# Rapid Assessment Reference Condition Model

*The Rapid Assessment is a component of the LANDFIRE project. Reference condition models for the Rapid Assessment were created through a series of expert workshops and a peer-review process in 2004 and 2005. For more information, please visit www.landfire.gov. Please direct questions to helpdesk@landfire.gov.*

## Potential Natural Vegetation Group (PNVG)

**R8PIECap** **Appalachian Shortleaf Pine**

## General Information

**Contributors** *(additional contributors may be listed under "Model Evolution and Comments")*


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**Vegetation Type**

Woodland

**Dominant Species***

PIEC2 SCHIZ
QUCO
CAAL
COFL2

**General Model Sources**

- [x] Literature
- [ ] Local Data
- [x] Expert Estimate

**LANDFIRE Mapping Zones**

57 53
48 54
47 59

**Rapid AssessmentModel Zones**

- [ ] California
- [ ] Great Basin
- [ ] Great Lakes
- [ ] Northeast
- [ ] Northern Plains
- [ ] N-Cent.Rockies
- [ ] Pacific Northwest
- [ ] South Central
- [ ] Southeast
- [x] S. Appalachians
- [ ] Southwest

### Geographic Range

Widely distributed throughout the Southern Appalachians, Piedmont, Cumberlands as well as in the Interior Highlands and Coastal Plains. Generally at lower elevations (<3000 feet).

### Biophysical Site Description

Found on a wide range of topographic positions but generally more gentle terrain. Generally dry, but not xeric sites. Often found on deeper sandy soils.

### Vegetation Description

Shortleaf Pine woodlands can have a rich herbaceous understory. Some woody species particularly oaks and hickory with arborescent species such as dogwood and sourwood also present. With altered fire regimes, Mountain Laurel and less fire-adapted woody tree species such red maple and American Beech may be present. Shortleaf seed is very small, with very limited seed energy to establish roots in mineral soil and develop a top capable of photosynthesis before seed energy is expended. In addition, it is very shade intolerant and is easily suppressed in height growth with overhead shade in as little as one growing season.

### Disturbance Description

Strongly fire-adapted. Mean fire-return intervals ranging from 3 to 10 years. Fire is the natural mechanism to prepare a seedbed and control woody species competition. Unlike white pine or Virginia pine, shortleaf re-sprouts if top-killed and is therefore capable of a gradual buildup of regeneration in a frequent fire regime. Other disturbance dynamics include weather (wind) and insects and disease. A very stable community under natural fire regimes. Shortleaf is susceptible to mortality caused by; southern pine beetle (SPB), lightning strike followed by black turpentine beetle, Ips beetle, littleleaf disease, and storm events. SPB and blowdowns remove the canopy over extensive areas providing the conditions needed for natural regeneration and thereby ecosystem sustainability, provided there has been a frequent light fire regime. Non-fire disturbances that can result in stand replacement include mortality from insects, disease (biotic) and wind-weather related events (abiotic) e.g., windstorm and ice. In the absence of periodic fire, dense

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regeneration leads to overcrowded stands more likely predisposed to insects, particularly southern pine beetle (SPB) epidemics. Larger patches or regeneration 5 to 500 acres in size can occur in association with SPB outbreaks in the Southern Appalachians. Other bark beetles also attack these species but produce smaller patches (usually less that an acre) of mortality.

### Adjacency or Identification Concerns

This PNVG is a part of NatureServe (2005) Ecological System CES202.332 Southern Interior Low Mountain Pine Forest. However, it is separated from Virginia pine in regard to the role of fire (Shortleaf Pine is strongly influenced by periodic low-intensity fire). It sometimes overlaps with NatureServe (2005) Ecological System CES202.331 Southern Appalachian Montane Pine Forest and Woodland (more often with Pitch Pine than with Table-Mountain Pine). Usually Shortleaf Pine is found at lower elevations, on more fertile soils and less extreme topography.

### Scale Description

**Sources of Scale Data** ☐ Literature ☐ Local Data ☑ Expert Estimate

Generally large patch. In woodland conditions, some smaller openings or regeneration will form following canopy disturbances.

### Issues/Problems

Forest health problems (Southern Pine Bark Beetle epidemic conditions) coupled with altered fire regimes over time have greatly reduced the abundance of this community in its historic range.

### Model Evolution and Comments

Based on the quality control process, mixed severity fire was added to Class C and Class D as a maintenance disturbance with a probability of 0.007. This created little change to resulting percent in each vegetation class, but did reduce the FRI to about 150 years.

Peer review results: wove reviewer comments into Vegetation Description and Disturbance Description. There is some redundancy, but often the context is slightly different. These descriptions may need to be streamlined during the LANDFIRE modeling process.

## *Succession Classes***

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

### *Class A* 10 %

Early1 All Struct

**Description**

Pine and oak reproduction up to 15 feet in height. Other woody and herbaceous species can include hickories, flowering dogwood, mountain laurel, blackberry and huckleberry and grasses.

**Dominant Species* and Canopy Position**

PIEC2 Upper
QUCO2 Mid-Upper
COFL2 Low-Mid
CAAL2 Mid-Upper

**Upper Layer Lifeform**

☐ Herbaceous
☐ Shrub
☑ Tree

**Fuel Model** 9

**Structure Data (for upper layer lifeform)**

| | Min | Max |
|---|---|---|
| *Cover* | 1 % | 10 % |
| *Height* | Shrub Tall >3.0 m | Tree Regen <5m |
| *Tree Size Class* | Sapling >4.5ft; <5"DBH | |

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

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### *Class B* 10 %

Mid1 Closed

**Description**

Canopy closure excludes most herbaceous ground cover. Galax, pipsiewa can be present. Overstory components can include oaks and hickories.

**Dominant Species* and Canopy Position**

PIEC2 Upper
QUCO2 Mid-Upper
COFL2 Low-Mid
CAAL2

**Upper Layer Lifeform**

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

**Fuel Model** 9

**Structure Data (for upper layer lifeform)**

| | Min | Max |
|---|---|---|
| *Cover* | 50 % | 100 % |
| *Height* | Tree Regen <5m | Tree Short 5-9m |
| *Tree Size Class* | Pole 5-9" DBH | |

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

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### *Class C* 30 %

Mid1 Open

**Description**

Canopies are relatively open with a grassy understory and/or other fire-adapted herbaceous vegetation. Pine dominates overstory but may also have oak and hickory.

**Dominant Species* and Canopy Position**

PIEC2
QUCO2
CAAL2
SCHIZ4

**Upper Layer Lifeform**

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

**Fuel Model** 9

**Structure Data (for upper layer lifeform)**

| | Min | Max |
|---|---|---|
| *Cover* | 25 % | 50 % |
| *Height* | Tree Regen <5m | Tree Short 5-9m |
| *Tree Size Class* | Pole 5-9" DBH | |

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

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### *Class D* 40 %

Late1 Open

**Description**

Open park-like stand with grassy understories. Rich herbaceous understory with a limited amounts of woody midstory and understory (huckleberry, dogwood, oak, hickory).

**Dominant Species* and Canopy Position**

PIEC2 Upper
QUCO2 Mid-Upper
CAAL2 Middle
SCHIZ4 Lower

**Upper Layer Lifeform**

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

**Fuel Model** 9

**Structure Data (for upper layer lifeform)**

| | Min | Max |
|---|---|---|
| *Cover* | 25 % | 70 % |
| *Height* | Tree Short 5-9m | Tree Medium 10-24m |
| *Tree Size Class* | Medium 9-21"DBH | |

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

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### *Class E* 10 %

Late1 Closed

**Description**

Canopy closure with overstory tree crowns often touching each other. Overstory contains varying amounts of oak and hickory with a well-developed midstory that includes shade-tolerant, fire-intolerant woody vegetation. Species could include red maple,

**Dominant Species* and Canopy Position**

PIEC2
QUCO2
COFL2
ACRU

**Upper Layer Lifeform**

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

**Fuel Model** 9

**Structure Data (for upper layer lifeform)**

| | Min | Max |
|---|---|---|
| *Cover* | 70 % | 100 % |
| *Height* | Tree Short 5-9m | Tree Medium 10-24m |
| *Tree Size Class* | Medium 9-21"DBH | |

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

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sassafras, sourwood, mountain laurel, blackgum, dogwood and, occasionally, red cedar and/or white pine.

## Disturbances

**Disturbances Modeled**

- [x] Fire
- [x] Insects/Disease
- [x] Wind/Weather/Stress
- [ ] Native Grazing
- [ ] Competition
- [ ] Other:
- [ ] Other

**Historical Fire Size (acres)**

Avg: 500
Min: 10
Max: 5000

**Sources of Fire Regime Data**

- [x] Literature
- [ ] Local Data
- [x] Expert Estimate

**Fire Regime Group:** 1

I: 0-35 year frequency, low and mixed severity
II: 0-35 year frequency, replacement severity
III: 35-200 year frequency, low and mixed severity
IV: 35-200 year frequency, replacement severity
V: 200+ year frequency, replacement severity

**Fire Intervals (FI)**

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is central tendency modeled. Minimum and maximum show the relative range of fire intervals, if known. Probability is the inverse of fire interval in years and is used in reference condition modeling. Percent of all fires is the percent of all fires in that severity class. All values are estimates and not precise.

| | *Avg FI* | *Min FI* | *Max FI* | *Probability* | *Percent of All Fires* |
|---|---|---|---|---|---|
| *Replacement* | 125 | | | 0.008 | 4 |
| *Mixed* | 155 | | | 0.00645 | 4 |
| *Surface* | 6 | | | 0.16667 | 92 |
| *All Fires* | 6 | | | 0.18112 | |

## References


Brown, James K.; Smith, Jane Kapler, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 257 p.

Frost, C., Presettlement Fire Frequency Regimes of the United States: A First Approximation.Pages 70-81, May 1996., Proceedings of the 20nd Tall Timbers Fire Ecology Conference: Fire in Ecosystem Management: Shifting the Paradigm from Suppression to Prescription. Tall Timbers Research Station, Tallahassee, FL.

Little, E.L., Jr., 1971, Atlas of United States trees, volume 1, conifers and important hardwoods: U.S. Department of Agriculture Miscellaneous Publication 1146, 9 p., 200 maps.
[Online]. Available: http://esp.cr.usgs.gov/data/atlas/little

NatureServe. 2005. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatrueServe Central Databases. Arlington, VA U.S. A. Data current as of January 13, 2005.

Schmidt, Kirsten M, Menakis, James P., Hardy, Colin C., Hann, Wendel J., Bunnell, David L. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. Gen. Tech. Rep. RMRS-GTR-87. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 41 p. + CD.

U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (2002, December). Fire Effects Information System, [Online]. Available: http://www.fs.fed.us/database/feis/.

U.S. Department of Agriculture, Forest Service, Southern Region, June 1997, Guidance for Conserving and


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Restoring Old-Growth Forest Communities on National Forests in the Southern Region – Report of the Region 8 Old-Growth Team, Forestry Report R8-FR 62.

U.S. Department of Agriculture, Forest Service, Southern Forest Research Station, Southern Forest Resource Assessment, [Online]. Available: http://www.srs.fs.fed.us/sustain

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