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)

R8PRWMe Eastern Prairie Woodland Mosaic

General Information

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

Modelers		Reviewers	
Cecil Frost	cecil.frost@ncmail.net	Carl Nordman	Carl_Nordman@natureserv.org
Steve Lindeman	slindeman@tnc.org		

Vegetation Type

Grassland

Dominant Species*

SCHIZ	QUST
SONU	QUMA
PAVI2	PIEC2
ANGE	QUAL

General Model Sources

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

LANDFIRE Mapping Zones

53 59 54 57

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

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 and possibly the Hudson Valley of New York.

Biophysical Site Description

The original community as described by early explorers and the first settlers was a mosaic of open woodland with interspersed prairies (Lederer 1672, Logan 1859). The prairie component 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). In the Great Valley of Virginia, West Virginia and Maryland, extensive grasslands on the uplands were interspersed with oak woodland in ravines.

Vegetation Description

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 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. This type includes Southern Ridge and Valley Patch Prairie (NatureServe (2005) Ecological System CES202.453) in the

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

southern portion of the range. Described as "a collection of deep soil prairies and barrens….formerly widespread, but is now found only in scattered and isolated remnants. Vegetation is typically prairie-like and may have supported scattered trees depending on fire-return interval" (DeSelm and Murdock, 1993).

Disturbance Description

Fire regime group I. Surface fires, set annually by Native Americans, mostly in late October and November (Byrd 1728), of light intensity in woodlands and short grass, medium intensity in tallgrass prairie. Burning was done after the end of the growing season in fall and early winter when Indians left their villages to live in fall hunting camps. Reasons for burning mentioned in historical records were to drive game, to keep the countryside open and free of underbrush for easy travel, and to facilitate gathering of fall mast such as acorns and chestnuts.

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 from Virginia north. 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.

Scale Description

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

Historically occurred along the eastern interface between the Appalachian and Cumberland mountains and the Piedmont from Virginia south through Georgia in patches and bands.

Issues/Problems

Very few good examples of this type currently exist on the landscape. This type has largely been converted to agriculture or residential development.

Model Evolution and Comments

QA/QC resulted in the following changes: Changed Rel Age to -2 and TSD of AltSuccession in Class A to 2 because Class A has only 2 timesteps; Added TSD of 27 years to Class B (was 0). These changes did change some of the class proportions by <10%, and raised the Surface Fire FRI by 9 years. Peer Review Changes: Based upon general comments from the Peer Reviewer, AltSuccession from A to B (TSD 2) was removed; Changed Succession from B to D (from E), and made AltSuccession E (from D); Added Surface Fire in C with probability of 0.01. Regional Lead added Mixed Fire (probability 0.01) to Class B and Class E with D as destination because these classes appear to be wooded, and in these areas there could be mixed severity fires caused by lightning, or by escaped Native American burning.

*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

Open prairie patches dominated by perennial grasses.

Dominant Species* and Canopy Position

SCHIZ4 Upper
SONU2 Upper
PAVI2 Upper
ANGE Upper

Upper Layer Lifeform

☑ Herbaceous
☐ Shrub
☐ Tree

Fuel Model 1

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	100 %
Height	Herb Short <0.5m	Herb Tall > 1m
Tree Size Class	no data	

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

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

Class B 5 %

Mid1 Closed

Description

Unburned sapling to pole-sized oaks with reduced herbaceous understory.

Dominant Species* and Canopy Position

QUST Upper
QUMA Mid-Upper
SCHIZ4 Lower
SONU2 Lower

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☑ Tree

Fuel Model 2

Structure Data (for upper layer lifeform)

	Min	Max
Cover	10 %	25 %
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 55 %

Mid1 Open

Description

Prairie unburned for 2-3 years: denser grass cover, fuel accumulation of dead grass, and reduced cover of forbs.

Dominant Species* and Canopy Position

SCHIZ4 Upper
SONU2 Upper
PAVI2 Upper
ANGE Upper

Upper Layer Lifeform

☑ Herbaceous
☐ Shrub
☐ Tree

Fuel Model 1

Structure Data (for upper layer lifeform)

	Min	Max
Cover	70 %	100 %
Height	Herb Tall > 1m	Herb Tall > 1m
Tree Size Class	no data	

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

Class D 20 %

Late1 Open

Description

Woodland/savanna oak-hickory (& shortleaf pine in the southern range) overstory with understory of perennial grasses and forbs. Cover <65%.

Dominant Species* and Canopy Position

QUST Upper
QUMA Mid-Upper
SCHIZ4 Lower
SONU2 Lower

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☑ Tree

Fuel Model 2

Structure Data (for upper layer lifeform)

	Min	Max
Cover	10 %	65 %
Height	Tree Short 5-9m	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 10 %

Late1 Closed

Description

Closed canopy (>65%) with 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-

Dominant Species* and Canopy Position

QUST Upper
QUMA Mid-Upper
SCHIZ4 Lower
SONU2 Lower

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☑ Tree

Fuel Model 8

Structure Data (for upper layer lifeform)

	Min	Max
Cover	65 %	100 %
Height	Tree Short 5-9m	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:

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

sheltered north slopes. Understory with tree saplings and low shrubs such as blueberry (Vaccinium spp.).

Disturbances

Disturbances Modeled

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

Historical Fire Size (acres)

Avg: 10000
Min: 1000
Max: 20000

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	10			0.1	50
Mixed	900			0.00111	1
Surface	10			0.1	50
All Fires	5			0.20111	

References

Abrams, M. D. 1992. Fire and the development of oak forests. BioScience. 42:346-353.

Anderson, R. C. 1972. Prairie history, management and restoration in southern Illinois. Pages 15-22 in J. Zimmerman, ed., Proc. Second Midwest Prairie Conf. Madison, WI 242 pp.

Anderson, R. C. and L. E. Brown. 1986. Stability and instability in plant communities following fire. Amer. J. Bot. 73: 364-368.

Axelrod, D. I. 1985. Rise of the grassland biome, central North America. Bot. Rev. 163-201.

Barden, L.S. 1997. Historic prairies in the piedmont of North and South Carolina, USA. Natural Areas Journal 17:149-152.

Barden, L.S. and F.N. Woods. 1973. Characteristics of lightning fires in southern Appalachian forests. Proc. Tall Timbers Fire Ecol. Conf. No. 13:345-361.

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.

Byrd, William. 1728 [1967]. Histories of the dividing line betwixt Virginia and North Carolina. Dover Publications, New York. 340 p.

Davis, J.E., Jr. 1996. Restoration of a piedmont prairie: potential species composition and demographics of the federally endangered sunflower Helianthus schweinitzii T&G (Asteraceae). Master's thesis, University of North Carolina at Charlotte, Charlotte, NC.

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

Deselm, H.R., and N. Murdock. 1993. Grass dominated communities. Pages 87-141 in W.H. Martin, S.G Boyce, and A.C. Echternacht, editors. Biodiversity of the Southern United States: Upland terrestrial communities. John Wiley and Sons, New York.

Dyksterhuis, E. J. 1957. The savanna concept and its use. Ecology 38:435-442.

Engle, D. M. and J. F. Stritzke. 1995. Fire behavior and fire effects on eastern red cedar in hardwood leaf-litter fires. Int. J. Wildland Fire. 5: 135-141.

Komarek, E. V. 1965. Fire ecology-Grasslands and man. Proc. Ann. Tall Timbers Fire Ecol. Conf. 4: 169-220.

Komarek, E.V. 1974. Effects of fire on temperate forests and related ecosystems: Southeastern United States. Pages 252-277 in T.T. Kozlowski and C.E. Ahlgren, eds., Fire and ecosystems. Academic Press, New York, NY. 542 pp.

Lederer, John, 1672 [1966] The Discoveries of John Lederer, translated by Sir William Talbot, Readex Microprint, 1966

Logan, John H. 1859. A history of the upper country of South Carolina. Vol. I (Vol. II never pub.) S.G. Courtenay & Co., Charleston, S.C. 521 p.

NatureServe. 2005. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA. U.S.A. Data current as of March 14, 2005.

Penfound, W. T. 1962. The savanna concept in Oklahoma. Ecology 43: 774-775.

Rice, E. L. and W. T. Penfound. 1959. The upland forests of Oklahoma. Ecology 40: 593-608.

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.

Rebertus, A. J. and B. R. Burns. 1997. The Importance of gap processes in the development and maintenance of oak savannas and dry forests. Journal of Ecology 85:633-645.

T.N. Shiftlet, ed. Rangeland cover types of the United States. Soc. Range Manage., Denver, CO. 152 pp.

Trollope, W. S. W. 1984. Fire in savannah. Pages 151-175 in P. de V. Booysen and N.M. Tainton, eds., Ecological effects of fire in South African ecosystems. Springer-Verlag, New York, NY. 426 pp.

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/.

Wright, H. A. and A. W. Bailey. 1982. Fire ecology. John Wiley and Sons, New York, NY. 501 pp.

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