City of Auburn | Water Resource Management

OUR LOCAL WATER RESOURCES

A Workshop Presented by
The Watershed Division or the City of Auburn Water Resource Management Department


Protecting, Preserving, and Restoring Our Local Water Resources

AGENDA

Our Hydrologic Context

Supply & Demand (Our Source Water)

Our Watersheds

Our Known Water Quality Concerns

Our Water Quality Monitoring

Our Efforts for Improvement

A Citizen's Guide to Healthy Streams, Lakes, Ponds, and Wetlands
(Dr. Eve Brantley)

But first, who is the Watershed Division?

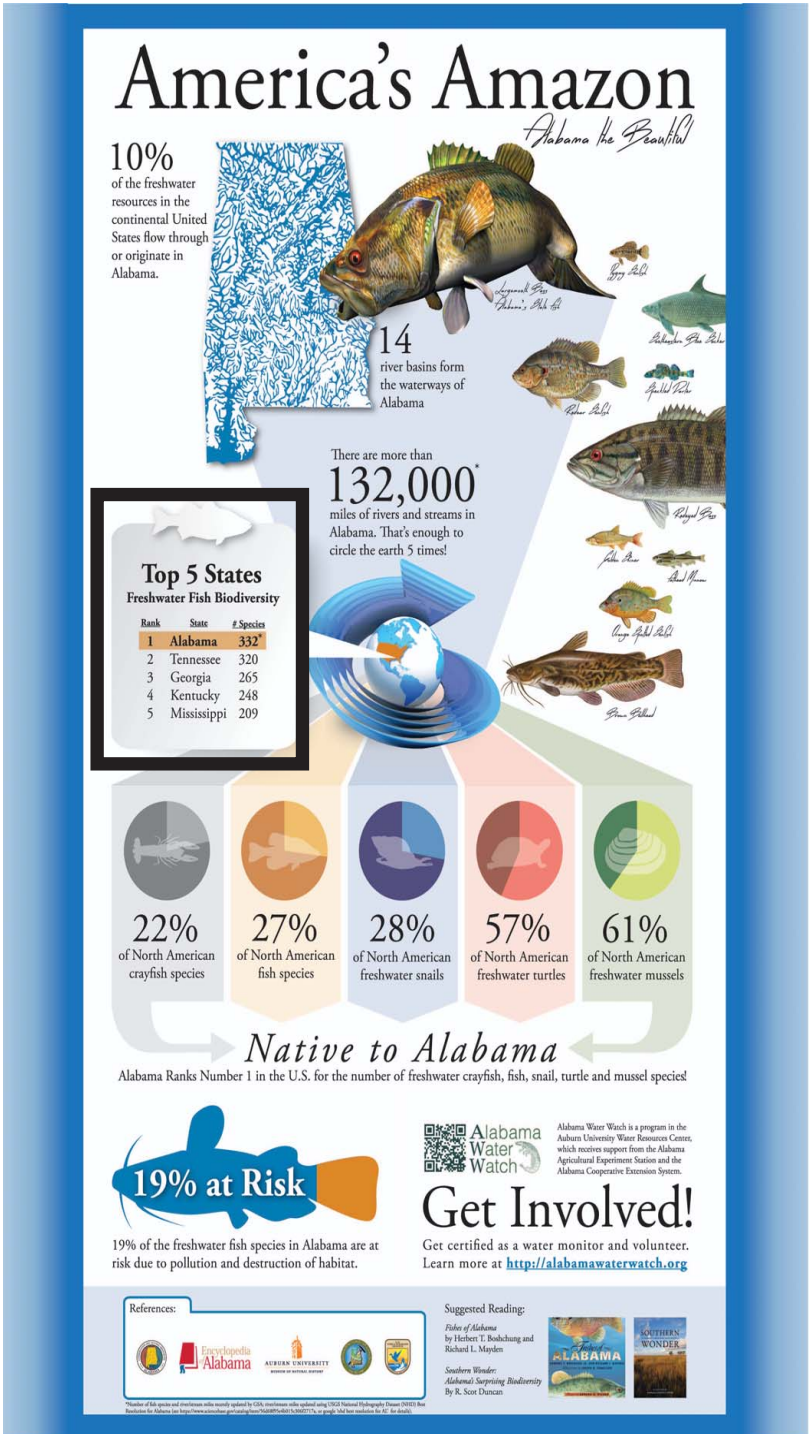
Ron McCurry
BS in Building Science
Master of Community Planning

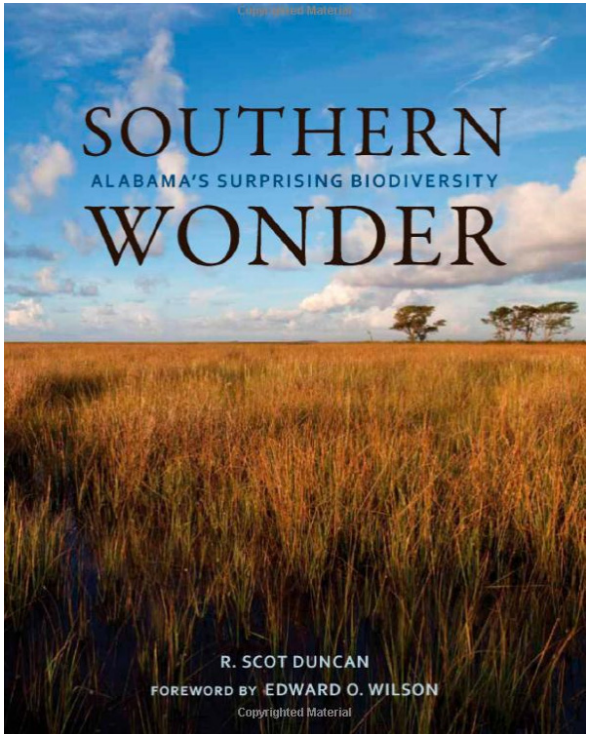
Dan Ballard, PLA
BS in Zoology
Master of Landscape Architecture

Dusty Kimbrow
BA in Geography
Master of Science in Geography

Why do we have a Watershed Division?

Our Hydrologic Context

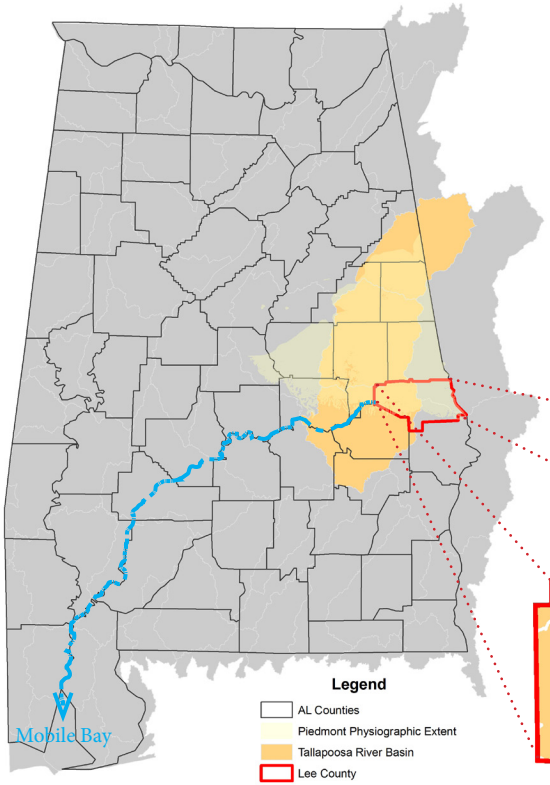




How Does Alabama Compare?

WE ARE A WATER RICH STATE

State & County Context



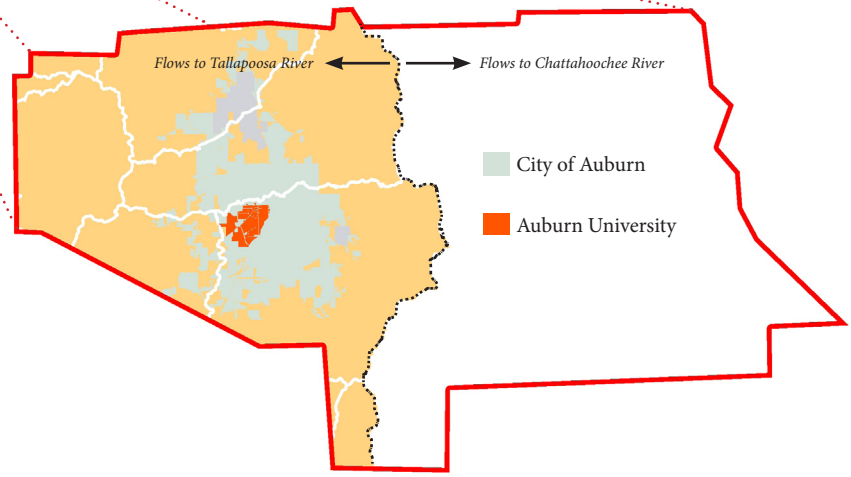
Southern Outer Piedmont Physiographic Region

Topography - Characterized by rolling hills and representative of a transitional zone to the coastal plains.

Vegetation - Predominant forests types include oak-pine and oak-hickory.

Geology - Formations of schist, saprolite, gneiss, and granite are common.

Soils - Clay-rich, red soils are the common soil type



Tallapoosa River Basin

4,675 Square Miles, of which 85% is in Alabama and 15% in Georgia

258 Mile Long River

Major Water Bodies - Lake Wedowee, Lake Martin, Yates Lake, and Lake Tallassee

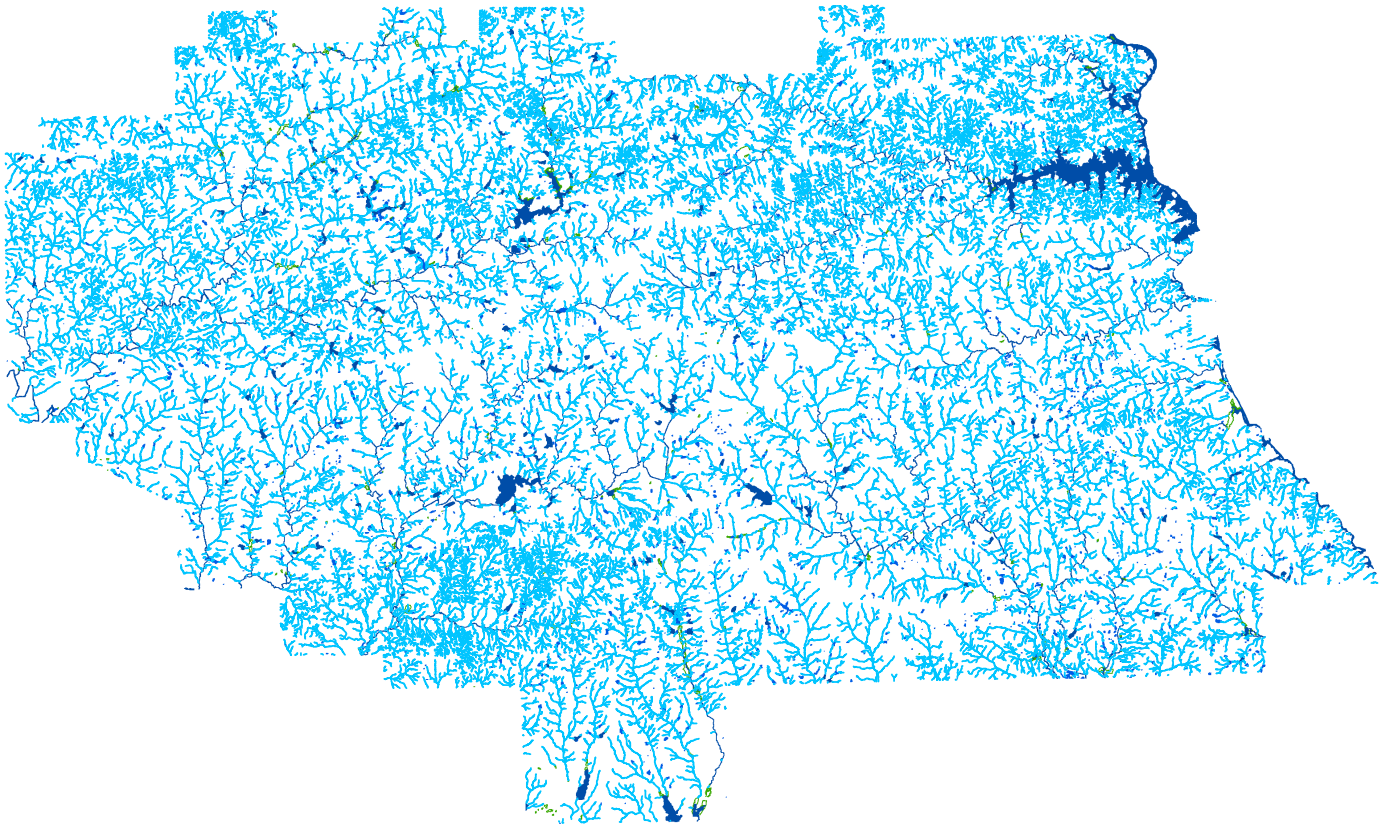
Local Facts

- The City of Auburn is located entirely in the Tallapoosa River Basin

- The Falls of Chewacla Park are a physical feature of the Fall Line, the geomorphic break between the piedmont and the coastal plain regions

- The highest elevation in the City of Auburn is +/-830 Above Mean Seal Level

County Topography & Hydrology



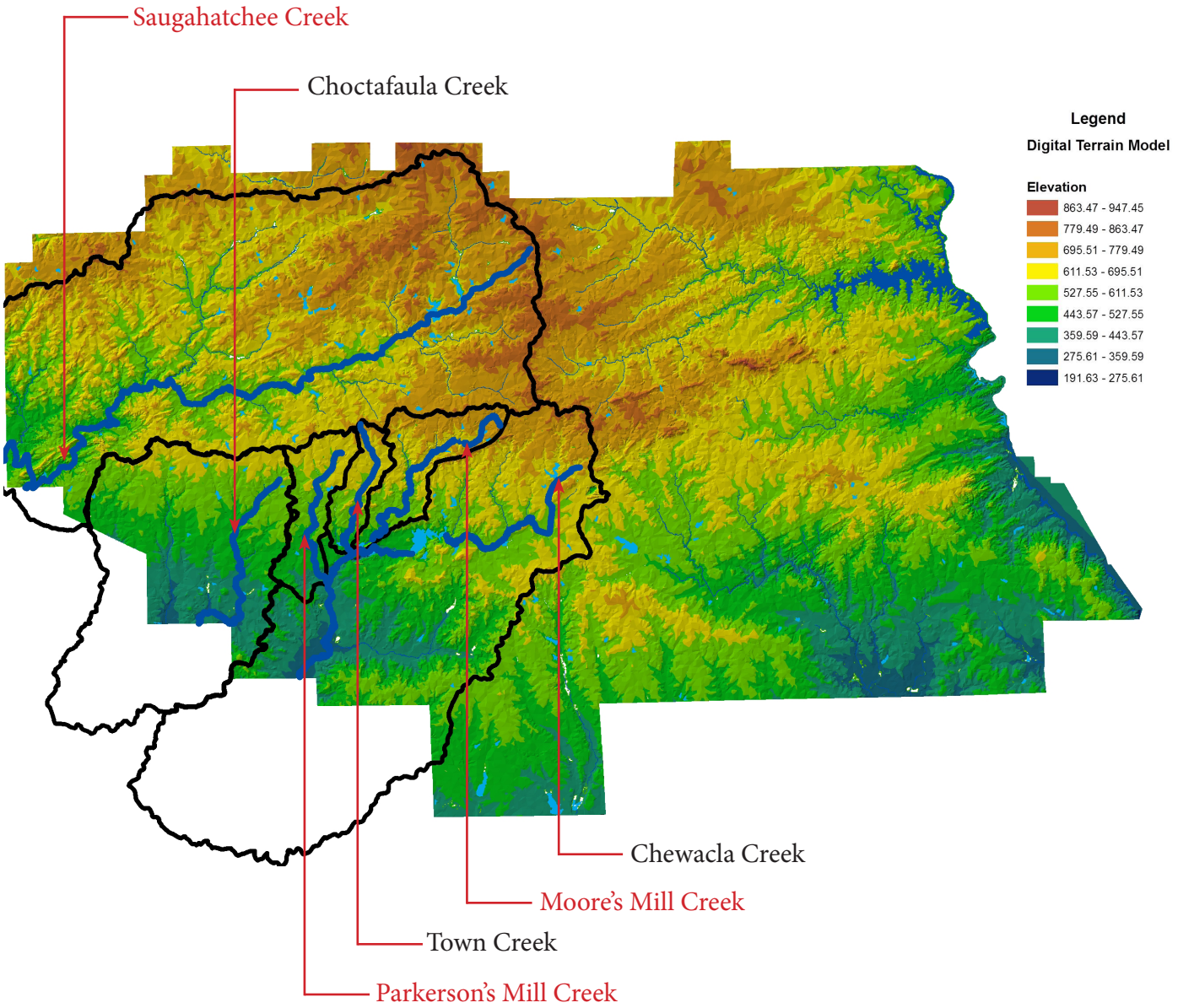
+/- 3,500 Miles of Small 1st and 2nd Order Streams

>500 Miles of Larger 3rd, 4th, 5th, and 6th Order Streams

>3,500 Lakes and Ponds = >3,500 Dams (>600 in the City of Auburn)

>300 Detention Ponds in the City of Auburn

County Topography & Hydrology



**RED = Impaired Waterway*

Watershed Boundary - A watershed is all the land that drains to a particular point, water body, etc.

Before we go any further.....

STREAM

A natural watercourse which conveys a constant current of flowing water within a defined channel.

- Perennial Stream = A stream that flows year-round
- Intermittent = A stream that flows at least six months of the year but does not flow during part or all of the dry season.
- Ephemeral Stream = A stream that only flows during short durations as a result of precipitation.

LAKE

A natural or artificial body of water which retains water year-round and is more than two acres (Per CoA).

POND

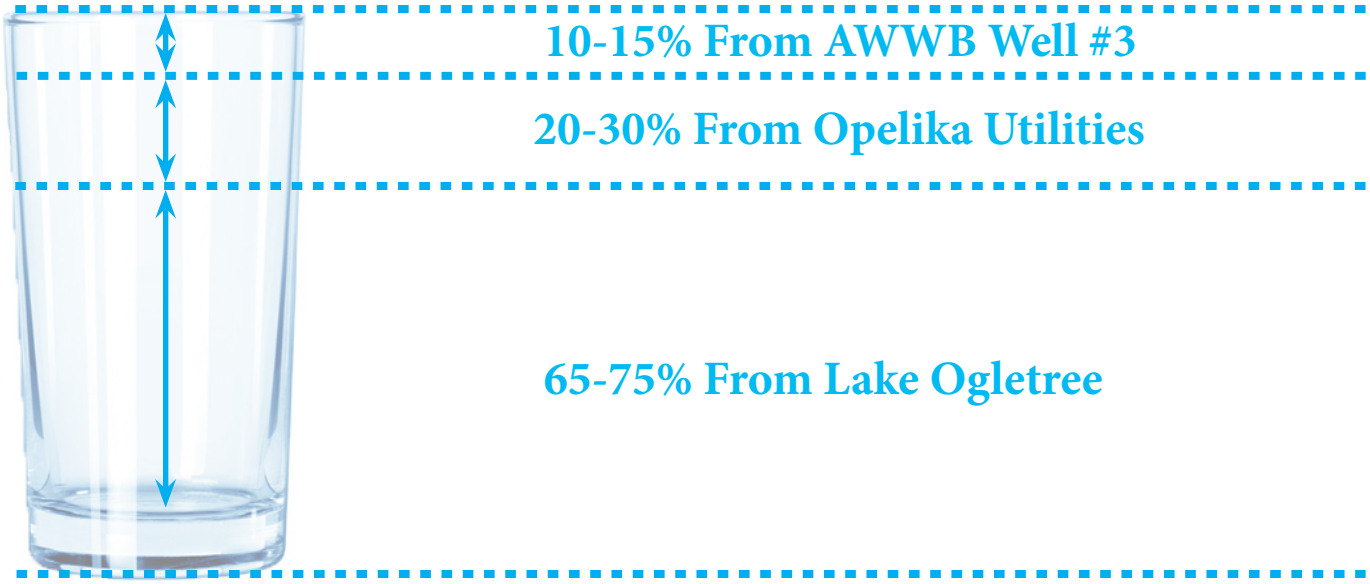
A natural or artificial body of water which retains water year-round and is less than two acres (Per CoA).

DETENTION POND

A small storage lagoon that temporarily stores stormwater runoff and re-leases it at a lesser rate (Per CoA).

Supply & Demand
(Our Source Water)

Supply & Demand



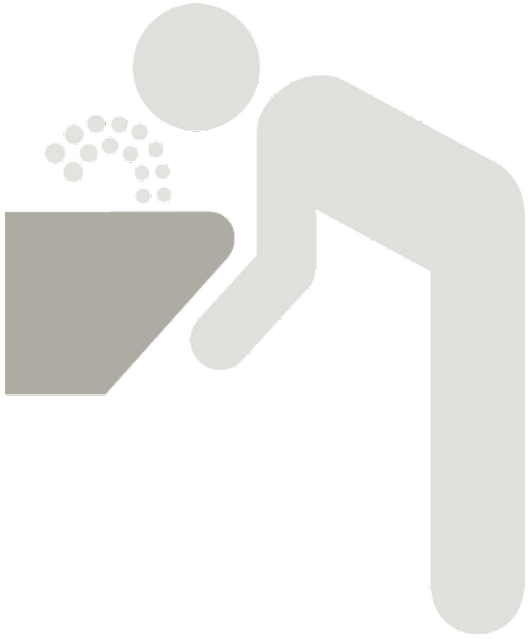
LOCAL WATER DEMAND STATISTICS 2016

Total Annual Demand = 2.83 Billion Gallons

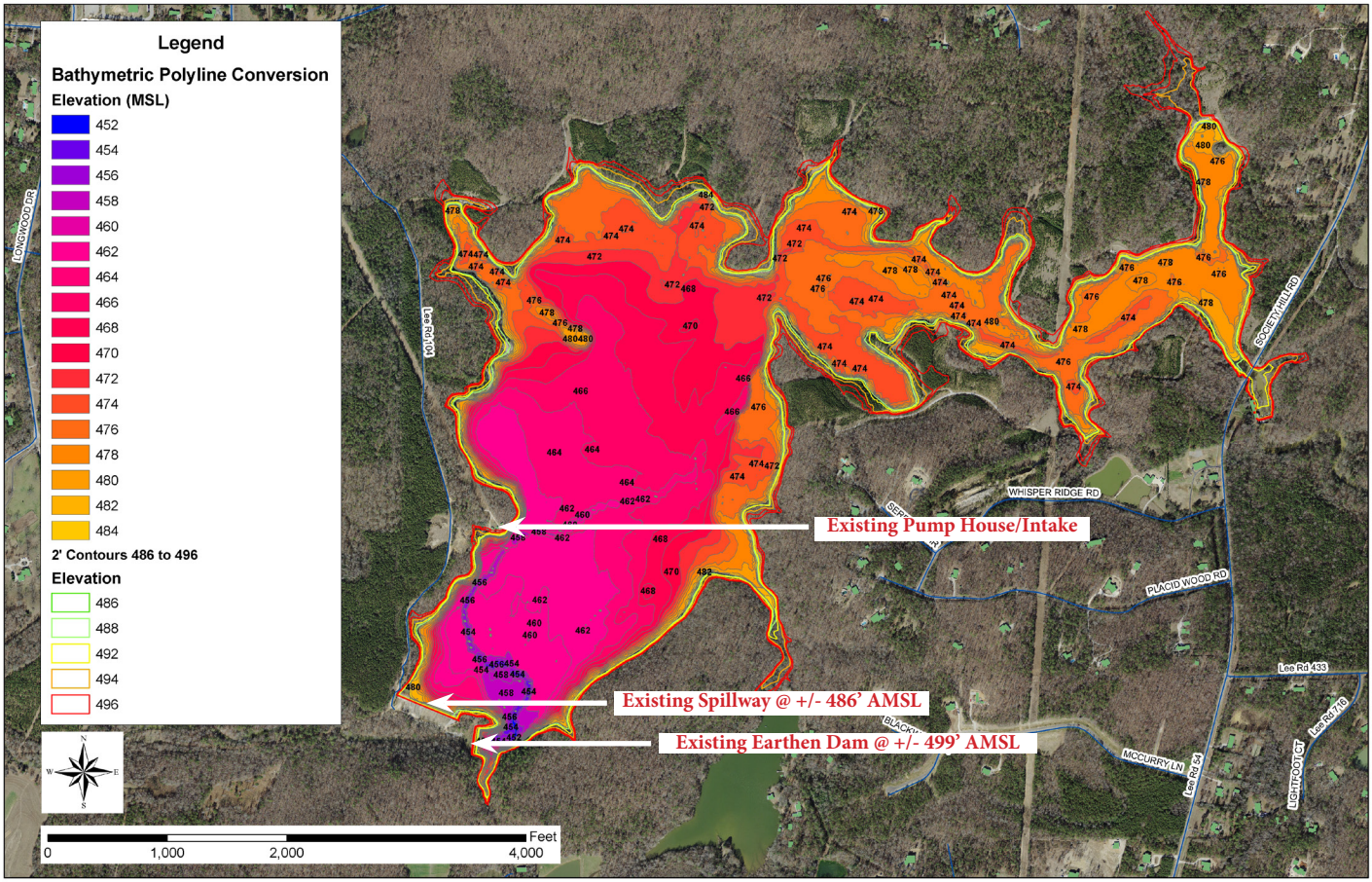
Average Daily City-Wide Demand = 7,739,282 Gallons

Peak Daily City-Wide Demand = 12,079,000 Gallons

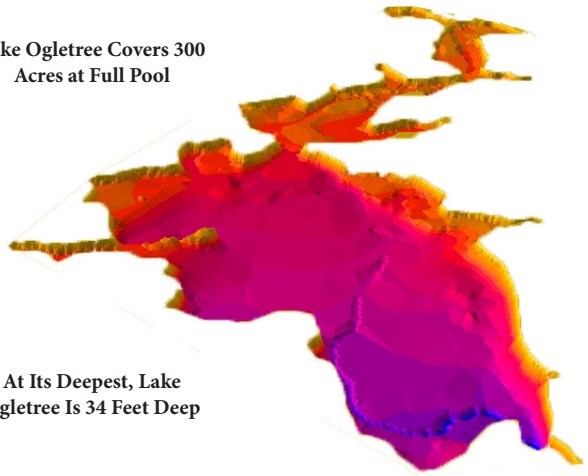
Approx. Annual Demand Per Capita = 47,209 Gallons



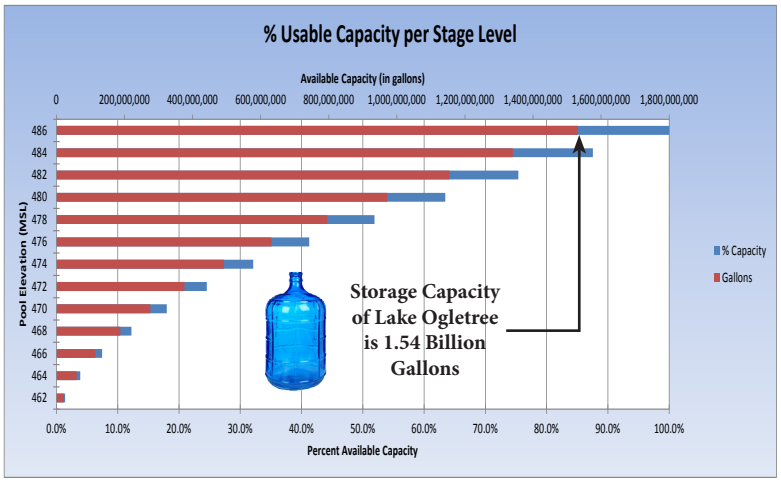
Lake Ogletree - Our Primary Source Water



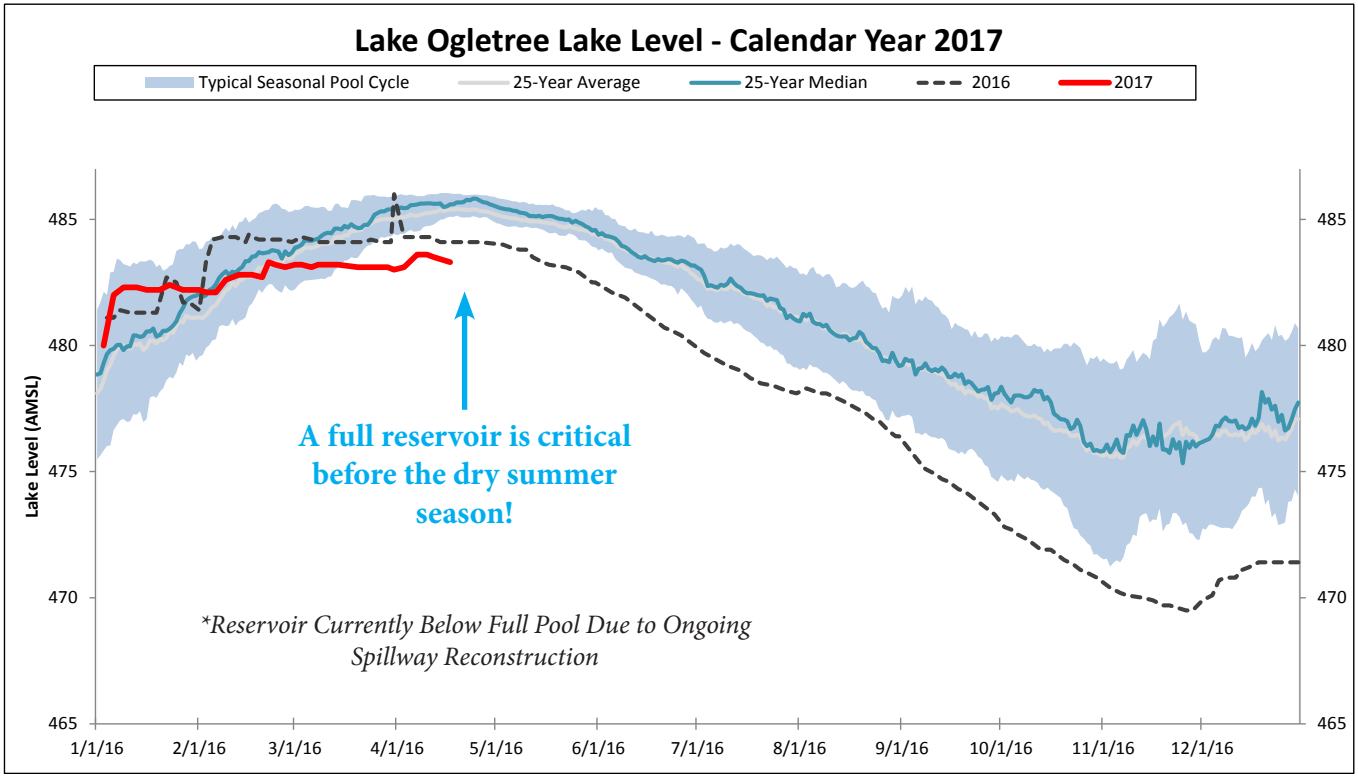
Lake Ogletree Covers 300 Acres at Full Pool

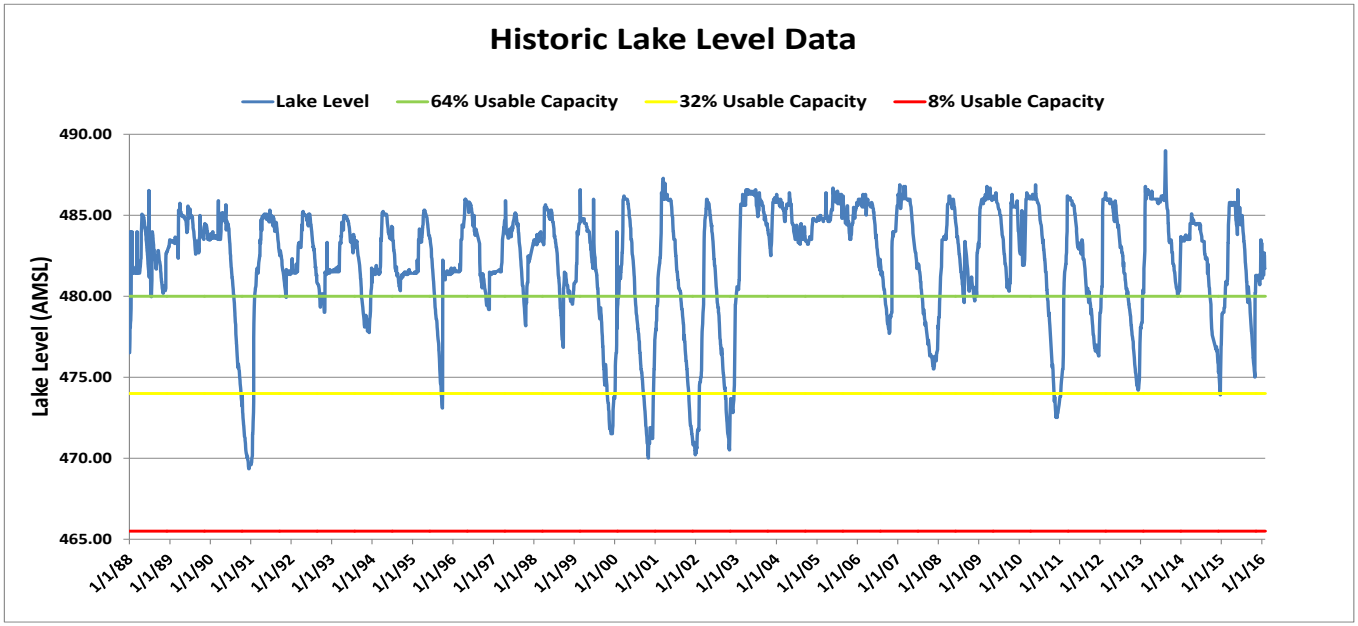


At Its Deepest, Lake Ogletree Is 34 Feet Deep

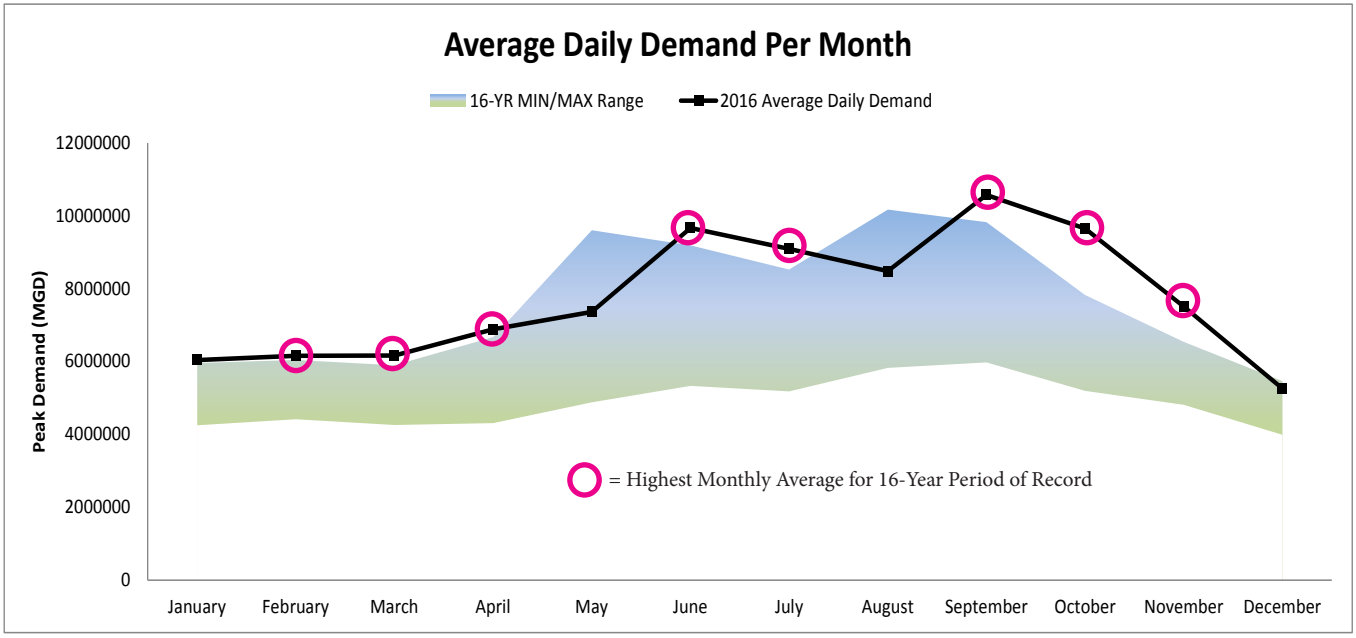


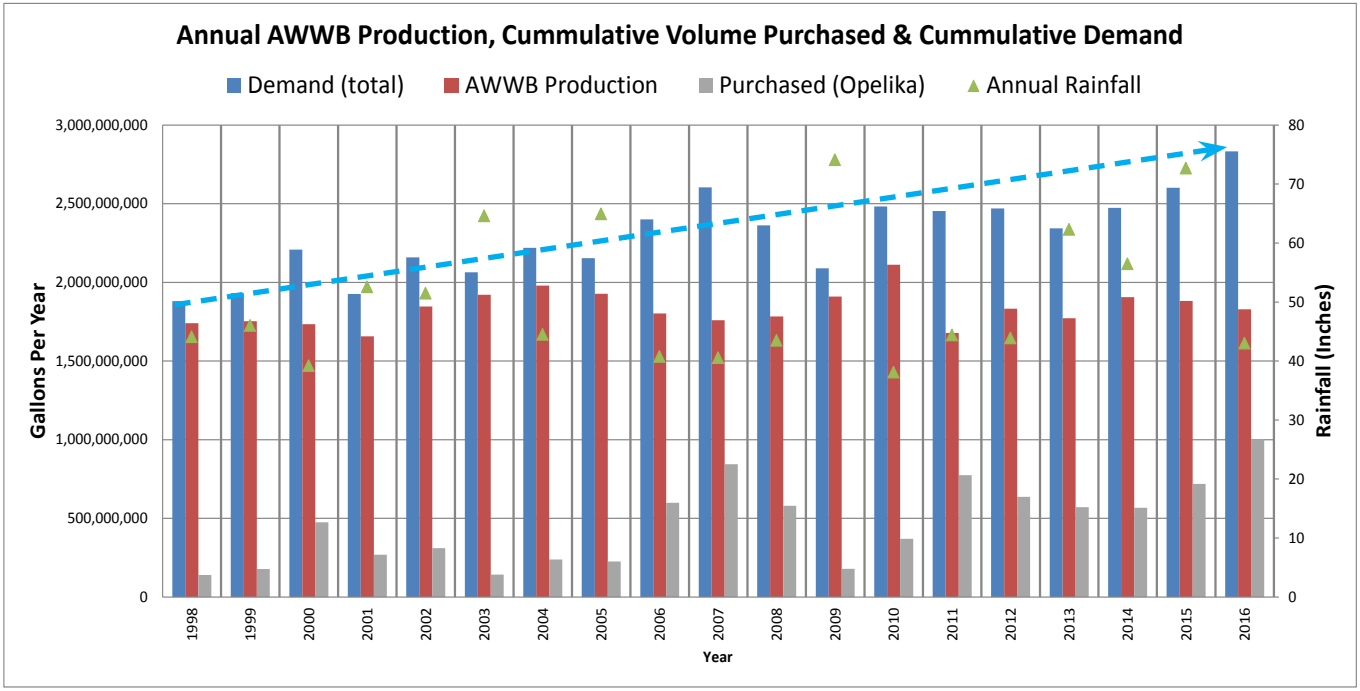
Reservoir Pool Cycle



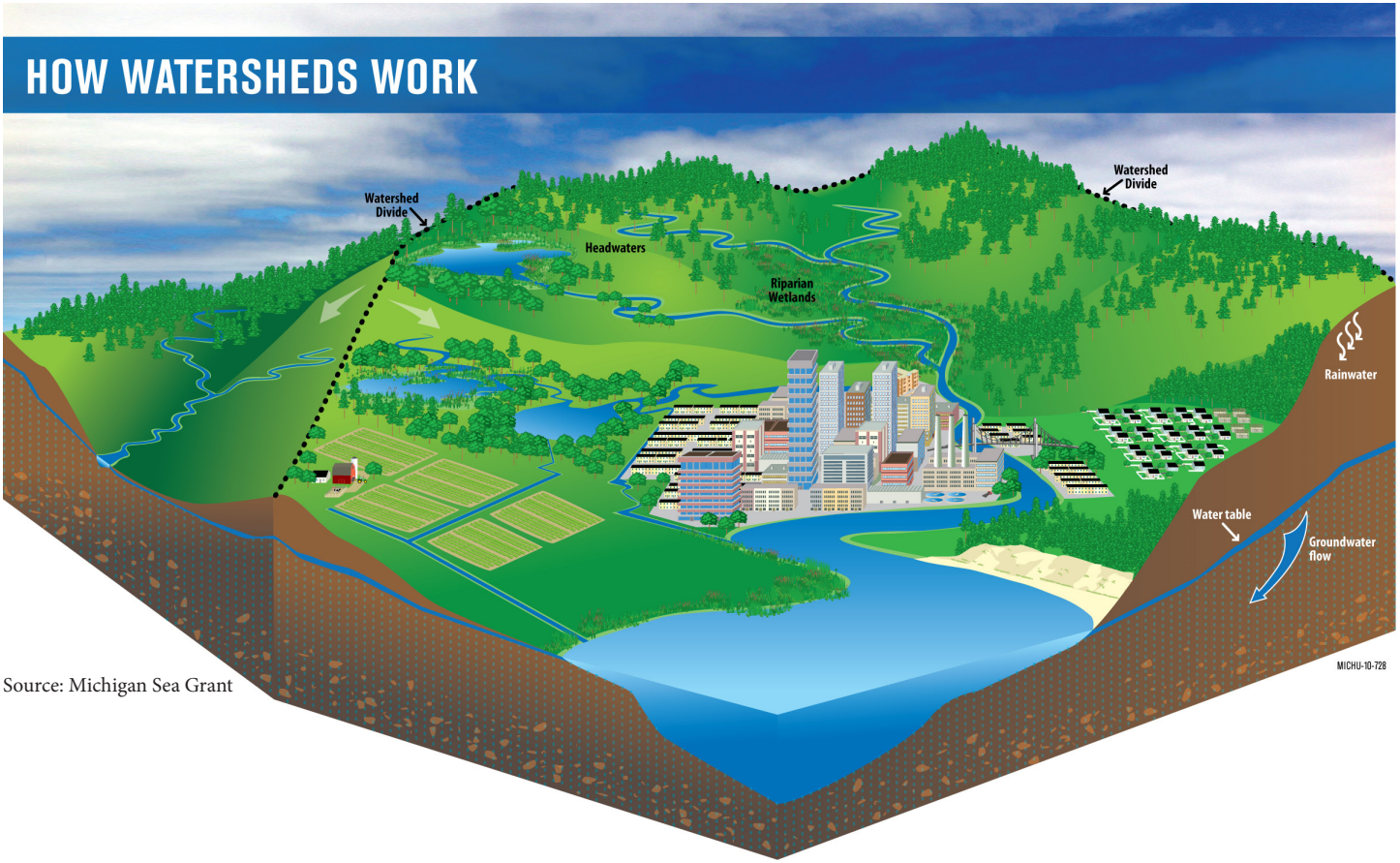


Demand Cycle & Trend





Our Watersheds



Source: Michigan Sea Grant

WHAT IS A WATERSHED?

- Simply put, a watershed is all the area of land that drains to a particular point.
- The "quality" of our water resources are a direct reflection of how we treat our land, which is why watersheds are the unit by which Water Resource Managers "manage" those resources.
- Watershed management seeks to guide land planning, land use, and land development in a manner that protects and preserves the biological, chemical, and physical integrity of our water resources.

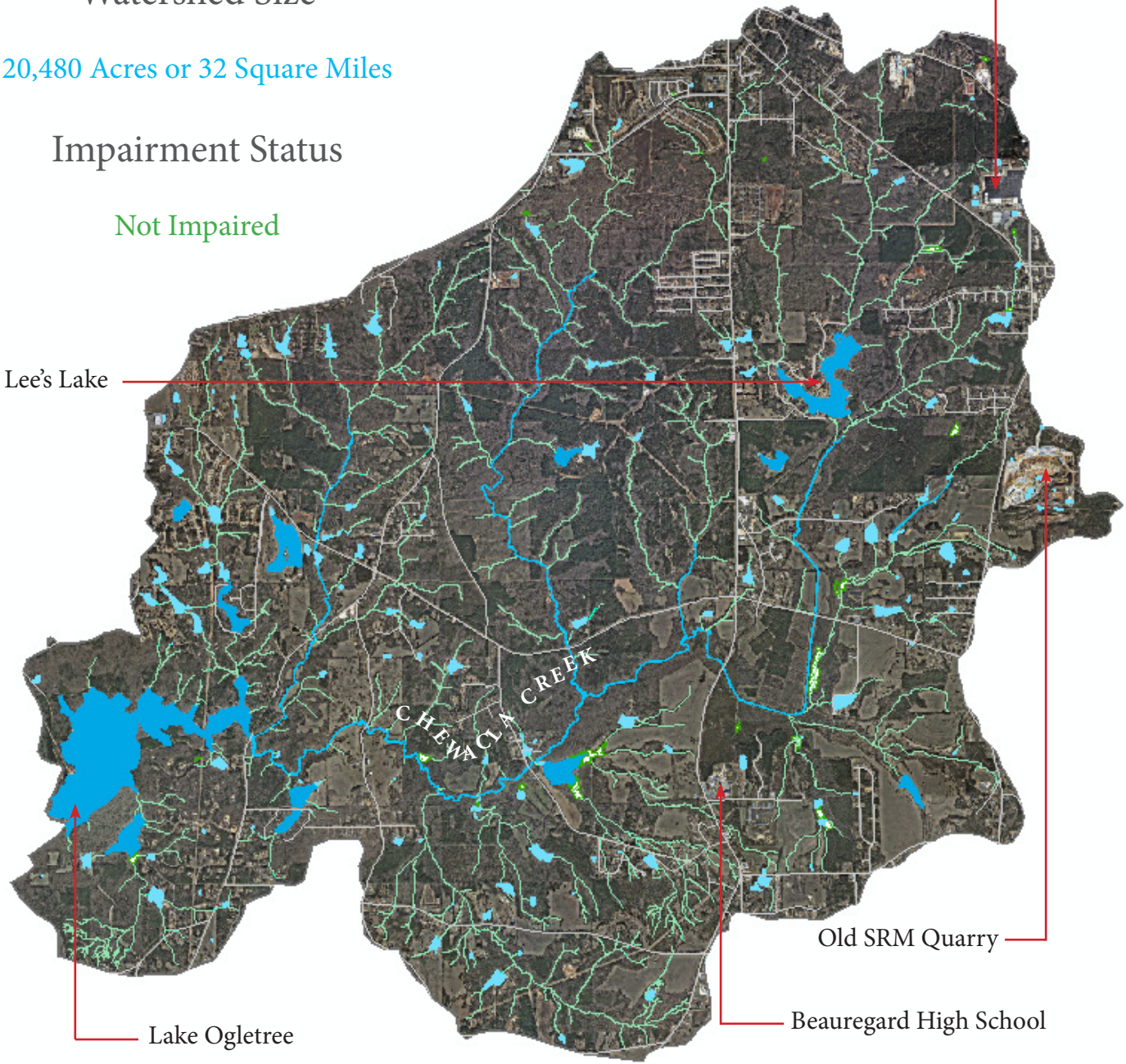
The Lake Ogletree Watershed

Watershed Size

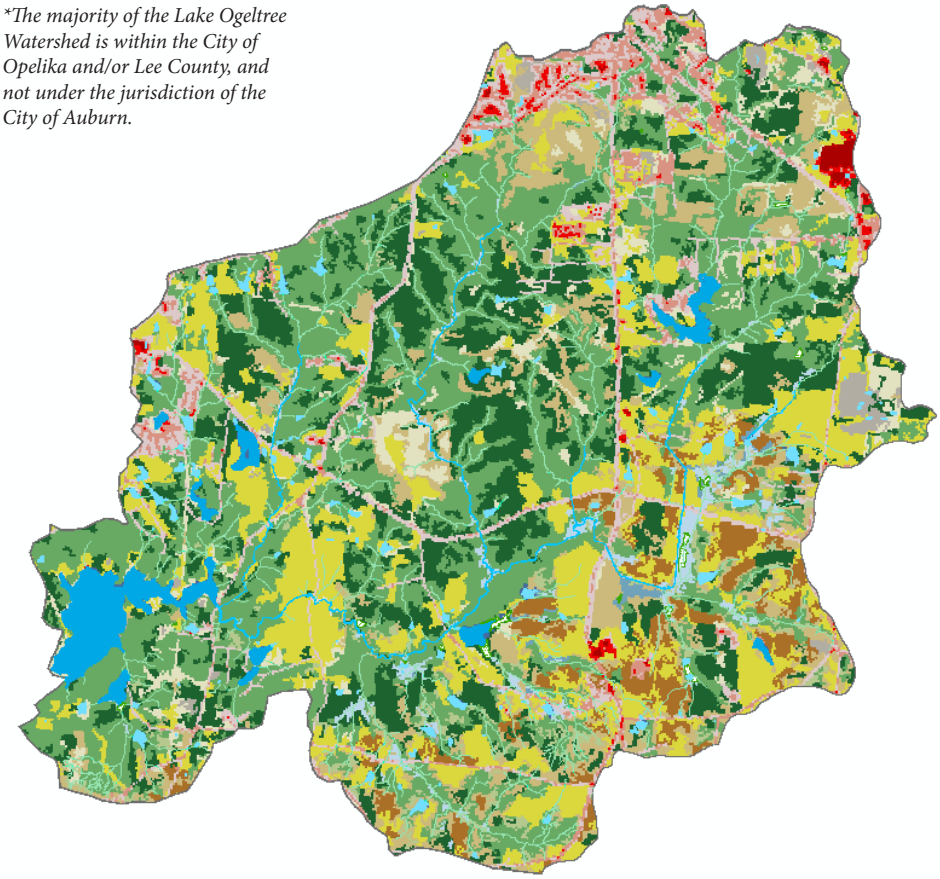
20,480 Acres or 32 Square Miles

Impairment Status

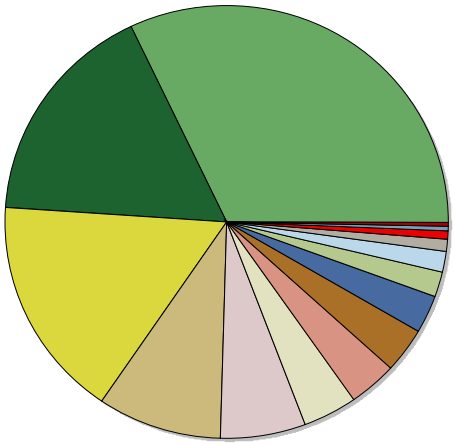
Not Impaired



**The majority of the Lake Ogeltree Watershed is within the City of Opelika and/or Lee County, and not under the jurisdiction of the City of Auburn.*



- Deciduous Forest
- Evergreen Forest
- Pasture
- Shrub/Scrub
- Developed - Open Space
- Grassland
- Developed - Low Intensity
- Cultivated Cropland
- Water
- Mixed Forest
- Wetland
- Barren Land
- Developed - Medium Intensity
- Emergent Wetland
- Developed - High Intensity



LANDCOVER STATISTICS

**From 2011 NLCD*

Watershed Size = 32 Square Miles or 20,567 Acres

Watershed to Reservoir Size Ratio = 68:1

Predominant Landcover = Deciduous & Evergreen Forest

Percent Developed = 11 Percent

Average Annual Demand Per Capita = 24,700 Gallons

The Parkerson Mill Creek Watershed

Watershed Size

6,147 Acres or 9.6 Square Miles

Impairment Status

Impaired with Approved TMDL
Pollutant - Pathogens (E-Coli)

Parkerson Mill Creek Immediately Downstream of Veterans Blvd.

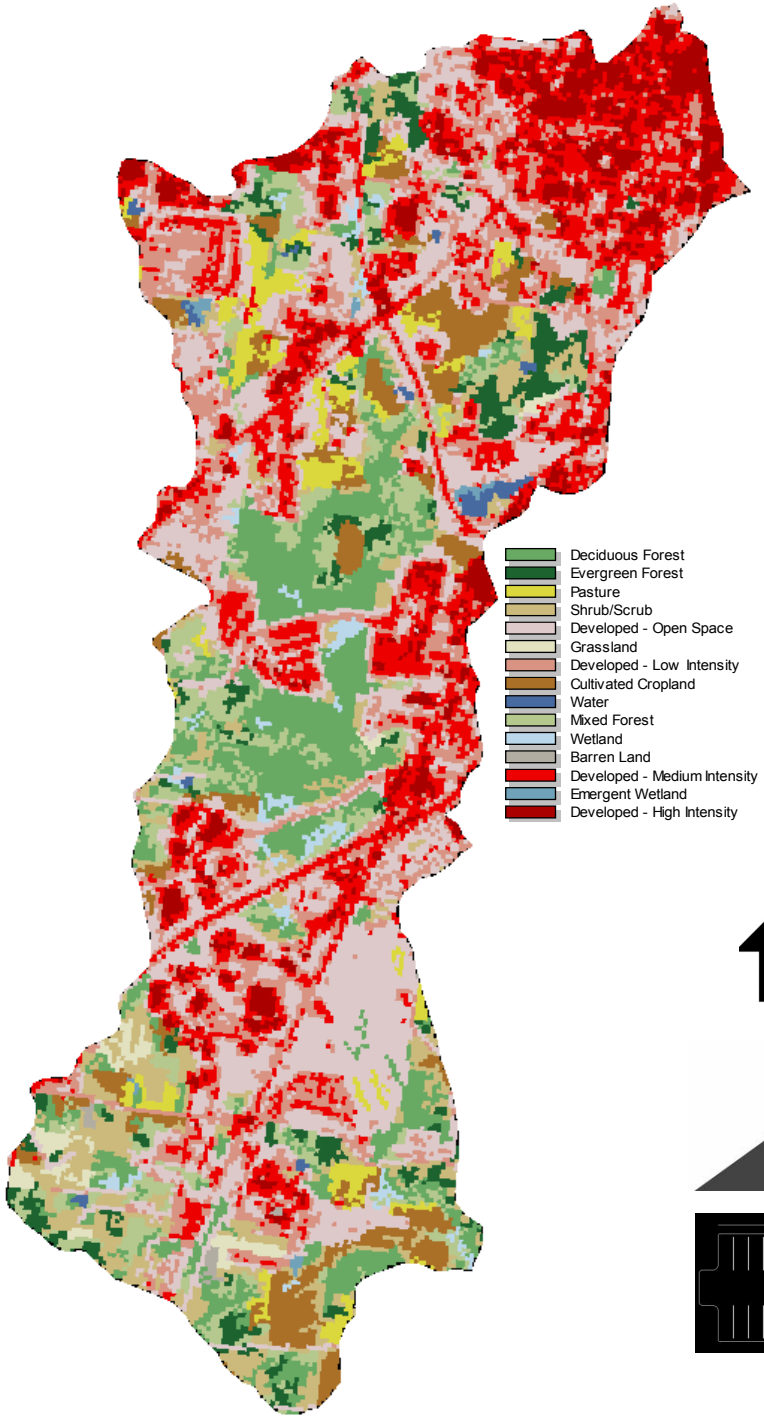
Parkerson Mill Creek Immediately Downstream of W. Longleaf Dr.

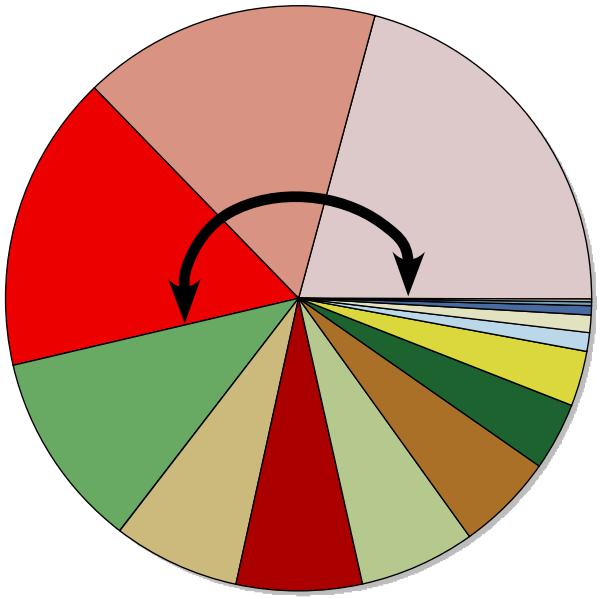
LANDCOVER STATISTICS

**From 2011 NLCD*

Predominant Landcover

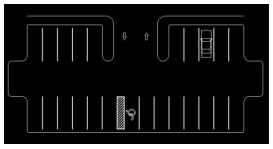
>50% Developed (various intensity)





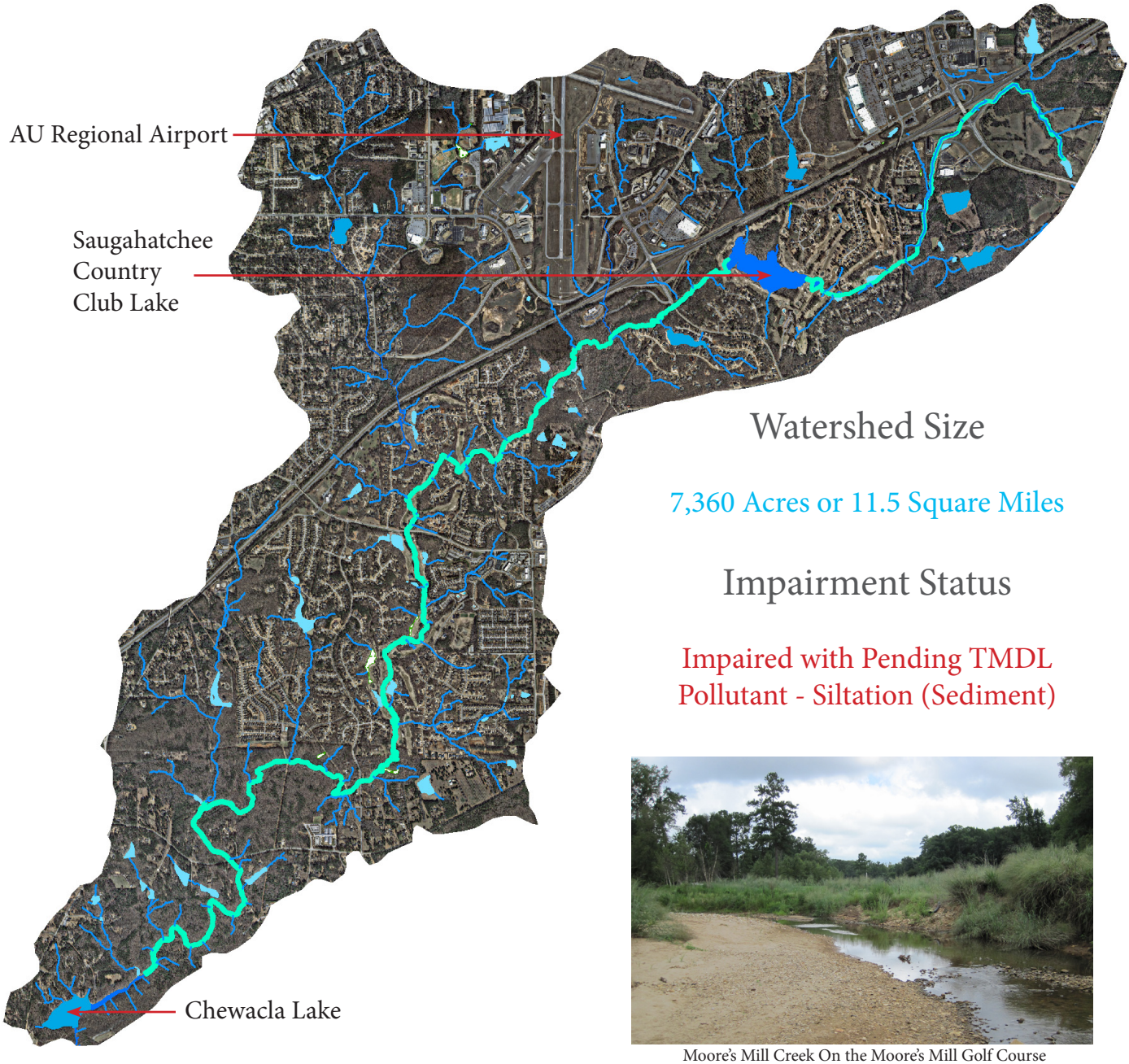
3,966 Structures ~ 368 Acres of Rooftop

326 Acres of Roadway



350 Acres of Parking

The Moore's Mill Creek Watershed



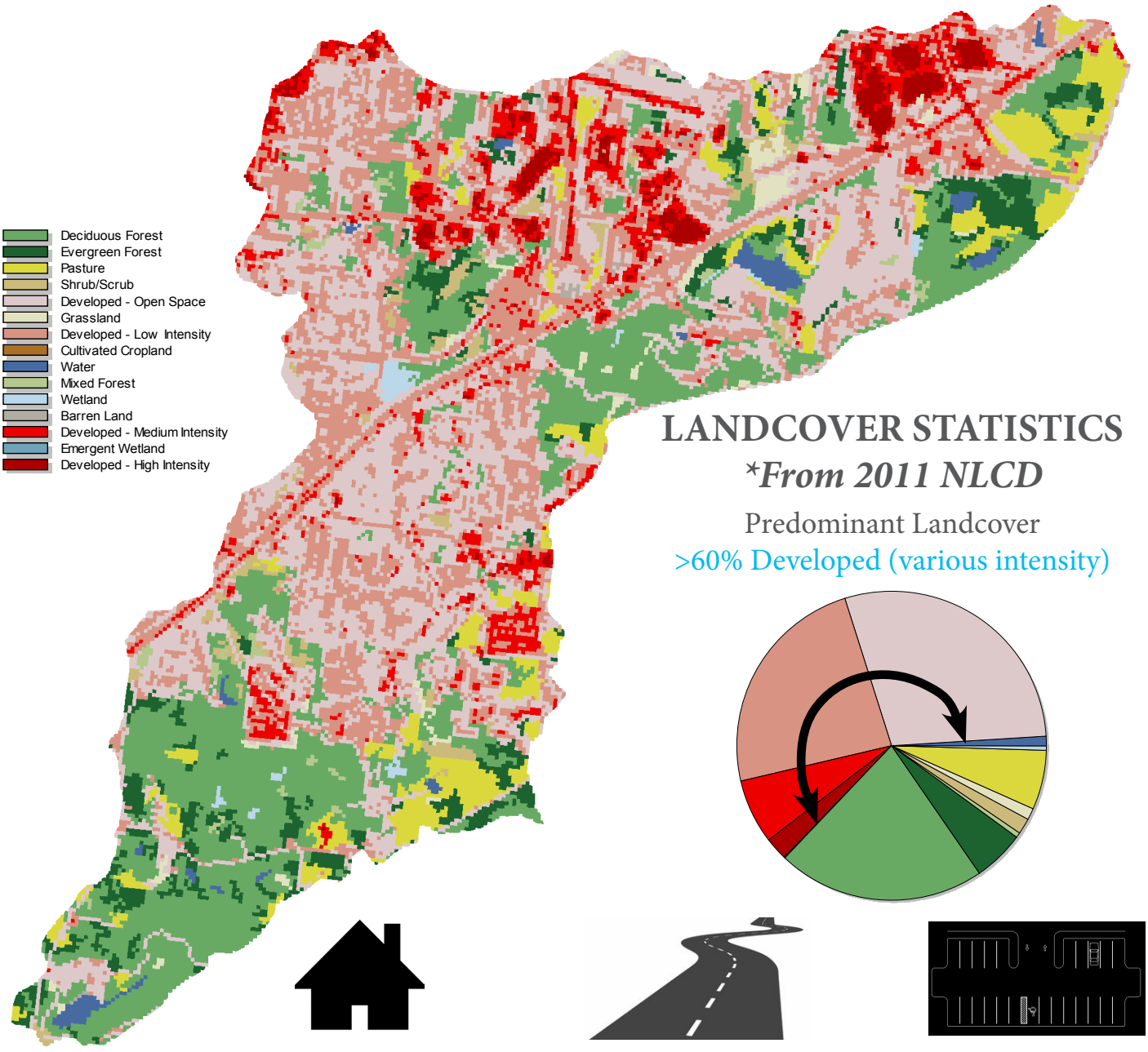
Watershed Size

7,360 Acres or 11.5 Square Miles

Impairment Status

Impaired with Pending TMDL
Pollutant - Siltation (Sediment)

Moore's Mill Creek On the Moore's Mill Golf Course



LANDCOVER STATISTICS

From 2011 NLCD

Predominant Landcover

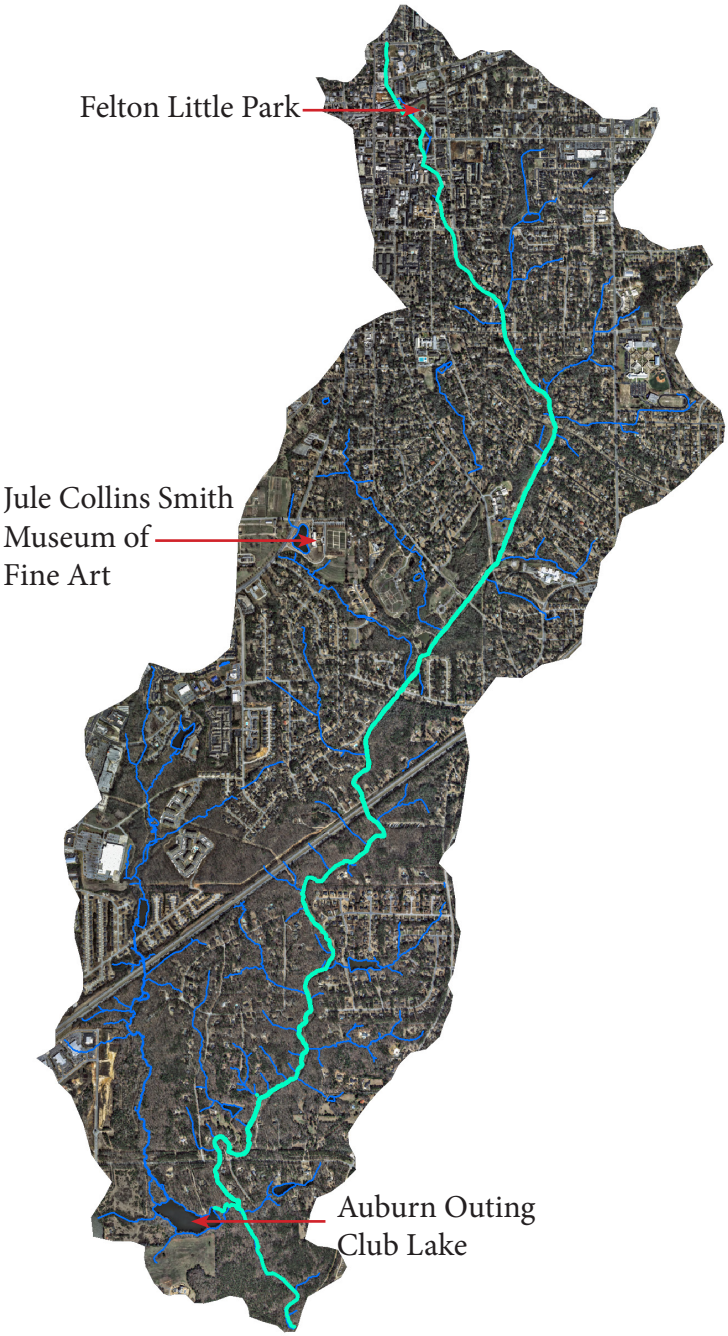
>60% Developed (various intensity)

5,344 Structures ~ 371 Acres of Rooftop

400 Acres of Roadway

198 Acres of Parking

The Town Creek Watershed



Watershed Size

3,562 Acres or 5.5 Square Miles

Impairment Status

*Not Impaired
*On the ADEM 2A List and Scheduled for Assessment in 2017

Town Creek at Felton Little Park

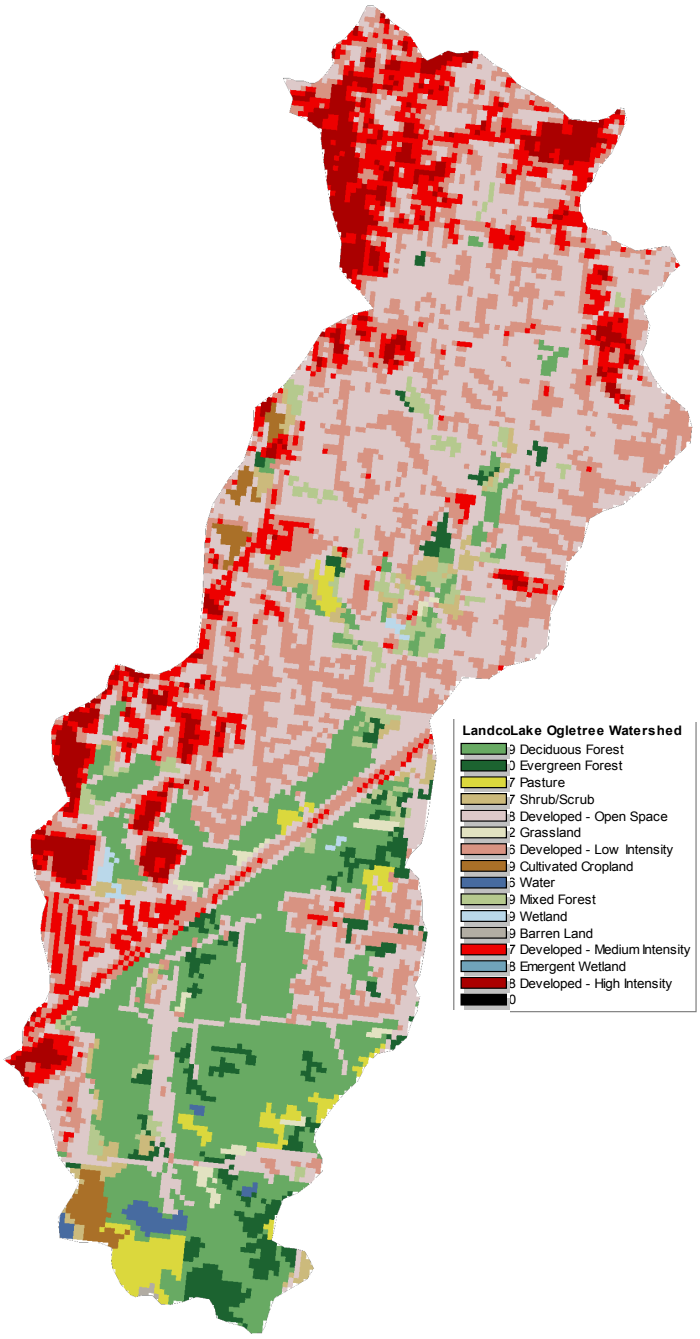
Town Creek Upstream of Shell Toomer Parkway

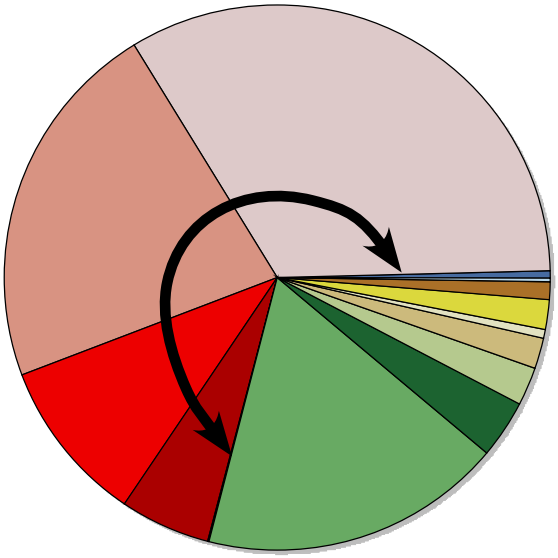
LANDCOVER STATISTICS

From 2011 NLCD

Predominant Landcover

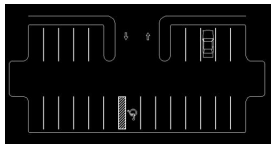
>70% Developed (various intensity)





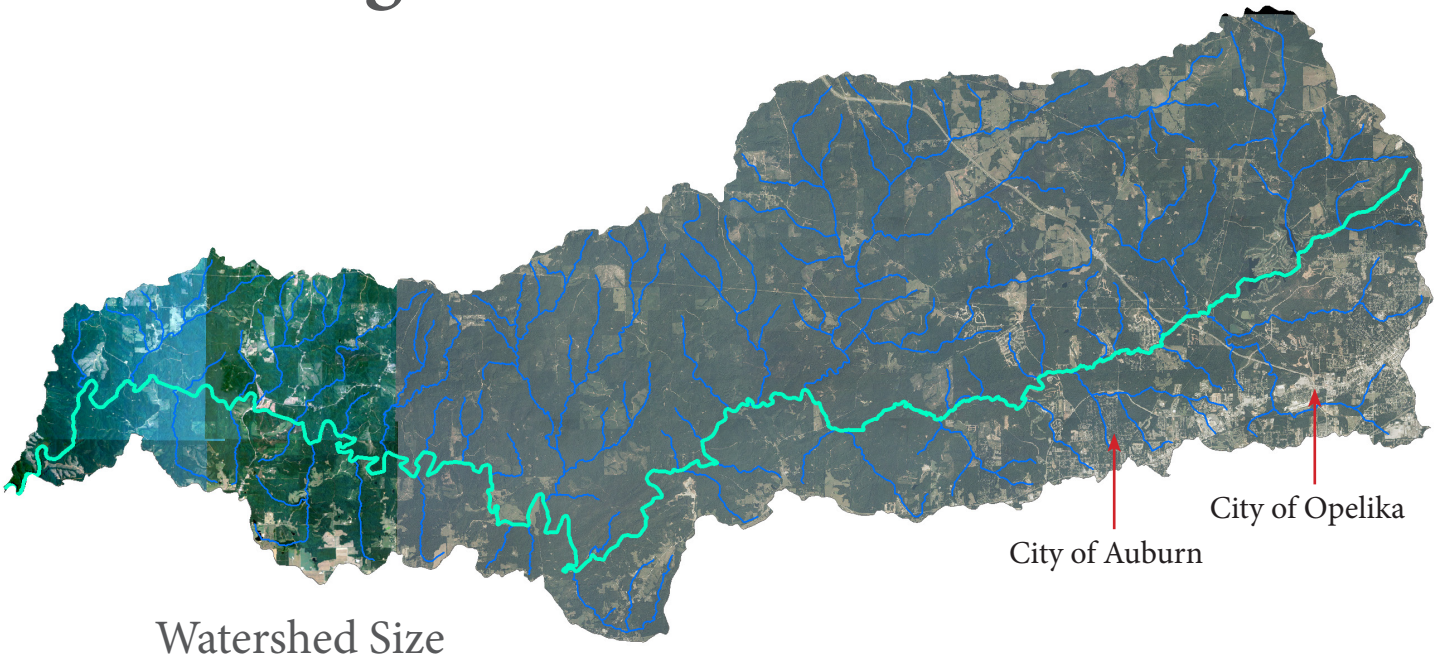
4,268 Structures ~ 259 Acres of Rooftop

239 Acres of Roadway



151 Acres of Parking

The Saugahatchee Creek Watershed

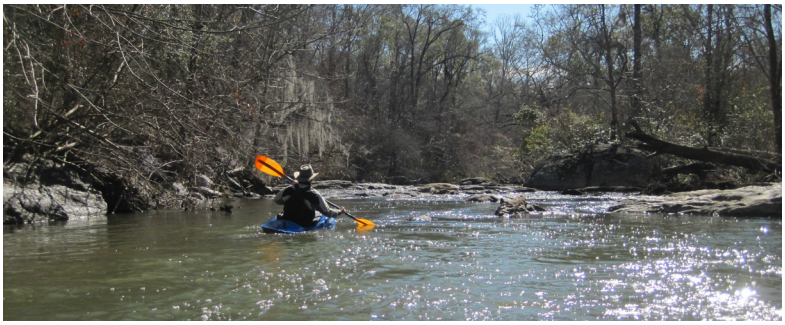


Watershed Size

138,853 Acres or 217 Square Miles

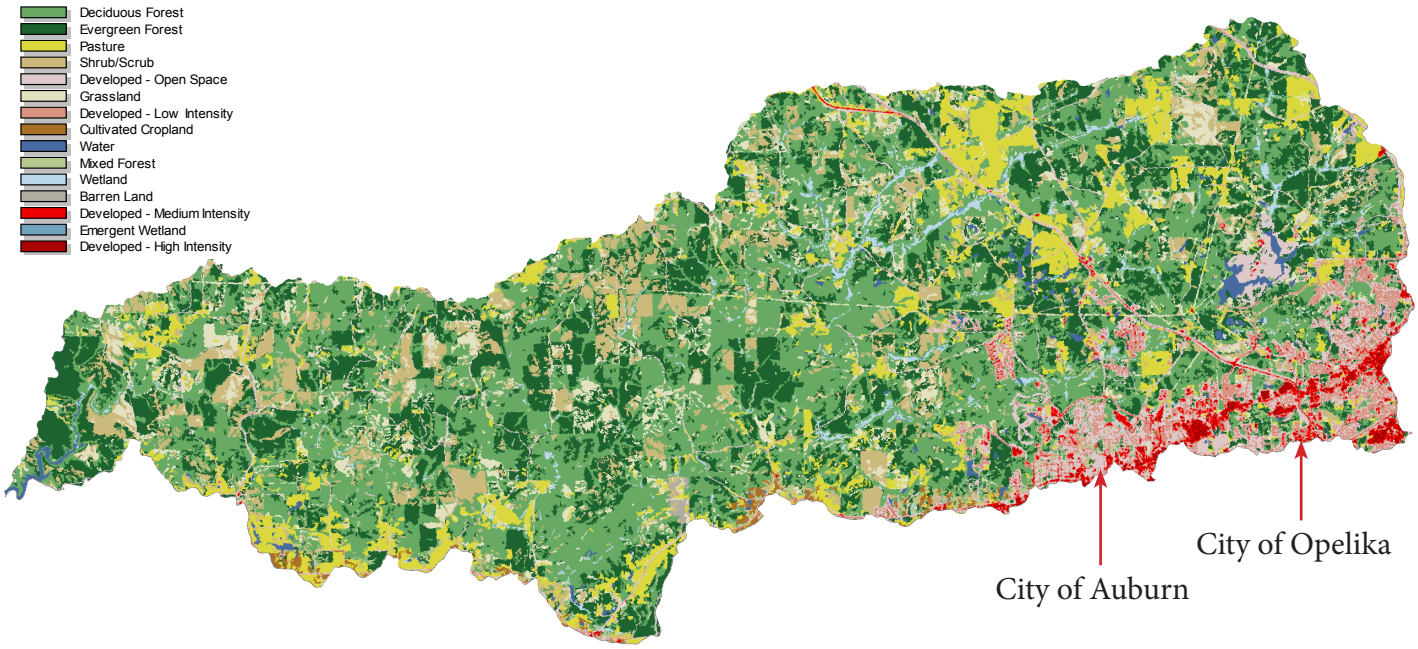
Impairment Status

Impaired with Approved TMDL
Pollutant - Nutrients (Phosphorus)



Saugahatchee Creek Downstream of N. Donahue

Saugahatchee Creek Adjacent to Auburn University Golf Club

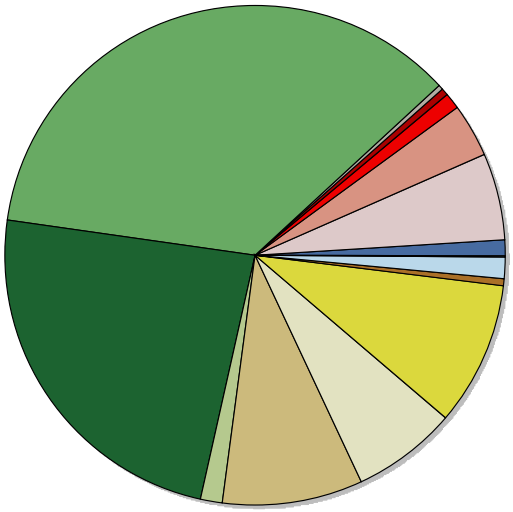


LANDCOVER STATISTICS

**From 2011 NLCD*

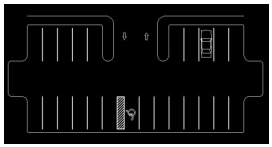
Predominant Landcover

Deciduous & Evergreen Forest



***Insufficient Data**

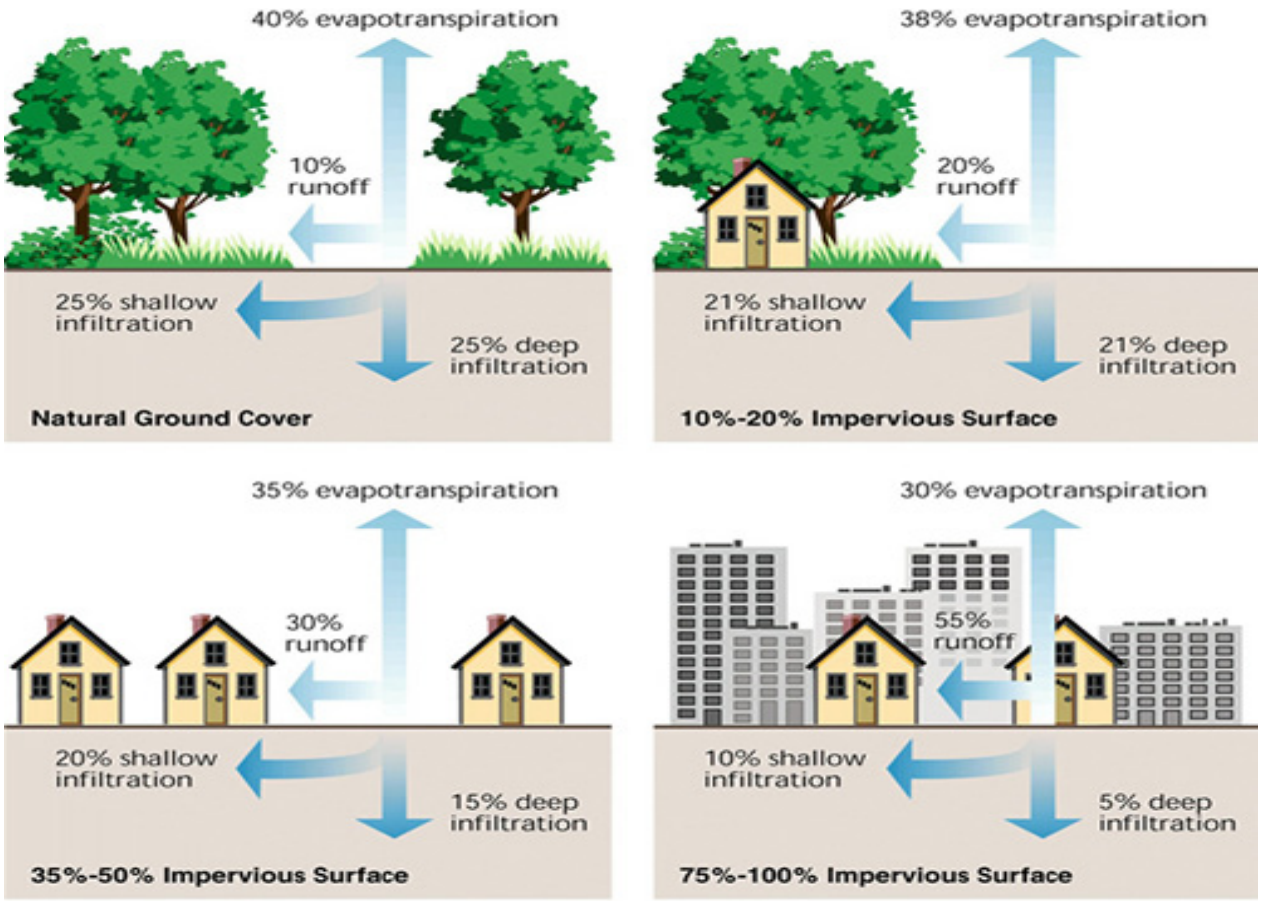
***Insuficient Data**



***Insufficient Data**

**Watershed spans multiple counties, beyond current GIS datalayer coverage.*

Effects of Impervious Surfaces on Stormwater Runoff



Increases in Impervious Surfaces within a Watershed Result in:

Increase Runoff Rates + Runoff Volume

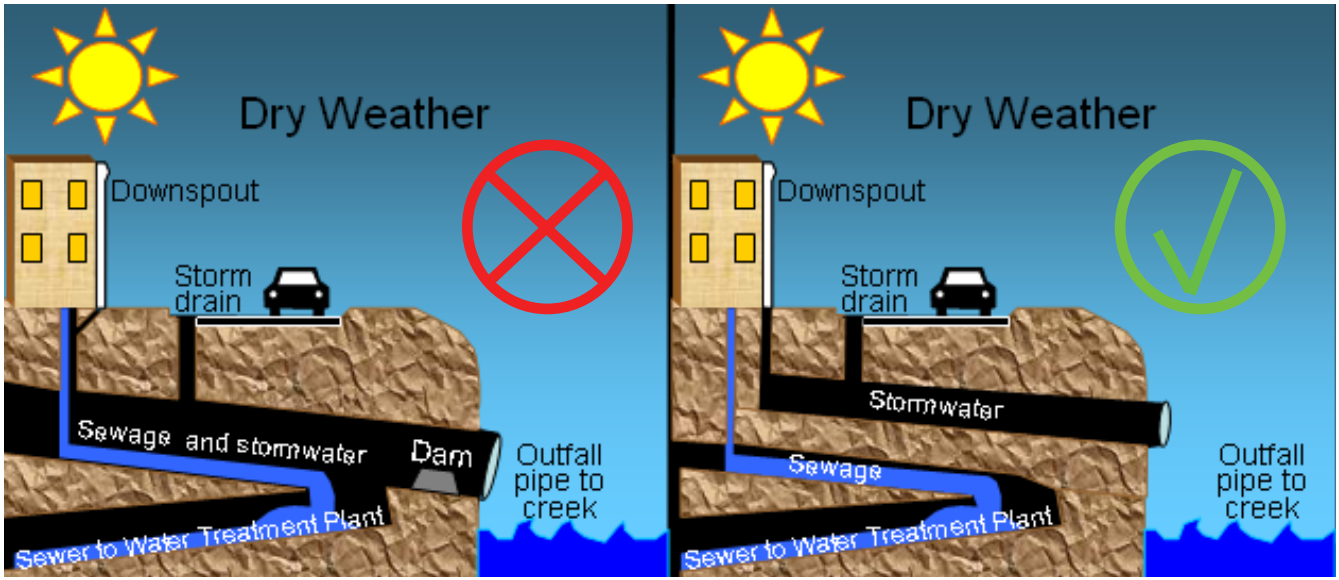
Increases in Flooding Frequency + Magnitude

Increased Pollutant Load to Surface Waters

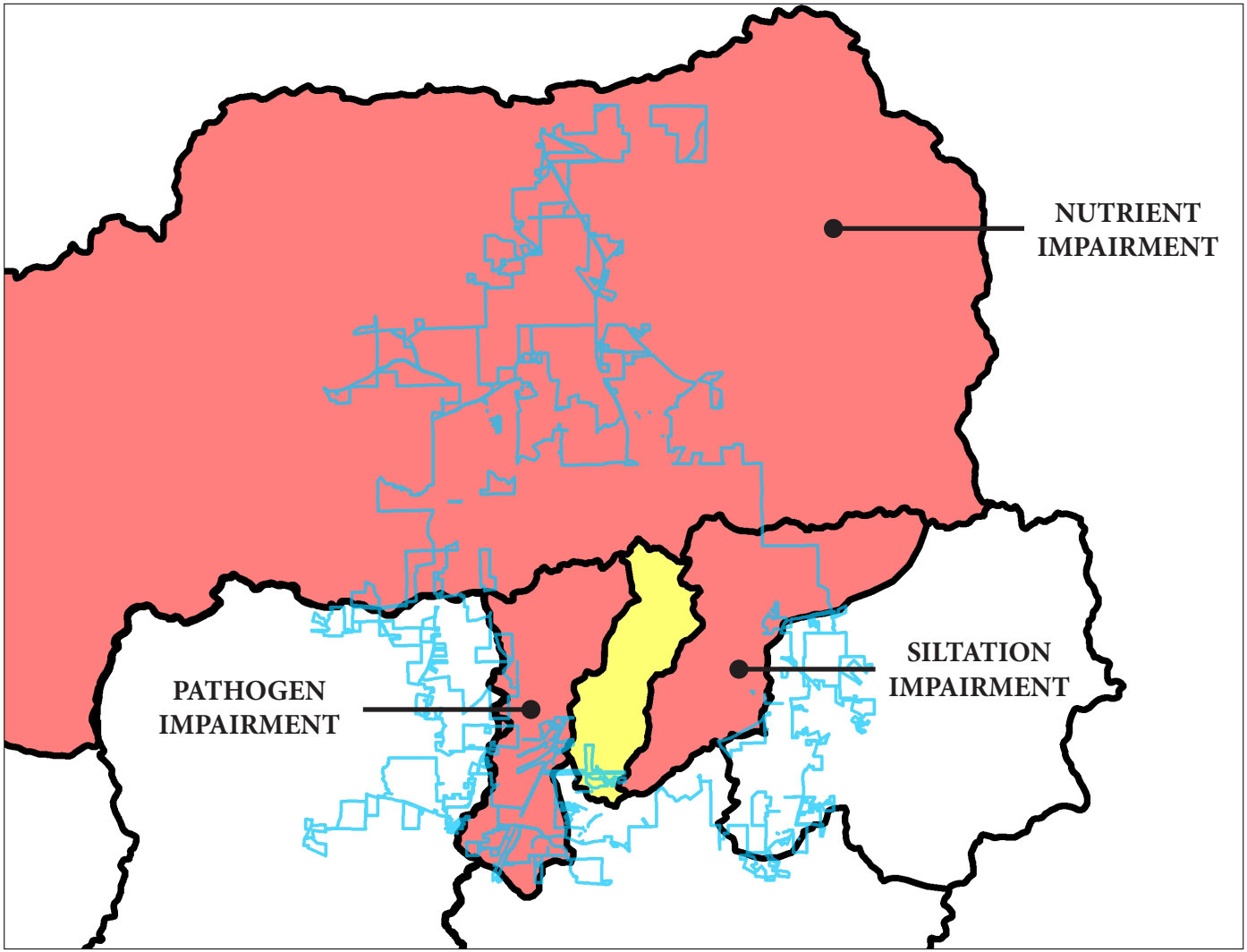
Decrease in Infiltration + Base Flow of Surface Waters

How the City Manages Stormwater

- A Municipal Separate Storm Sewer System, otherwise known as an MS4
- Permitted by the Alabama Department of Environmental Management to own and operate an MS4
- <u>Must perform 5 Minimum Control Measures</u>
  1) Public Education, Outreach, and Participation
  2) Illicit Discharge Detection and Elimination
  3) Construction Stormwater Runoff Control
  4) Post-Construction Stormwater Runoff Control
  5) Pollution Prevention and General Housekeeping for Municipal Operations



Our Known Water Quality Concerns



Watersheds of Impaired Waters - Waters in which a pollutant has caused or is suspected of causing impairment.

Category 2A Waters - Waters for which available data does not satisfy minimum data requirements but there is a high potential for use impairment based on the limited data.

City of Auburn Limits - The majority of the City of Auburn drains to an impaired waterbody.

NUTRIENT IMPAIRMENT

Description

Excess nitrogen & phosphorus causes eutrophication; the enrichment of a waterbody such that the growth of algae and other aquatic plants negatively impact the health of other organisms.

Potential Nutrient Sources

- Treated Wastewater
- Untreated Wastewater (sanitary sewer overflows)
- Fertilizers (both residential and agricultural)
- Organic debris (ex. grass clippings)
- Wildlife (fecal matter)

SILTATION IMPAIRMENT

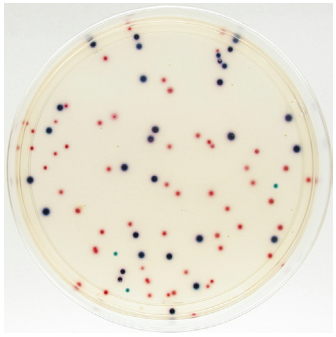
Description

Excess sediment and siltation that causes a negative impact on the ecological health of an aquatic ecosystem.

Potential Sediment Sources

- Construction Stormwater Runoff (poor erosion and sediment control)
- Excessive stream erosion (can be accelerated by urban runoff)

PATHOGEN IMPAIRMENT



Description

Excess sediment and siltation that causes a negative impact on the ecological health of an aquatic ecosystem.

Potential Pathogen Sources

- Untreated Wastewater (sanitary sewer overflows, failing septic systems, and/or illicit connections)
- Wildlife
- Pets
- Agricultural Runoff

Our Water Quality Monitoring

Definitions of Common Water Quality Parameters

Water Temperature

A measure of how hot or cool a substance is. For most designated uses, State Water Quality Criteria requires that temperature not exceed **90° Fahrenheit (32.2° Celsius)**.

pH

A measure of how basic or how acidic a substance is. For most designated uses, State Water Quality Criteria requires pH to be **between 6.0 and 8.5.**

Dissolved Oxygen

A measure of the concentration of oxygen in its dissolved form within a substance. For most designated uses, State Water Quality Criteria requires dissolved oxygen to be a minimum of **5 mg/L** except under "extreme conditions".

Specific Conductance

A measure of a substance's ability to pass an electrical current. There are currently no State Water Quality Criteria for conductivity. Conductivity is directly correlated to the amount of dissolved ions within a substance and is a useful indicator of potential illicit discharges.

Turbidity

The measure of the degree of transparency of a fluid as it affects the ability of light to pass through. Although it is not a direct measurement of sediment or Total Suspended Solids (TSS) within the water column, it is generally accepted as a useful surrogate for monitoring sediment pollution in stormwater runoff from active construction sites and is often the monitoring parameter of choice for regulatory agencies.

E. coli

Escherichia coli (E. coli) are a bacteria commonly found in the intestines of warm blooded animals. Although most stains are harmless, others are pathogens that can cause severe illness. State Water Quality Criteria require *E. coli* concentrations to be less than **298 colonies/100 ml** in any sample during the summer months and less than 2,507 colonies/100 ml during the winter months.

Water Quality Monitoring Categories

ROUTINE/COMPLIANCE MONITORING

Purpose

To assess local waters for compliance with State Water Quality Criteria and to identify water quality concerns.

Includes

Weekly Monitoring of 40 Reference Stations

Continuous Unattended Monitoring Through Water Quality Sondes

INVESTIGATIVE MONITORING

Purpose

To identify, track, and eliminate sources of pollution to the City's local water resources.

Includes

Pollutant Source Identification & Tracking Using Field and Analytical Methods

Screening and Assessment of Storm Sewer Outfalls

SPECIAL PURPOSE MONITORING

Purpose

To meet permit and/or other contractual obligations, to assess impairments, and to monitoring our drinking source water.

Includes

Stream Gaging Program

Safe Harbor Agreement (contracted)

Impairment Monitoring

Source Water Monitoring

Routine/Compliance Monitoring

Monitored with:

YSI Pro Plus Water Quality Meter
+
LaMotte 2020we Turbidimeter

+

40 Monitoring Stations in 6 Separate Watersheds

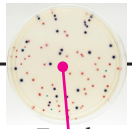
Monitored for Turbidity, Temperature, Dissolved Oxygen, pH, and Specific Conductance

Data Made Available Through Public Viewer Application

Investigative Monitoring

Monitored with:

YSI Pro Plus Water Quality Meter
+
LaMotte 2020we Turbidimeter
+
WRM Laboratory



E-coli

Yes

Possible sanitary wastewater contamination

Ammonia/ Potassium ratio >1.0

No

Possible washwater contamination

Anaylyzed in new WRM Laboratory

Yes

No

Likely natural water source

START

Surfactants >0.25mg/L or Boron >0.35mg/L

No

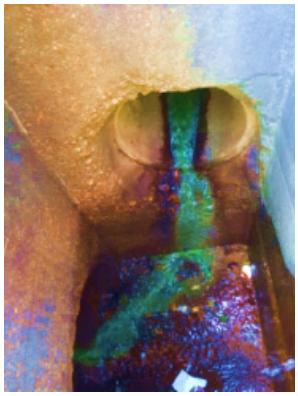
Fluoride >0.25mg/L

Yes

Likely tap and/or irrigation water source

Figure 47: Flow Chart to Identify Illicit Discharges in Residential Watersheds

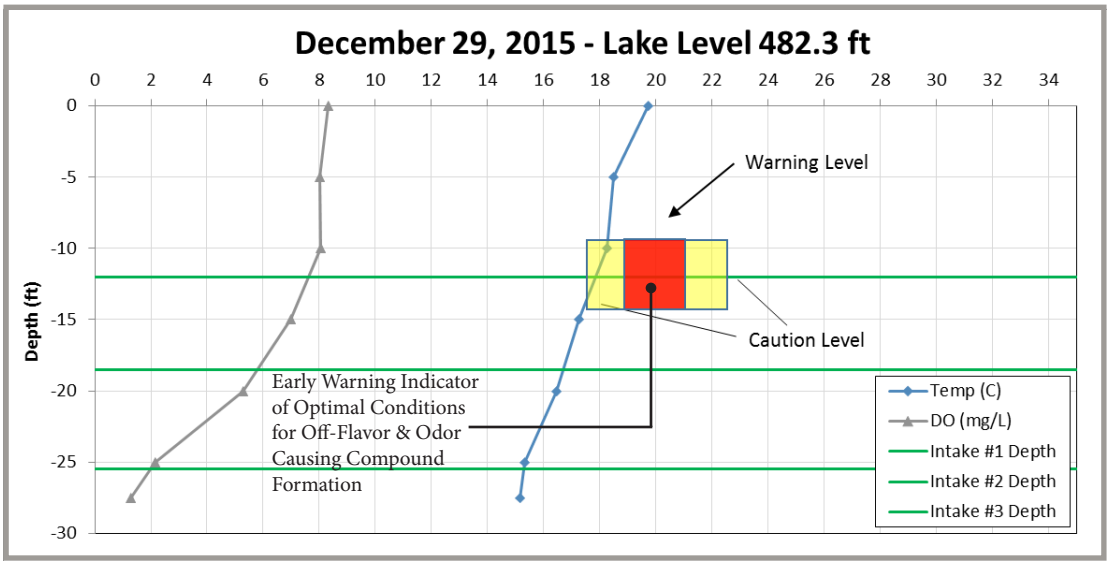
Non-Toxic Sewer Tracing Dye - Used to identify proper and illicit connections to sewer and storm sewer systems.



Illicit Cross Connection - A sanitary sewer line that is either directly or indirectly discharging sanitary sewer to our storm sewer system.

Illicit Discharge Elimination - The repair and abatement of an illicit cross connection to the City's storm sewer system.

Special Purpose Monitoring



Kemmerer Sampler Used for Obtaining Samples at Specified Depths in Lake Ogletree

SOURCE WATER MONITORING PROGRAM

Foundation Built by Dr. Williard T. Blevins

Transitioned to In-House Program in 2015

Regular Monitoring of 14 Reference Stations in Lake Ogletree and its Contributing Watershed

Routine Depth Profiles of Water Quality Throughout the Reservoir Water Column

Routine Monitoring for Off-Flavor and Odor Causing Compounds

SAFE HARBOR AGREEMENT

30 Year Agreement with US Fish & Wildlife to Protect Endangered Freshwater Mussel Species

Requires 15 Year Stream Bioassessment Period (ending 2018)

Requires 2 Million Gallons Per Day Released from Lake Ogletree to Chewacla Creek (Environmental Flows)

Requires Martin-Marietta to Repair Sink Holes Forming Near Creek

Hamiota altilis
(Endangered Fine-Lined Pocketbook Mussel)

Field Analysis of Macroinvertebrate Biodiversity

STREAM GAGING PROGRAM

3 Gages Owned & Operated by WRM

2 Jointy Funded Through United States Geological Survey

4 Funded Through Safe Harbor Agreement

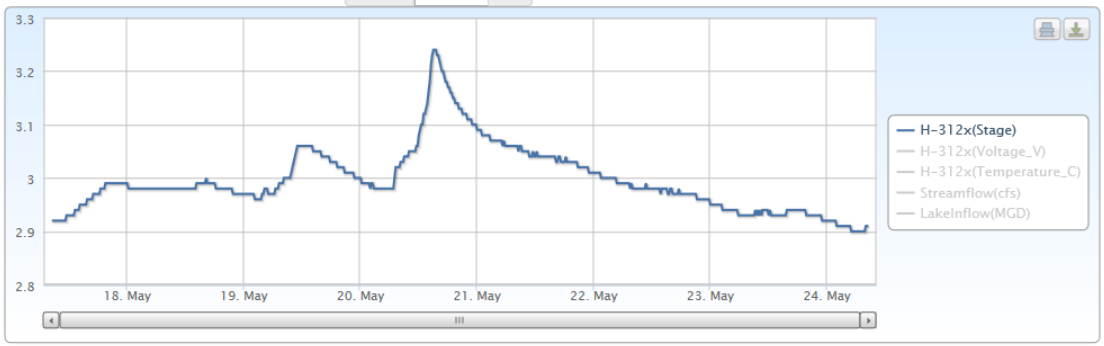
Data History

Realtime Hydrograph of Streamflow Into Lake Ogletree

Data Range from: 5/17/2016 to: 5/24/2016 Reset

Click and drag to zoom. Toggle sensors in the legend. single default all

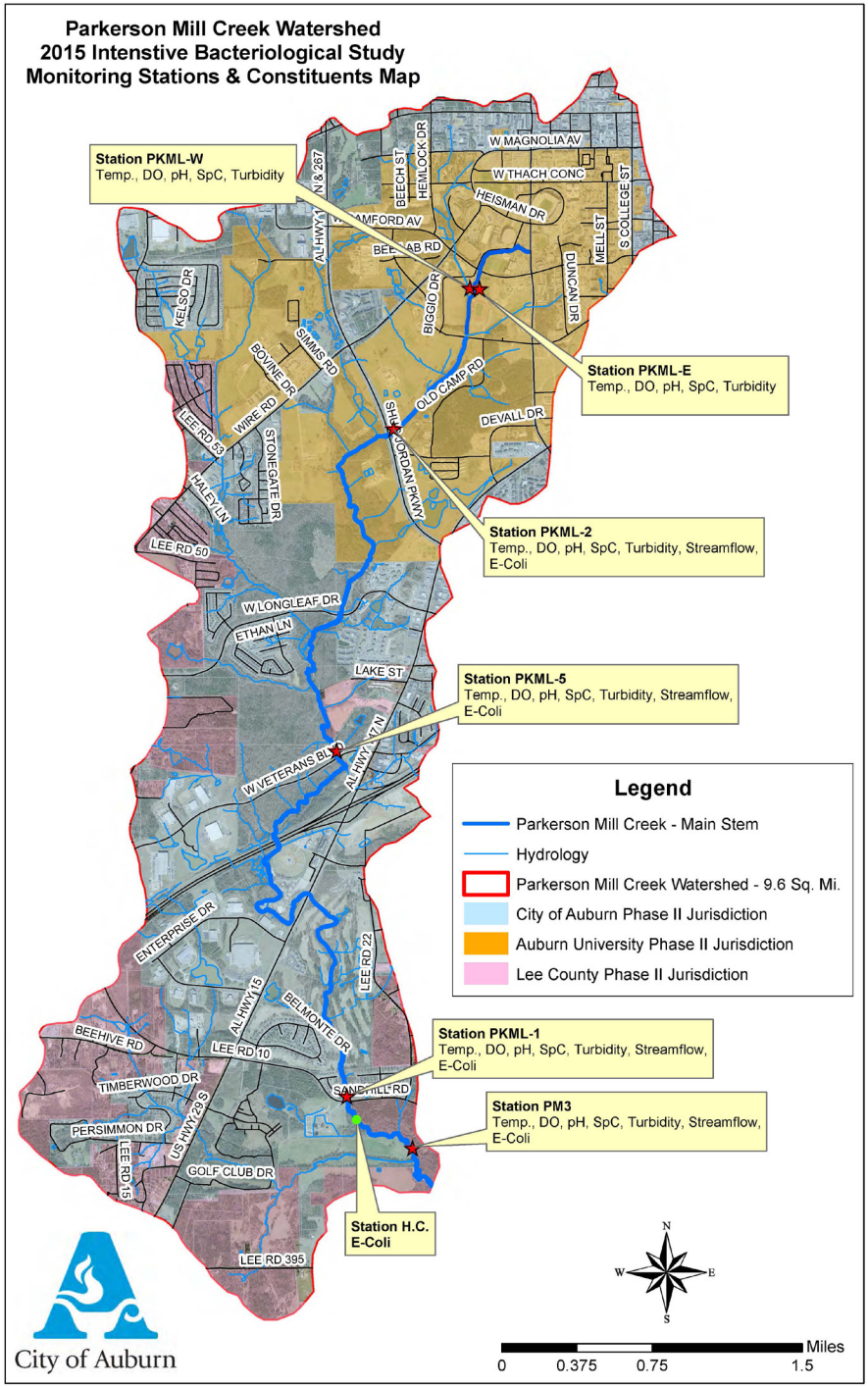
Y-axis Scaling Min: 2.8 Max: 3.3



Showing 1 to 50 of 673 entries First Previous 1 2 3 4 5 Next Last

Date	Time	H-312x(Stage)	H-312x(Voltage_V)	H-312x(Temperature_C)	Streamflow(cfs)	LakeInflow(MGD)
05/24/2016	08:30:00	2.91	12.3	19.5	16.2	10.5
05/24/2016	08:15:00	2.91	12.3	19.5	16.2	10.5
05/24/2016	08:00:00	2.91	12.3	19.5	16.2	10.5
05/24/2016	07:45:00	2.90	12.3	19.5	15.8	10.2
05/24/2016	07:30:00	2.90	12.3	19.5	15.8	10.2
05/24/2016	07:15:00	2.90	12.3	19.6	15.8	10.2
05/24/2016	07:00:00	2.90	12.3	19.6	15.8	10.2
05/24/2016	06:45:00	2.90	12.2	19.6	15.8	10.2
05/24/2016	06:30:00	2.90	12.2	19.6	15.8	10.2
05/24/2016	06:15:00	2.90	12.3	19.6	15.8	10.2
05/24/2016	06:00:00	2.90	12.2	19.7	15.8	10.2
05/24/2016	05:45:00	2.90	12.3	19.7	15.8	10.2
05/24/2016	05:30:00	2.90	12.2	19.7	15.8	10.2
05/24/2016	05:15:00	2.90	12.3	19.8	15.8	10.2
05/24/2016	05:00:00	2.90	12.2	19.8	15.8	10.2

Show 50 entries



IMPAIRMENT MONITORING

Pollutant-Specific Monitoring of Impaired Waters

Detailed Studies to Identify and Track Sources

Data-Driven Management Decisions

Allows for Monitoring of Measurable Improvements for Pollutant of Concern or Related Water Quality Parameters

Our Efforts for Improvement: A Sample of Recent Watershed Projects

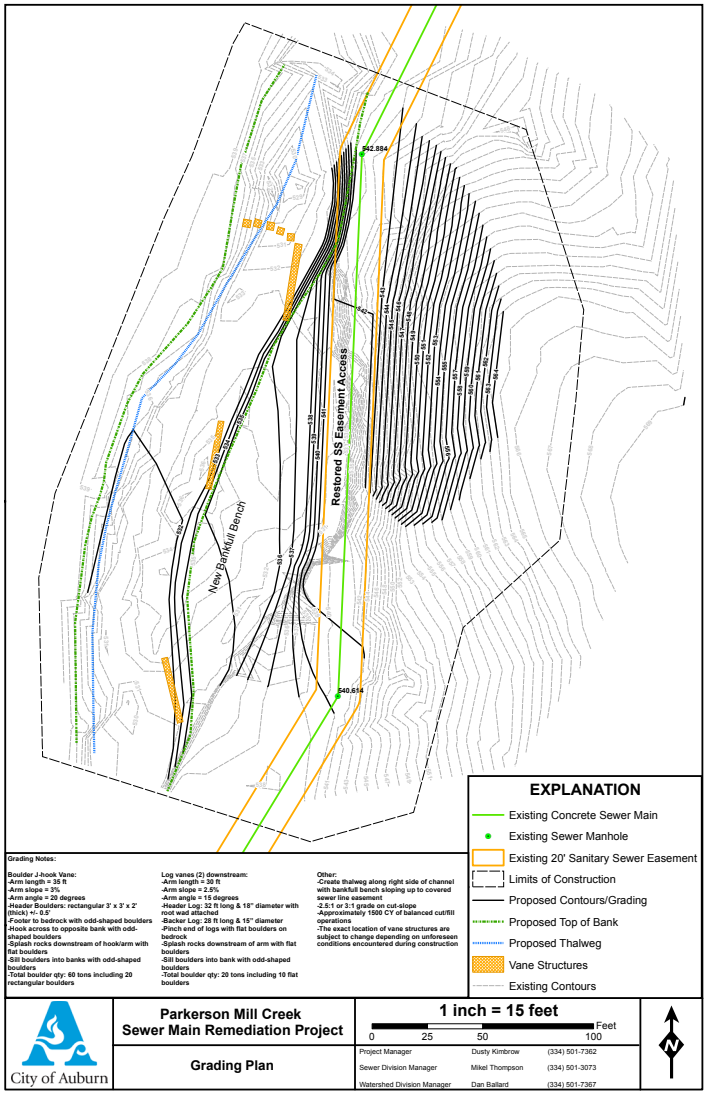
Parkerson Mill Sewer Stabilization

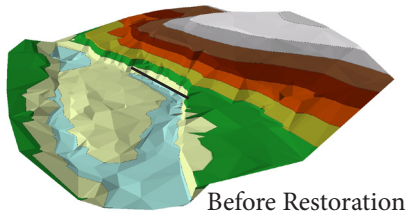
PROBLEM STATEMENT

80+ Linear Feet of Exposed Sanitary Sewer Main

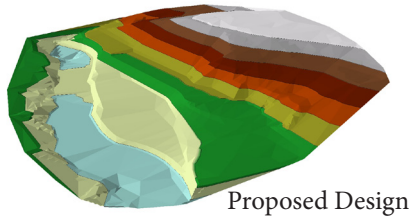
Active and Accelerated Lateral Migration of the Stream Channel

Increased Susceptibility to Leaks, Inflow, and Rupture





Before Restoration



Proposed Design

DESCRIPTION OF THE SOLUTION

Stabilization of 265 Linear Feet of Stream Using Natural Channel Design Methods

Restored Easement Accessibility & Stabilized Sanitary Sewer Main

Improved Aquatic Habitat and Ecological Function

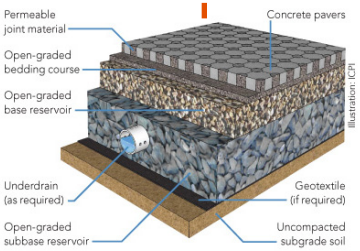
Toomer's Stormwater Improvements

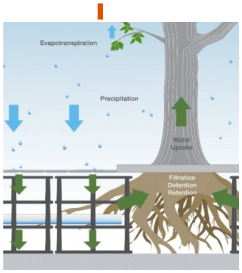
PROBLEM STATEMENT

Aging Infrastructure

Urban Stormwater Runoff from Impervious Surfaces

Impaired Watershed (Parkerson Mill Creek)





SOLUTION #1

Permeable Interlocking Concrete Pavers

Significantly Improved Infiltration and Filtration of Urban Stormwater Runoff

Runoff Volume Reducation and Improved Water Quality

SOLUTION #2

Silva Cell Suspended Pavement

Improved Infiltration and Improved Root Growth for Street Trees

Runoff Volume Reduction and Improved Water Quality

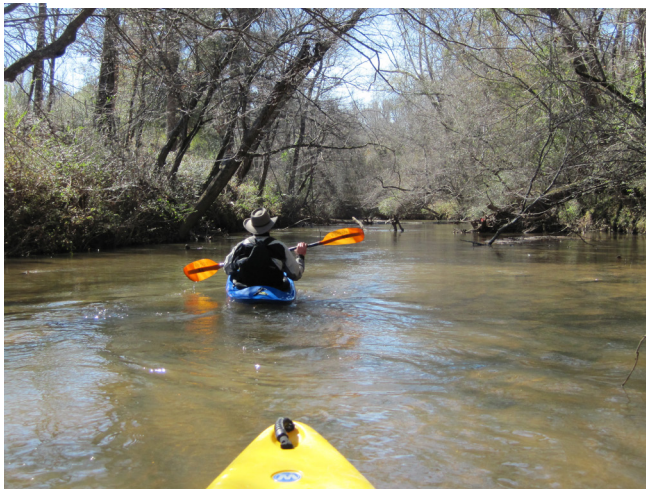
SOLUTION #3

Increased Street Trees (Princeton Elm)

Increased Capture and Evapotranspiration of Rainfall

Decreased Heat Island Effect and Improved Pedestrian Experience

SAUGAHATCHEE CREEK GREENWAY
SAUGAHATCHEE CREEK BLUEWAY

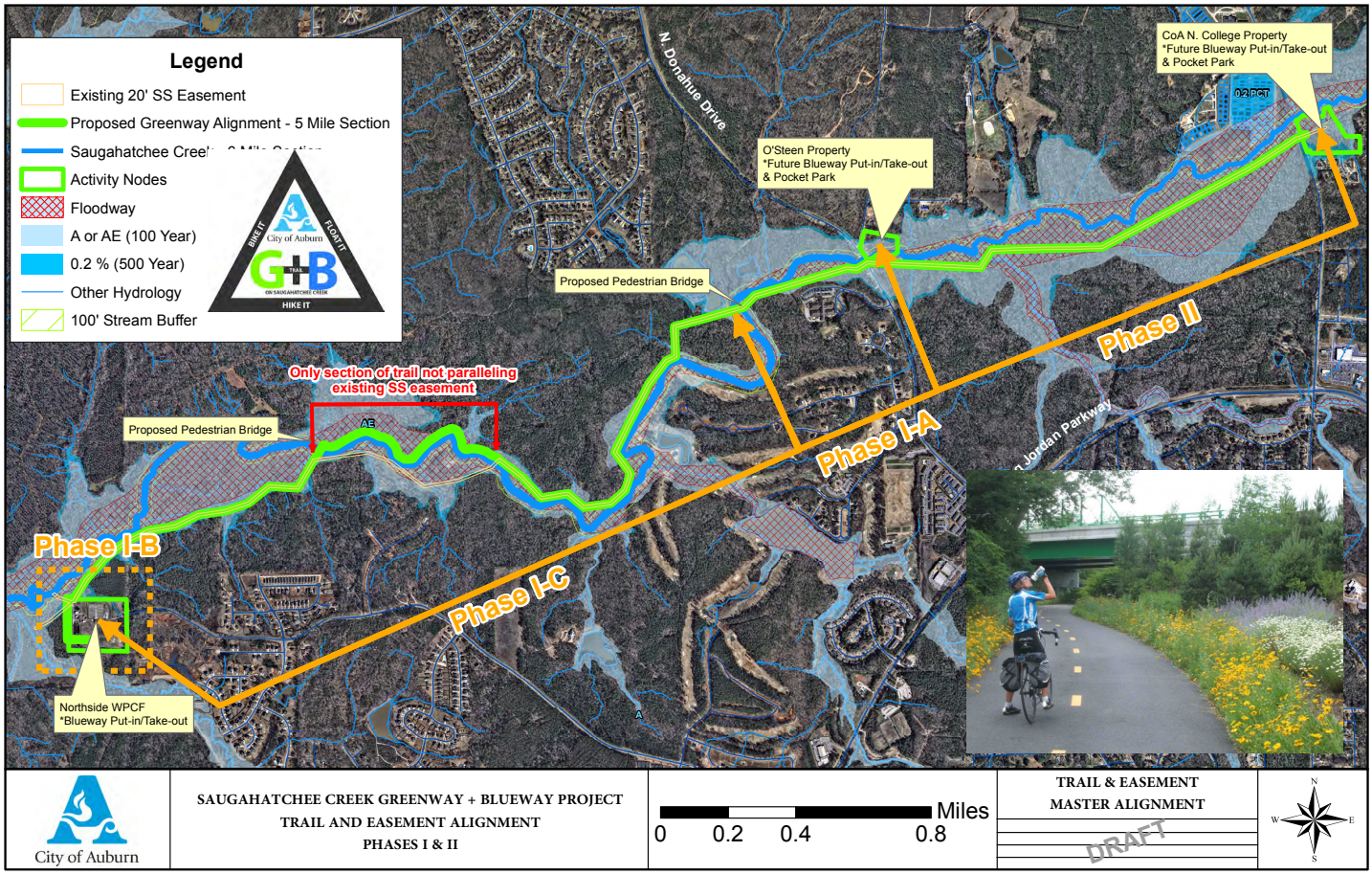


PROBLEM STATEMENT

Impaired Watershed (Saugahatchee Creek)

Public Awareness of the Problem and Public Recognition of Saugahatchee Creek as an Asset

No Contiguous Greenway Along the North Side of Auburn



DESCRIPTION OF THE SOLUTION

Provide 6+ Miles of Multimodal Greenway & Blueway

Harness the Recreational and Cultural Value of Saugahatchee Creek to Emphasize the Importance of It's Ecological Integrity

Provide the Citizens of Auburn with a One-of-a-Kind Trail System, Connecting Neighborhoods, Schools, Parks, and Nature

Provide Opportunities for Citizen Water Quality Monitoring of Saugahatchee Creek

A Citizen's Guide to Healthy Streams, Lakes, Ponds, and Wetlands (Dr. Eve Brantley)