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):

R7EPWM **Eastern Woodland Mosaic**

General Information

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

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Vegetation Type

Woodland

Dominant Species*

QUVE QUST
QUAL PIST
QUCO CATO
QURU

General Model Sources

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

LANDFIRE Mapping Zones

60 64
61 65
63 66

Rapid Assessment Model Zones

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

Geographic Range

Upper piedmont flats and lower mountain valleys on the east side of the Southern Appalachian Mountains, Georgia to Pennsylvania, including the Great Valley, the Shenandoah Valley, the Hudson Valley of New York and southern New England.

Biophysical Site Description

Eastern Woodland Mosaic forests dominated by oak are distributed across multiple physiographic and soil regions including unconsolidated sandy soils of the coastal plain to the predominantly loams and sandy loams (Lorimer, 2003). In glaciated areas often associated with outwash plains consisting of coarse sandy soils. Water and nutrient retention are low in areas dominated by glacially derived soils. Precipitation ranges widely but timing is more important to fire return interval. Dry periods in spring and fall accompanied by high winds increase fire probability.

Vegetation Description

The original community as described by early explorers and the first settlers was a mosaic of open woodland with interspersed prairies in the southern extent (Lederer 1672, Logan 1859) and shrubby grasslands in the northern extent (Stewart, 2002). Numerous pollen and charcoal studies provide little support for large grassland systems in the north with oak and pine dominated systems prevalent (Foster and Motzkin 2003). The prairie component in the south was located on the flat to convex and gently rolling uplands of the larger fire compartments. The largest of these in the southern part of the range was up to five miles wide without a tree or only a few blackjack oaks (Logan 1859). Early explorers reported open treeless areas greater than 3 miles long (Pyne1982). In the Great Valley of Virginia, West Virginia and Maryland, extensive grasslands on the uplands were interspersed with oak woodland in ravines. The woodland canopy was dominated by post oak (Quercus stellata), blackjack oak (Q. marilandica), and shortleaf pine (Pinus echinata) in the southern half of the range, and by white oak (Quercus alba), mockernut hickory (Carya tomentosa), hackberry (Celtis occidentalis) and red cedar (Juniperus virginiana) in the Shenandoah Valley

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

and other northern valleys with calcareous soils. On acidic soils, black oak (Quercus velutina) was a constituent in the northern range). Open prairies and the grassy understory beneath woodland trees were dominated by tallgrass species such as little bluestem (Schizachyrium scoparium) and Indiangrass (Sorghastrum nutans) on the drier sites, with switchgrass (Panicum virgatum) and big bluestem (Andropogon gerardii) in moist swales. The grasses were interspersed with a diverse assortment of perennial forbs. The federally endangered smooth coneflower (Echinacea laevigata) was a component of the herb layer in the southern range from North Carolina to northeast Georgia. Understories of fire-maintained wooded areas were characterized by short grasses such as poverty grass (Danthonia spp) in the southern end of the range and Deschampsia flexuosa in the northern range. Burned woodland and scrub vegetation were the habitat for the extinct subspecies of the western prairie chicken, the eastern heath hen (Tympanuchus cupido cupido) (Foster and Motzkin 2003). Many open sites were preferentially colonized by Euro-Americans because they were already partially cleared (Pyne, 1982, Stewart 2002).

Disturbance Description

Naturally this system has frequent fire dominated by low intensity surface fires. These fires were often ignited by Native Americans with fire return internals of less than five years. Lightning ignitions are insignificant except in ridgetop systems. Periodic tropical storms increase fuel loads through windthrow and crown damage, increase fire intensities and create ladder fuels causing the increased probability of stand replacing fires.

Adjacency or Identification Concerns

The description of this type is limited to vegetation of the zone of prairie-woodland mosaic at the toe of the Appalachians and the Appalachian eastern interior valleys. Grades to the east into piedmont oak-hickory-shortleaf pine in the Carolinas and south, and to closed canopy oak-hickory forests in mid Atlantic states and pine barrens in the northeast. On the piedmont there were smaller and more dispersed prairies which included several distinct types depending upon soils and geological substrates such as diabase and serpentine. Graded locally upslope into fire maintained chestnut oak (Quercus montana)-mockernut hickory (Carya tomentosa) and, historically, American chestnut (Castanea dentata) forest with a grassy, fire-maintained understory. Grades into northern hardwoods in the northwest portion of the unit.

Scale Description

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

Probably the dominant vegetation around Native Algonquian settlements that were concentrated in river valleys and on sand plains. Thousands of acres were interspersed with vegetation influenced by less frequent fires on north facing slopes and in wetlands.

Issues/Problems

This is based on the FRCC model EPWM (dated November 20, 2004), but original reference percentages could not be replicated, and class D may be under represented compared to the original model, but all class percentages are within +/- 10%. Fire regime frequencies are also similar to the original model.

Model Evolution and Comments

Suggested Reviewers: Cecil Frost - Independent, Dr. William A. Patterson III. - U-Mass, Doug Wallner - National Park Service, Paul Nelson, Tom Foti and Doug Zollner.

Comments: For future model runs, the probability of a wind/weather disturbance should increase in late-open and late-closed with increased tree volume.

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 Open

Description

Class A, post replacement consists of large open areas with oak sprouts, perennial grasses and forbs. Frequent fire intervals of <4 years maintain class A. Class A unburned for 4-6 years transitions to class C.

Indicator Species* and Canopy Position

SCSC	Upper
QUVE	Upper
QUAL	Upper
BEPO	Upper

Upper Layer Lifeform

- ☐ Herbaceous
- ☑ Shrub
- ☐ Tree

Fuel Model 1

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	25 %
Height	Herb Short <0.5m	Shrub Short 0.5-0.9m
Tree Size Class	Seedling <4.5ft	

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

Dominant lifeform is herbaceous. Cover ranges from 5-75%. Height is herbaceous short-herbaceous medium.

Class B 10 %

Mid1 Closed

Description

Class B, mid-closed consists of sapling to pole-sized oaks with reduced herbaceous understory. Natural succession transitions class B to class E. Low severity surface fires maintain class B. Mixed severity fire and wind/ weather disturbance transitions class B to class C. Replacement fire transitions class B to class A.

Indicator Species* and Canopy Position

QUVE	Upper
QUAL	Upper
BEPO	Upper
SCSC	Lower

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 5

Structure Data (for upper layer lifeform)

	Min	Max
Cover	65 %	90 %
Height	Tree Short 5-9m	Tree Medium 10-24m
Tree Size Class	Pole 5-9" DBH	

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

Class C 15 %

Mid1 Open

Description

Class C, mid-open consists of shrub/grass understory with sapling to pole-sized oak overstory. Natural succession transitions class C to class D. Low severity surface fires, mixed severity fire and wind and weather disturbance will maintain class C. Replacement fire transitions class C to class A. AltSuccession or fire exclusion transitions class C to class B.

Indicator Species* and Canopy Position

SCSC	Lower
QUVE	Upper
QUAL	Upper
BEPO	Upper

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 3

Structure Data (for upper layer lifeform)

	Min	Max
Cover	20 %	65 %
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:

Dominant lifeform is herbaceous and shrub. Cover ranges from 5-50%. Height is herbaceous short-herbaceous medium.

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Class D 50 %

Late1 Open

Description

Class D, late-open consists of canopy cover <65% woodland/savanna oak-hickory (& shortleaf pine in the southern range) overstory with understory of perennial grasses and forbs. Natural succession, low severity surface fires mixed severity fires and wind/weather disturbances will maintain class D. Replacement fire transitions class D to class A. AltSuccession or fire exclusion transitions class D to class E.

Indicator Species* and Canopy Position

QUVE	Upper
QUAL	Upper
BEPO	Mid-Upper
SCSC	Lower

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 8

Structure Data (for upper layer lifeform)

	Min	Max
Cover	30 %	65 %
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 E 20 %

Late1 Closed

Description

Class E, late-closed with a canopy closure >65% red oak, white oak, black oak, tulip poplar, hackberry, and in the most fire-sheltered ravines, sugar maple and beech in the north. In the south, white oak, post oak, mockernut hickory and sometimes white pine (Pinus strobus) in fire-sheltered north slopes. Understory with tree saplings and low shrubs such as blueberry (Vaccinium spp.). Natural succession and low severity surface fires maintain class E. Mixed severity fire, wind/weather disturbances and insects/disease will transition class E to class D. Replacement fire transitions class E to class A.

Indicator Species* and Canopy Position

QUVE	Upper
QUAL	Upper
BEPO	Middle
VACO	Lower

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 9

Structure Data (for upper layer lifeform)

	Min	Max
Cover	65 %	90 %
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:

Disturbances

Non-Fire Disturbances Modeled

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

Historical Fire Size (acres)

Avg: 1000
Min: 20
Max: 3000

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 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	200	100	300	0.005	2
Mixed	40	20	60	0.025	9
Surface	4	1	7	0.25	89
All Fires	4			0.28	

References

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