

Vegetation Succession Classes: Cherokee National Forest, north end

Short Mt. Cherokee NF

Part 1: S-class refresher
Part 2: Data used for
S-classing
Part 3: S-classing process
Part 4: Results and
examples

Part 1: Succession class - Refresher

LANDFIRE Biophysical Setting Model

Biophysical Setting 5713520

Southern Appalachian Montane Pine Forest and Woodland

General Information

Contributors

Modeler 1 Steve Croy
Modeler 2 Margit Bucher
Modeler 3 Sam Lindblom

Date 8/15/2007

Reviewer Wanda SanJule
Reviewer Charles Lafon

Vegetation Type

Forest and Woodland

Map Zone

57

Model Zone

S. Appalachians

Dominant Species

PIPU5 GAYLU
PIRU VACCI
QUPR2 QUIL
QUCO2

Geographic Range

Blue Ridge Mountains of TN, NC, and VA (including extreme northeast GA and northwest SC).
Mountains of the Ridge and Valley in VA and WV. Western extent is along the KY-VA border on Pine Mtn.

There may also be isolated examples occurring on ridges or monadnocks like Pine Mountain (MZ54 GA), Kings Mountain (MZ59 NC), Pilot Mountain and Hanging Rock in NC.

Biophysical Site Description

Occurs on xeric to dry sites at moderate to upper elevations between 1000-4000ft. Typically described as “ridgetop communities” this community occupies the driest and most fire-prone of sites. Sites are typically located on convex, south to west facets of steep spur ridges, narrow rocky crests, and cliff tops. They occur at elevations from below 300m (1,000 ft) to more than 1,200m (4,000 ft) on various substrates, but most commonly on acidic, sedimentary and metasedimentary substrates, e.g., sandstone, quartzite, and shale. A few stands occur on Piedmont monadnocks and foothills. Soils are very infertile, shallow, and droughty. Thick, poorly decomposed duff layers, along with dead wood and inflammable shrubs, contribute to a strongly fire-prone habitat.

Succession Classes

Succession classes are the equivalent of Vegetation Fuel Classes” as defined in the Interagency FRCC Guidebook (www.frcc.gov).

Class A 5%

Early Development 1 All Structure

Upper Layer Lifeform

Indicator Species* and Canopy Position

QURU	Upper
QUPR2	Upper
MAAC	Upper
CAAL27	Upper
BELE	Upper

Structure Data (for upper layer lifeform)		
	Min	Max
Cover	0%	70%
Height	Tree 0m	Tree 10m
Tree Size Class	Sapling > 4.5ft; <9” DBH	

Description

(Class age 0-19 yrs): Treefall gaps and small to medium patches 0-19 yrs in age with saplings and small trees up to 20 cm (8 in) DBH. Potential canopy species (oaks) are typically mixed with subcanopy and shrub species and herbs. Most oaks are coppice grown from previously established and fire killed individuals with some as seedlings from animal-buried acorns.

With time and periodic surface fire, Class A succeeds to Class C. We estimate that periodic surface fires may occur in this class every 15-25 years but that stand replacement fires would only occur every 300+ years.

Class B 5%

Mid Development 1 Closed

Upper Layer Lifeform

Indicator Species* and Canopy Position

QURU	Upper
QUPR2	Upper
MAAC	Upper
CAAL27	Upper
BELE	Upper

Structure Data (for upper layer lifeform)		
	Min	Max
Cover	71%	100%
Height	Tree 10m	Tree 25m
Tree Size Class	Medium 9-21” DBH	

Description

(Class age 20-79yrs): Mid-seral closed forest (canopy closure > 60%) with old treefall gaps with a closed canopy. Midstory well-developed; shrub/herbaceous cover > 35%; shade tolerant species in the understory.

Evaluation of BpS models, Oak Panel & Steve Croy

BpS number	5713520	5713170	5713150	NEW BpS	5713200	5713180
DESCRIPTIVE						
(A) Vegetation Succession Class , Early succession - All						
Dominant Species	PIRI, PIRU5 QUCO2, QUPR2	SCSC, KALA, GABA, VAPA4QUPR2	QUAL, QUVE, QUPR2, CADE12	QURU,QUPR2 MAAC, CAAL27 BELE, CADE12	QURU,QUPR2 BELE, ACPE	FAGR, LIRIO, ACSA3,BEAL2
Age in class (Min)	0	0	0	0	0	0
Age in class (Max)	15	19	19	19	10	9
Tree Size Class (Type)	sapling	n/a	sapling	sapling	seedling	sapling
Tree Size Class (DBH)	< 5"	n/a	< 5"	< 9"		< 5"
Percent Cover (Min)	51%	35%	40%	50%	0%	0%
Percent Cover (Max)	100%	100%	70%	70%	20%	100%
Tree Height (Min)	0m	0m	0m	0m	0m	0m
Tree Height (Max)	5m	1.1m	10m	13m	5m	5m
(B) Vegetation Succession Class, Mid succession – Closed						
Dominant Species	PIRI, PIRU5 QUCO2, QUPR2	QUPR2, QUVE, PIST, ACRU, KALA, GABA	QUPR2, QUVE,, PIST, ACRU	ACRU, LITU QURU,QUPR2 PIST, MAAC, ACPE	QURU,QUPR2 BELE, ACPE	LIRIO, BEAL2, ACSA3, FAGR
Age in class (Min)	16	20	20	20	11	10
Age in class (Max)	70	69	69	79	50	99
Tree Size Class (Type)	Medium	Sapling	Medium	Medium	Sapling	Pole
Tree Size Class (DBH)	9-21"	< 5"	9-21"	9-21"	< 5"	5-9"
Percent Cover (Min)	71%	60%	61%	61%	21%	71%
Percent Cover (Max)	100%	85%	100%	100%	60%	100%
Tree Height (Min)	5.1m	0m	10.1m	10m	0m	5.1m
Tree Height (Max)	10m	3m	25m	25m	5m	10m
(C) Vegetation Succession Class, Mid succession - Open						Late-Open
Tree Height (Max)	25m	25m	50m	35m		

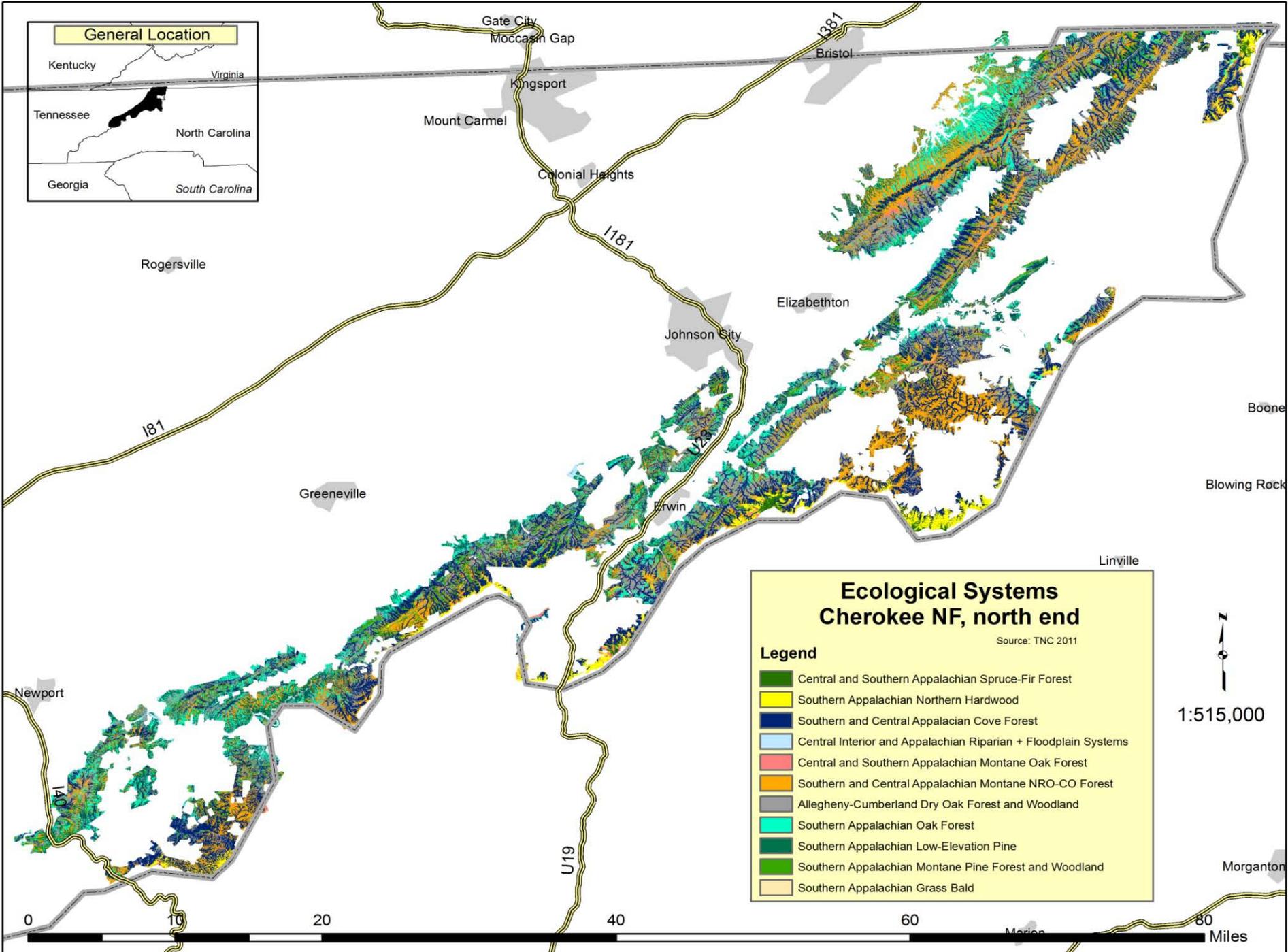
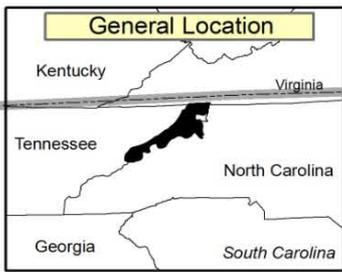
Part 2: Data used for S-classing

What is needed to identify forest succession classes

1. Map of vegetation that may have been dominant on the landscape prior to Euro-American settlement that developed under historical disturbance regimes.
2. Current vegetation type.
3. Current forest stand age.
4. Current forest stand canopy cover percent.

Sources of data used to identify succession classes

1. Ecological Systems derived from Ecological Zones
2. Forest types from Cherokee NF Continuous Inventory & Stand Condition data
3. [a] Forest stand age from Cherokee NF CISC data, [b] map of current early succession habitat created by fire (from USFS), and [c] map of old growth forest conditions (from SAHC)
4. Canopy cover modeled from satellite imagery (LANDFIRE data)

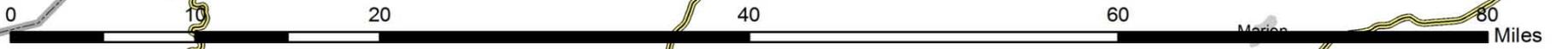


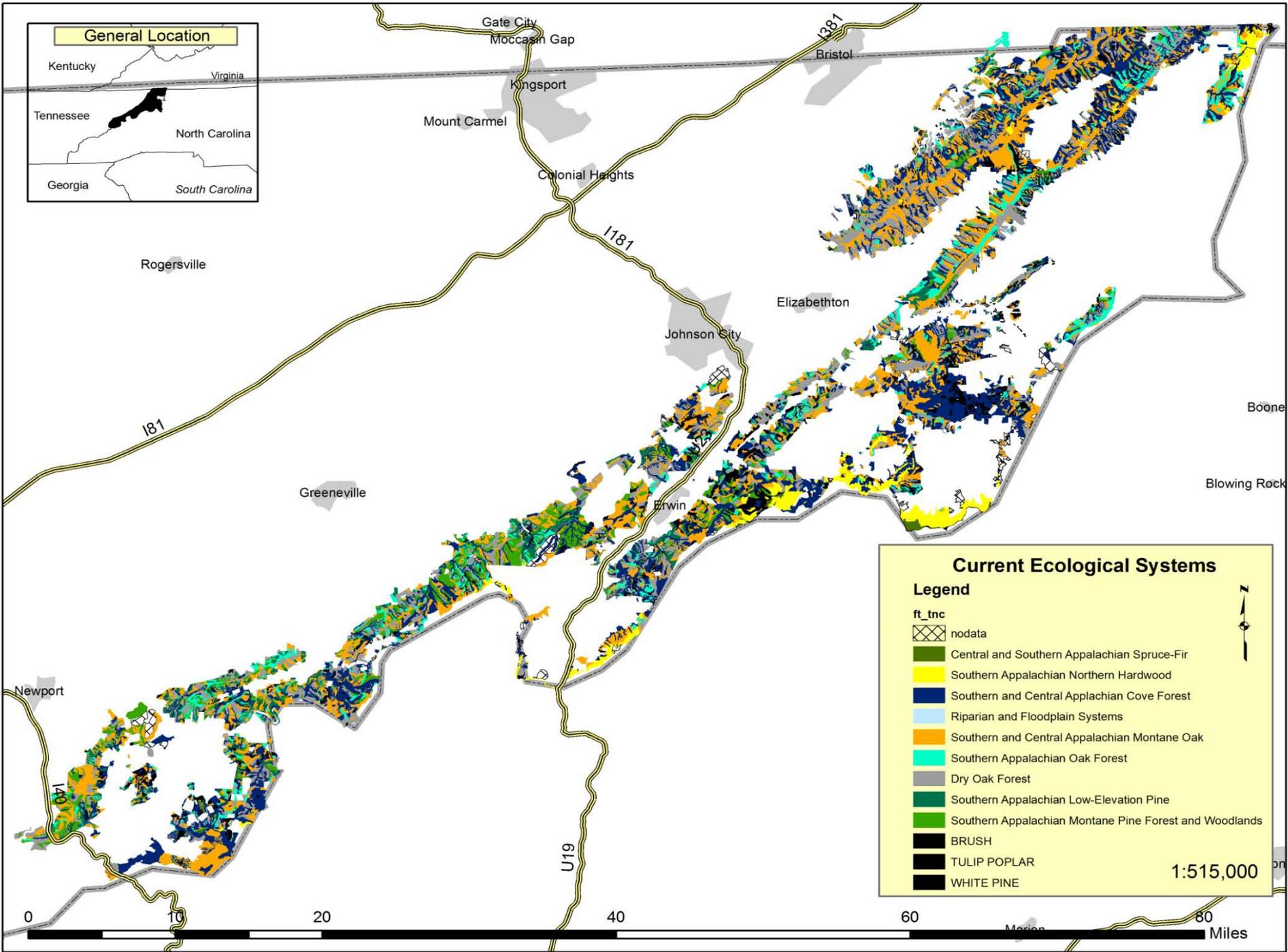
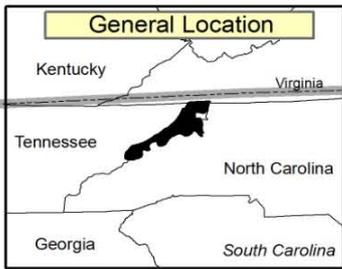
**Ecological Systems
Cherokee NF, north end**

Source: TNC 2011

Legend

- Central and Southern Appalachian Spruce-Fir Forest
- Southern Appalachian Northern Hardwood
- Southern and Central Appalachian Cove Forest
- Central Interior and Appalachian Riparian + Floodplain Systems
- Central and Southern Appalachian Montane Oak Forest
- Southern and Central Appalachian Montane NRO-CO Forest
- Allegheny-Cumberland Dry Oak Forest and Woodland
- Southern Appalachian Oak Forest
- Southern Appalachian Low-Elevation Pine
- Southern Appalachian Montane Pine Forest and Woodland
- Southern Appalachian Grass Bald



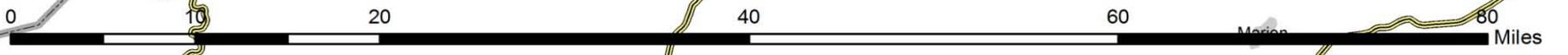


Current Ecological Systems

Legend

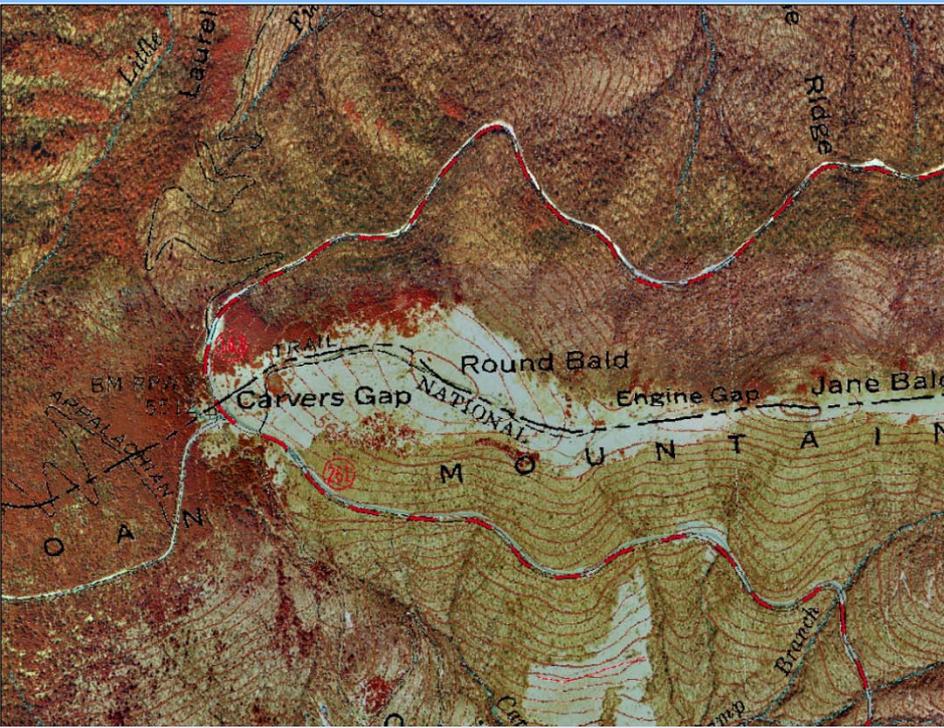
- ft_tnc
- nodata
- Central and Southern Appalachian Spruce-Fir
- Southern Appalachian Northern Hardwood
- Southern and Central Appalachian Cove Forest
- Riparian and Floodplain Systems
- Southern and Central Appalachian Montane Oak
- Southern Appalachian Oak Forest
- Dry Oak Forest
- Southern Appalachian Low-Elevation Pine
- Southern Appalachian Montane Pine Forest and Woodlands
- BRUSH
- TULIP POPLAR
- WHITE PINE

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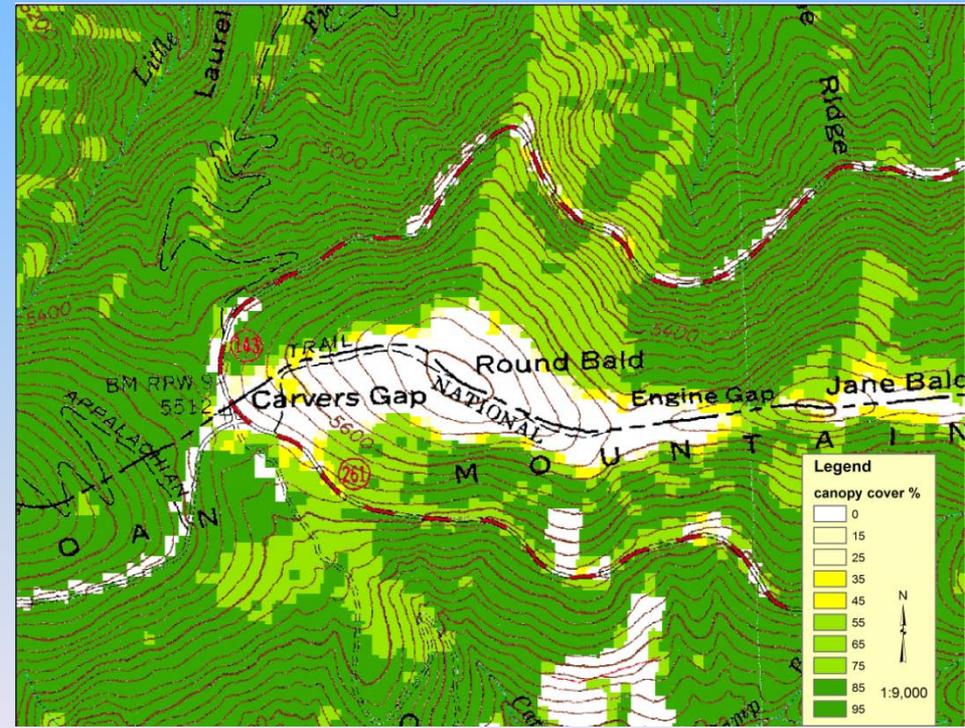


Canopy cover data used for S-classing: Roan Mountain

1998 color IR
leaf-on, 1:12,000

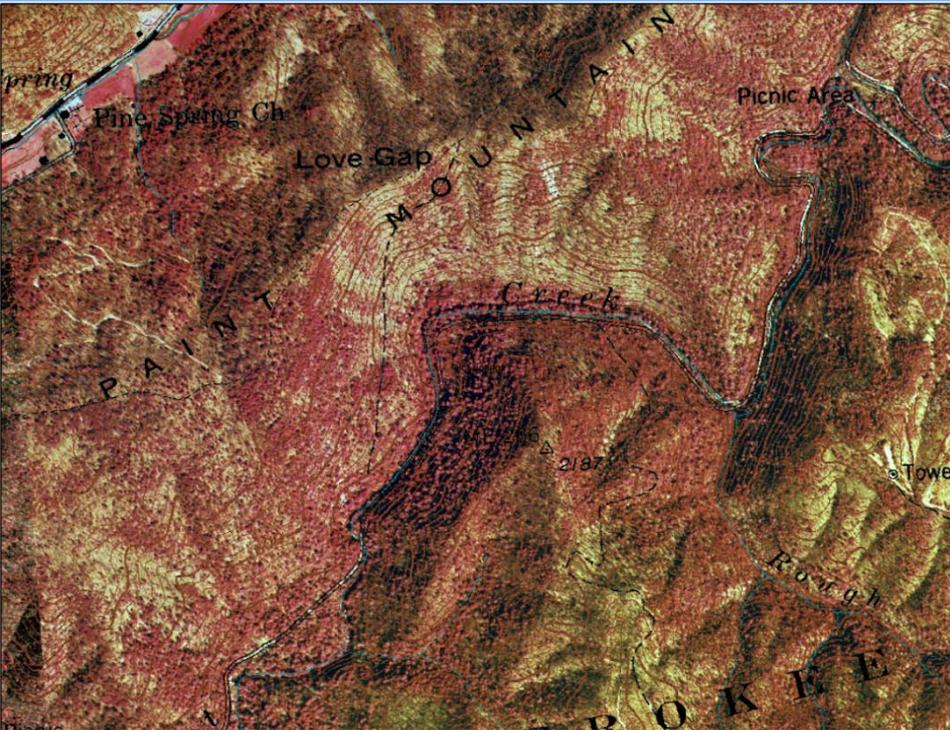


2001 satellite imagery
30 meter resolution
Canopy cover % classified

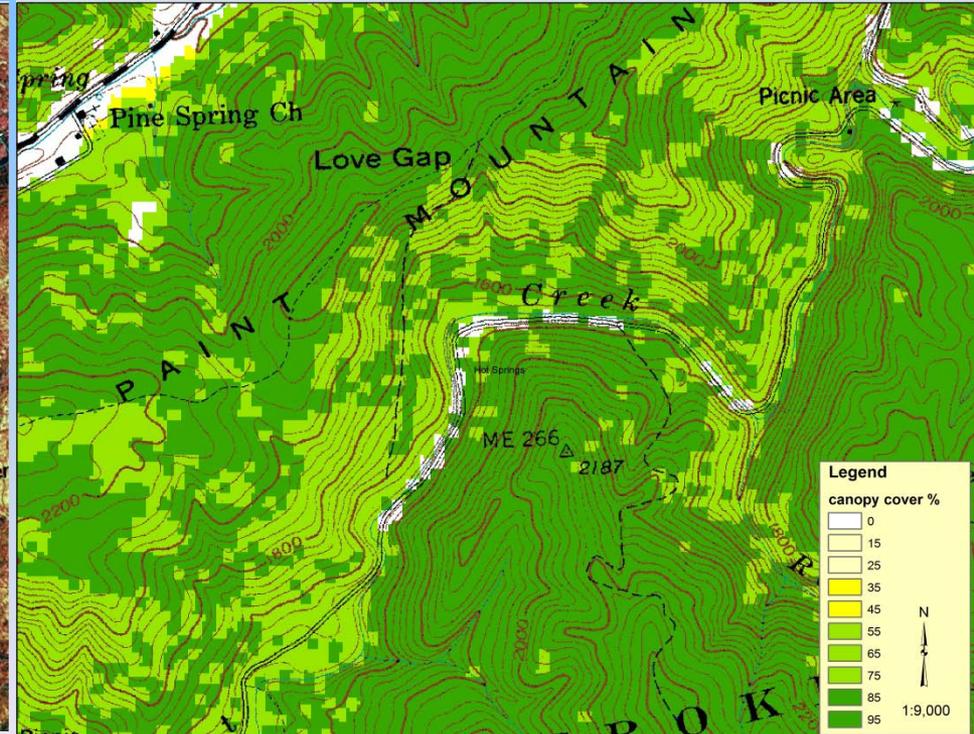


Canopy cover data used for S-classing: Paint Rock

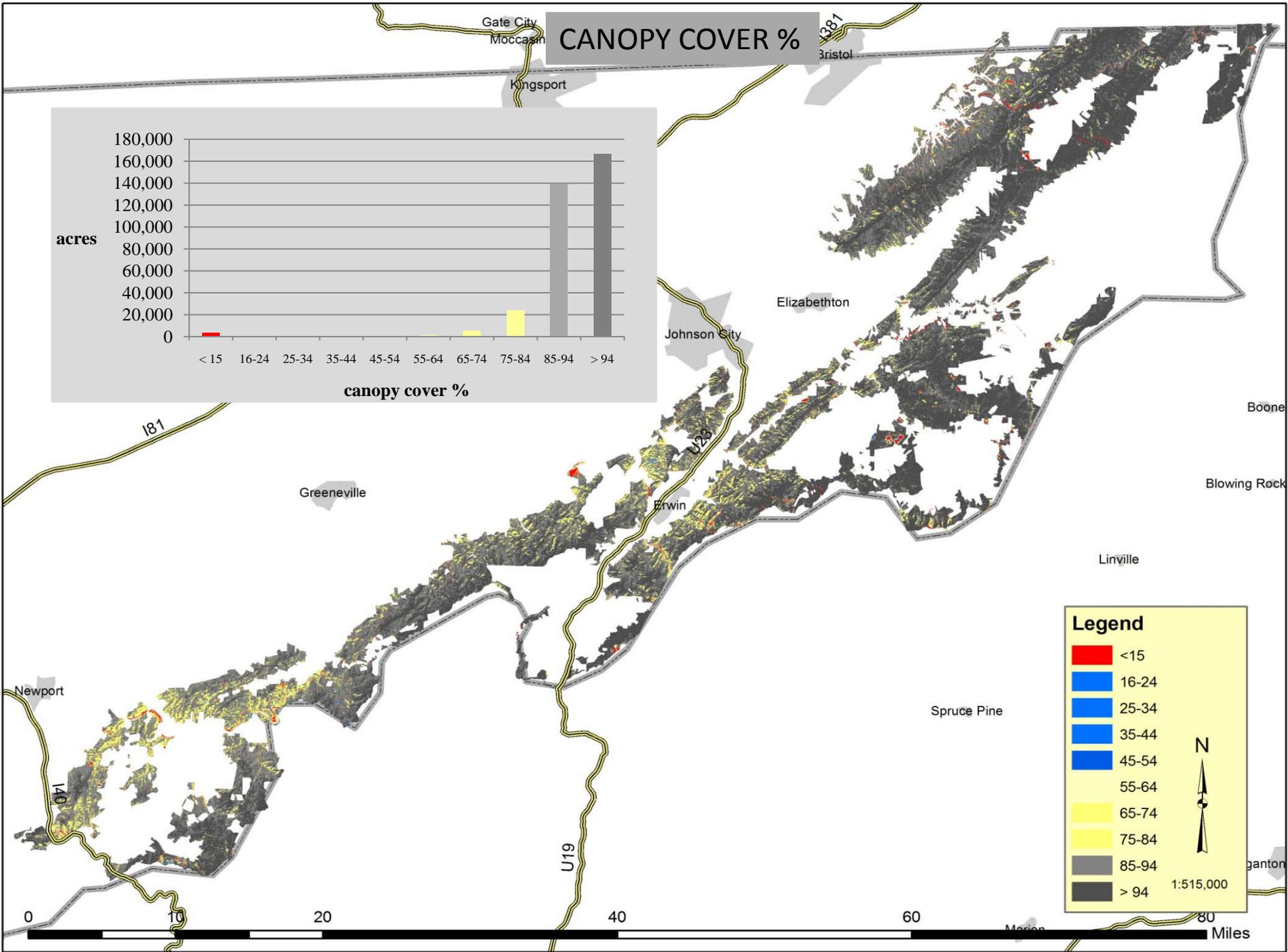
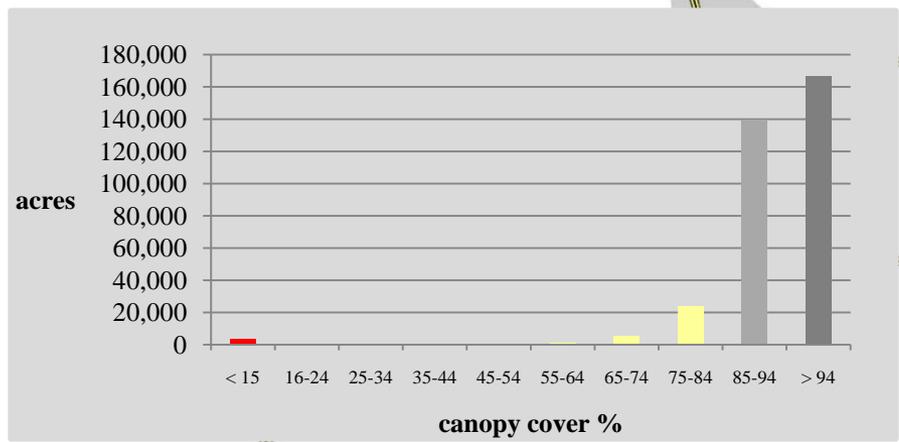
1998 color IR
leaf-on, 1:12,000



2001 satellite imagery
30 meter resolution
Canopy cover % classified



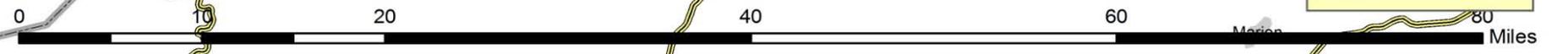
CANOPY COVER %



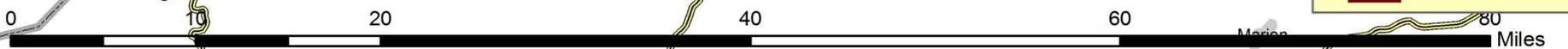
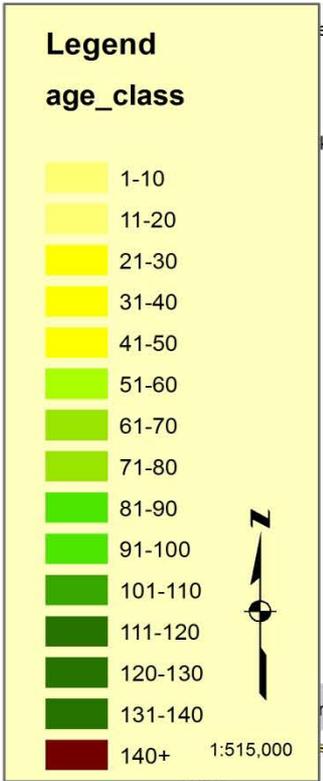
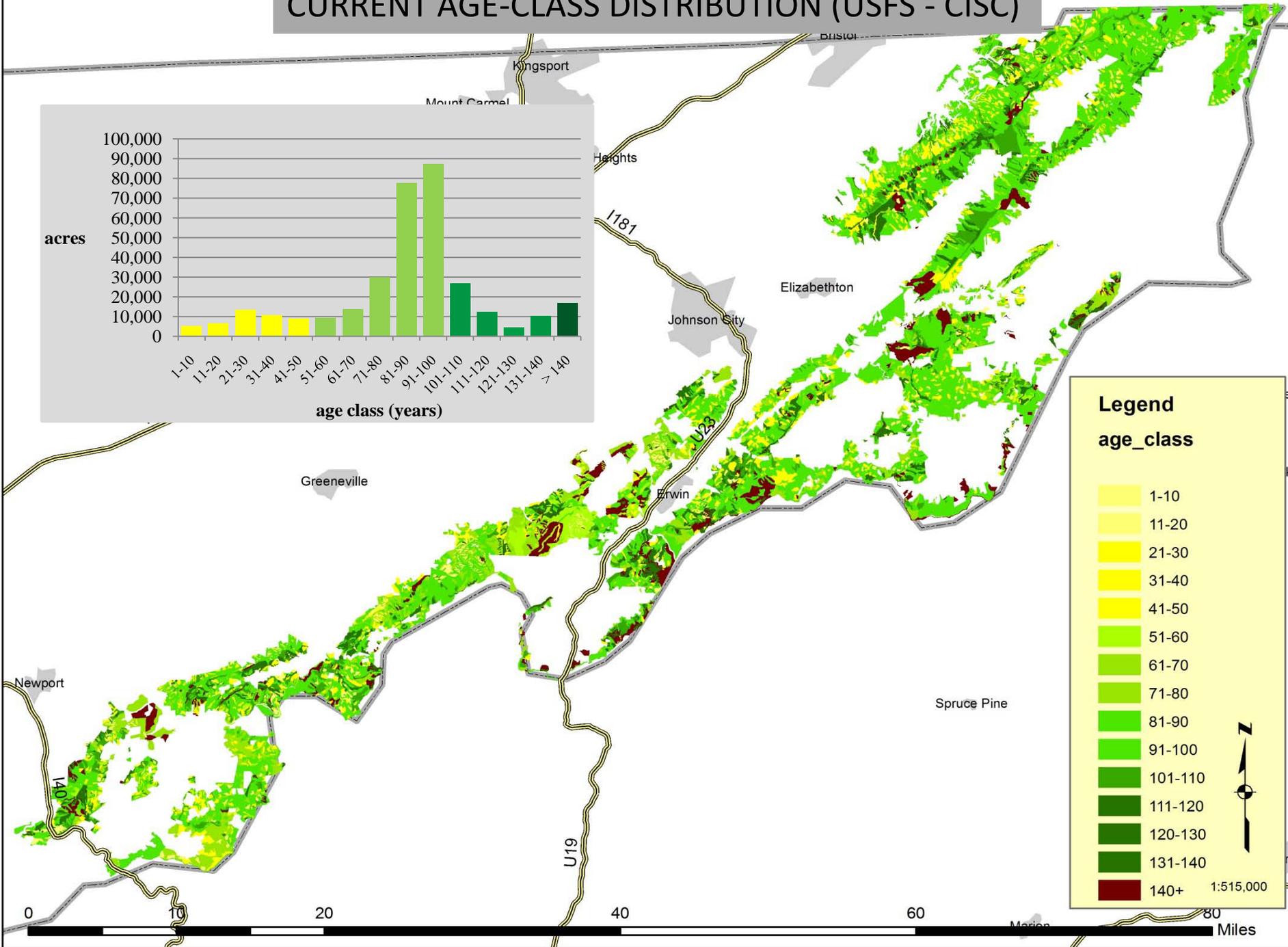
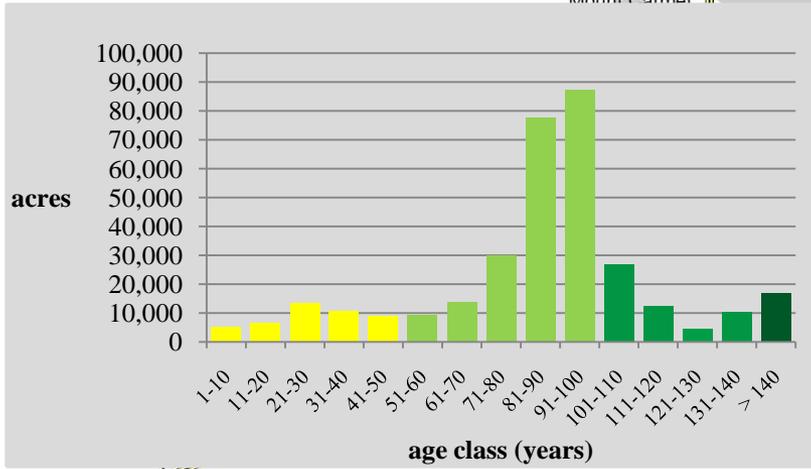
Legend

- <15
- 16-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65-74
- 75-84
- 85-94
- > 94

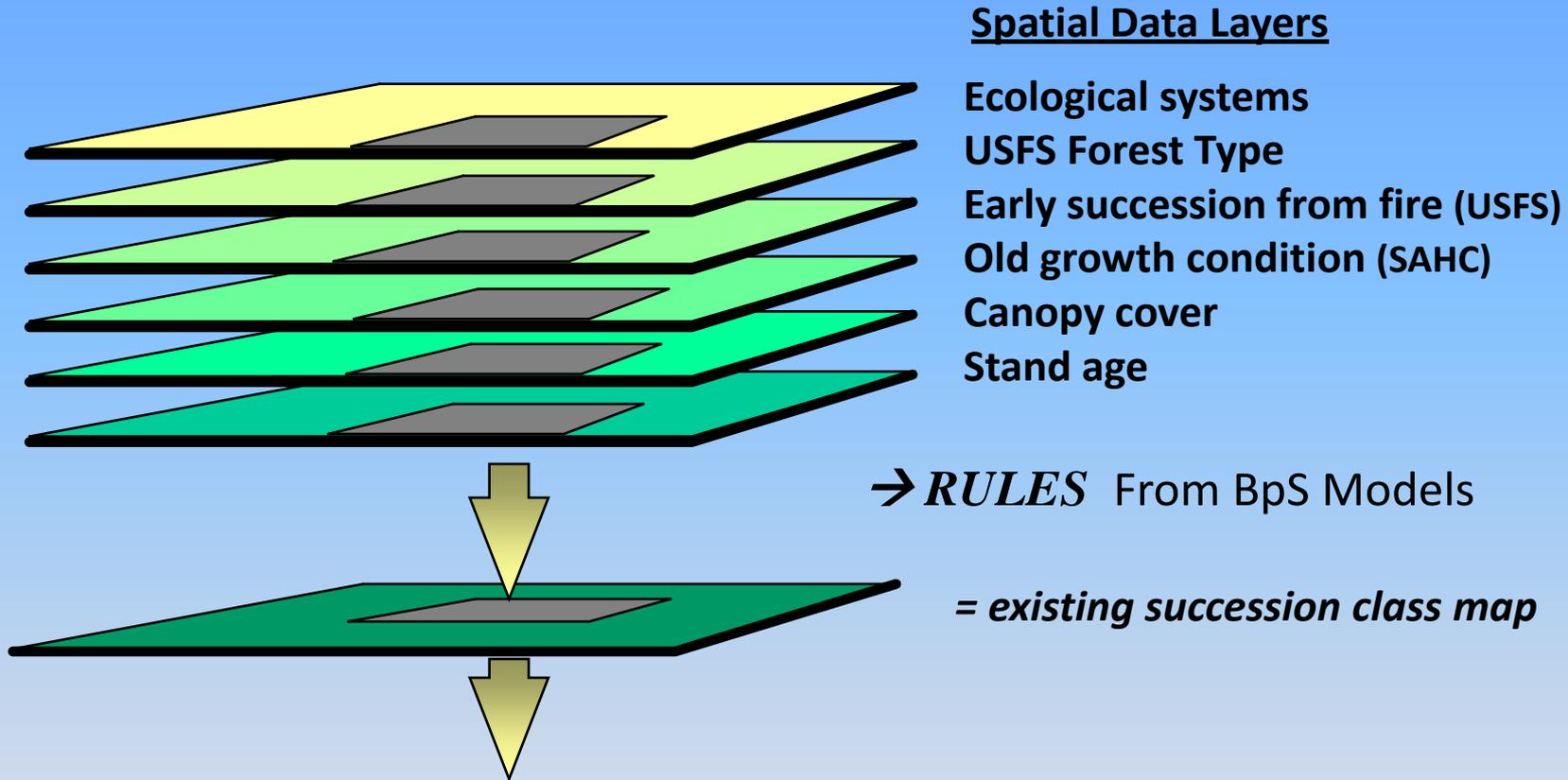
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CURRENT AGE-CLASS DISTRIBUTION (USFS - CISC)

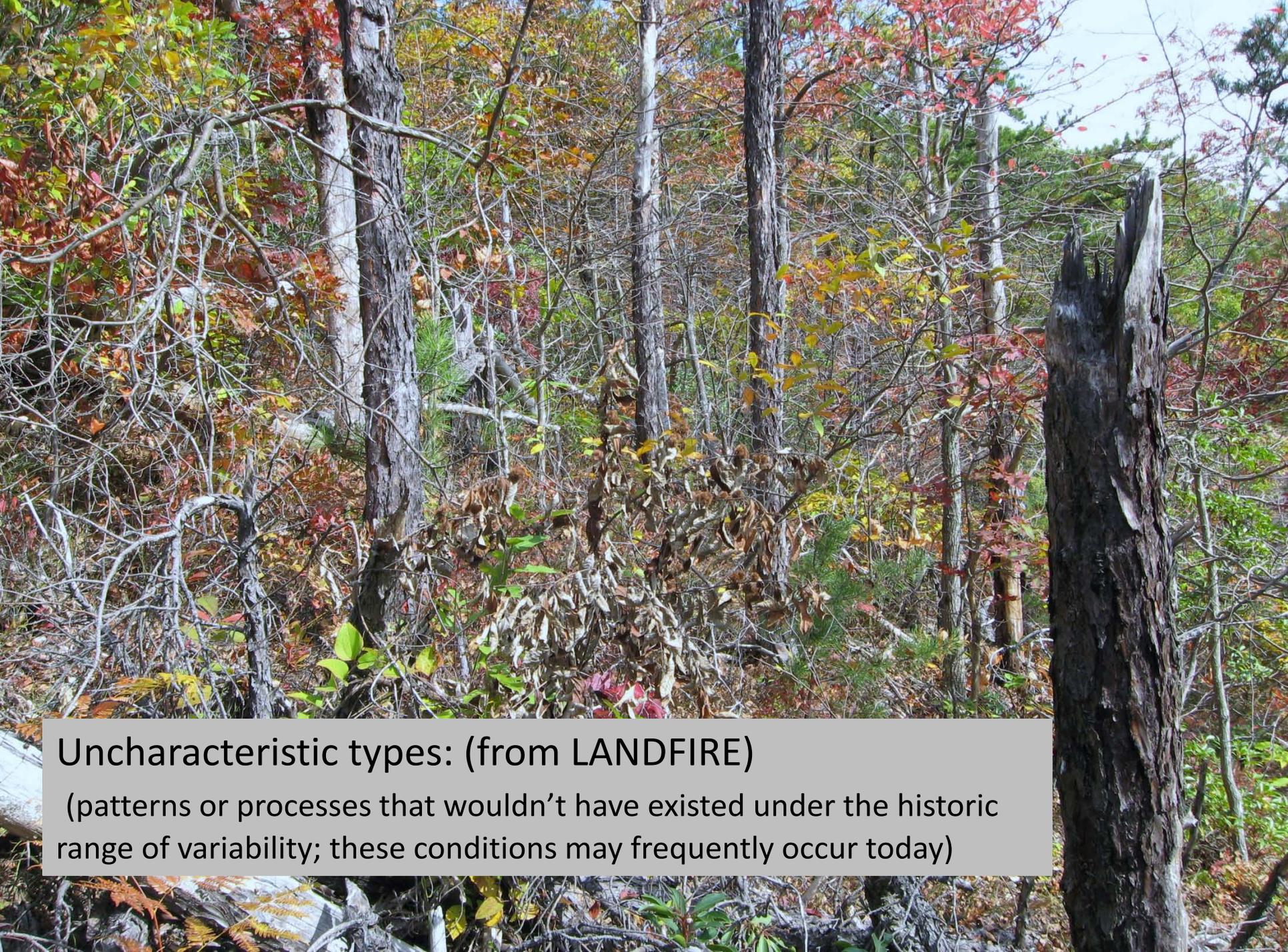


Part 3: Succession classing process



Cove Forest Class	----- S-classes -----						
	A	B	C	D	E	F	G
Acres in Class	637	75,545	823	14,907	-	-	5,794
Current % in Class	1	73	1	14	0	0	6
Dry Oak Forest							
Acres in Class	1,882	8,224	53	870	39,386	200	9,205
Current % in Class	3	12	0	1	60	0	14

= *existing S-class distribution*



Uncharacteristic types: (from LANDFIRE)

(patterns or processes that wouldn't have existed under the historic range of variability; these conditions may frequently occur today)

RULES1: use the following to identify “Uncharacteristic Vegetation” only where these conditions exist in polygons 3 acres or greater in size:

UN1 (U-WP): FT=3 (White Pine) and BpS not 16 or 18 (Montane Pine or Low Elevation Pine)

UN2 (U-YP): FT= 50 (Yellow Poplar) and BpS not 4 (Southern and Central Appalachian Cove Forest)

UN3 (U-BR): FT = 99 (Brush, kallat, rhodo) and BpS not 27 (Southern Appalachian Grass and Shrub Balds)

UN4 (U-OD): FT = 53 (White Oak-Red Oak-Hickory) or 56 (Yellow Poplar-White Oak-Red Oak) or 60 (Chestnut Oak-Scarlet Oak) or 52 (Chestnut Oak) or 59 (Scarlet Oak) or 55 (Northern Red Oak) or 54 (White Oak) and BpS = 16 (Southern Appalachian Low-Elevation Pine) or 18 (Southern Appalachian Montane Pine Forest and Woodland)

UN5 (U-PD): FT = 39 (Table Mt. Pine) or 38 (Pitch Pine) or 32 (Shortleaf Pine) and BpS = 8 (Montane Oak) or 9 (Red Oak-Chestnut Oak) or 13 (Southern Appalachian Oak) or 10 (Allegheny-Cumberland Dry Oak Forest and Woodland)

UN6 (U-SF) BpS = 1 (Southern Appalachian Spruce-Fir and FT not equal 7 (Red Spruce-Fraser Fir) or 17 (Red Spruce-Northern Hardwoods)

RULES2: use the following to identify “Characteristic Vegetation”

Biophysical Setting Model 5713090 (3.1% of the CNF)

BpS = Southern Appalachian Northern Hardwood Forest (2) and stand age < 25 years, *canopy n/a* = Class A

BpS = Southern Appalachian Northern Hardwood Forest (2) and stand age 25-75 years, *canopy n/a* = Class B

BpS = Southern Appalachian Northern Hardwood Forest (2) and stand age > 75 years and canopy cover > 80% = Class C

BpS = Southern Appalachian Northern Hardwood Forest (2) and stand age > 75 years and canopy cover < 81% = Class D

Comment: Class D canopy cover altered from 60% max to < 81% so rules are mutually exclusive

Biophysical Setting Model 5713150 (12.1 % of the CNF)

BpS = Southern Appalachian Oak (13) and stand age < 20 years, *canopy n/a* = Class A

BpS = Southern Appalachian Oak (13) and stand age 20-69 years and canopy cover > 60% = Class B

BpS = Southern Appalachian Oak (13) and stand age 20-69 years and canopy cover < 61% = Class C

BpS = Southern Appalachian Oak (13) and stand age 70-130 years and canopy cover < 81% = Class D

BpS = Southern Appalachian Oak (13) and stand age 70-130 years and canopy cover > 80% = Class E

BpS = Southern Appalachian Oak (13) and stand age > 130 years, and = canopy cover < 81% = Class F

BpS = Southern Appalachian Oak (13) and stand age > 130 years, and = canopy cover > 80% = Class G

Biophysical Setting Model 5713170 (19.3% of the CNF)

BpS = Allegheny-Cumberland Dry Oak Forest and Woodland (10) and stand age < 20 years, *canopy n/a* = Class A

BpS = Allegheny-Cumberland Dry Oak Forest and Woodland (10) and stand age 20-69 years and canopy cover > 59% = Class B

BpS = Allegheny-Cumberland Dry Oak Forest and Woodland (10) and stand age 20-69 years and canopy cover < 60% = Class C

BpS = Allegheny-Cumberland Dry Oak Forest and Woodland (10) and stand age 70-110 years and canopy cover < 66% = Class D

BpS = Allegheny-Cumberland Dry Oak Forest and Woodland (10) and stand age 70-110 years and canopy cover > 65% = Class E

BpS = Allegheny-Cumberland Dry Oak Forest and Woodland (10) and stand age > 110, and = canopy cover < 66% = Class F

BpS = Allegheny-Cumberland Dry Oak Forest and Woodland (10) and stand age > 110, and = canopy cover > 65% = Class G

Comment: Class C, D, E ages do not match the ‘summary’ table – because Steve Croy and I did not edit these; these changes are based upon my judgement and incorporate the regional oldgrowth guidance

Biophysical Setting Model 5713180 (29.6% of the CNF)

BpS = Southern and Central Appalachian Cove Forest (4) and stand age < 10 years, *canopy n/a* = Class A

BpS = Southern and Central Appalachian Cove Forest (4) and stand age 10-99 years, *canopy n/a* = Class B

BpS = Southern and Central Appalachian Cove Forest (4) and stand age 100-140 years and canopy cover < 81% = Class C

BpS = Southern and Central Appalachian Cove Forest (4) and stand age 100-140 years and canopy cover > 80% = Class D

BpS = Southern and Central Appalachian Cove Forest (4) and stand age > 140 years, *canopy n/a* = Class G

Comment: Class E and F not used

Biophysical Setting Model 5713200 and NEW BpS Model: Central Appalachian Red Oak-Chestnut Oak (20.8% of the CNF)

BpS = Southern and Central Appalachian Red Oak-Chestnut Oak (9) or Central and Southern Appalachian Montane Oak (8) and:

stand age < 20 years, *canopy n/a* = Class A

stand age 20-79 years and canopy cover > 60% = Class B

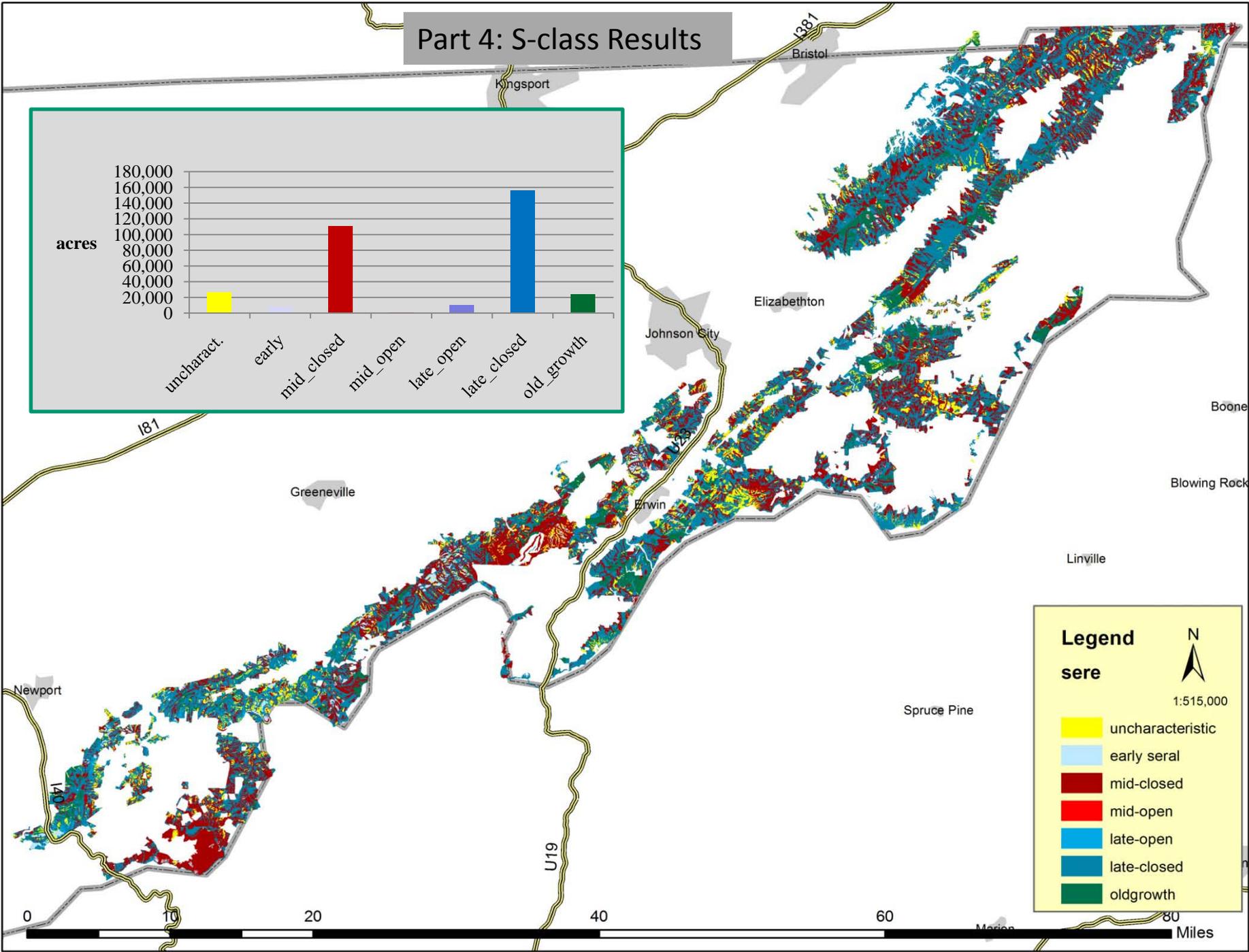
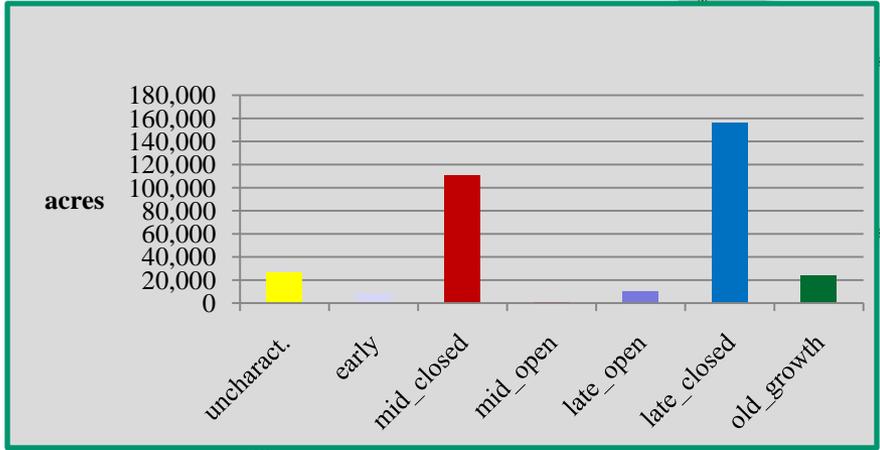
stand age 20-79 years and canopy cover < 61% = Class C

stand age 80-130 years and canopy cover < 81% = Class D

stand age 80-130 years and canopy cover > 80% = Class E

stand age > 130 years, and canopy cover < 81% = Class F

Part 4: S-class Results



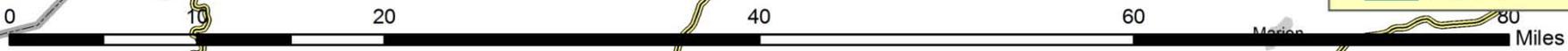
Legend

sere

- uncharacteristic
- early seral
- mid-closed
- mid-open
- late-open
- late-closed
- oldgrowth

N

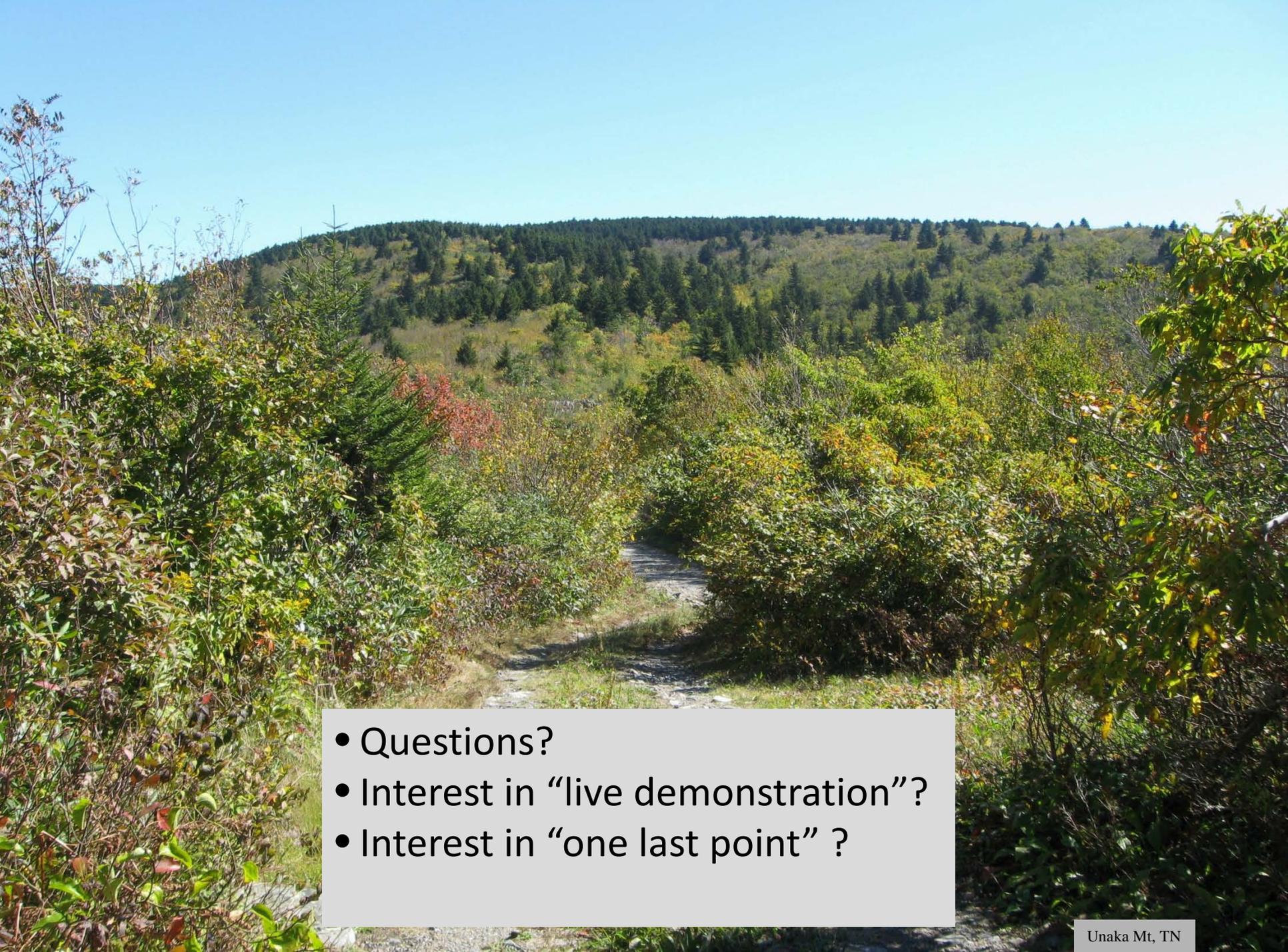
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S-class distribution on the Cherokee NF, north end

Cove Forest Class	----- S-classes -----							----- Uncharacteristic vegetation classes ----- ^{1/}						^{2/}	Total
	A	B	C	D	E	F	G	U-WP	U-YP	U-BR	U-OD	U-PD	U-SF	Data?	
Acres in Class	637	75,545	823	14,907	-	-	5,794	2,026	-	387	-	-	-	2,858	102,977
Current % in Class	1	73	1	14	0	0	6	2	0	0	0	0	0	3	30% of all ac.
Dry Oak Forest															
Acres in Class	1,882	8,224	53	870	39,386	200	9,205	1,834	898	29	-	2,204	-	1,096	65,881
Current % in Class	3	12	0	1	60	0	14	3	1	0	0	3	0	2	19% of all ac.
Dry-Mesic Oak Forest															
Acres in Class	1,234	6,955	74	3,511	23,393	335	2,178	1,319	166	4	-	974	-	623	40,766
Current % in Class	3	17	0	9	57	1	5	3	0	0	0	2	0	1	12% of all ac.
Low-Elevation Pine Forest															
Acres in Class	564	1,042	22	1,096	13,032	-	-	-	70	-	7,379	-	-	607	23,812
Current % in Class	2	4	0	5	55	0	0	0	0	0	31	0	0	2	7% of all ac.
Montane Pine Forest & Woodland															
Acres in Class	1,281	2,839	181	631	12,028	-	-	-	67	57	4,314	-	-	439	21,837
Current % in Class	6	13	1	3	55	0	0	0	0	0	20	0	0	1	6% of all ac.
Montane Red-Chestnut Oak Forest															
Acres in Class	2,018	14,559	107	2,285	42,864	309	5,716	963	1,153	179	-	610	-	1,084	71,847
Current % in Class	3	20	0	3	60	0	8	1	2	0	0	1	0	1	21% of all ac.
Northern Hardwood Forest															
Acres in Class	211	1,443	9,265	493	-	-	-	10	-	34	-	-	-	183	11,639
Current % in Class	2	12	80	4	0	0	0	0	0	0	0	0	0	0	3% of all ac.
Riparian & Floodplain Systems															
Acres in Class	83	314	48	375	1,324	-	-	45	-	-	-	-	-	359	2,548
Current % in Class	3	12	2	15	52	0	0	2	0	0	0	0	0	9	1% of all ac.
Spruce-Fir Forest															
Acres in Class	0	55	2	346	-	-	-	-	-	259	-	-	1,431	143	2,236
Current % in Class	0	2	0	15	0	0	0	0	0	12	0	0	64	5	1% of all ac.
TOTALS								6,197	2,354	949	11,693	3,788	1,431	7,392	343,684

^{1/} U-WP = White Pine, U-YP = Yellow Poplar, U-BR = Brush, U-OD = Oak dominated, U-PD = Pine dominated, U-SF = Hardwood dominated ^{2/} No forest type or no forest type and no age

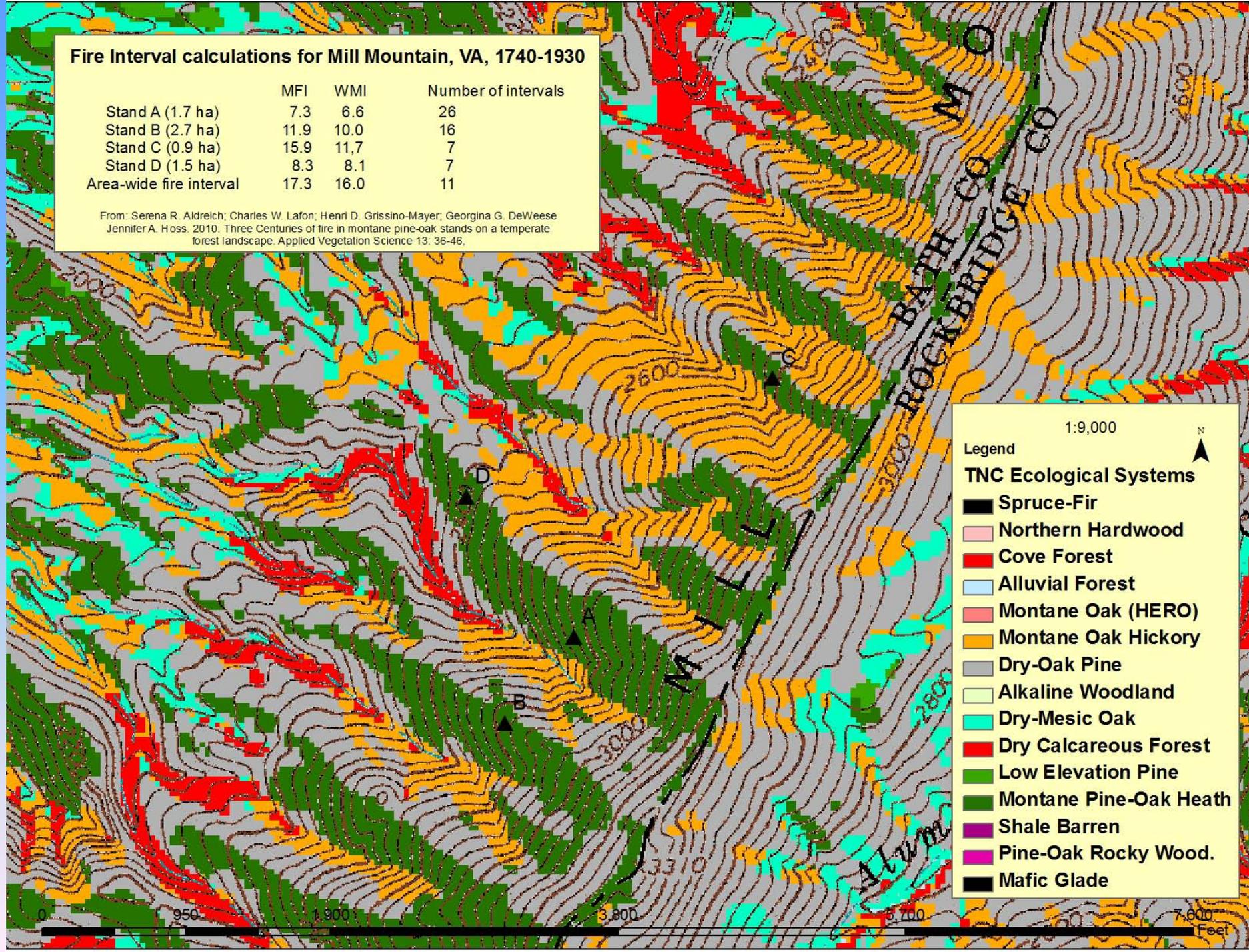


- Questions?
- Interest in “live demonstration”?
- Interest in “one last point” ?

Fire Interval calculations for Mill Mountain, VA, 1740-1930

	MFI	WMI	Number of intervals
Stand A (1.7 ha)	7.3	6.6	26
Stand B (2.7 ha)	11.9	10.0	16
Stand C (0.9 ha)	15.9	11.7	7
Stand D (1.5 ha)	8.3	8.1	7
Area-wide fire interval	17.3	16.0	11

From: Serena R. Aldreich; Charles W. Lafon; Henri D. Grissino-Mayer; Georgina G. DeWeese
 Jennifer A. Hoss. 2010. Three Centuries of fire in montane pine-oak stands on a temperate
 forest landscape. *Applied Vegetation Science* 13: 36-46.



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Legend

TNC Ecological Systems

- Spruce-Fir
- Northern Hardwood
- Cove Forest
- Alluvial Forest
- Montane Oak (HERO)
- Montane Oak Hickory
- Dry-Oak Pine
- Alkaline Woodland
- Dry-Mesic Oak
- Dry Calcareous Forest
- Low Elevation Pine
- Montane Pine-Oak Heath
- Shale Barren
- Pine-Oak Rocky Wood.
- Mafic Glade



Slide from Steve Croy