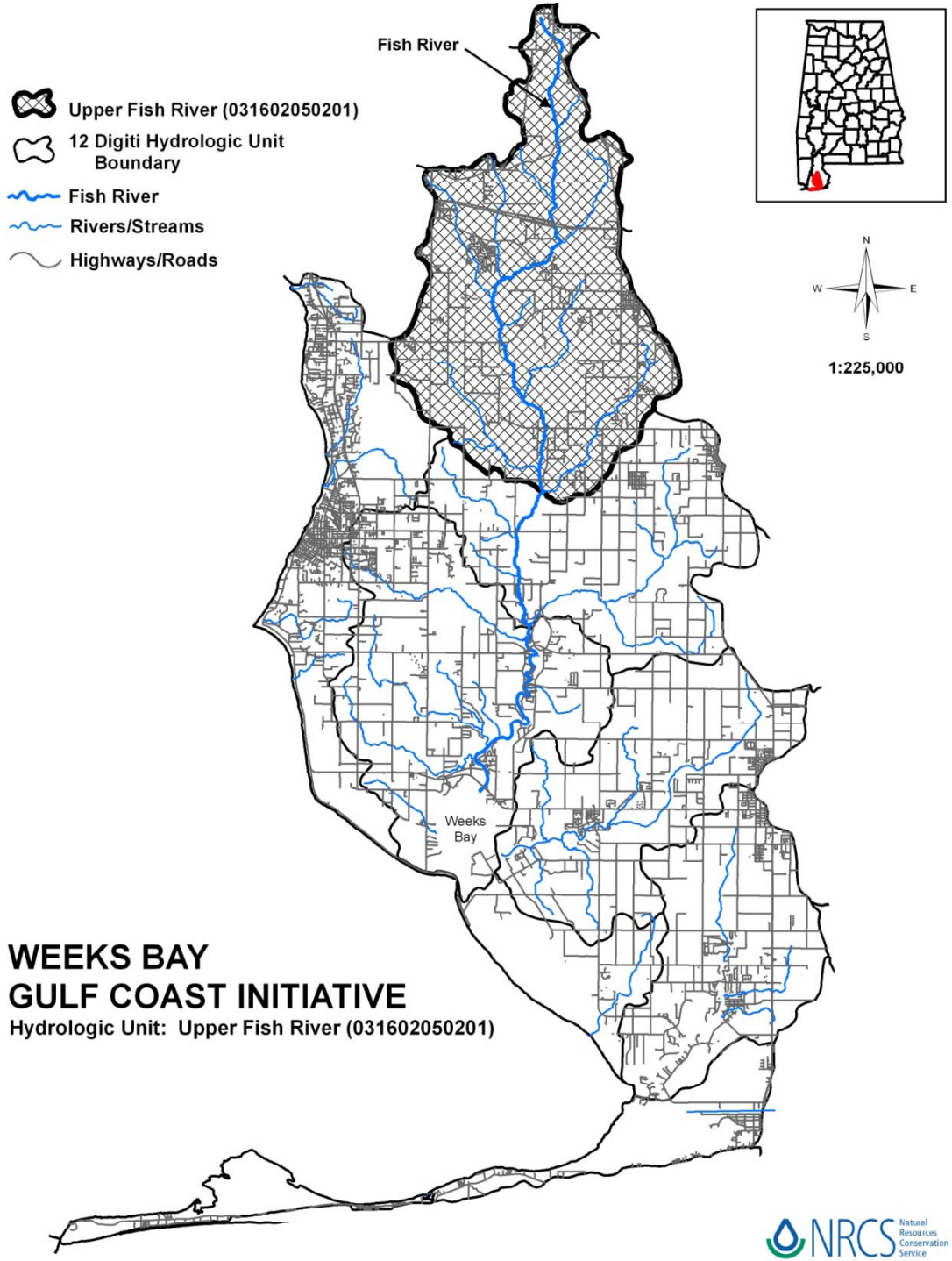
2011: Continuing Success

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

USDA
NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Critical Habitat Units for Threatened & Endangered Mussels of the Mobile River Basin – Geological Survey of Alabama



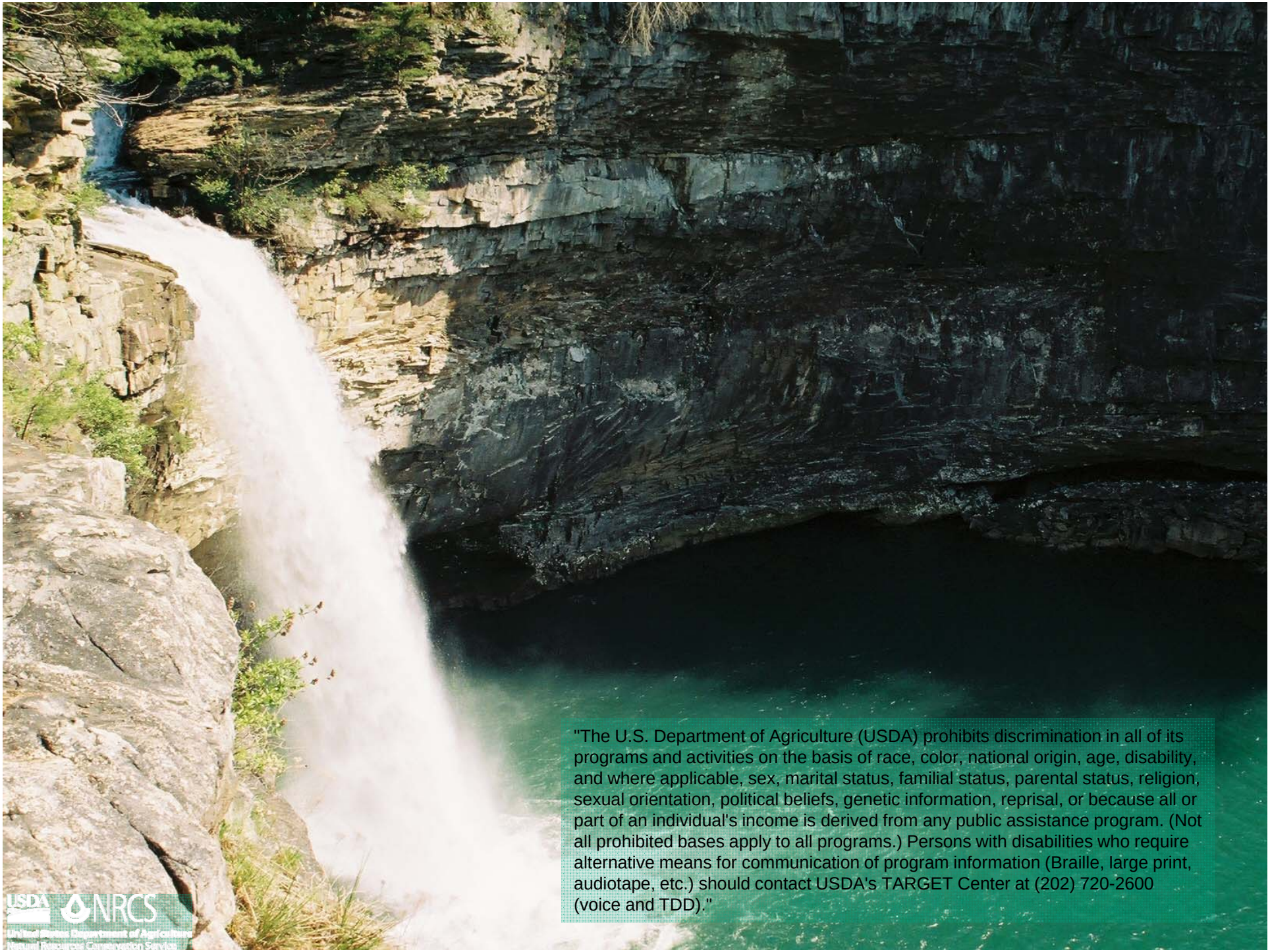


WEEKS BAY
GULF COAST INITIATIVE

Hydrologic Unit: Upper Fish River (031602050201)

NRCS Natural Resources Conservation Service

USDA
NRCS
United States Department of Agriculture
Natural Resources Conservation Service



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USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Decentralized Wastewater Treatment Systems as a Tool for Reducing Pollutant Loading to Alabama Lakes

Jan 26, 2011

Sonja Massey

Land Division, Groundwater Branch

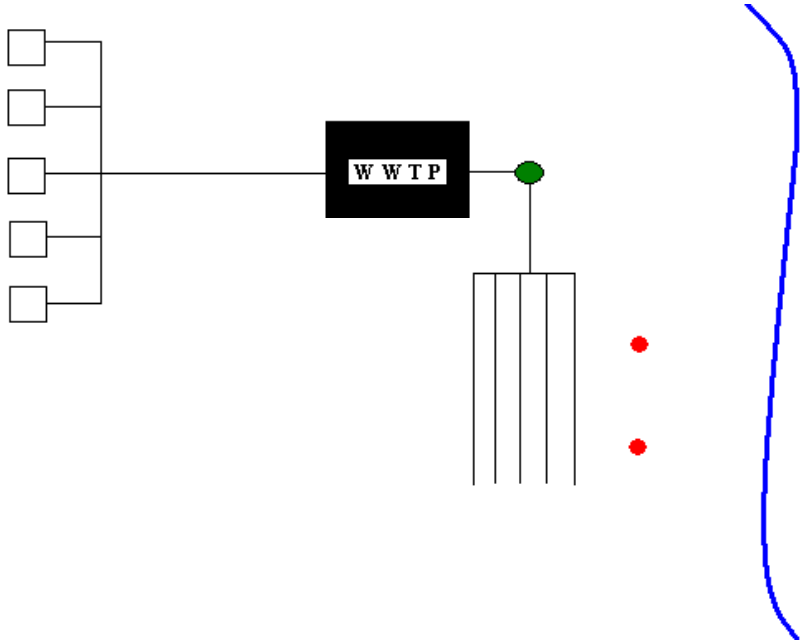
Alabama Department of Environmental Management

adem.alabama.gov

adem.alabama.gov

Decentralized Wastewater Treatment Systems

Residential Sanitary WWTP



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EPA Document Decentralized Wastewater Treatment Systems – A Program Strategy 2005

- Decentralized systems serve 25% of U. S. population
- Decentralized systems are used in about one-third of all new housing and commercial development
- More than half of the 25 million decentralized systems are found in suburban areas
- State water quality agencies identify poorly operating septic systems as second greatest threat to groundwater quality

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Decentralized Wastewater Treatment Systems

Advantages of Decentralized Approach

- Lower capital cost than traditional central sewer design
- Can accomplish higher treatment levels
- Can serve to keep recharge local

ADEM

adem.alabama.gov

Act 2009-773
May 22, 2009

Subsurface Discharges

- Requires any DCWWS permittee to demonstrate financial responsibility through Public Service Commission as an approved Wastewater Management Entity

- Establishes division of permitting responsibilities between ADEM and ADPH

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Decentralized Wastewater Systems
Permitting Agencies

- ADEM

  Systems Greater Than 15,000 GPD

- ADPH

  Systems 15,000 GPD or less

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ADEM Permitting of Decentralized Wastewater Systems

ADEM permits DCWW subsurface discharges as ***Class V wells*** through the Underground Injection Control (UIC) Permitting Program.

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Statutory Authorities

Federal UIC Program Authority

- Authorized by the federal **Safe Drinking Water Act**

Alabama UIC Program Authority

- Provided by the **Alabama Water Pollution Control Act**

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Regulatory Requirements for Class V Wells

Prohibition of Adverse Effect on Ground or Surface Water Quality

- Any injection activity, from any well type, that may result in groundwater concentrations in a USDW exceeding primary or secondary drinking water standards,
- Which may result in a surface water of the state failing to meet applicable water quality criteria, or
- Which may otherwise adversely affect the health of persons or other legitimate beneficial uses of a water of the state is prohibited."

Reference Rule 335-6-8-.05(d)

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Injection Well Facilities

Class V Wells

Residential Sanitary WWTP

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Injection Well Facilities

Class V Wells

Subsurface emplacement may occur through

- Drip irrigation
  - Approximately 8 inches below the surface, or within the root zone
- Traditional field lines
  - Approximately 18 inches below the surface

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Injection Well Facilities

Class V Wells

Residential Sanitary WWTP

adem.alabama.gov

Injection Well Facilities

Class V Wells

Residential Sanitary WWTP

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Permitting Information

Alabama UIC Program

- Decentralized treatment systems permitted as Class V wells must provide a minimum of Secondary Treatment
- Systems located near a water quality limited surface water may have treatment limitations established through water quality modeling.

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Permitting Information

Alabama UIC Program

Effluent Treatment, Sampling, & Reporting Requirements

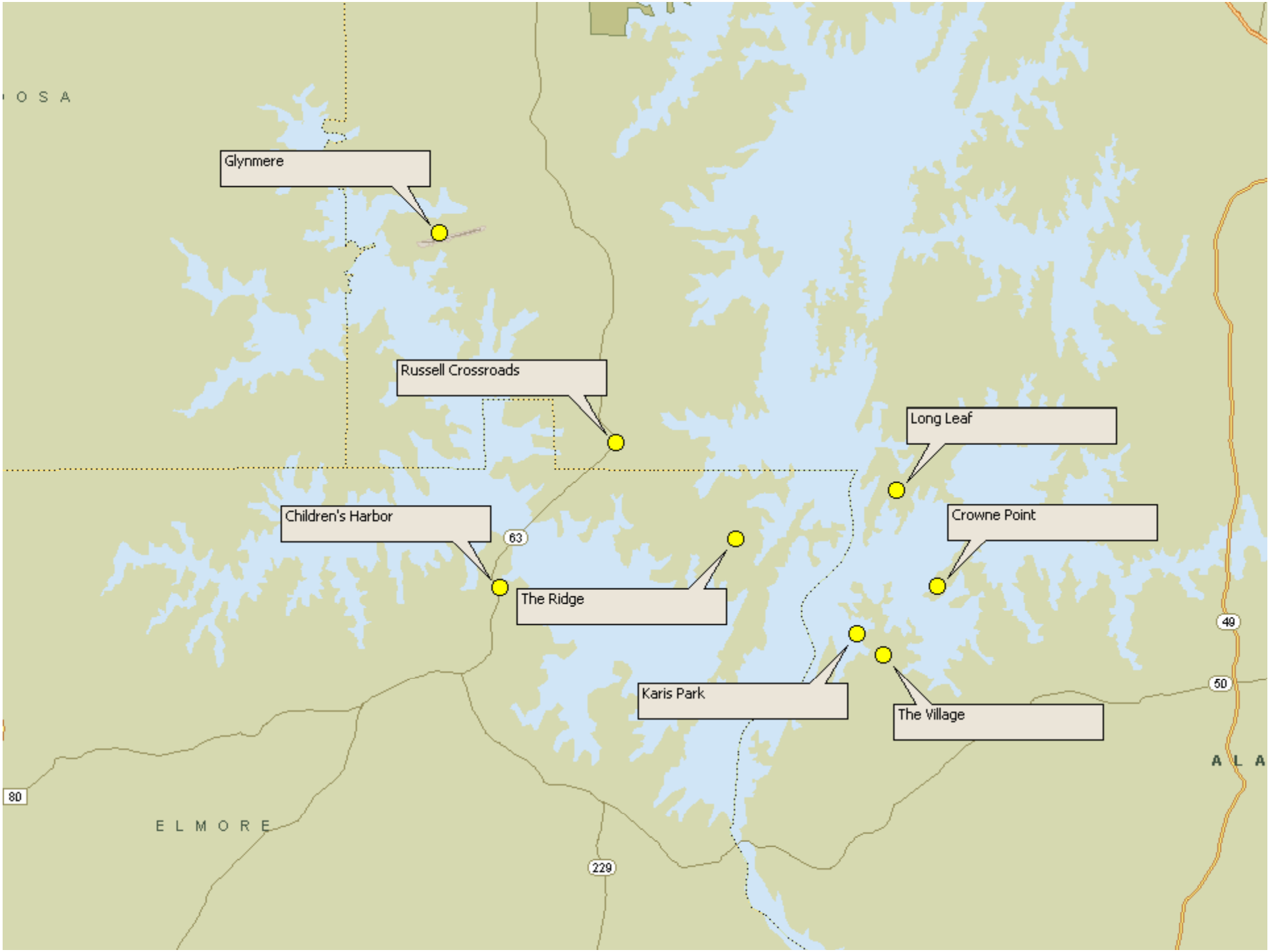
- *Secondary Treatment Required*
- *Must Meet Effluent Quality Limits at the point of Injection for BOD,TSS, TKN*

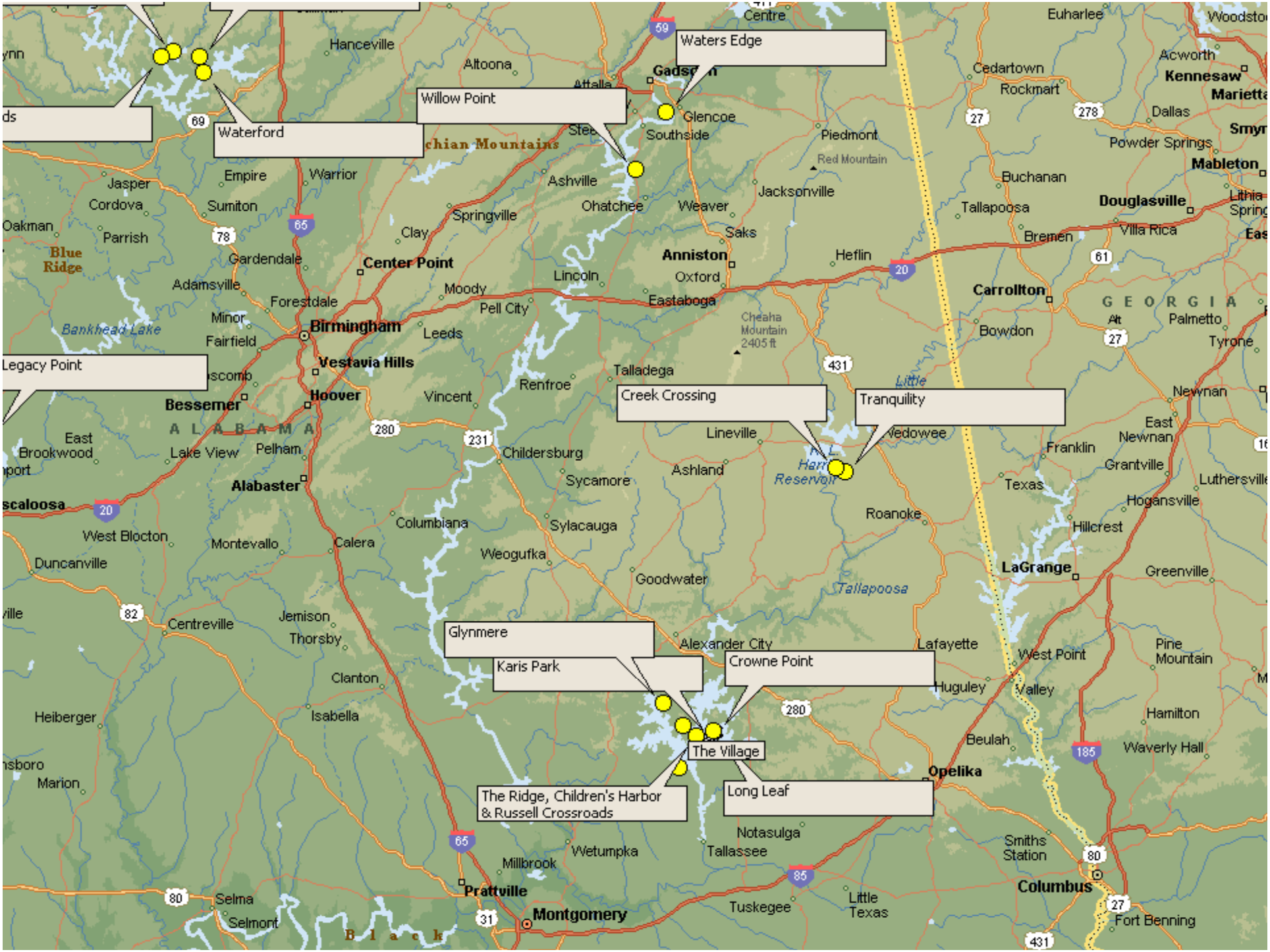
Injection Well Performance Standards

- *Injection Well Must Function Properly*
- *No Effluent Surfacing*

Groundwater Monitoring Requirements

- *Don't Exceed MCLs in Downgradient Monitoring Wells*
  Nitrate 10 mg/l


Glynmere
Russell Crossroads
Long Leaf
Children's Harbor
Crowne Point
The Ridge
Karis Park
The Village
63
49
50
80
229
ELMORE


Waters Edge
Willow Point
Waterford
Legacy Point
Creek Crossing
Tranquility
Glynmere
Karis Park
Crowne Point
The Village
The Ridge, Children's Harbor & Russell Crossroads
Long Leaf
Gadsden
Glencoe
Southside
Anniston
Oxford
Eastaboga
Jacksonville
Piedmont
Red Mountain
Weaver
Ohatchee
Ashville
Springville
Center Point
Birmingham
Vestavia Hills
Hoover
Bessemer
Alabama
Alabaster
Pelham
Lake View
Leeds
Moody
Pell City
Lincoln
Talladega
Cheaha Mountain 2405 ft
Lineville
Ashland
Sycamore
Childersburg
Vincent
Renfroe
Sylacauga
Columbiana
Weogufka
Goodwater
Alexander City
Lafayette
Huguley
Roanoke
Wedowee
Tallapoosa
Little Tallapoosa
Hart Reservoir
Carrollton
Bowdon
Bremen
Villa Rica
Tallapoosa
Buchanan
Cedartown
Rockmart
Euharlee
Acworth
Kennesaw
Marietta
Dallas
Powder Springs
Mableton
Douglasville
Lithia Springs
Smyrna
Woodstock
Palmetto
Tyrone
Newnan
East Newnan
Grantville
Franklin
Texas
Hogansville
Hillcrest
LaGrange
Greenville
West Point
Valley
Pine Mountain
Hamilton
Waverly Hall
Beulah
Opelika
Smiths Station
Columbus
Fort Benning
Little Texas
Tuskegee
Tallassee
Notasulga
Wetumpka
Millbrook
Prattville
Montgomery
Selma
Selmont
Marion
Heiberger
Isabella
Clanton
Thorsby
Jemison
Centreville
Calera
Montevallo
West Blocton
Duncanville
Brookwood
Bankhead Lake
Blue Ridge
Oakman
Parrish
Cordova
Jasper
Sumiton
Empire
Warrior
Gardendale
Adamsville
Forestdale
Minor
Fairfield
Hanceville
Altoona
Centre
Heflin
Clay
Saks
Tyrone
Black
GEORGIA

Catherine's
MARKET

Springhouse

STOP

UV
PURE
Hallett
CROSS FIRE
UV #1
UV
PURE
Hallett
UV #2

RIDGE MARINA
RUSSELLmarine
Hurricane

DANGER
PINCH POINT
WARNING

adem.alabama.gov

Alabama UIC Program

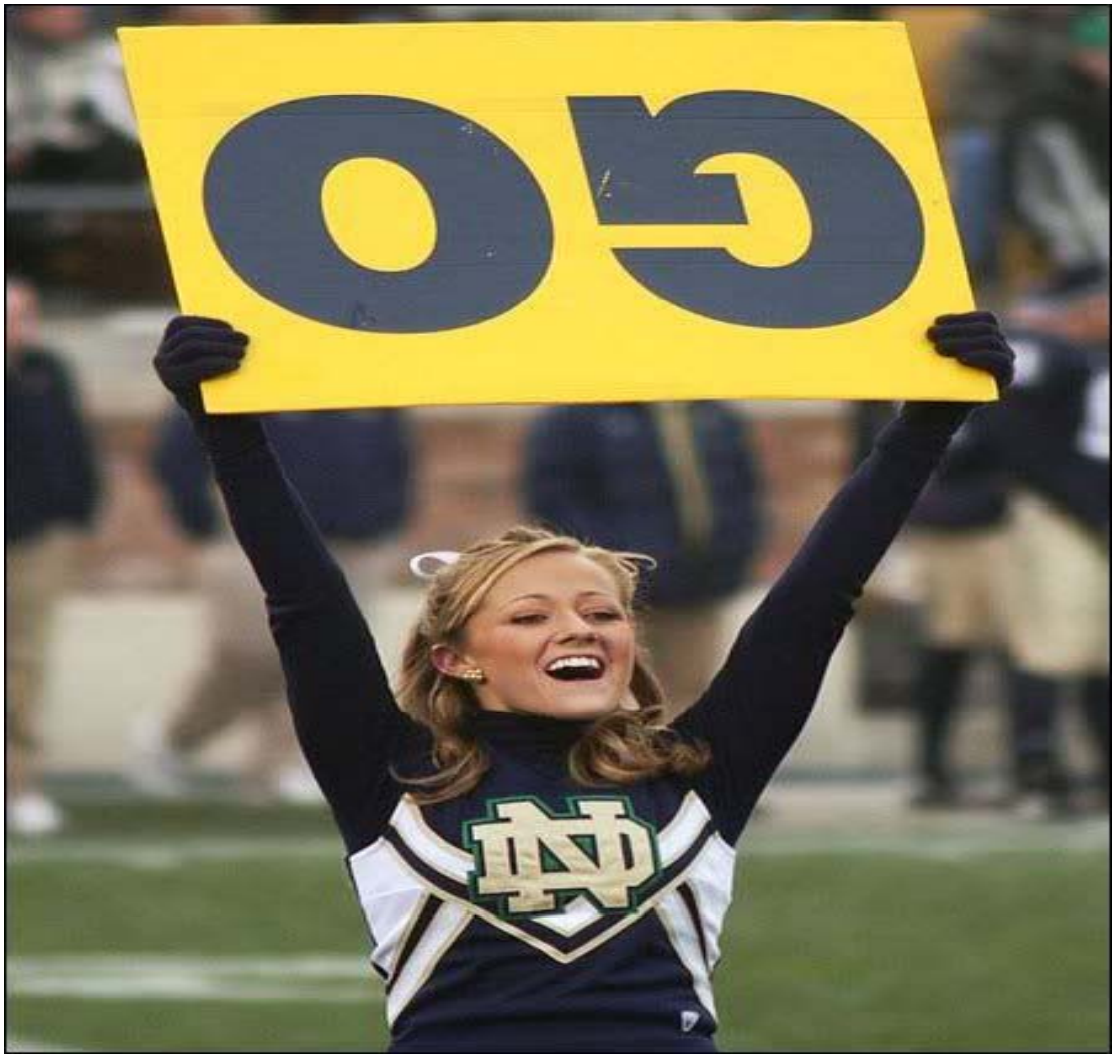
Sonja Massey
Land Division
ssm@adem.state.al.us
334-271-7832

Rain Water Collection for Poultry Production

Alabama Mountains, Rivers & Valleys RC&D Co, Council, Inc.

Mike Roden, NRCS-RC&D Coordinator

Are You Ready?!



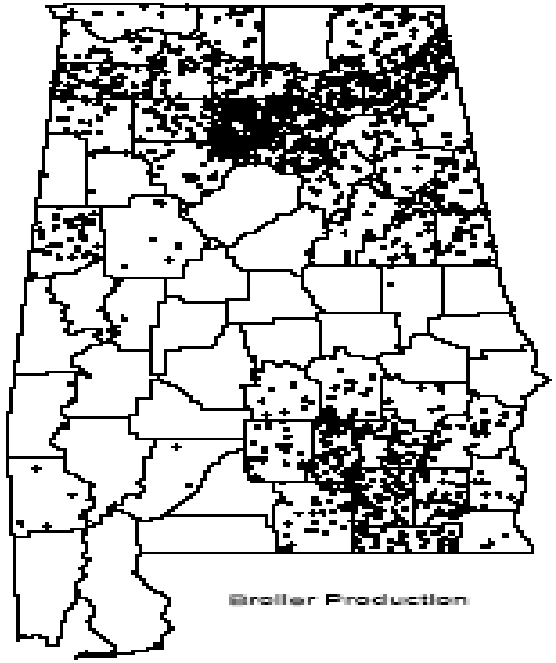
WAR EAGLE !

Where We Are….

Broiler Production, 2006

During the 2006 marketing year, Alabama broiler growers produced 1.053 billion broilers, down slightly from previous marketing year. Alabama is ranked third in production behind Georgia and Arkansas. Cullman county was the leading producer, followed by DeKalb, Marshall and Blount. Cash receipts amounted to $2.16 billion, down 10 percent from previous year.

Cullman County Top in Broiler Production



Leading Counties	Thou Birds
Cullman	173,131
DeKalb	87,869
Marshall	60,498
Blount	54,025

Historically the AMRV-RC&D in Partnership With ADEM Has Been Very Active in Waste Management

"Although we have informed the birds of these regulations, they have done nothing to decrease the amount of manure produced during these critical times….." Brian Brown

Cullman Times Sunday August 29, 2010

"This is the first time in 20 years it's cost me money to grow chickens," said Holly Pond farmer Terry Carr Friday. "Our chickens haven't performed like they should. The thing about it is, I'm still doing everything I've done—to the tee—for the last 20 years, and the only variable, really, that's outside my control is the water. I'm not the only one out this way who's having the same problem at the same time."

Why?

- Rural Water Rates Rising Faster Than Any Other Utility
- Low Profit Margin for Poultry Growers
- Water Quality
- Water Seepage into Poultry Houses from Roof Rainwater runoff

We Knew What We Wanted To Do But We Didn’t Understand the Process….

Auburn Had Already Been Trying to Find a Way to Get This Done….

The Team

- $9,459 Auburn University
- $5,000 CAWACO RC&D
- AMRV-RC&D
  - $50,000 CIG Grant NRCS
  - $20,000 Al Assoc RC&D
- $13,000 Ken Taylor, Farmer

Our Approach

TEAMWORK

Share Victory. Share Defeat.

Some of Us Needed More Training……

Challenges…

- Poultry Company Approval
- Bio-Security
- Drinking Water Quality
- Costs

How It Works

- Gutters
- Gravity fills tanks from bottom…60,000 gal
- Ozone / Chlorination
- Redundancy…..
  - lightning strike
  - Rainfall event

Storage Tanks…60,000 Gallons

DEERE
310G

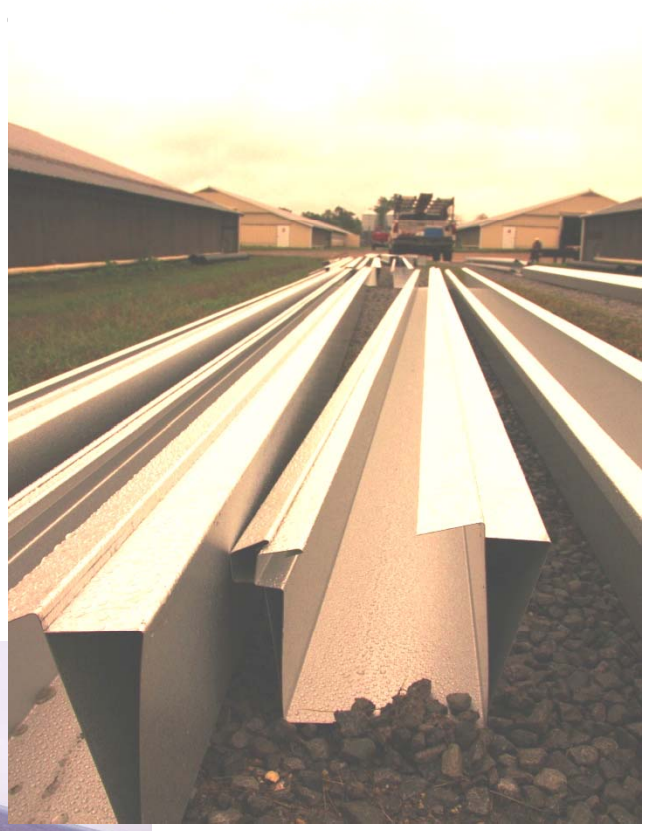
Tank Installation

WATER ONLY

WATER ONLY

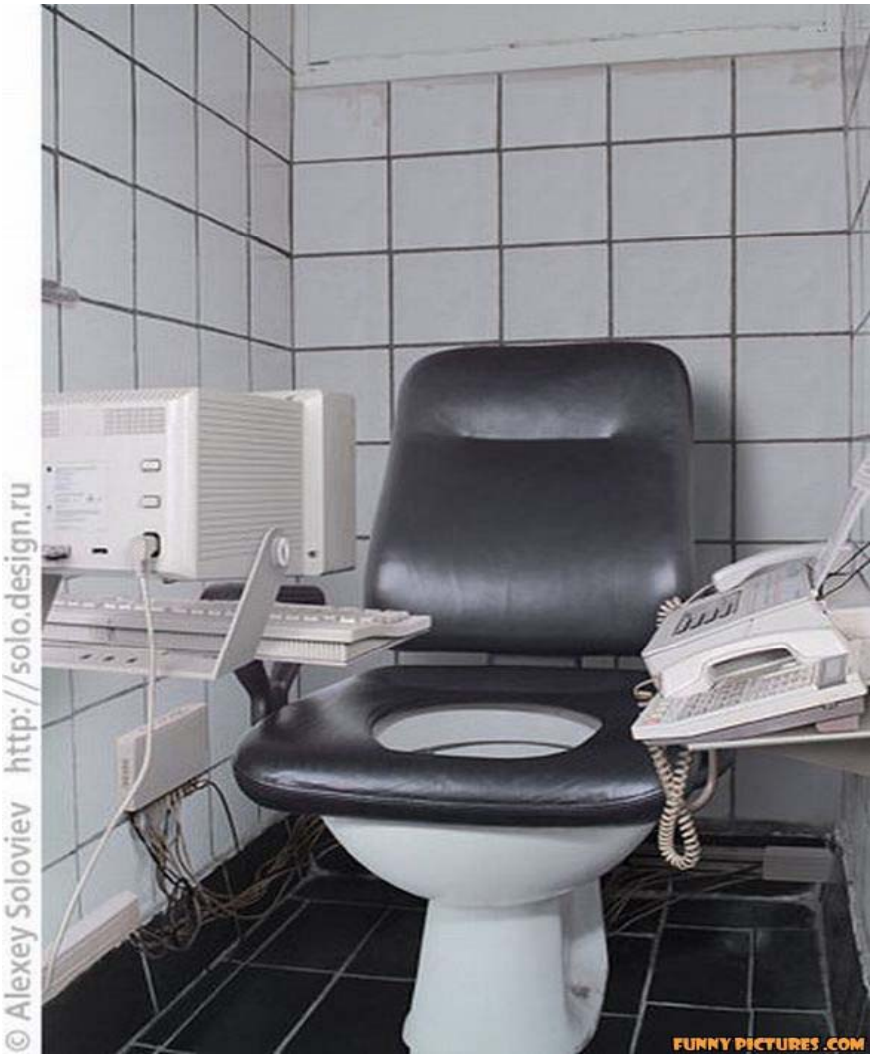
New Technology

The Gutters..



Water Treatment

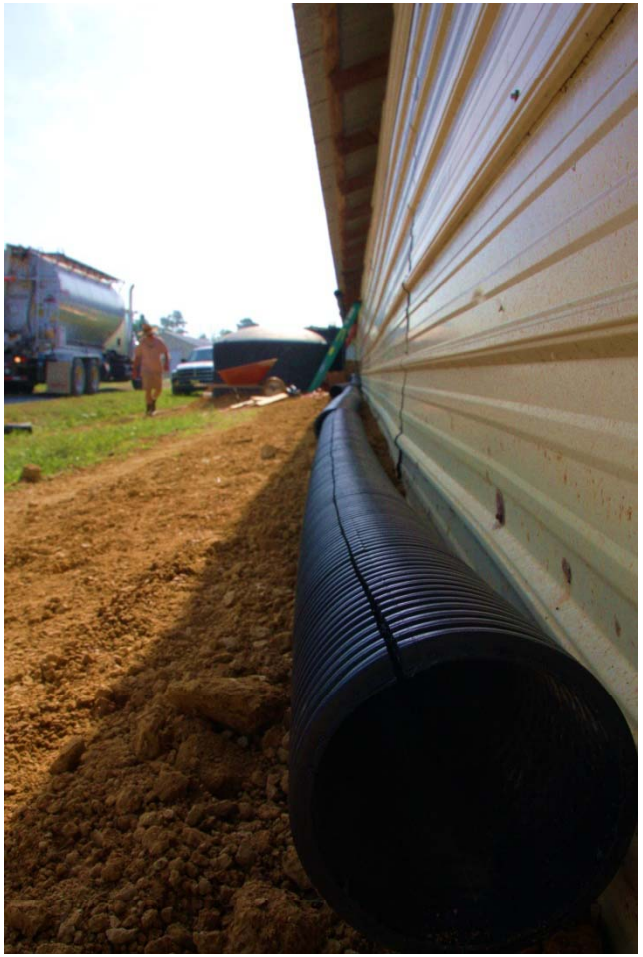
All the Team Members Constantly Stayed on the Job …



Surprises

- Condensation

Costs…..Alternative/CAWACO RC&D

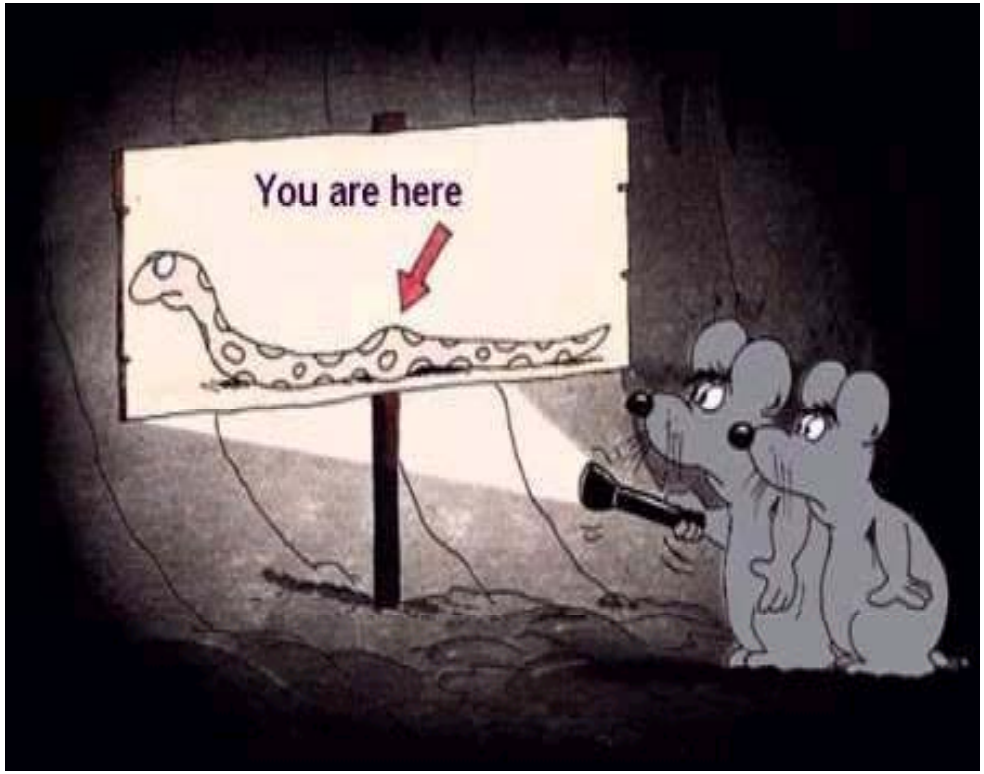


Field Days…Local Ag Partners

Field Days…Elected & Agency Officials

The Results…..

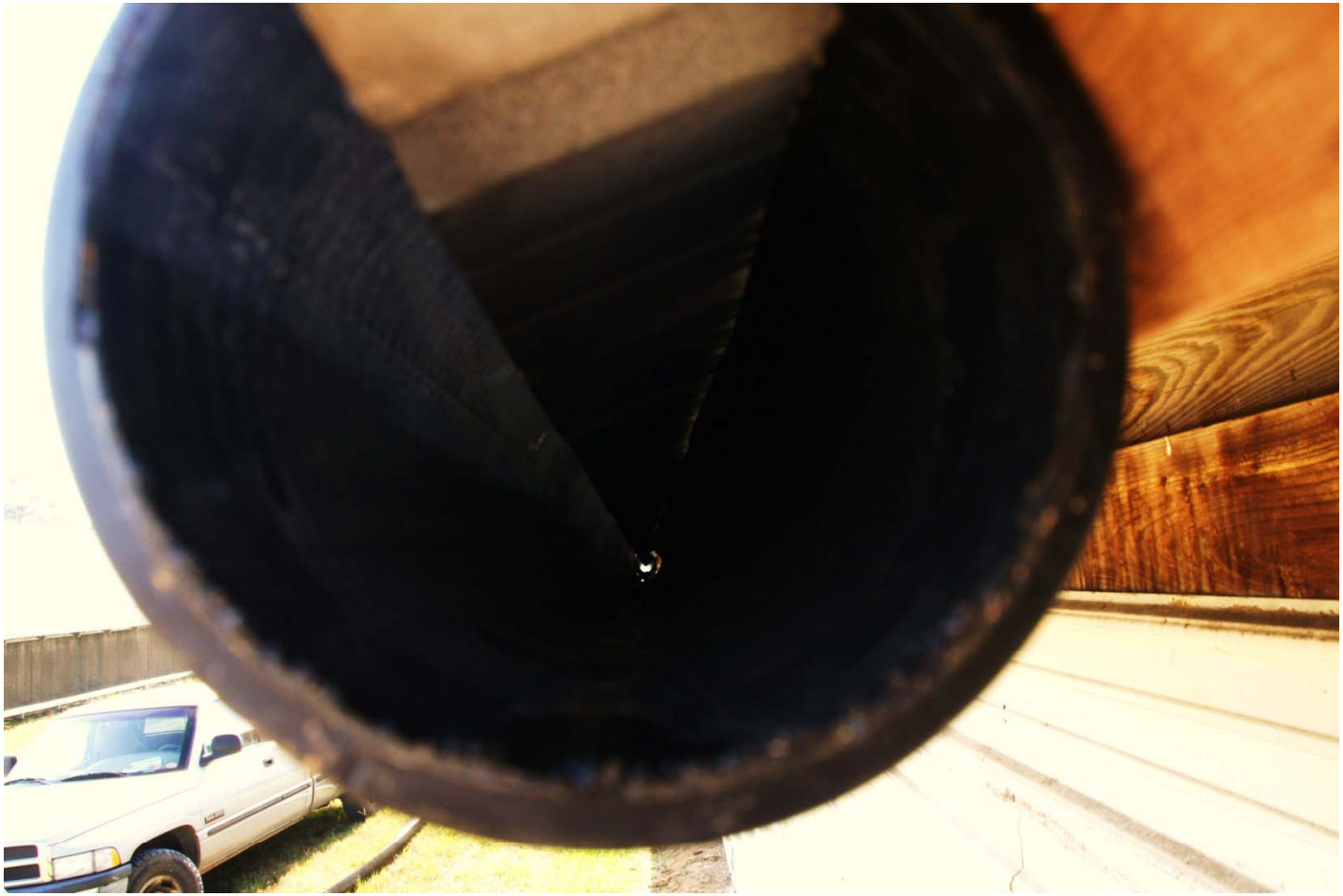
- Last Flock…Used 165,000 gallons of water…
  - 120,00 came from rainwater (about 3.6 inches of rain during period)
  - 45,000 from municipal supply
- Grower Pleased
- Data to be collected for full year
- Additional grower field days



What does This Mean For Water Quality?

- Alabama has approximately 14,000 poultry houses. Each of these houses has sloped metal roofs that can serve as collection basins for rainwater. A 40’ x 500 foot house has a surface area of 20,000 square feet. If the average farm size is four houses this represents rapid rainfall run-off from approximately 2.3 acres per farm.
- Almost 100% runoff from the poultry roofs can be captured
- Runoff from these roofs collects nutrients & manure as it travels across pastureland and areas where litter has been applied

The Light At The End Of The Tunnel?



I Hope We Have Been Clear….

If We Haven’t Shown You What You Wanted To See… We’re Sorry

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WaterWorks

Center for Environmental Education

WaterWorks
Center for
Environmental Education
AMRV-RC&D

Project Details

Purchase Price	**$10.00**
Grants	
Water Works EPA/ADEM Section 319 grant	$304,100.00
Volunteer work May 2009 to June 2010- 5,800 Hours @ $20.25	$117,450.00
RC&D/ACES Grant "Water Works Edu Center"	$21,854.64
RC&D Grant "Water Works"	$21,146.00
RC&D Grant "On-Site Sewage Education"	$31,070.00
RC&D Grant "Water Works Facilities Prep"	$36,409.20
RC&D Grant "WW Office Relocation and Ed Center"	$16,591.31
Legacy Grant "WaterWorks Environmental Responsibility"	$10,000.00
ADECA/DOE Energy Division Grant (State-DOE funds)	$112,990.00
Facility Purchase $10.00, Current Facility Value $450,000.00	$449,990.00
Total Project Value	**$1,121,601.00**

Program Components

- 2 Solar Power Systems
- Porous Parking Storm Water Retention Basin
- Active Multi Cell Wetland Water Treatment System
- Biology/Ecology Lab
- 2 Types of Green Roof Demonstrations
- Vermicular Worm Compost Station
- Natural Mosquito Control Demonstration
- 2 On-Site Alternative Sewage Treatment Systems
- Passive Solar Water Heater, High E

Solar Power System

- **Demonstrates a 10KW Photovoltaic Power system to provide most of the energy needs for the entire facility. Also has a solar powered pump pumping water from Flint Creek to the facilities wetland water treatment system.**

Solar Data

- 10 KW Photovoltaic Solar System
- 6,749 Lbs of Carbon Credits Generated (as of 1/21/11)
- Average $145.00 credit monthly

Solar
Power
RESERVED
PARKING
CAT
Jeep

Green Roofs and Porous Parking Storm Water Retention Basin

- **Demonstrates an energy efficient green roof to reduce storm water runoff. In addition the roof runoff is captured and pumped/filtered through the wetlands before being discharged back to Flint Creek. Rain can also be guttered to Porous Parking area.**
- **Demonstrates a unique approach for communities that have EPA Storm Water Compliance requirements. It features a three foot basin under the porous pavers so 100% of storm water is stored in place until it can safely filter into the ground.**

Garden Roof® Assembly
HYDROTECH

FIRE • RESCUE
DEPARTMENT
ALABAMA

Active Wetland Water Treatment System

- **Demonstrates a hands-on educational approach to teach the value of natural wetlands to filter water and to learn about wetland & stream ecology featuring micro & macro invertebrates, fish, turtles, amphibians and their relationship to aquatic habitats and water quality.**

Natural
Wetlands
Natural
Water
Treatment

Biology/Ecology Education Lab

- **Demonstrates a hands-on educational approach to teach the value of natural wetlands to filter water. The use of AWW test kits, pathogen and NPK sampling along with bio-assessments will monitor the effectiveness of the wetland system.**

Living Mural Alabama Aquatic Ecosystem

- Demonstrates a living cross section of an aquatic ecosystem and its functions.
- 2 large aquariums in a closed loop self treating aquatic ecosystem system. One 385 gallon 10 foot long tank with karst, soil horizons and other natural features will house a large community of native species flora and fauna. One 130 gallon 5 foot long tank will house gravel beds with native snails, mussels, crayfish, macro invertebrates and wetland plants and will serve as a natural filter.

EXIT

Natural Mosquito Control Demonstration

- Two outside wetland cells are being used to breed Gambusia “Mosquito Fish” and other native species fish that prey on Mosquito Larva. These will be distributed locally through awareness programs.

On-Site Sewage Treatment

- **Demonstrates the use of "constructed wetlands" & mound systems to treat all the sewage generated at the facility.**

On-Site
Sewage
Wetland

Sewage
Treatment
Mound

Rain Barrel Workshops/Demonstration and Vermicular Worm Composting

- Demonstrates the use of rain barrels in a residential/farm setting and shows the use of a worm composting bin to provide earth insulation and to digest all the organic / paper waste generated at the facility.

Rainwater
Harvesting

Worm
Composter

Alabama Mountains Rivers and Valleys Resource Conservation Development Council
and
Alabama Clean Water Partnership Tennessee Basin Offices

ALUM
FLOURIDE
CAUSTIC

AMRV-RC&D

CAUTION
LOW OVERHEAD
WOMEN

The End

Questions?

STATE OF ALABAMA DEPARTMENT OF INDUSTRIAL RELATIONS

MINING AND RECLAMATION DIVISION

ABANDONED MINE LANDS PROGRAM

RECLAMATION AND RESTORATION AT SURFACE MINING SITES

Alabama Department of Industrial Relations

MINING & RECLAMATION DIVISION ABANDONED MINE LANDS

» BOOTHTON PROJECT

Alabama Department of Industrial Relations

AML PROJECT –BOOTHTON
DANGEROUS HIGHWALL PRIOR TO CLEARING

AML PROJECT –BOOTHTON
DANGEROUS HIGHWALL PRIOR TO CLEARING

Alabama Department of Industrial Relations

AML PROJECT –BOOTHTON
DANGEROUS HIGHWALL PRIOR TO CLEARING

AML PROJECT –BOOTHTON
PRIOR TO CONSTRUCTION

AML PROJECT –BOOTHTON
PRIOR TO CONSTRUCTION

Alabama Department of Industrial Relations

AML PROJECT –BOOTHTON
ADEM PERMIT SIGN

AML PROJECT –BOOTHTON SEDIMENT CONTROL STRUCTURES

Alabama Department of Industrial Relations

AML PROJECT –BOOTHTON SEDIMENT CONTROL STRUCTURES

Alabama Department of Industrial Relations

AML PROJECT –BOOTHTON SEDIMENT CONTROL STRUCTURES

Alabama Department of Industrial Relations

AML PROJECT –BOOTHTON
CLEARING OF PROJECT SITE

AML PROJECT –BOOTHTON
CLEARING OF PROJECT SITE

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CLEARING OF PROJECT SITE

Alabama Department of Industrial Relations

AML PROJECT –BOOTHTON
DANGEROUS HIGHWALL AFTER CLEARING

AML PROJECT –BOOTHTON
BACKFILLING DANGEROUS HIGHWALL

Alabama Department of Industrial Relations

AML PROJECT –BOOTHTON
BACKFILLING DANGEROUS HIGHWALL

Alabama Department of Industrial Relations

AML PROJECT –BOOTHTON
RECLAIMED SITE PRIOR TO REVEGETATION

AML PROJECT –BOOTHTON
RECLAIMED SITE PRIOR TO REVEGETATION

AML PROJECT –BOOTHTON CONSTRUCTION COMPLETE

AML PROJECT –BOOTHTON SEDIMENT CONTROL STRUCTURES

Alabama Department of Industrial Relations

AML PROJECT –BOOTHTON
RECLAIMED SITE AFTER REVEGETATION

AML PROJECT –BOOTHTON RECLAIMED SITE AFTER REVEGETATION

AML PROJECT –BOOTHTON POST CONSTRUCTION

Alabama Department of Industrial Relations

AML PROJECT –BOOTHTON
AERIAL VIEW RECLAIMED SITE

Alabama Department of Industrial Relations

AML PROJECT –BOOTHTON
AERIAL VIEW RECLAIMED SITE

Alabama Department of Industrial Relations

CANE CREEK PROJECT

ABANDONED MINE LANDS PROGRAM
MINING AND RECLAMATION DIVISION
OF
DEPARTMENT OF INDUSTRIAL RELATIONS

IN
COOPERATION
WITH

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

CANE CREEK PROJECT

Alabama Department of Industrial Relations

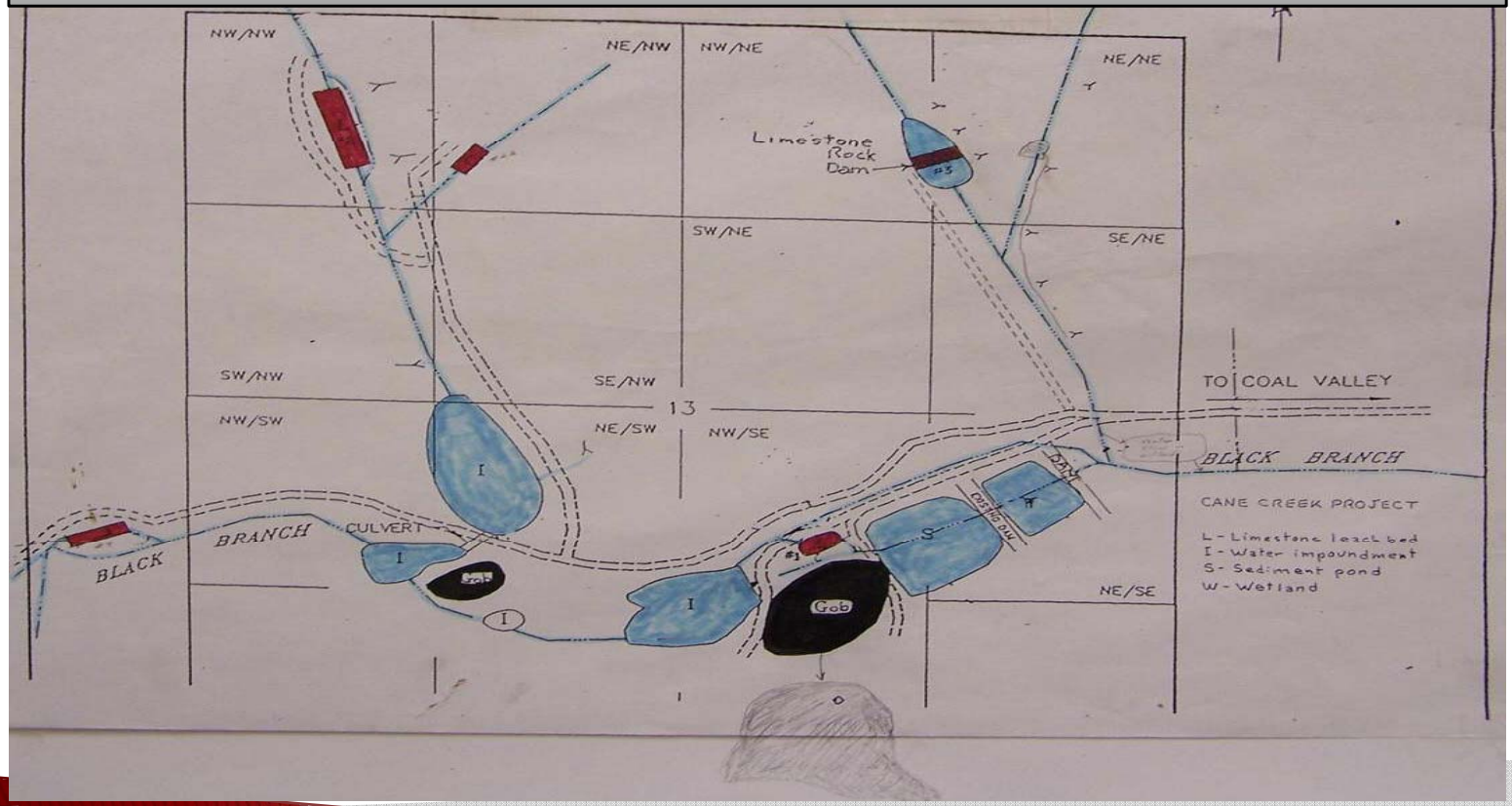
CANE CREEK PROJECT

Alabama Department of Industrial Relations

CANE CREEK PROJECT

Alabama Department of Industrial Relations

CANE CREEK PROJECT



CANE CREEK PROJECT

CANE CREEK IV
WATER ANALYSIS SAMPLING SITES 4, 5 & 6
APRIL, MAY & JUNE, 2006

PARAMETER	SITE 4	SITE 5	SITE 6
pH	3.59	3.32	3.71
Acidity (mg/L)	65.83	99.16	362.33
Alkalinity (mg/L)	<0.01	<0.01	<0.01
Aluminum (mg/L)	2.37	2.66	8.82
Iron (mg/L)	0.28	1.74	41.81
Manganese (mg/L)	1.59	2.93	2.59
Flow (GPM)	494	691	82

CANE CREEK PROJECT

Alabama Department of Industrial Relations

CANE CREEK PROJECT

Alabama Department of Industrial Relations

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CANE CREEK PROJECT

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Remediation of Illegal Dump Sites

Holly Funk
ADEM - Land Division

22nd Annual Nonpoint Source Conference

January 26, 2011

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Unauthorized Dumps and Scrap Tire Accumulations

ADEM Admin. Code r. 335-4-2

Scrap Tire Site Remediation

ADEM Admin. Code r. 335-13-11

Solid Waste Fund Site Remediation

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Unauthorized Dumps and Scrap Tire Accumulations

- Identify
  - ADEM staff
  - Public complaints
  - Local government (county engineers, county commissioners, solid waste officers)
  - Aerial Reconnaissance
- Investigate
  - State geographically divided among six inspectors
  - Obtain ranking criteria (quantity of material, types of waste, proximity to surface water, drinking water wells, environmental justice areas, and utilities)
  - Obtain GPS coordinates to determine property ownership

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Investigate: Types of Solid Wastes

- Household Garbage
- Construction & Demolition Wastes (such as lumber, shingles, and sheetrock)
- Industrial Wastes
- Electronics
- Furniture
- Appliances
- Scrap Metal
- Scrap Tires

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Unauthorized Dumps and Scrap Tire Accumulations

- Information Gathering
  - Notice of Deficiency issued to property owner/responsible party
  - Thirty days to respond to Department
  - Review response of property owner
- Evaluate
  - Responsible Party or
  - Innocent Landowner
- *Primary tool for remediation is through enforcement action*
- When responsible party refuses to remediate dump site or the property owner is deemed innocent, the clean-up of those sites may be eligible for funding using the Solid Waste Fund or the Scrap Tire Fund

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Funding

Where does the funding come from (Solid Waste Fund)?

Disposal Fees at Landfills

- $1.00 per ton or $0.25 per cubic yard on all solid waste disposed in Alabama-i.e. municipal solid waste (MSW) landfill, construction and demolition (C/D) landfill, industrial waste landfill

Where does the funding come from (Scrap Tire Fund)?

Fees on Purchase of Tires

- $1.00 per tire on all new or used tires sold

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Funded Remediation Projects

After determining innocent landowner status:

- Use ranking criteria to prioritize remediation activities
- Map location of each dump site using mapping software (for internal use only)
- When site ranks high enough, execute site access agreement with property owner
- Contact local governments for interest in site remediation via Interagency Cooperative Agreements (ICA)

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Funded Remediation Projects

If local governments are not interested:

- Publish public notice of proposed remediation project
  - Four major newspapers (Huntsville, Birmingham, Montgomery & Mobile);
  - Closest daily newspaper to dump site; and
  - The Department's website: www.adem.state.al.us/newsEvents/publicNotices.cnt
- Conduct mandatory bid preview meeting for contractors at dump site
- Hold competitive bid process
- Low bidder notified and remediation plan requested

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Remediation Plan Components

- Disposal location
- Estimated quantities and types of waste
- Measures to control erosion
- Site restoration and closure
- Proposed schedule of work
- Measures to protect utilities
- Measures to prevent vector migration

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Funded Remediation Projects

- Review and approve professional engineer-prepared remediation plan
- Contract signing
- Issue Notice to Proceed (must initiate remediation activities within ten days of NTP)
- Oversee remediation activities by contractor
- Payment to contractor after project completed and approved by Department personnel

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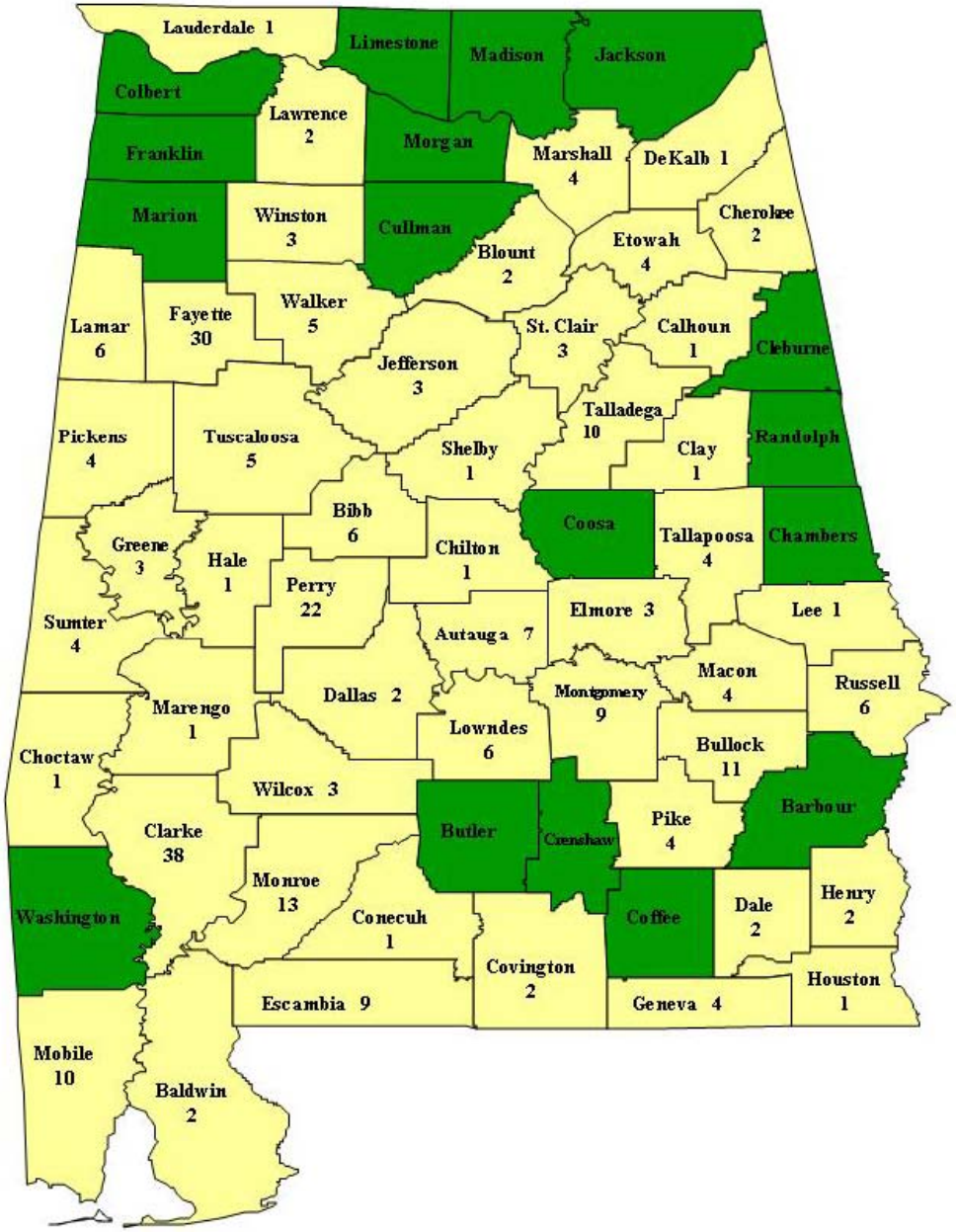
Number of Scrap Tire/Solid Waste Funded Remediation Sites



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Unauthorized Dump Site Remediation Projects

Solid Waste Fund (since program inception in June 2009)

- 221 identified unauthorized dump sites (UAD)-Fund eligible and ranked
- 57 remediation projects currently in progress
- 55 remediation projects completed
- Expenditures of ~$2,805,000
- ICA projects comprised ~$1,270,500 of total funds
- Approximately 7,500 tons of solid waste removed/disposed from the 55 remediation projects

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Unauthorized Dump Site Remediation Project Before and After Photos

Coden, Mobile County, Alabama

Jackson, Clarke County, Alabama

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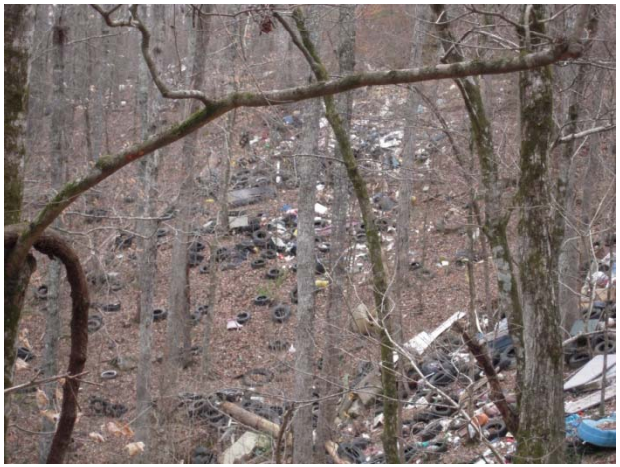
Unauthorized Dump Site Remediation Project Before and After Photos



Berry, Fayette County, Alabama

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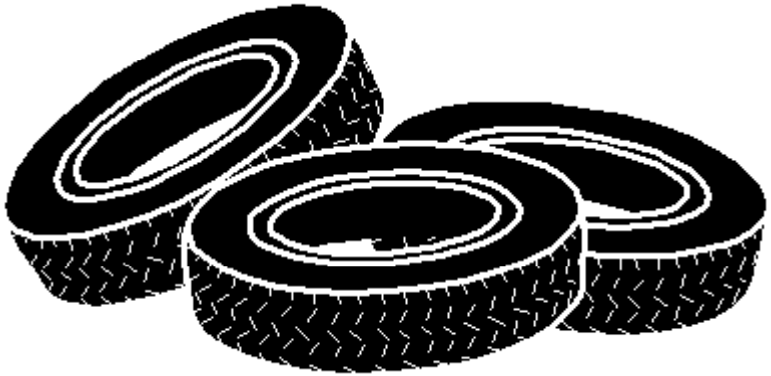
Small Scrap Tire Site Remediation Projects

Scrap Tire Fund FY 2009

- 14 projects totaling ~$104,000
- Approximately 65,500 passenger tire equivalents (PTE) removed from the 14 small scrap tire sites



Scrap Tire Fund FY 2010

- 25 projects totaling ~$380,000
- Approximately 48,000 passenger tire equivalents (PTE) removed associated with these remediations
- In addition to the removal of scrap tires, ~240 tons of solid waste disposed from these sites

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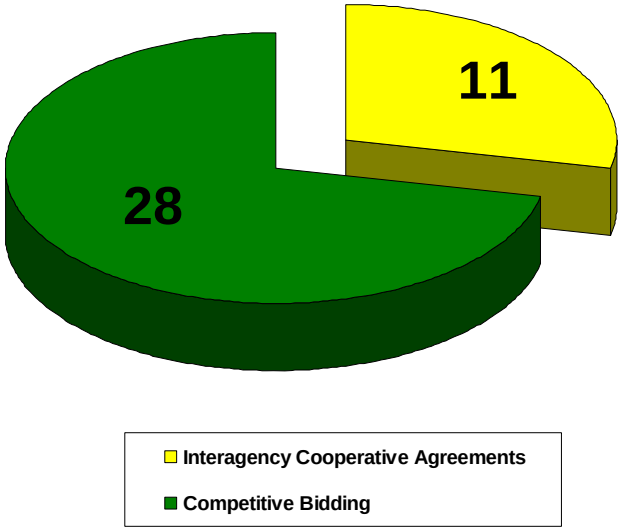
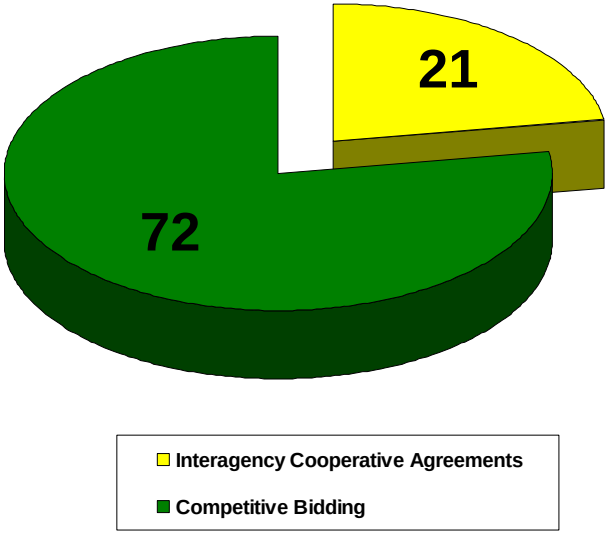
Clean-Up Mechanism

Small Scrap Tire Site Remediation Projects



Unauthorized Dump Remediation Projects



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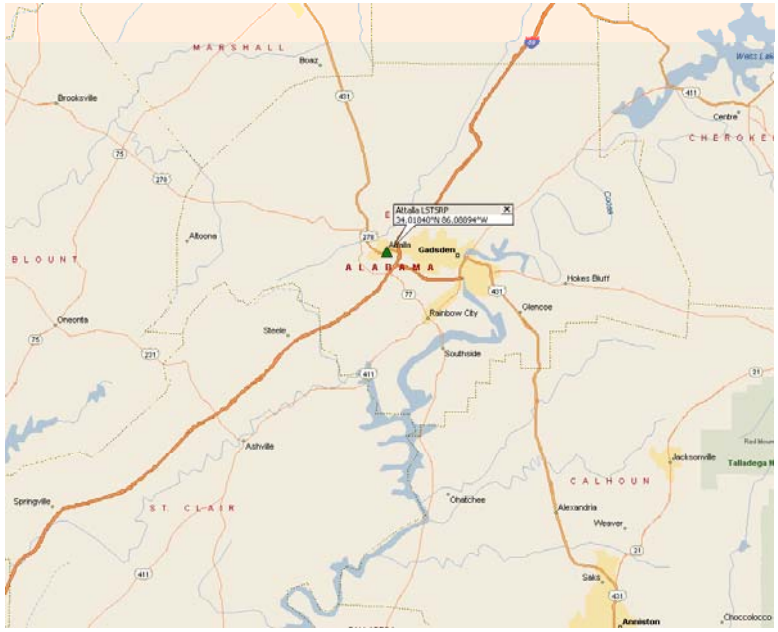
Large Scrap Tire Site Remediation Project

- Attalla, Etowah County
  - Approximately 4,200,000 tires removed
  - Cost for project ~$3.7 million



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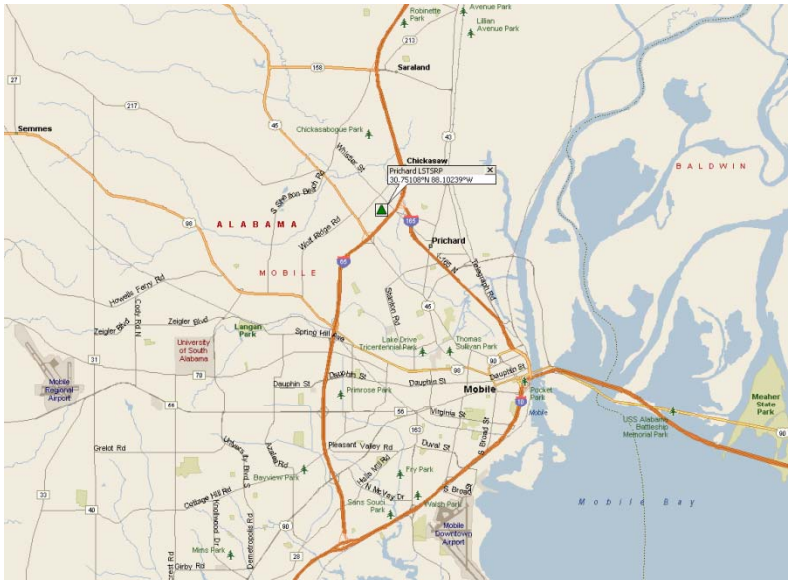
Large Scrap Tire Site Remediation Project

- Prichard, Mobile County
  - Approximately 1,300,000 tires removed
  - Cost for project ~$800,000



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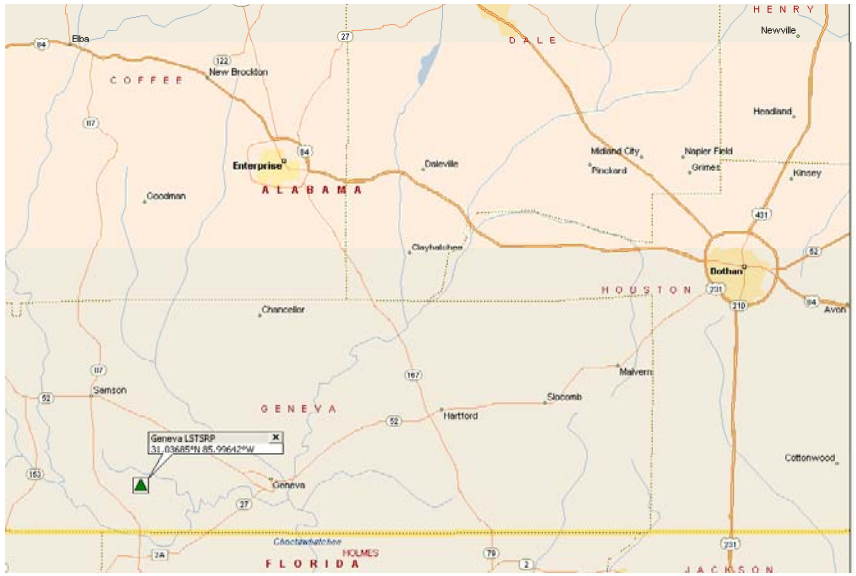
Large Scrap Tire Site Remediation Projects

- Samson, Geneva County (in progress)
  - Estimated 1,000,000 scrap tires at site
  - Projected cost of project ~$1,000,000



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Small Scrap Tire Site Remediation Project Before and After Photos

Samson, Geneva County, Alabama

Madrid, Houston County, Alabama

QUESTIONS??

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The ALDOT Environmental Program(s)

Barry Fagan, pe/pls, cpesc

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ALDOTs Mission

To provide a safe, efficient, environmentally sound intermodal transportation system to facilitate economic and social development and prosperity through the efficient movement of people and goods...

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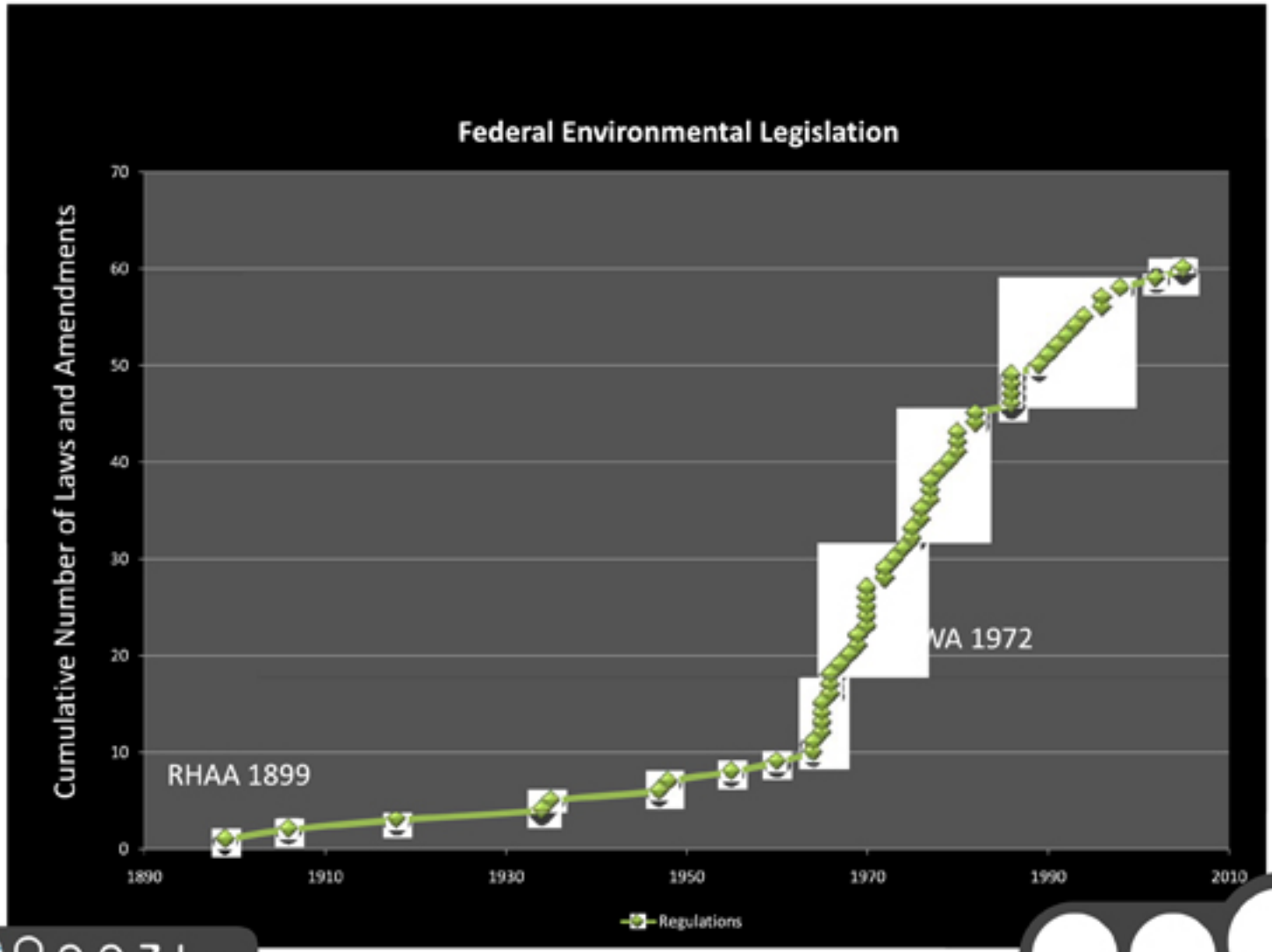
Federal Environmental Legislation
Cumulative Number of Laws and Amendments
70
60
50
40
30
20
10
0
1890
1910
1930
1950
1970
1990
2010
RHAA 1899
WA 1972
Regulations

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We know...

- the purpose
- the goals
- the source
- the intent

Clean Water Act

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Clea

• share

60.....1970.....1980.

the CWA created a real expectation that we get better.

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We do...

- seek
- listen
- learn
- change
- share

goal - to minimize the gap betweeen what we know and what we do.

we know...

- the purpose
- the goals
- the source

Water Act

we do...

- seek
- listen
- l

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tensions are managed by seeking

Balance -

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ions are managed by seeking

Balance -

- have a clear objective
- make constant corrections
- find a focal point

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The ALDOT Office of Environmental Compliance

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Three Key Areas of Focus

1. Communication - a transmitting or exchange of information

2. Integration - the bringing of parts into a whole

3. Innovation - the process of making changes
(intentional evolution)

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- **ALDOT Activities**
  - Environmental Aspects of ALDOT Activities
    - Environmental Impacts of Environmental Aspects of ALDOT Activities

CREATE

Responsibilities
- Requirements (legal/regulatory)
- Commitments (social expectations)

    - Tasks and Subtasks of Environmental Program Components
  - Components of Environmental Programs
- **ALDOT Environmental Programs**

SATISFY

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we know...

- we must get better.

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we do...

care.

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we have...

- some answers.

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we have...

- some answers.
- a tough job.

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The ALDOT Environmental Program(s)

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