



United States Department of Agriculture

# Why Soils Matter to Trees



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USDA – NRCS

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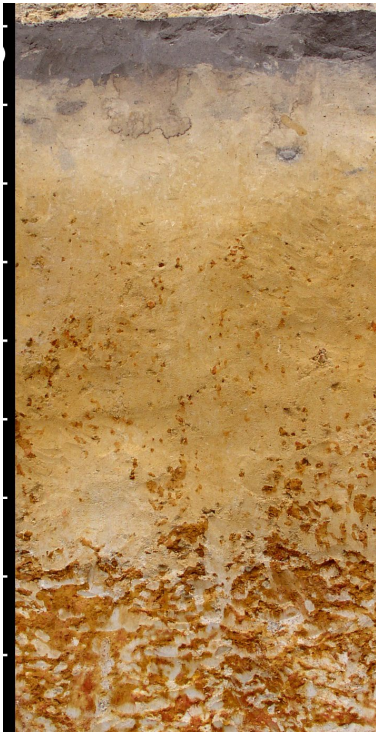


Natural  
Resources  
Conservation  
Service

[nrcs.usda.gov/](https://nrcs.usda.gov/)

# What is soil?

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- Unconsolidated mineral or organic material on the immediate surface of the earth that serves as a natural medium for the growth of land plants.





# Growth...

The final crop  
of any land  
is People  
and the  
Spirit of the People.  
We tell here a story of  
Growth in Georgia  
New Growth  
of the soil  
and the People  
From the Ground Up.

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“Soil is the eternal  
treasury of  
mankind. It is the  
most familiar, but  
the most mysterious  
stuff on Earth.”

Russell Lord, 1944

# Why is Soil Important?

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- Soils grow food
- Soils grow fiber
- Soils grow lumber
- Soils provide foundation for buildings
- Soils dispose of waste products
- Soils are used for recreation areas
- Soils are source materials – construction, medicines
- Soils support and provide homes for wildlife
- Soils store heat, water, carbon, nutrients



# Consider the earth's surface:

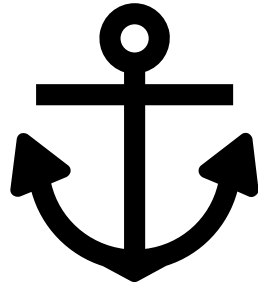
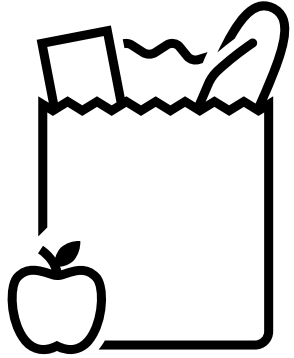
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- Developed areas
- Mountains
- Beaches
- Ice and snow
- Deserts
- Tundra
- Oceans
- Rock

Only ~3% of the Earth's surface is suitable for growing crops! (American Farmland Trust)

<https://vimeo.com/128288736>





## Plants Depend on Soil for:

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- Anchorage
- Water
- Oxygen
- Nutrients



# Objectives

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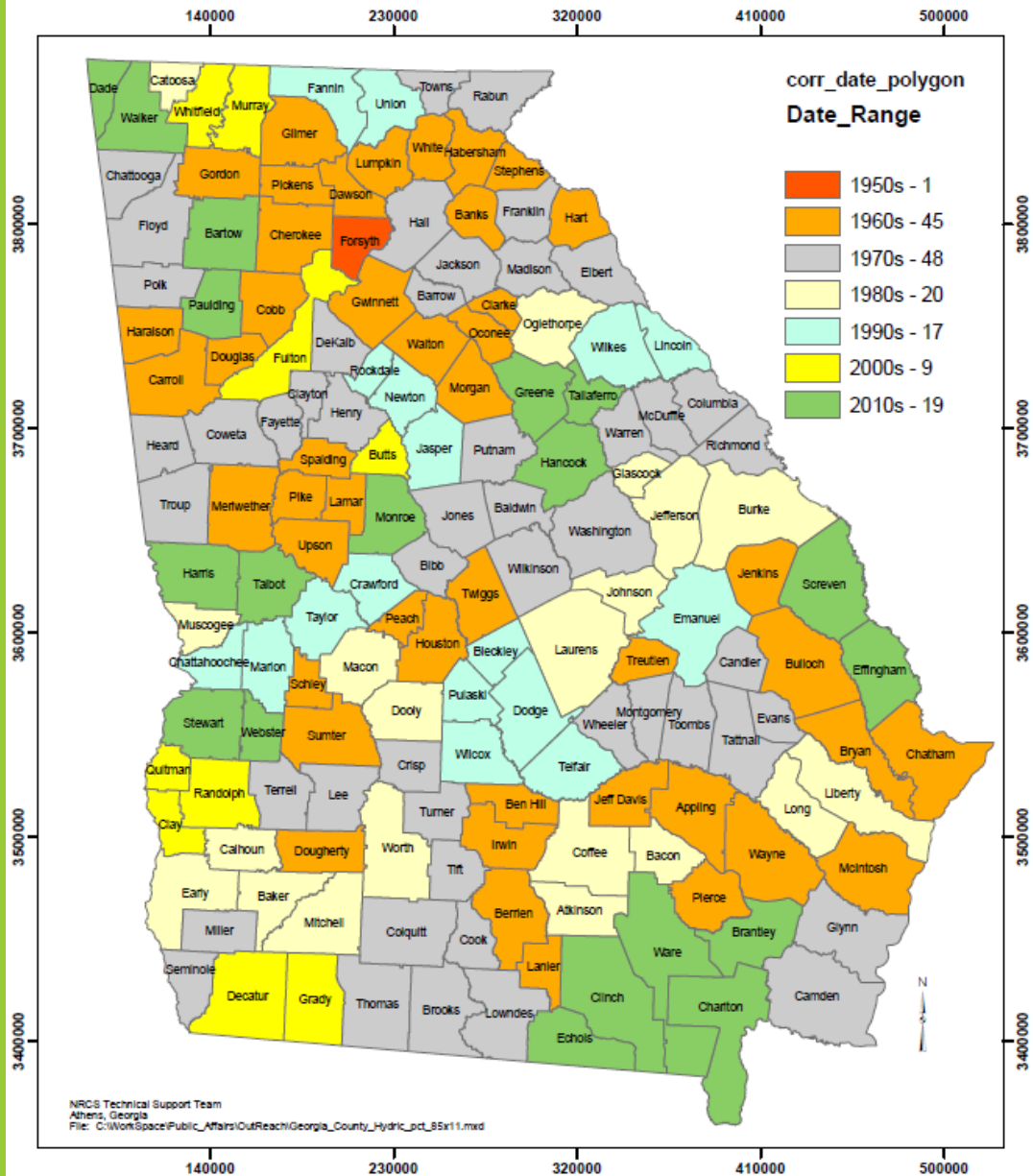
- **Soil Surveys – what are they?**
- **Mapping soils**
- **Review soils in Clarke Co.**
- **Discuss soil factors affecting tree growth**



# Soil Survey Complete, SSURGO Certified, February 2014

## GEORGIA

# Soil Survey Areas & Certification





# What is a Soil Survey?

## SOIL SURVEY



Clarke  
and  
Oconee  
Counties,  
Georgia

UNITED STATES DEPARTMENT OF AGRICULTURE  
Soil Conservation Service  
In cooperation with  
UNIVERSITY OF GEORGIA, COLLEGE OF AGRICULTURE  
AGRICULTURAL EXPERIMENT STATIONS  
Issued November 1968

## Soil surveys contain information to:

- Aid land use planning
- Predict soil behavior for selected land uses

## Contains:

Soil Descriptions, Tables, Maps

## Highlight:

Limitations, Suitabilities, Potentials



# Purpose of a Soil Map

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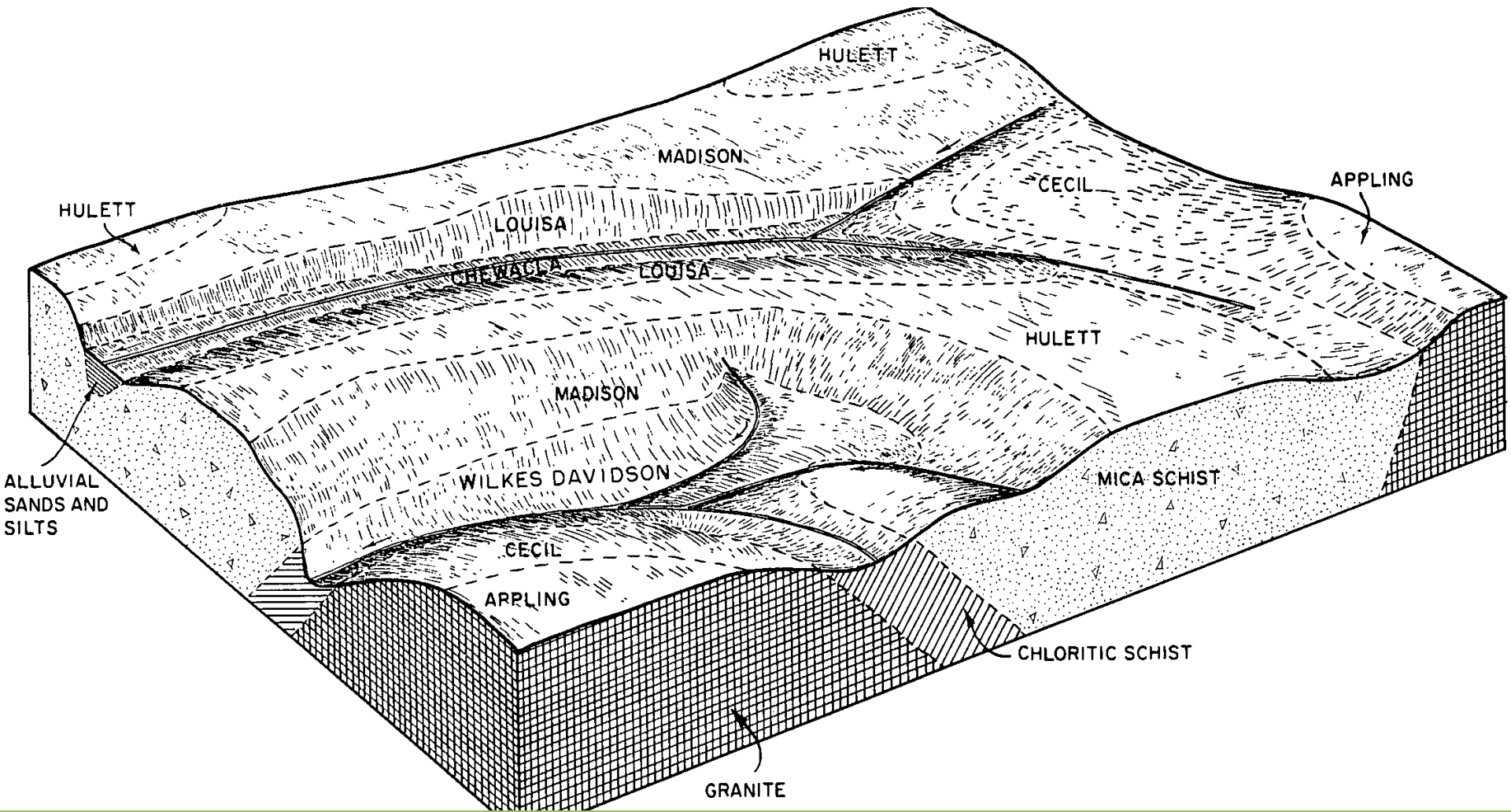
Convey to the map reader as much information in as much detail as possible regarding the character and pattern of soil distributions.

(Campbell and Edmonds, 1984)



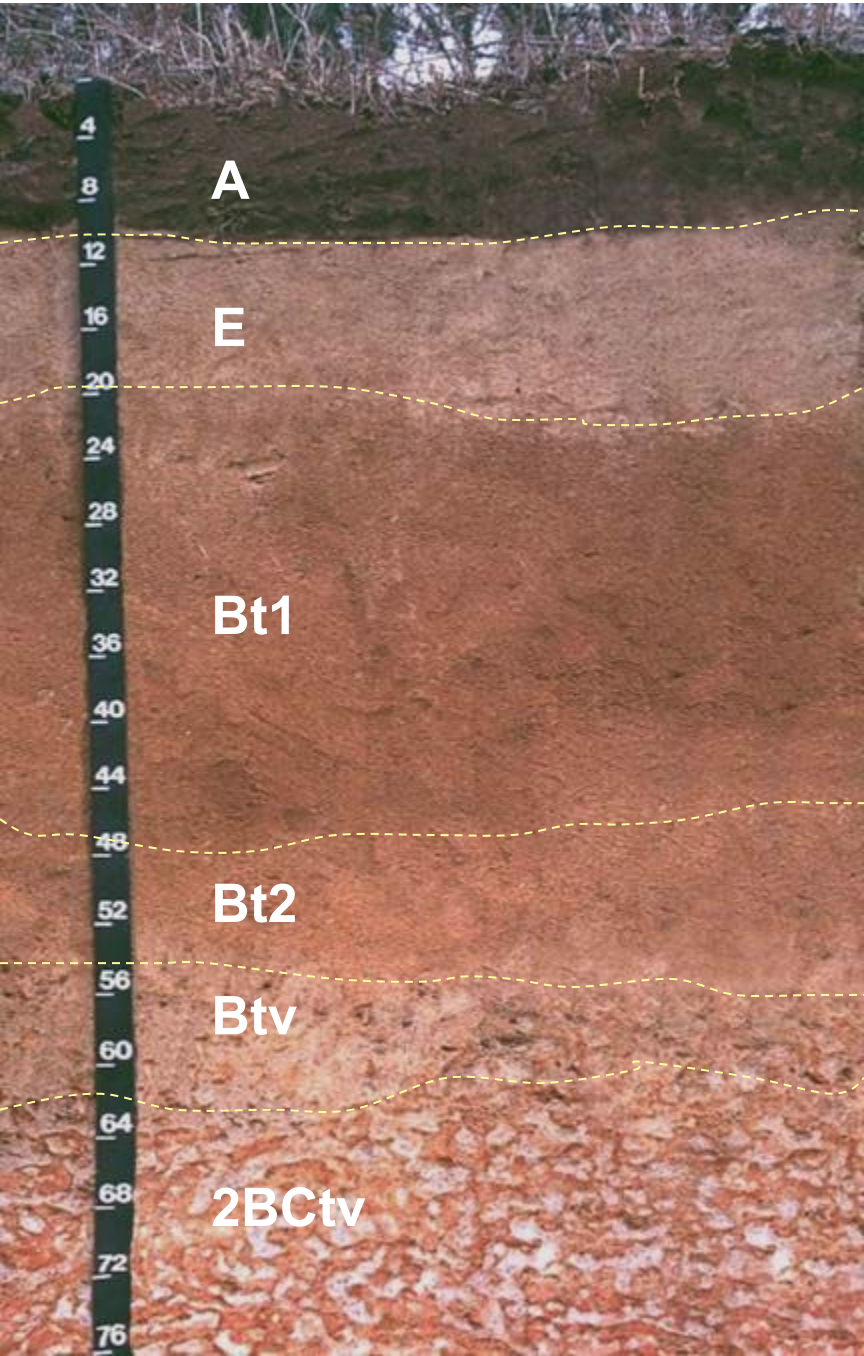




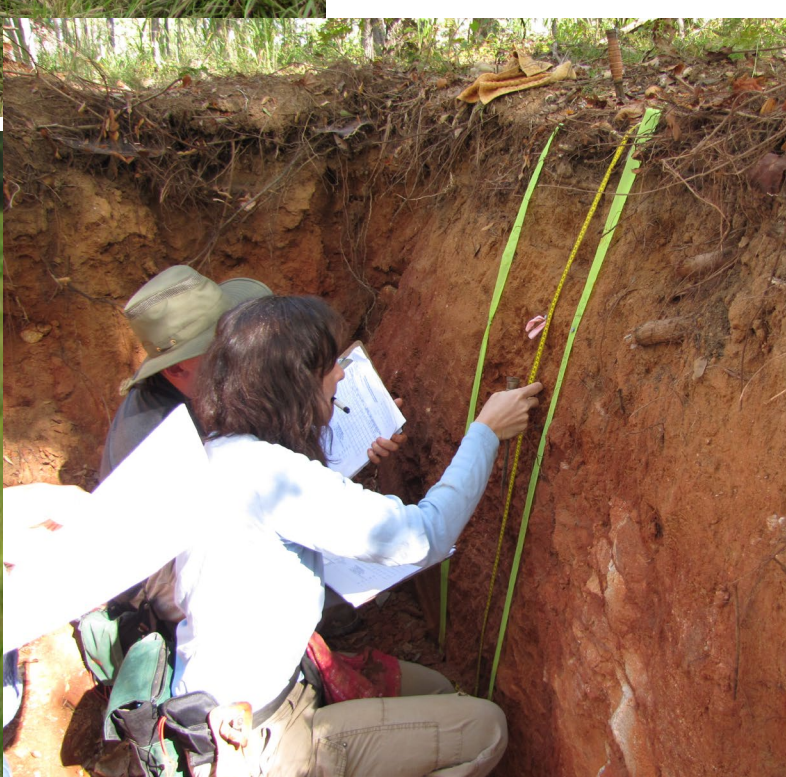


# Block Diagrams

# DESCRIBING SOIL











# “Reading” a Soil Map

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HOW TO USE AND INTERPRET WHAT YOU SEE



Convey to the map reader as much information in as much detail as possible regarding the character and pattern of soil distributions.

(Campbell and Edmonds, 1984)

# Phases of Map Units

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## Surface texture:

Cecil sandy loam, 2 to 6 percent slopes

Cecil **gravelly** sandy loam, 2 to 6 percent slopes

## Slope phase:

Cecil sandy loam, 2 to 6 percent slopes

Cecil sandy loam, **6 to 10** percent slopes

## Erosion phase:

Lloyd loam, 2 to 6 percent slopes

Lloyd loam, 2 to 6 percent slopes, **moderately eroded**

Surface fragments: Hard Labor loamy sand, 2 to 6 percent slopes

Hard Labor loamy sand, 2 to 6 percent slopes, **bouldery**

Flooding: Ocilla loamy sand, 2 to 6 percent slopes

Ocilla loamy sand, 2 to 6 percent slopes, **occasionally flooded**





# MAP UNIT SYMBOLS

## CfC2

**Dominant Soil**  
(Cf - Cecil sandy clay loam)

**Slope Class**  
(C – 6 to 10% slopes)

**Erosion Class**  
(2 – moderately eroded; not present if non eroded or slightly eroded)

| <u>Slope Class</u> | <u>Symbol</u> | <u>%</u> |
|--------------------|---------------|----------|
| Nearly level       | A             | 0 to 2   |
| Gently sloping     | B             | 2 to 6   |
| Strongly sloping   | C             | 6 to 10  |
| Moderately steep   | D             | 10 to 15 |
| Steep              | E             | 15 to 25 |
| Very Steep         | F             | >25      |

| <u>Erosion Class</u> | <u>Symbol</u> |
|----------------------|---------------|
| None                 |               |
| Slightly eroded      | 1             |
| Moderately eroded    | 2             |
| Severely eroded      | 3             |
| Gullied              |               |



Southern Piedmont  
Madison map unit



**IT'S HARD TO PUT NATURE INTO A DATABASE**

Southern Coastal Plain  
Goldsboro map unit









# CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

## CULTURAL FEATURES

### BOUNDARIES

County or parish



Field sheet matchline & neatline



### TRANSPORTATION

#### RAILROAD

Label only

### ROAD EMBLEM & DESIGNATIONS

Interstate



Federal



State



### LOCATED OBJECTS

Cemetery



Church



## HYDROGRAPHIC FEATURES

### STREAMS

Unclassified stream



Drainage end (indicates direction of flow)



## SOIL SURVEY FEATURES

### SOIL DELINEATIONS AND SYMBOLS



### MISCELLANEOUS SURFACE FEATURES

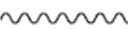
Borrow pits



Gravelly spot



Gully



Miscellaneous water



Perennial water



Rock outcrop



Sandy spot



Short steep slope



Stony spot



Very stony spot



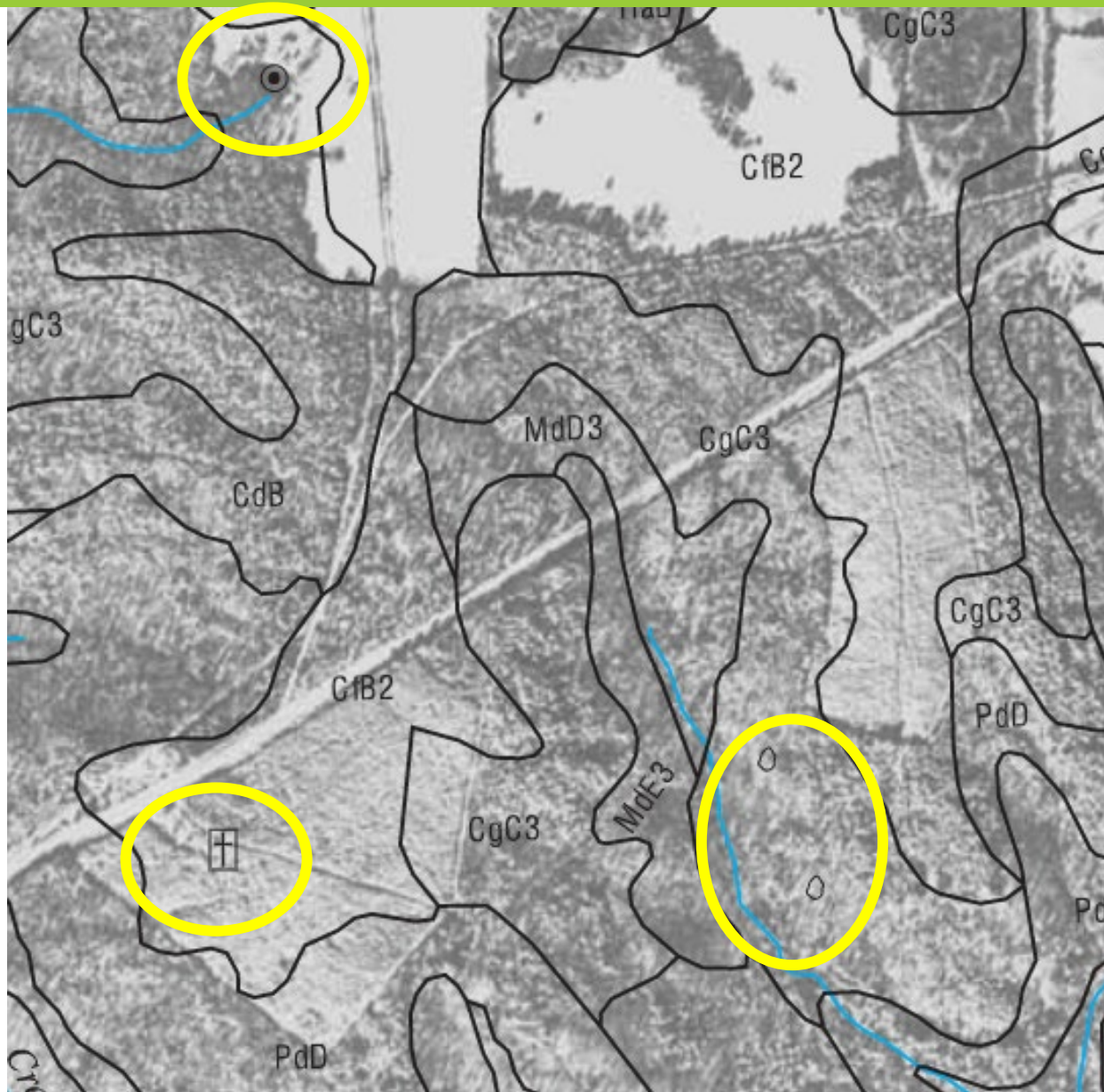
Wet spot



### AD HOC SYMBOLS

Bouldery spot





# Limitations to Soil Mapping

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- Map scale and MOU - minimum delineation size (5 acres)
- MU naming conventions
- Soil Taxonomy
- Satisfying multiple users – farmers, ranchers, developers, foresters, engineers, agencies, etc, etc (external and internal customers)



# Soil Properties

- Attribute of a soil that can be measured or inferred from **direct observation** in the field or lab
- Impact on land use and ecological processes
- Vary in their effects
  - Some properties don't have much negative effect; sometimes that same property will limit a particular practice.
- Several categories of properties
  - Chemical properties – pH, CaCO<sub>3</sub>, salts
  - Physical properties – clay content, structure, K<sub>sat</sub>
  - Erosion factors – K<sub>f</sub>, K<sub>w</sub>
  - Water features – seasonal high water table, flooding, ponding



# Common Soil Properties

- Soil reaction (pH) – Chemical (inherent)
- Organic matter – Physical (dynamic)



Photo credit: USDA-NRCS

# Common Soil Properties

- Depth to restrictive layer
- Slope – not really a soil property – more of a ‘site’ property

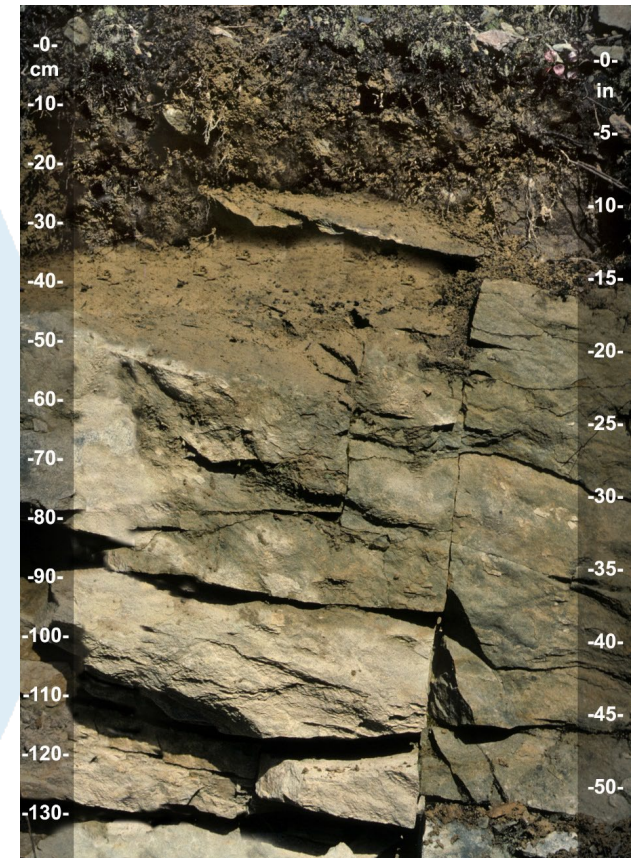
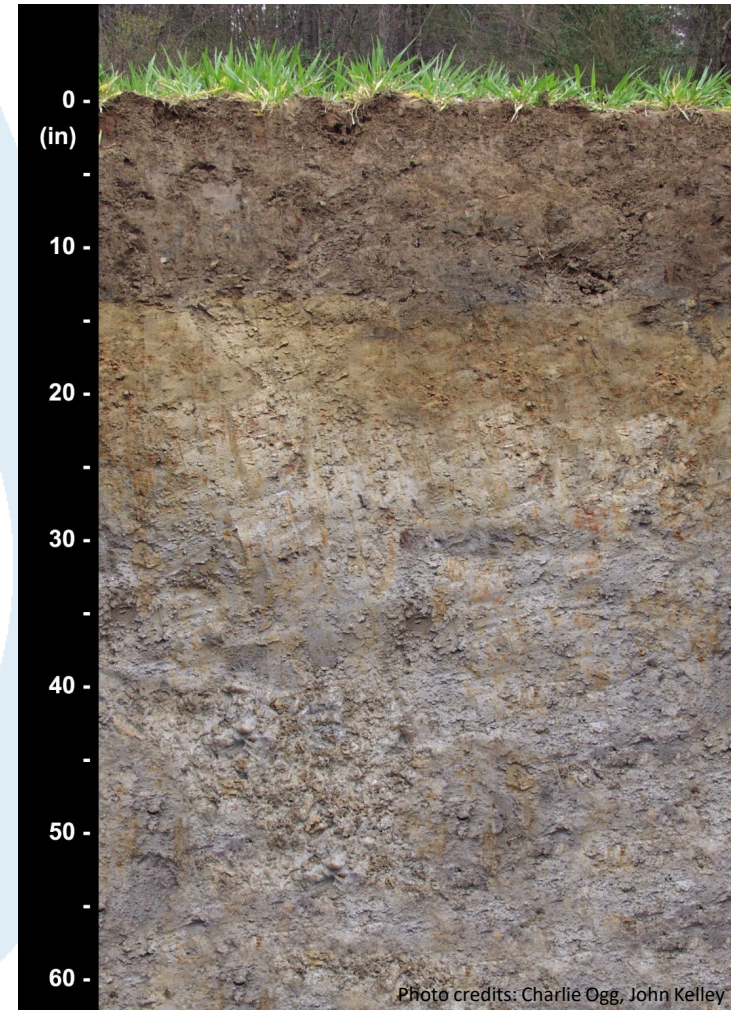


Photo credits: Chip Smith, John Kelley



# Common Soil Properties

- Depth to water table
- Flooding and Ponding frequency





# Web Soil Survey & Soil Data Viewer

Area of Interest (AOI) | Soil Map | Soil

**Area of Interest Interactive Map**

Legend | View Extent: Contiguous U.S. | Scale: (not to scale)

**Search**

**Area of Interest** | Open All | Close All

**AOI Properties** | Clear AOI

**AOI Information**

Name: Case\_PLU\_Layer

Map Unit Symbols:  Use Soil Survey Area Map Unit Symbols,  Use National Map Unit Symbols

Area (acres): 323.8

**Soil Data Available from Web Soil Survey**

**Schley and Sumter Counties, Georgia (GA652)**

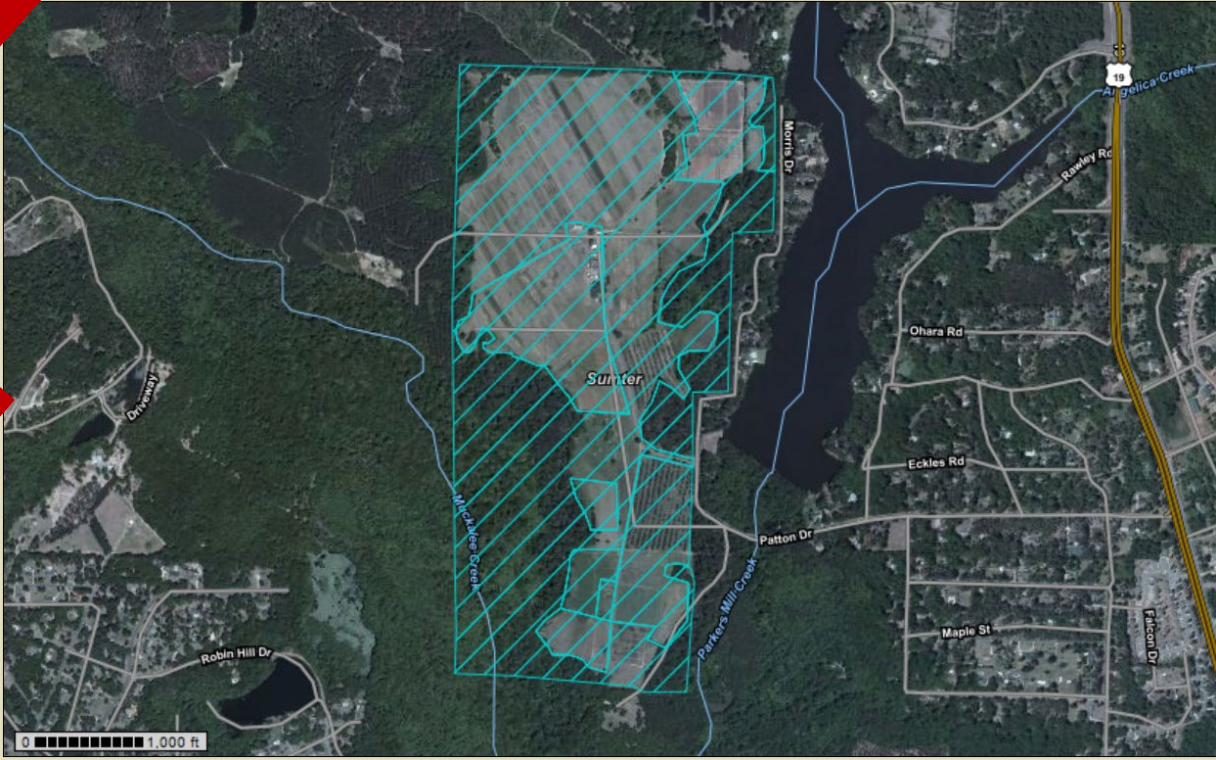
|                   |                               |
|-------------------|-------------------------------|
| Data Availability | Tabular and Spatial, complete |
| Tabular Data      | Version 14, Sep 13, 2018      |
| Spatial Data      | Version 3, Dec 11, 2013       |

**Import AOI**

- Create AOI from Shapefile
- Create AOI from Zipped Shapefile

Export AOI

**Quick Navigation**



0 1,000 ft

# Web Soil Survey

Soil Data Explorer

→ Soil Reports

→ Vegetative Productivity

→ Forestland Productivity

| Report — Forestland Productivity                                     |                        |            |                      |  |
|--|------------------------|------------|----------------------|--|
| Monroe County, Georgia   |                        |            |                      |  |
| Map unit symbol and soil name  | Potential productivity |            |                      | Trees to manage                              |
|  | Common trees           | Site Index | Volume of wood fiber |  |
|  |                        |            | <i>Cu ft/ac/yr</i>   |  |
| AwE—Ashlar-Wake complex, 15 to 25 percent slopes                     |                        |            |                      |  |
| Ashlar   | Loblolly pine          | 75         | 101.00               | Loblolly pine, Shortleaf pine                |
|  | Northern red oak       | 60         | 43.00                |  |
|  | Shortleaf pine         | 65         | 99.00                |  |
| Wake   | Loblolly pine          | 60         | 76.00                | Loblolly pine, Shortleaf pine                |
|  | Shortleaf pine         | 50         | 68.00                |  |
| BcB—Buncombe loamy sand, 0 to 6 percent slopes, occasionally flooded |                        |            |                      |  |
| Buncombe   | Loblolly pine          | 90         | 131.00               | Loblolly pine, Yellow-poplar                 |
|  | Yellow-poplar          | 100        | 107.00               |  |
| BpD—Bush River-Prosperity complex, 6 to 15 percent slopes            |                        |            |                      |  |
| Bush river   | Loblolly pine          | 84         | 118.00               | Loblolly pine, Shortleaf pine, Yellow-poplar |
|  | Shortleaf pine         | 66         | 101.00               |  |
|  | Southern red oak       | 72         | 54.00                |  |
|  | White oak              | 72         | 54.00                |  |
| Prosperity   | Loblolly pine          | 84         | 118.00               | Loblolly pine, Shortleaf pine, Yellow-poplar |
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|  | White oak              | 72         | 54.00                |  |

Area of Interest (AOI) | Soil Map | **Soil Data Explorer**

View Soil Information By Use: All Uses

Intro to Soils | **Suitabilities and Limitations for Use**

**Search**

**Suitabilities and Limitations Ratings**

Open All | Close All

- Building Site Development
- Construction Materials
- Disaster Recovery Planning
- Land Classifications
- Land Management
- Military Operations
- Recreational Development
- Sanitary Facilities
- Soil Health

**Vegetative Productivity**

- Crop Productivity Index
- Forest Productivity (Cubic Feet per Acre per Year)
- Forest Productivity (Tree Site Index)**

View Description | View Rating

**View Options**

- Map
- Table
- Description of Rating
- Rating Options  Detailed Description

**Basic Options**

Tree: **loblolly pine** Coile, Schumacher 1953 (690)

**Advanced Options**

**Soil Map**

Legend

Forestland Productivity Information Under Suitabilities and Limitations Produce a map

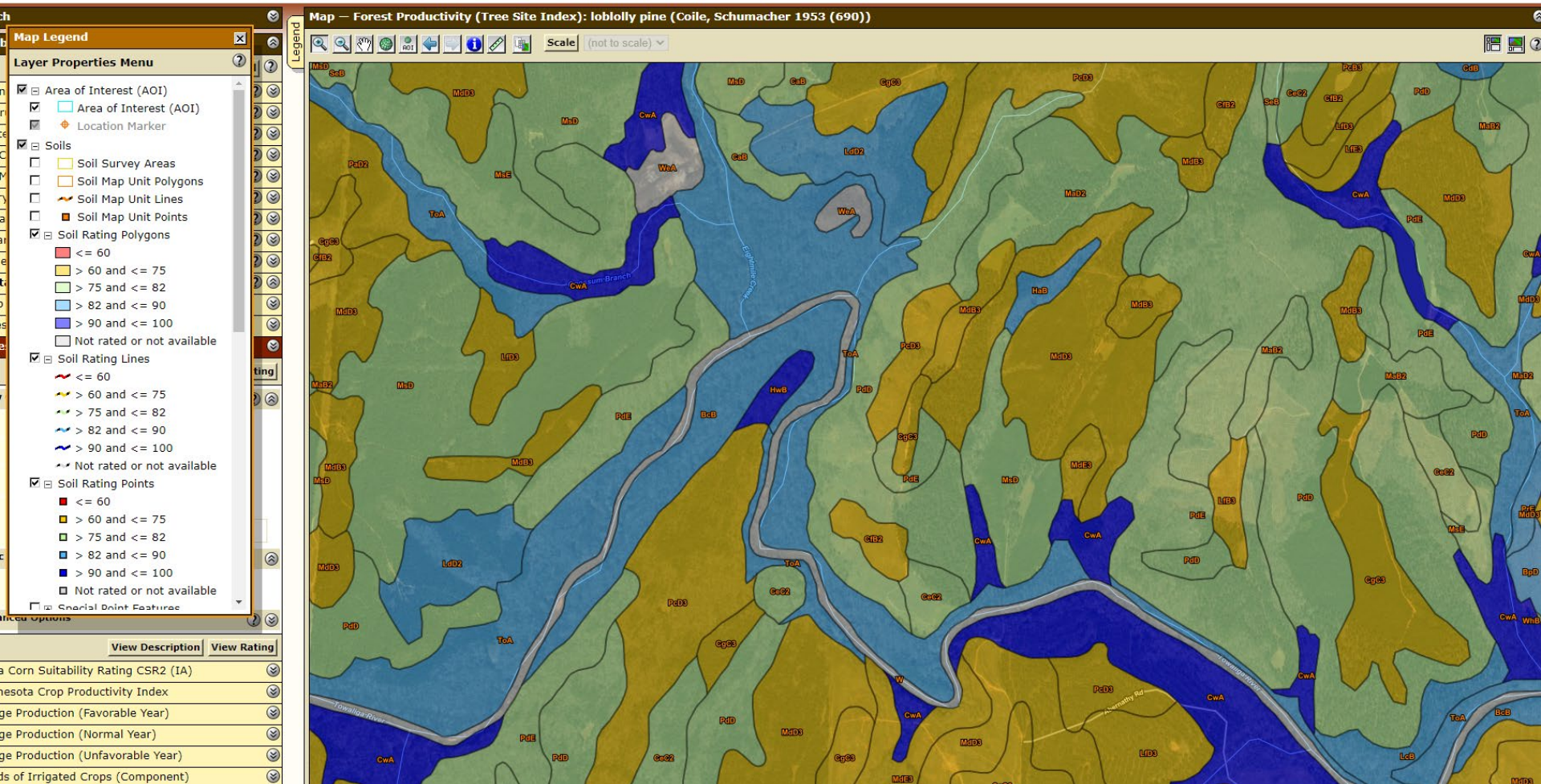
Cubic Feet per acre per year growth

Site Index (most common)





# Web Soil Survey Site Index Maps





# Soil Reports tab

Area of Interest (AOI) | Soil Map | **Soil Data Explorer** | Download Soils Data | Shopping Cart (Free)

View Soil Information By Use: All Uses

Intro to Soils | Suitabilities and Limitations for Use | Soil Properties and Qualities | Ecological Sites | **Soil Reports**

### Search

#### Soil Reports

Open All Close All

- AOI Inventory
- Building Site Development
- Construction Materials
- Disaster Recovery Planning
- Land Classifications
- Land Management
- Recreational Development
- Sanitary Facilities
- Soil Chemical Properties
- Soil Erosion
- Soil Health
- Soil Physical Properties
- Soil Qualities and Features
- Vegetative Productivity**
- Forestland Productivity**

[View Description](#) [View Soil Report](#)

#### Options

Include minor soils?

[View Description](#) [View Soil Report](#)

- Irrigated Yields by Map Unit Component
- Link to Ecological Site Descriptions in EDIT
- Nonirrigated Yields by Map Unit Component
- Rangeland and Forest Vegetation Classification, Productivity, and Plant Composition
- Waste Management
- Water Features
- Water Management

### Soil Map

Legend

Scale (not to scale)

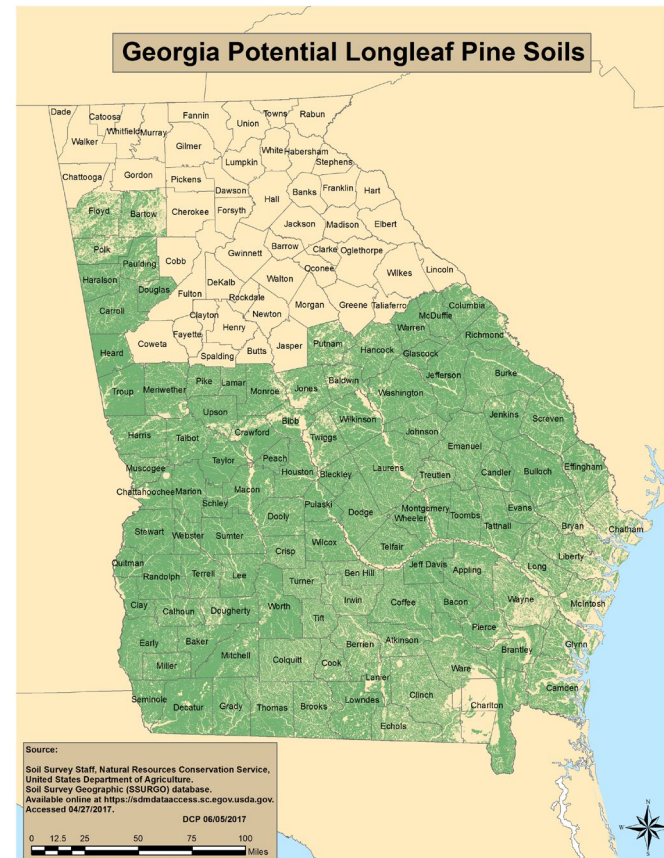
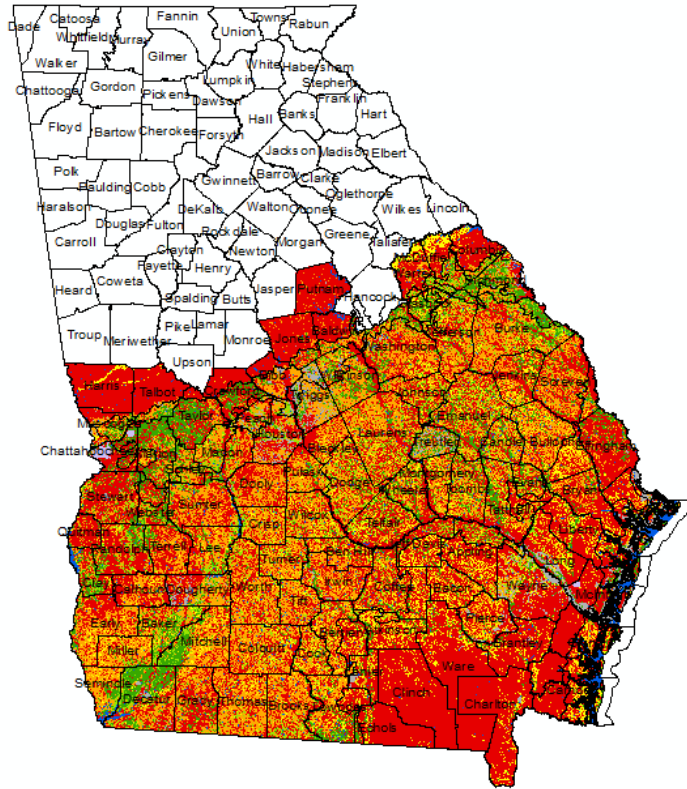
# Forestland Productivity Report

## Report — Forestland Productivity

Monroe County, Georgia

| Map unit symbol and soil name  | Potential productivity |            |  | Trees to manage                              |
|--|------------------------|------------|--|--|
|  | Common trees           | Site Index | Volume of wood fiber<br><i>Cu ft/ac/yr</i> |  |
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# Habitat Interpretations



United States Department of Agriculture



# Questions?

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