United States Department of Agriculture

Why Soils Matter to Trees

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USDA – NRCS
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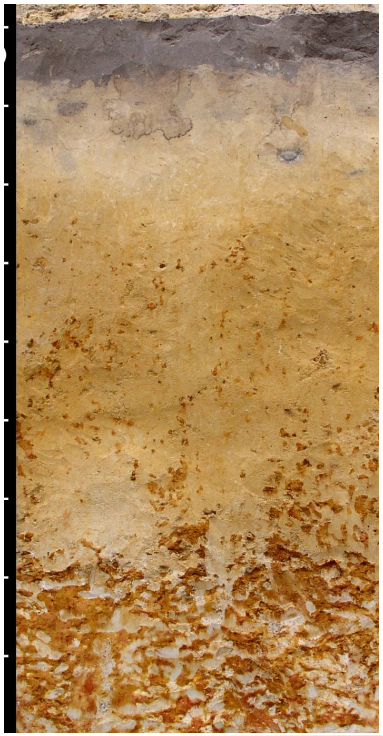
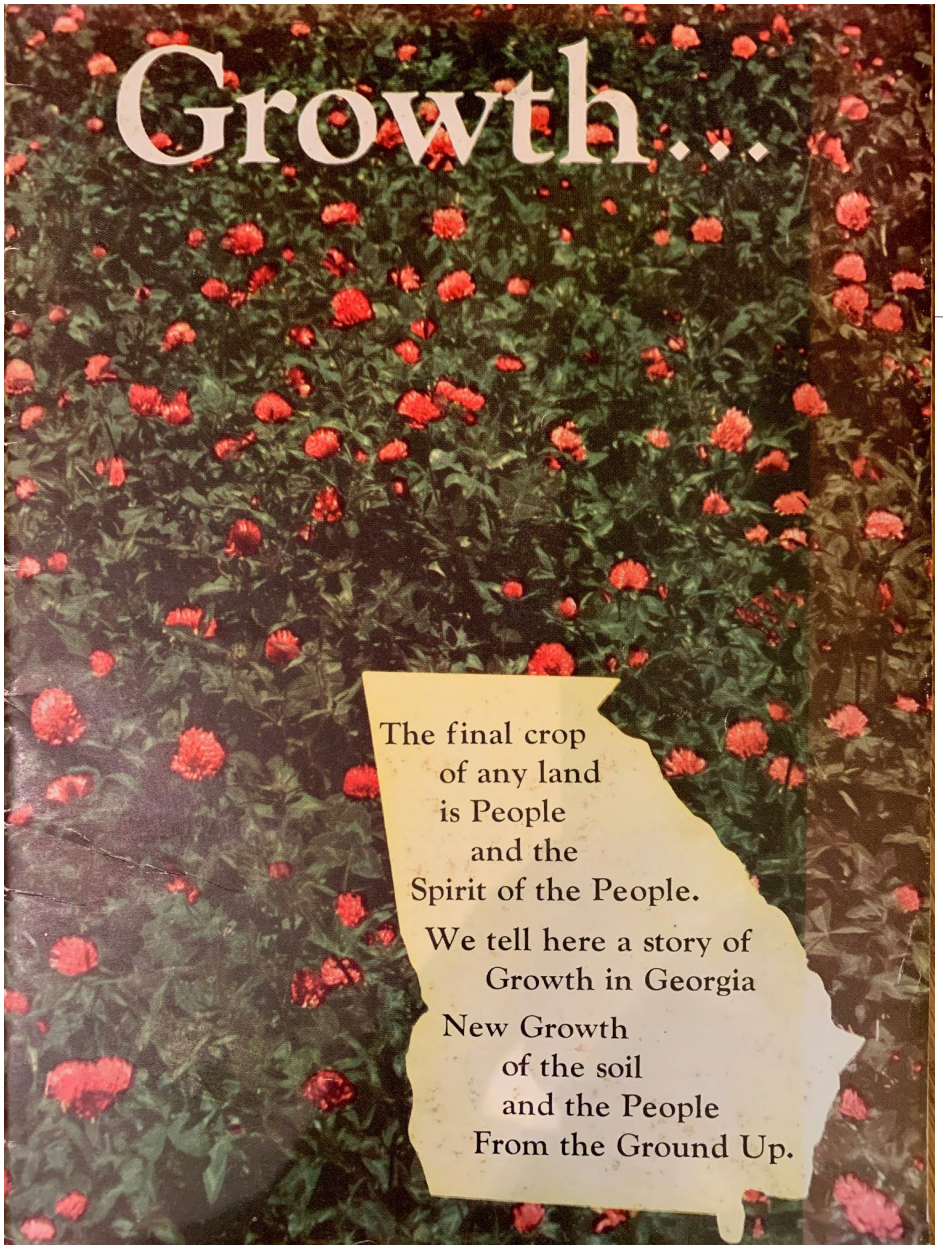
Natural Resources Conservation Service

nrcs.usda.gov/

What is soil?



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



"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?

- 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



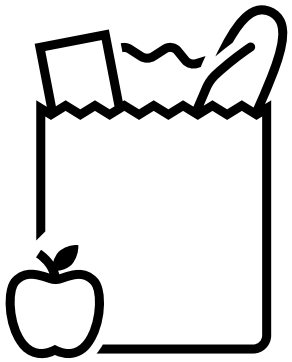


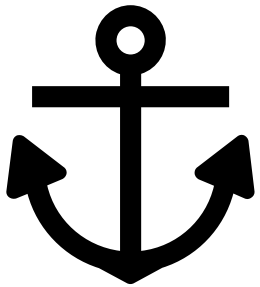



Consider the earth's surface:

- 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:

- Anchorage
- Water
- Oxygen
- Nutrients

Objectives

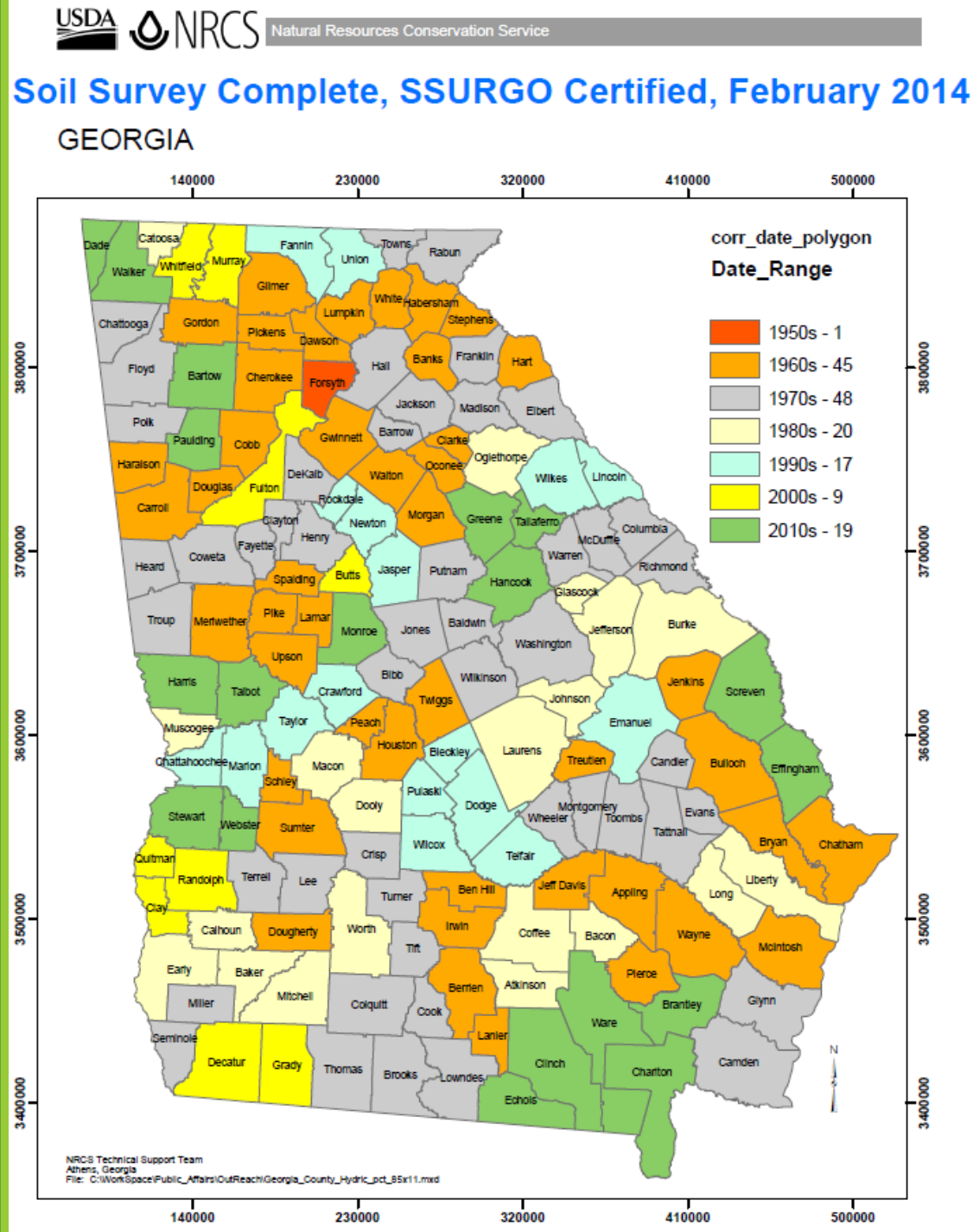
- **Soil Surveys – what are they?**
- **Mapping soils**
- **Review soils in Clarke Co.**
- **Discuss soil factors affecting tree growth**



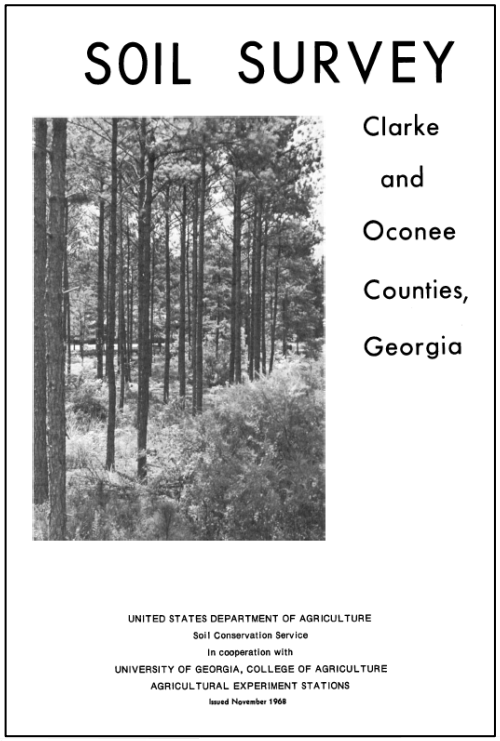





Soil Survey Areas & Certification



What is a Soil Survey?



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

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)





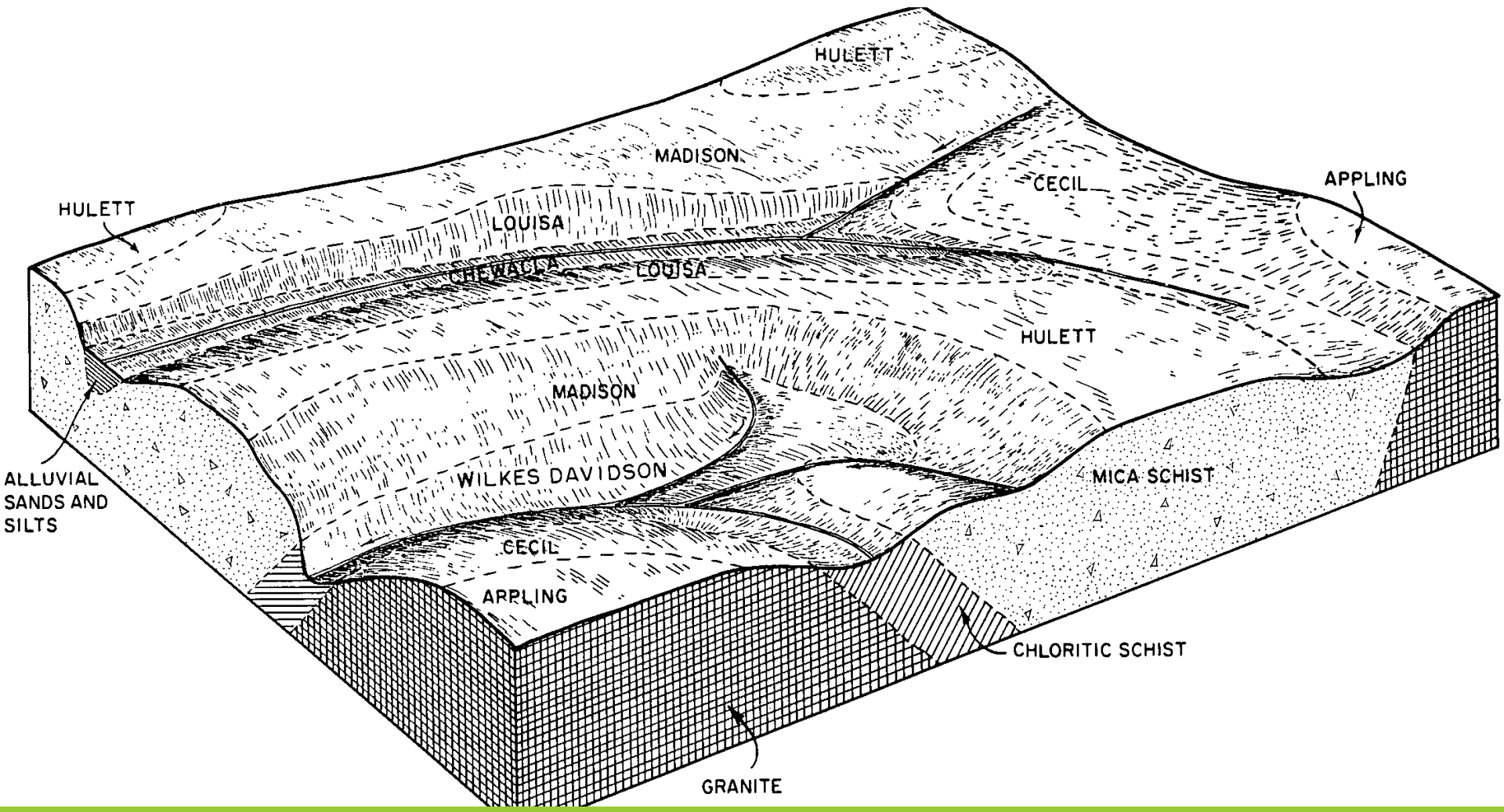






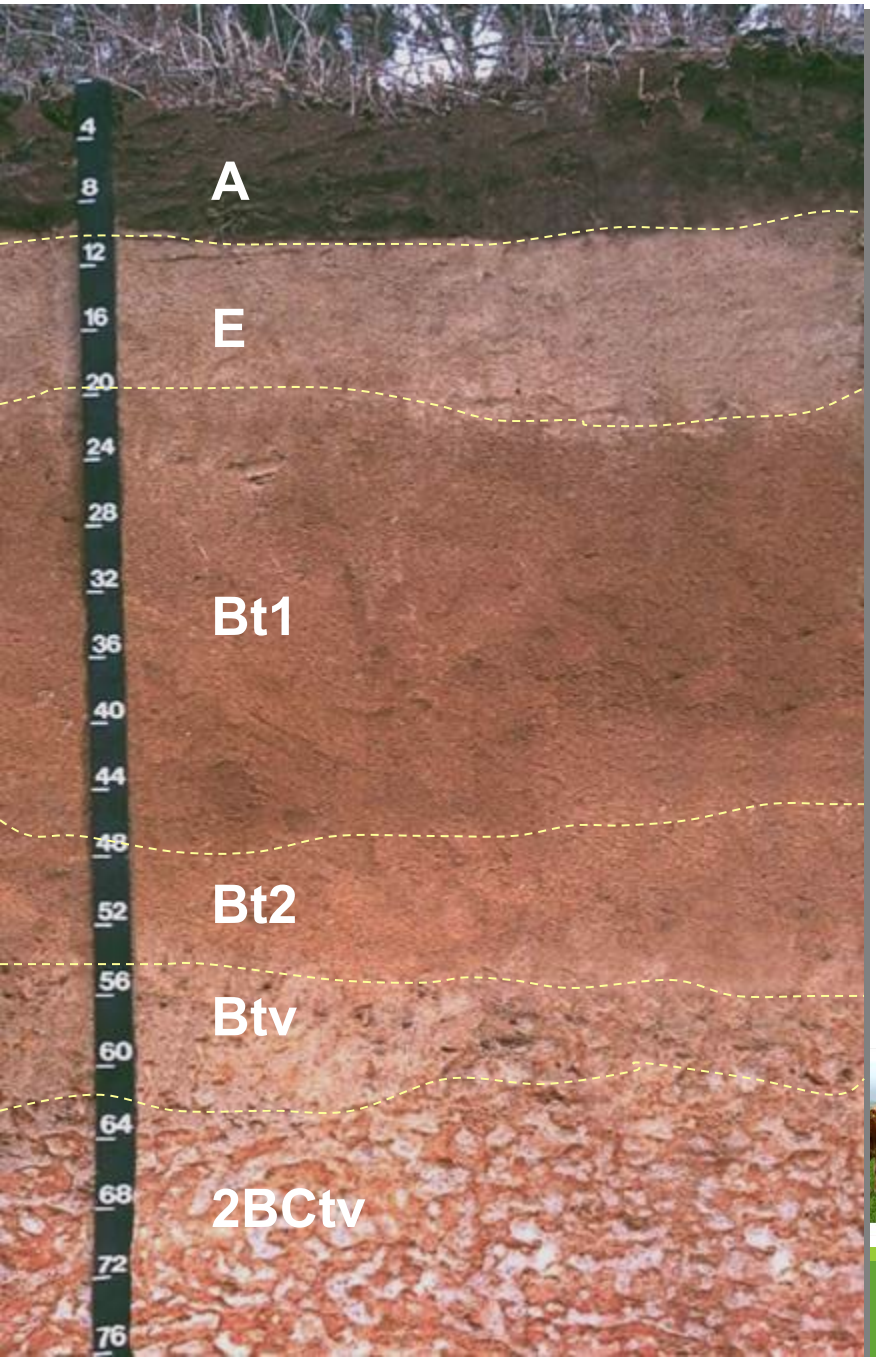


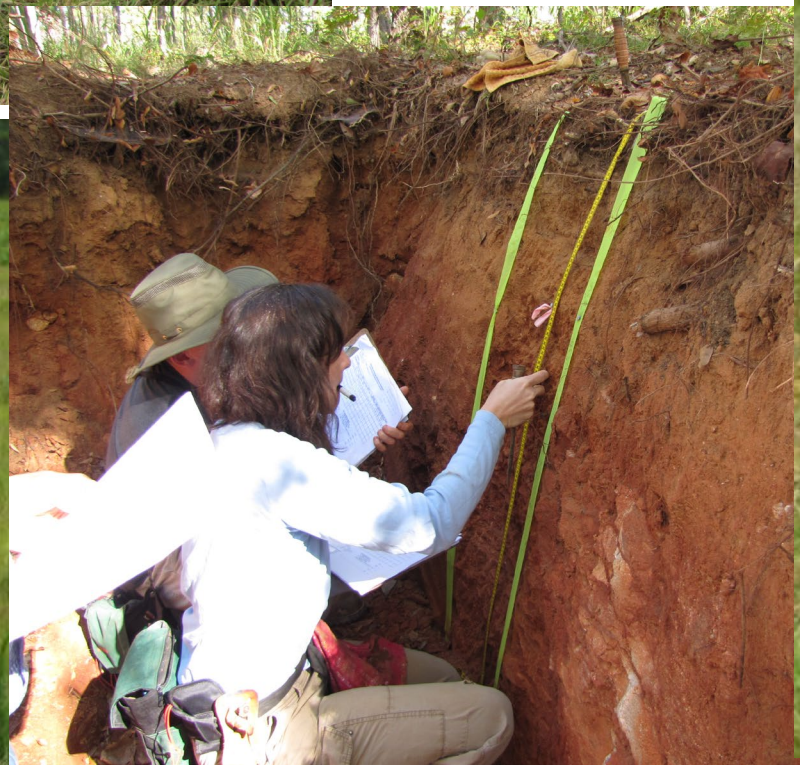




Block Diagrams

DESCRIBING SOIL

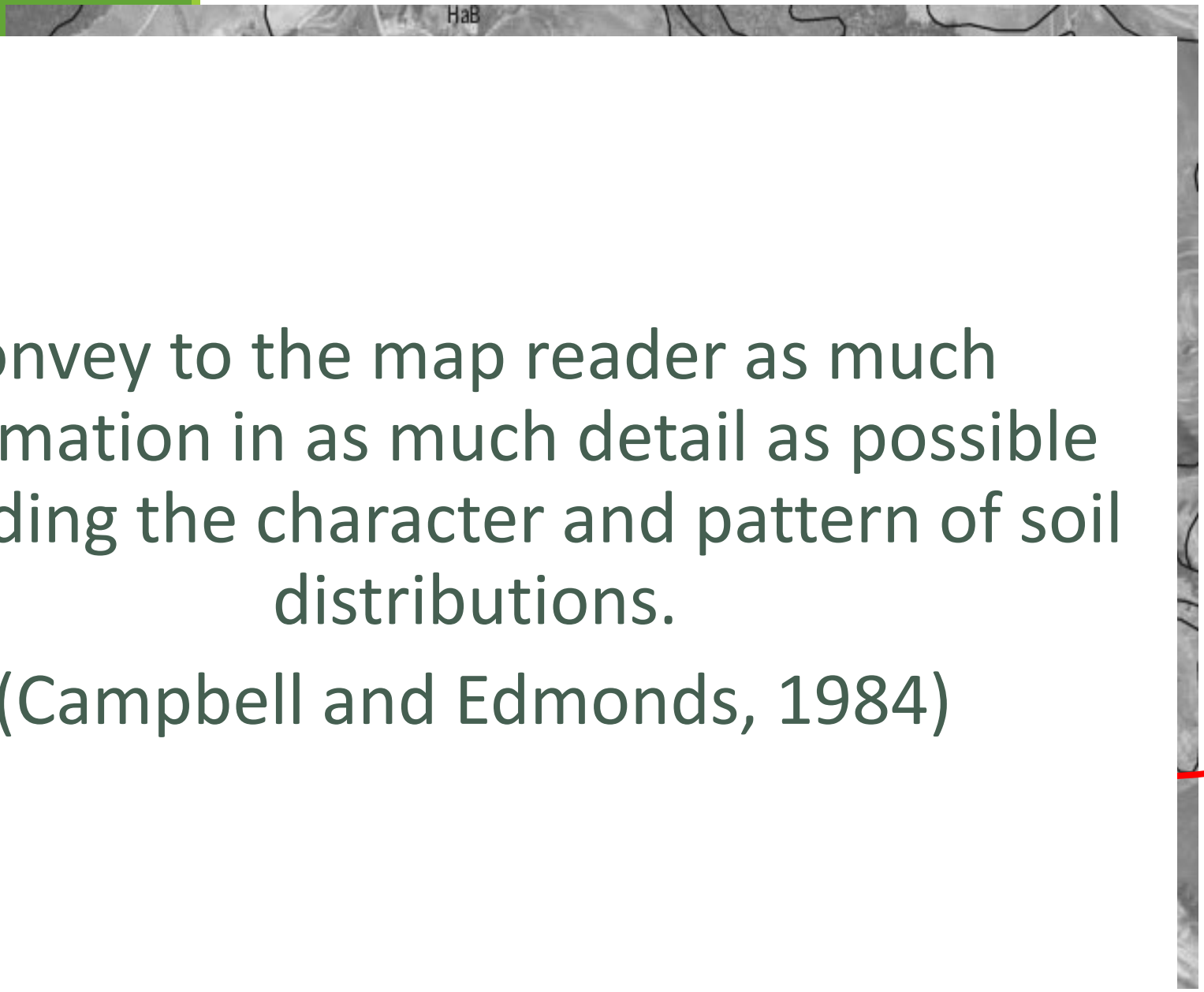




NRCS

“Reading” a Soil Map

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

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)

Slope Class	Symbol	%
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

Erosion Class	Symbol
None	
Slightly eroded	1
Moderately eroded	2
Severely eroded	3
Gullied	








IT'S HARD TO PUT NATURE INTO A DATABASE


HaB
CnA
ClC2
ClB2
HeB
HaB
ClC2
HaC
CeB
CeB
ClC2
CeB
ClC2
W
HaB
W
ClD2
W
CnA
SaB
HaB
ClC2
WyB2
ClB2
RnD2
SaB
W
ClC2
ClD2
HaB
nC2
ClB2
WyC2
WyB2
ClC2
HaB
HaB
W
ClC2
PaD2
ClC2
CeB
PaE2
RnD2
HaB
CeB

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

County or parish

Field sheet matchline & neatline

TRANSPORTATION

RAILROAD — Label only

ROAD EMBLEM & DESIGNATIONS

Interstate — 173 — 79 345

Federal — 287 — 410 224

State — 52 — 52 347

LOCATED OBJECTS

Cemetery

Church

HYDROGRAPHIC FEATURES

STREAMS

Unclassified stream

Drainage end (indicates direction of flow)

SOIL SURVEY FEATURES

SOIL DELINEATIONS AND SYMBOLS — ArC CaB

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


CgC3
CfB2
gC3
MdD3
CgC3
CdB
CgC3
CfB2
PdD
MdE3
CgC3
PdD

Limitations to Soil Mapping

- 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, $CaCO_3$, salts
  - Physical properties – clay content, structure, Ksat
  - Erosion factors – Kf, Kw
  - 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

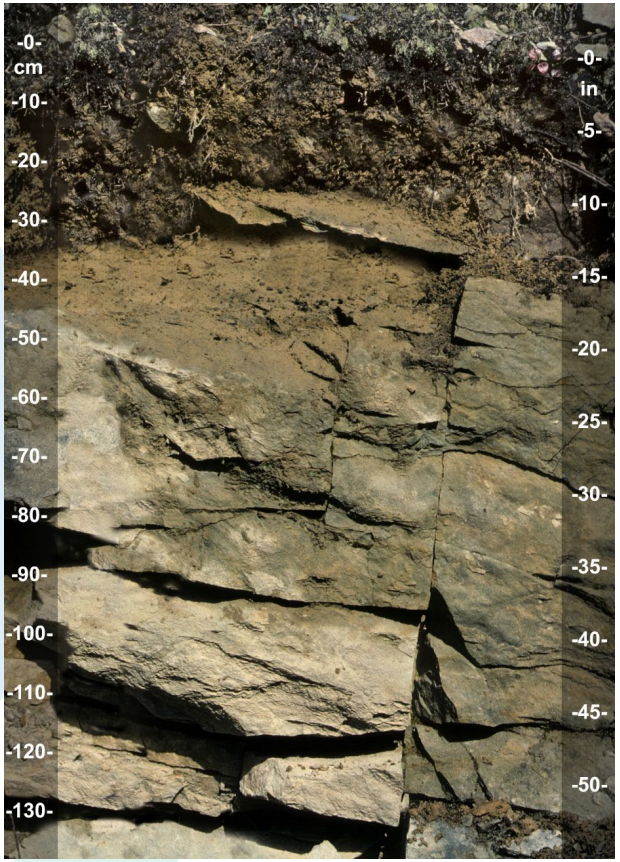
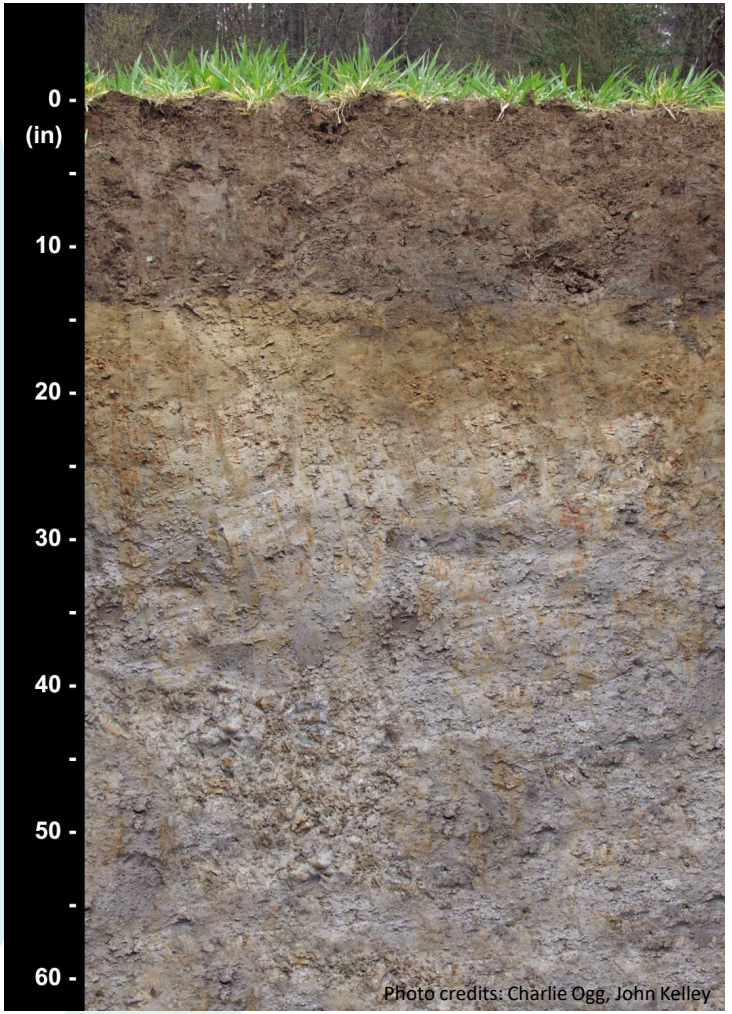


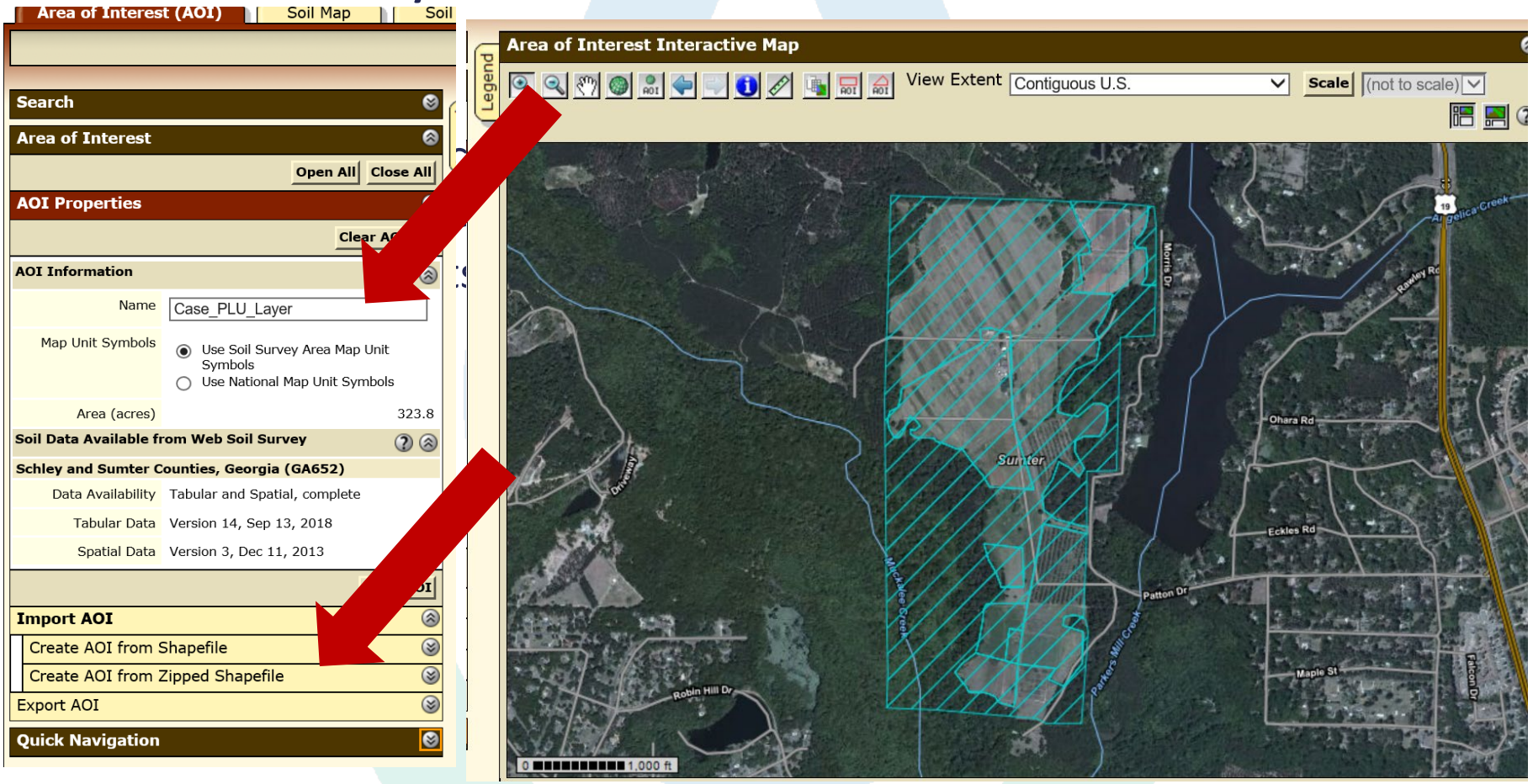
Photo credits: Chip Smith, John Kelley

Common Soil Properties

- Depth to water table
- Flooding and Ponding frequency



Web Soil Survey & Soil Data Viewer



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	
			Cu ft/ac/yr	
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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	Southern red oak	72	54.00	
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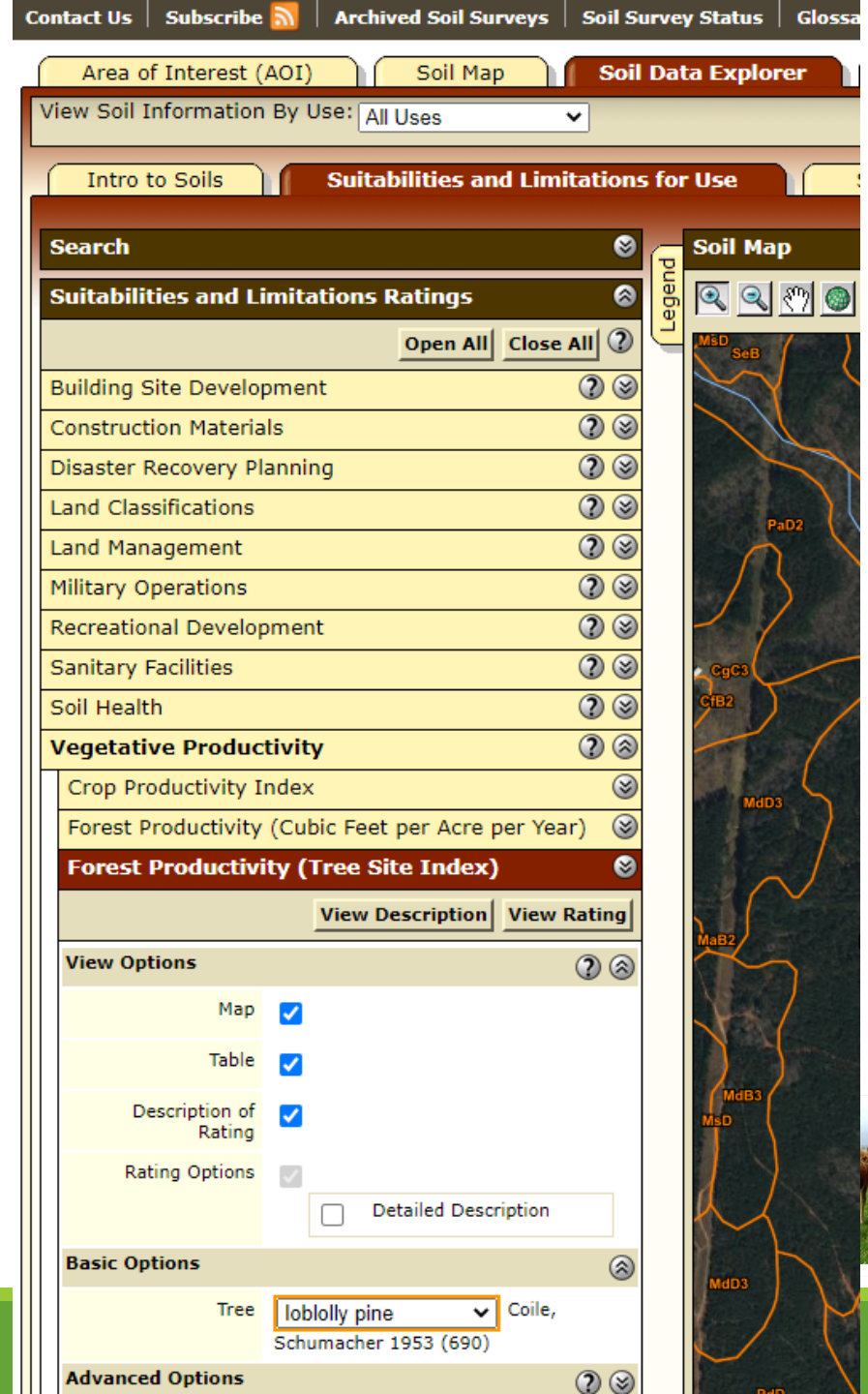


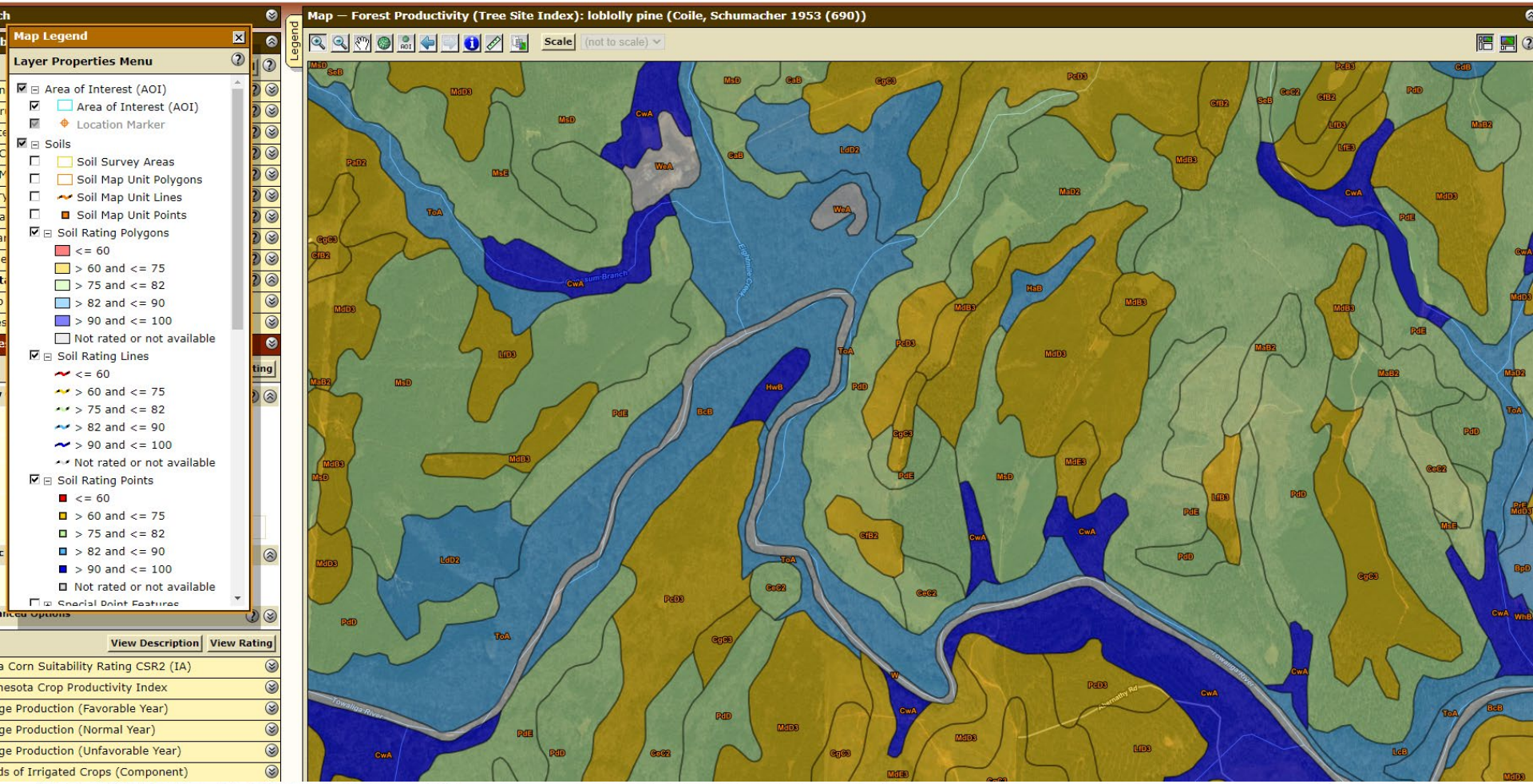
Forestland Productivity Information Under Suitabilities and Limitations Produce a map

Cubic Feet per acre per year growth

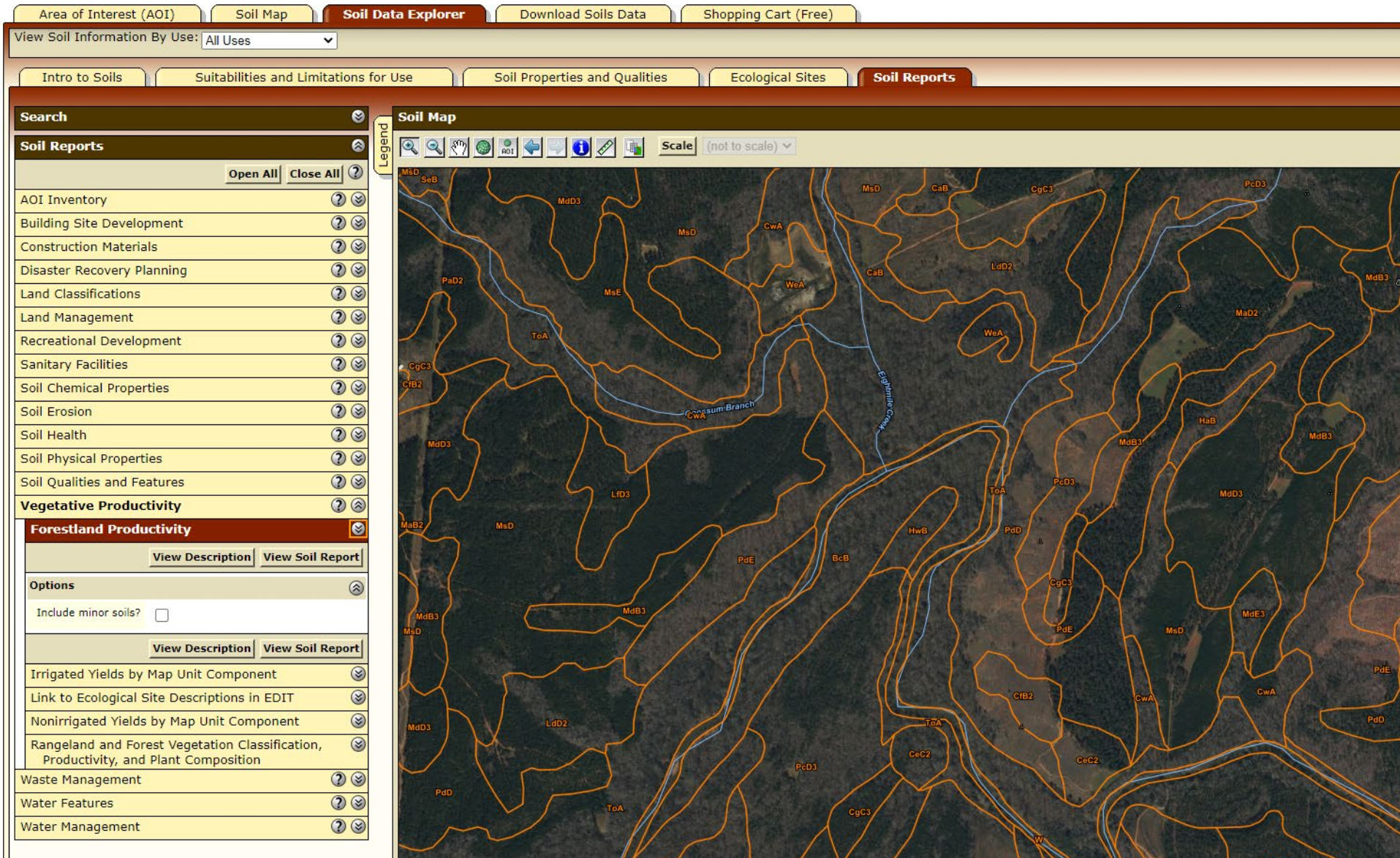
Site Index (most common)




Web Soil Survey Site Index Maps



Soil Reports tab



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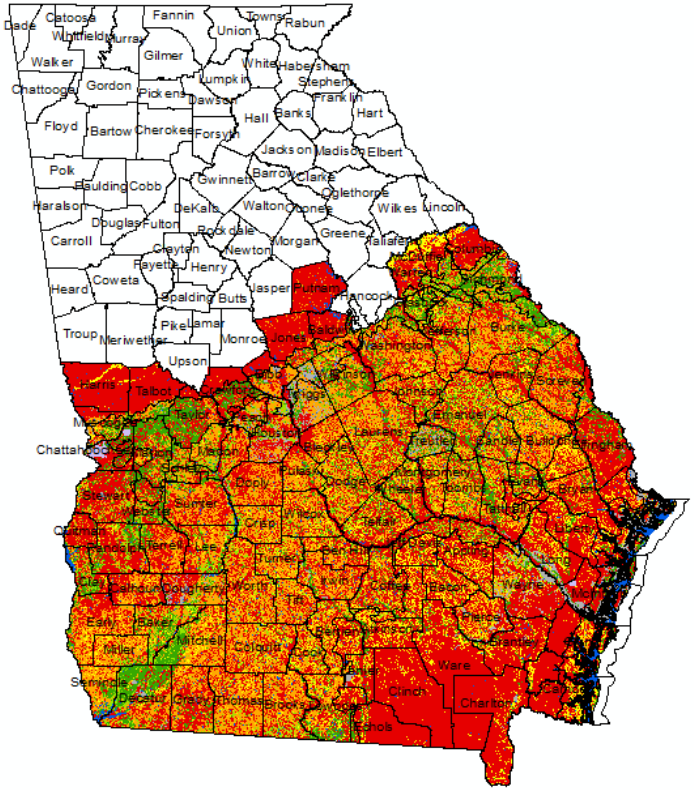

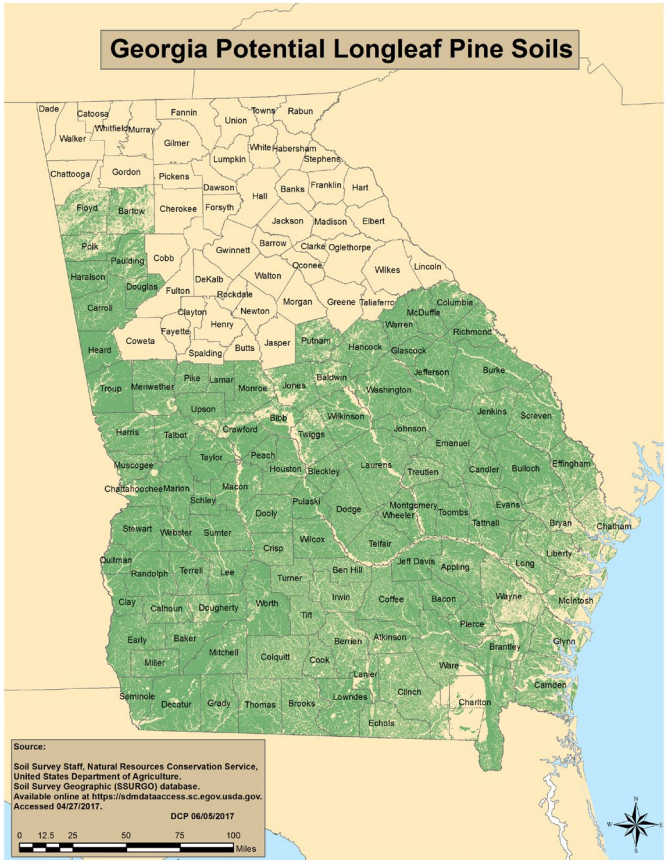

Habitat Interpretations

United States Department of Agriculture

Questions?

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