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 2004-2005. For more information, please visit www.landfire.gov. Please direct questions to helpdesk@landfire.gov.

Potential Natural Vegetation Group (PNVG):

R9OADM **Loess Bluff and Plain Forest**

General Information

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

Modelers		Reviewers
Bruce Davenport	bdavenport@fs.fed.us	
Alexa McKerrow	alexa_mckerrow@ncsu.edu	
Paul Arndt	parndt@fs.fed.us	

Vegetation Type

Forested

Dominant Species*

QUAL MAGR4
FAGR
QUPA11
LITU

General Model Sources

- ☐ Literature
- ☐ Local Data
- ☑ Expert Estimate

LANDFIRE Mapping Zones

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Rapid Assessment Model Zones

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

Geographic Range

Loess bluff and plain forest occurs under suitable conditions in areas corresponding to Kuchler type 100 along the coastal plain of Kentucky, Tennessee and Mississippi. This includes the loess bluffs and the loess hills of the coastal plain.

Biophysical Site Description

For this model the broader concept of the mixed mesophytic forest has been split. This model is specific to the mesic and dry-mesic forests of the loess bluff and plain. The distribution of these forests is determined by the interaction of topography and fine textured soils. Within the type, local variability in topography and moisture determine the dominant canopy. Drier sites occur along the bluff tops and on the loess plain. Mesic sites occur in protected areas. Loess deposits make the fertility and the local topography of this area distinct (Natureserve 2005, Braun 1950, Miller and Neiswender 1987). The geology of the area is mapped as the Jackson Formation (Hardeman 1966).

Vegetation Description

Most stands are co-dominated by American beech (Fagus grandifolia) with or without white oak (Quercus alba). The mesic end of the gradient may not include oaks at all, but instead show dominance by Fagus grandifolia, yellow poplar (Liriodendron tulipifera), or sweet gum (Liquidambar styraciflua). In the southern bluffs cherrybark oak (Quercus pagodifolia) is an important canopy dominant. There is a recognized species shift from north to south, with southern magnolia (Magnolia grandiflora) occurring in the southern loess bluffs and dropping out in the north.

Disturbance Description

Fire frequency and severity in this PNVG is classified as Fire Regime Group III, with infrequent, low intensity surface fires and rare mosaic or replacement fires. The mean fire return interval (MFI) is about 35 years with wide year-to-year and within-type variation related to moisture cycles, degree of sheltering, and

*Dominant and Indicator Species are from the NRCS PLANTS database. To check a species code, please visit http://plants.usda.gov.

proximity to more fire-prone vegetation types. Anthropogenic fire was considered and it contributes to within-type MFI variation.

Adjacency or Identification Concerns

There is a sharp transition along the western edge of the loess bluff and plain forest down to the Mississippi river, and a more subtle gradient along the eastern edge in the loess plain. This PNVG transitions into the oak-hickory-pine type in central and southern Mississippi and to the dry oak hickory type in northern Mississippi, Tennessee and Kentucky.

Scale Description

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

The loess bluff forests are described by Natureserve (2005) as large patch communities, while East Gulf Coastal Plain Northern Loess Plain Oak-Hickory Upland forests are considered matrix communities.

Issues/Problems

There is an issue with respect to recognizing canopy closure of just the overstory of this forest type. In this model, the sub-canopy closure really makes the difference between what an open and closed stand represent. The keep relative age was used in the model to keep it realistic.

Model Evolution and Comments

We have included the use of keep relative age in this model, realizing that in the long term modeling this will either have to be accommodated in the software or reworked. The inclusion makes more ecological sense. Without it the proportion of forests shift to the mid-successional forest class, which is not expected on the ground. We have included some of the dry-oak hickory upland type of the loess plain in with this model. The Southern Appalachian group needs to deal with the dry-oak hickory type as a part of the interior low plateau modeling. Reviewers may want to consider specifically the fire return interval given this PNVG in the tension zone between a high fire frequency landscape and the Mississippi Alluvial Plain that is considered non-pyrogenic (Frost 1998). Questions that came up as part of the review included the potential for Native American burning of the alluvial plain and/or the oak.

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 Structures

Description

0-15 years. This class is characterized by sprouts, seedlings, and saplings, primarily of major overstory species, in gaps created by wind, lightning, insect/disease, and less frequently, fire. Shade intolerant species (e.g. Liriodendron tulipifera, LITU) are confined to multiple-tree gaps. This is not a fire driven system, so a majority of early succession would result from other disturbances, including tree fall.

Indicator Species* and Canopy Position

QUAL	Upper
FAGR	Upper
QUPA11	Upper
LITU	Upper

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☑ Tree

Fuel Model 9

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	100 %
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:

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Class B 25 %

Mid1 Closed

Description

15–79 years. Class B is dominated by a young to early mature canopy with some obligate mid-story and understory species. The closed condition is a function of understory/midstory development and depending on the age of the overstory, at least two strata are present. The fire frequency primarily impacts the amount of subcanopy vegetation. Under standard conditions, infrequent and low intensity fires, the stands have dense undergrowth and are considered closed.

Indicator Species* and Canopy Position

QUAL	Upper
FAGR	Upper
QUPA11	Upper
LITU	Upper

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 9

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	85 %	100 %
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 10 %

Mid1 Open

Description

15-79 years. Class C has the same overstory composition and structure as B, but without a well-developed midstory. Surface fires serve to maintain the open understory in these stands. In this model, a fire every 25 years would be sufficient to keep a stand open. Class C will transition into Class B through an alternative succession pathway (growth of the understory/midstory) if fire is absent for more than 25 years.

Indicator Species* and Canopy Position

QUAL	Upper
FAGR	Upper
QUPA11	Upper
LITU	Upper

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 9

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	0 %	85 %
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 15 %

Late1 Open

Description

80-200+ years. Class D is characterized by an early to late mature canopy that may exceed 100 feet in height. Dominant overstory species vary depending on location and stand history. The open condition is dependent on the absence of muti-layered vertical structure. Surface fires serve to maintain the open understory in these stands. In this model, a fire every 25 years would be sufficient to keep a stand open. Class D will transition into Class E through an alternative succession pathway (growth of the understory/midstory) if fire is absent for more than 25 years.

Indicator Species* and Canopy Position

QUAL	Upper
FAGR	Upper
QUPA11	Upper
LITU	Upper

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 9

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	0 %	85 %
Height	Tree Tall 25-49m	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 40 %

Late1 Closed

Description

80-200+ years. Class E exhibits the same overstory composition and structure as D. However, well developed lower layers are present containing canopy species and other species confined to those levels. Fire frequency primarily impacts the amount of subcanopy vegetation. Under standard conditions, infrequent and low intensity fires, the stands have dense undergrowth and are considered closed.

Indicator Species* and Canopy Position

QUAL	Upper
FAGR	Upper
QUPA11	Upper
LITU	Upper

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 9

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	85 %	100 %
Height	Tree Tall 25-49m	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

Non-Fire Disturbances Modeled

- ☐ Insects/Disease
- ☑ Wind/Weather/Stress
- ☐ Native Grazing
- ☐ Competition
- ☐ Other:
- ☐ Other:

Historical Fire Size (acres)

Avg: 200
Min: 5
Max: 2000

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 the 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	476			0.00210	7
Mixed	385			0.0026	9
Surface	39			0.02564	85
All Fires	33			0.03034	

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