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)

R8OACOm Appalachian Dry Mesic Oak Forest

General Information

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

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Vegetation Type

Forested

Dominant Species*

QUAL QUCO
QURU
QUPR
QUVE

General Model Sources

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

LANDFIRE Mapping Zones

57
61
48

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

Ranges throughout the central and southern Appalachians, from approximately central Pennsylvania south to northern Georgia and northeast Alabama.

Biophysical Site Description

This system consists of predominately dry-mesic to dry forests occurring on open and exposed topography at lower to mid elevations in the Southern Blue Ridge, Southern Ridge and Valley, and Central Appalachians. This is the upland forest that characterizes much of the Appalachian highlands of the southeastern United States. It occupies a region of considerable size and environmental diversity with respect to landform, climate, soils, and geology. Various species of oak (Quercus spp.) are consistently present as major components of the tree stratum. Historically American chestnut (Castenea dentata) was a dominant or co-dominant in many of these communities until its virtual elimination by the chestnut blight fungus [Endothia (Cryphonectria) parasitica] during the early 1900's. Contiguous forests of tens to hundreds of thousands of acres once occurred.

Elevations of these forests range from less than 800 feet to over 4000 feet. Occurs on open slopes, ridgetops, lower elevation peaks, and higher parts of broad valley bottoms. Bedrock may be of any type. Soils are usually deep residual soils, but are often rocky. Some shallow soils, colluvium, and other soils may be present locally within the group, but shallow soils tend to produce environments that are more extreme and have a larger component of various pine species. Soils can range from acidic to circumneutral or basic, and the vegetation varies accordingly.

Vegetation Description

Typically, the vegetation seen today consists of forests dominated by oaks, especially white oak (Quercus alba) and red oak (Quercus rubra), and on drier sites chestnut oak (Quercus montana), black oak (Quercus velutina), and scarlet oak (Quercus coccinea). Along with oaks are varying amounts of hickory (Carya spp.), red maple (Acer rubrum), and other species such as white pine (Pinus strobus) and white ash

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(Fraxinus americana). American chestnut (Castanea dentata) was once dominant or codominant in many of these forests. Currently (but likely to a lesser extent in pre-European settlement periods) subcanopies and shrub layers are usually well-developed. Some areas (usually on drier sites) now have dense evergreen Ericaceous shrub layers of mountain laurel (Kalmia latifolia), fetterbush (Pieris floribunda), or on more mesic sites rhododendron (Rhododendron spp.). Others areas have more open shrub layers, sometimes consisting of blueberries (Vaccinium spp.) or huckleberries (Gaylussacia spp.). Herbs, forbs, and ferns are usually sparse to moderate in density.

Though often contiguous, patches are virtually always convoluted and interfingered with other systems, especially Mesophytic Cove Forests and Dry-Xeric Oak-Pine Forests. At the highest elevations it may grade into Northern Hardwood Forests. Small patches of other communities, such as rock outcrops and mountain wetlands, are sometimes embedded within this group. Fire disturbances have led to the small pocket inclusions of Pine (Shortleaf, Table Mountain Pitch, or Virginia Pine). Other important shade tolerant but fire intolerant understory species are dogwood, sourwood, holly, blackgum, as well as White Pine which can be an important understory component on South and West slopes. This Vegetation is similar to the TEC-CES202.886. Within this classification a shrub component is mentioned. However, TEC-CES202.886 needs to include mountain laurel as a shrub species.

Disturbance Description

This system is naturally dominated by stable, uneven-aged forests, with canopy dynamics dominated by gap-phase regeneration. Most oaks are long-lived with typical age of mortality ranging from 200 to 400 years. Scarlet and black oaks are shorter lived with typical ages being approximately 50 to 100 years while white oaks can live as long as 600 years. Extreme wind or ice storms occasionally create larger canopy openings. Virtually all examples have been strongly affected by introduction of the chestnut blight, which killed all of the American chestnut trees, eliminating it as a canopy dominant. The introduction, and now widespread establishment, of gypsy moth (Lymantria dispar) that favors oaks as food has also affected these forests by causing widespread mortality of overstory trees depending on topographic position and precipitation amounts around defoliation events. Past logging, and now lack of fire, has affected most occurrences by changing canopies to an even-aged, or more even-aged, structure with an understory of shade tolerant but fire intolerant species such as white pine, red maple, and striped maple (Acer pennsylvanica). Hickories are thought to have benefited greatly from the removal of American chestnut from the overstory, and their persistence and continued recruitment in contemporary oak-hickory forests may reflect fire exclusion in recent decades. It is also possible that in pre-European settlement days that native grazing by bison and elk impacted these communities, possibly favoring oaks. The historic Fire Regime Group is probably one with common surface fires and some mixed fires, but rare replacement fires. Recently, however, fire suppression has allowed extensive ericaceous and other shrub covers to expand, making the current FRG a III in all likelihood.

Adjacency or Identification Concerns

Area of concerns are where the shrub component is a major part of the fuel complex. Ranging in elevation from 1000 to 4000 ft, the northern aspects can dominate with a rhododendron, while the southern aspects can dominate with mountain laurel. When addressing closed versus open structure, this is dealing specifically with the state of the understory. Open is more frequently impacted by disturbances - more fire presence, while closed has been impacted less by disturbance leading to better understory / shrub development.

Scale Description

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

The landscape description provided for mapzone 57 provided by Croy and Frost adequately represents the vegetation extent in size. Their disturbance regime has been adjusted to be more frequent and additional disturbances have been added. Aspect and elevation play an integral role in the location of the shrub component. Uniformity of the vegetation is consistent across the area based on these topographic influences.

Issues/Problems

In this modified PNVG the disturbances are occurring more frequently and there are more types. These have been adjusted in the various classes. They have been placed on a shorter time periods. Also, other disturbances have been added. These include Wind/Weather, Mixed Fire, Ice/Storm Damage, and Insect/Disease.

Model Evolution and Comments

Additional reviewer was Rob Klein (Rob_Klein@nps.gov).

The FRCC model APOK produced by Steve Croy & Cecil Frost adequately represents mapzone 57. It has been slightly adjusted to reflect what North Carolina's perspective on what has transpired on the landscape as determined by disturbances and topographic influences. Additional suggested reviewers: Fred White - Silviculturalist, ret., NCDFR/Duke U.- contact Gary Curcio for follow-up on contact information for Fred White. / Steve Simon USFS Ecologist Asheville, NC.

Quality control process resulted in adding MZ 48 and 61 based upon Geographic Range. Alt Succession from C to B was removed and kept the C to E AltSuccession in that class because that combination generated results closer to what the original modeler reported. Peer review results: One reviewer suggested that fuel model for Class A should be 5, but other 3 reviewers did not suggest this so it was not changed. One reviewer suggested that the fuel model for Class B should be 8, but that was suggested by only one reviewer so it was not changed. Two reviewers suggested that fuel model for E should be 8 or 9, so it was changed to 8. One reviewer thought Chestnut Oak was more important than indicated. It is mentioned in the Vegetation Desc, but is not listed as a dominant species in any stage. Nothing was changed since I had no knowledge regarding where to add it. One reviewer commented that shrubs and ACRU may be overemphasized, and may be artifact of fire exclusion. However, accounting for the shrub understory was critical to these modelers, so no changes were made. One reviewer suggested that the FRI could be higher on drier sites, perhaps similar to TMPP. Since no other reviewer suggested this, I will leave as is but note the comment. Changed FRG to I based upon computed FRI values and description, and recommendation of one reviewer. The last two sentences of the Disturbance Description were added by the regional lead to more explicitly discuss the historic and current fire regime groups. One reviewer indicated that Shortleaf should be replaced by White Pine, which is possible. However, since only 1 of 4 reviewers and the modeler seemed to think Shortleaf was acceptable, no changes were made. Two reviewers commented on how the uniqueness of this BpS--how is it differentiated from more high elevation hardwood forests, and is it really different from Eastern Oak Xeric and Oak Dry Mesic. The modeler seemed to indicate that this is BpS is variable and intermingled (See Biophysical Site Description and Vegetation Description). At the scale of Rapid Assessment, this BpS seems to be separable and reasonable, but will need to be addressed during the LANDFIRE workshops. One reviewer indicated that there were two subcategories of this BpS--moister and drier. There are similarities in the FRG's, and some overlap between models, but the landscape percentages are quite different, so we kept the models as-is (no combining or additional separation).

Succession Classes**

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

Class A 5 %

Early1 All Struct

Description

Post Replacement: Treefall gaps and small to medium patches 0-19 years in age with saplings and small trees up to 20 cm (8 in) dbh. Potential
canopy species (oaks) are typically mixed with subcanopy tree 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

Dominant Species* and Canopy Position

ACRU	Mid-Upper
QUAL	Mid-Upper
QUPR2	Mid-Upper
CAAL2	Mid-Upper

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 9

Structure Data (for upper layer lifeform)

	Min	Max
Cover	80 %	95 %
Height	Tree Regen <5m	Tree Short 5-9m
Tree Size Class	Sapling >4.5ft; <5"DBH	

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

Class B 10 %

Mid1 Closed

Description

Mid-seral Closed:Old treefall gaps with closed canopy 20-64 years in age. Trees ranging from 20-60 cm (8-24 in) dbh. Shade tolerant species in
the understory. With developing shrubs, mountain laurel and rhododendron on their respective aspects.

Dominant Species* and Canopy Position

QUAL	Upper
QUPR2	Upper
CAAL2	Mid-Upper
ACRU	Mid-Upper

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 5

Structure Data (for upper layer lifeform)

	Min	Max
Cover	70 %	95 %
Height	Tree Medium 10-24m	Tree Tall 25-49m
Tree Size Class	Medium 9-21"DBH	

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

Class C 20 %

Mid1 Open

Description

Mid-seral Open: Woodland with an open midstory and canopy closure <60%. Age of 20-69 years. Shrub/herbaceous cover patchy.

Dominant Species* and Canopy Position

QUAL	Upper
QUPR2	Upper
CAAL2	Upper
PIEC2	Mid-Upper

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 9

Structure Data (for upper layer lifeform)

	Min	Max
Cover	60 %	70 %
Height	Tree Medium 10-24m	Tree Tall 25-49m
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 D 45 %

Late1 Open

Description

Late-seral Open: Forest with an open midstory and canopy closure 61-80%. Age is 70+ years. Shrub/herbaceous cover patchy.

Dominant Species* and Canopy Position

QUAL Upper
QUPR2 Upper
PIEC2 Upper
CAAL2 Mid-Upper

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☑ Tree

Fuel Model 9

Structure Data (for upper layer lifeform)

	Min	Max
Cover	60 %	80 %
Height	Tree Medium 10-24m	Tree Tall 25-49m
Tree Size Class	Large 21-33"DBH	

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

Class E 20 %

Late1 Closed

Description

Late-seral Closed: Closed canopy forest with cover >80%. Trees 65+ years in age. Midstory and understory closed with dense cover and stocking of shrubs and saplings. With minimal natural or native induced disturbance, dense understory shrub thickets developed (Mountain laurel on the southern aspects and rhododendron on the northern aspects)

Dominant Species* and Canopy Position

QUAL Upper
QUPR2 Upper
CAAL2 Mid-Upper
PIEC2 Upper

Upper Layer Lifeform

☐ Herbaceous
☑ Shrub
☑ Tree

Fuel Model 8

Structure Data (for upper layer lifeform)

	Min	Max
Cover	70 %	80 %
Height	Tree Medium 10-24m	Tree Tall 25-49m
Tree Size Class	Large 21-33"DBH	

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

Disturbances

Disturbances Modeled

☑ Fire
☐ Insects/Disease
☑ Wind/Weather/Stress
☐ Native Grazing
☐ Competition
☑ Other: Ice Damage
☐ Other

Historical Fire Size (acres)

Avg: 100
Min: 10
Max: 10000

Sources of Fire Regime Data

☑ Literature
☐ Local Data
☑ 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	220			0.00455	6
Mixed	90			0.01111	15
Surface	17			0.05882	79
All Fires	13			0.07448	

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