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)

R8BSOB **Bluestem Oak Barrens**

General Information

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

Modelers		Reviewers
Carl Nordman	carl_nordman@natureserve.org	
Steve Barrett	sbarrett@mtdig.net	

Vegetation Type

Grassland

Dominant Species*

SCSC
QUST
JUVIV
SONU

General Model Sources

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

LANDFIRE Mapping Zones

47
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

Western Indiana, Jackson Purchase and Pennyroyal Karst areas of western Kentucky (and adjacent Tennessee), middle Tennessee (Eastern and Western Highland Rim and Nashville Basin).

Biophysical Site Description

Open grasslands and woodland mosaic with scattered successional and mature forest patches. These are in flat areas which may have been prone to large wildfires, most of which were anthropogenic in origin. This model describes those areas of the prairie-forest interface where isolated oak-hickory forests occur in a prairie matrix.

Vegetation Description

Grasslands with areas of open woodlands, and successional areas of woody regeneration. Vegetative cover was determined mainly by fire frequency under a climatic regime capable of supporting any of these vegetation types. This model includes these NatureServe ecological systems: CES202.352, CES202.353, CES202.354, CES202.355, and CES203.479.

Disturbance Description

Disturbance regime in model is based on fire, mostly from anthropogenic burning by native Americans. Bison also were an agent of grazing disturbance, but were not specifically included in this model. The Fire Regime Group is either I (based on FRI) or III (based upon severity), but we will call it FRG I.

Adjacency or Identification Concerns

Included within areas of this model in the Nashville Basin are limestone cedar glades, the perennial grasslands of which can fall under this model. The rock outcrops are excluded due to lack of fuels.

Scale Description

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

5 - 50,000 acres, ave 3,000 acres of fire area

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

Issues/Problems

There may have been more Native American burning, which would have led to more acres being in classes A and C.

Model Evolution and Comments

Quality control resulted in the following changes:
-Removed TSD in Class C and Class D Surface Fire (rule violation).
-All other changes were made to try and mimic original results based upon request from original modeler. No peer review of this model, but the modeler was informed of the changes made.
-Removed AltSuccession from B (TSD 30 yrs) to E because Succession went to E. -Changed Class B and C to 30 time steps, and changed beginning Ages of E and D to reflect that change.
-Changed Class C Alt Succession to B to TSD 12 (from TSD 15) to move more pixels into B.
-Added MF in Class C to Class C with probability of 0.02 because MF FRI was too high.

*Succession Classes***

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

Class A 40 %

Early1 All Struct

Description

Open grasslands maintained by fire and to a lesser extent native grazing. These grasslands can result from the burning of wooded classes where the trees are killed. Early post-fire prairies dominated by perennial grasses.

Dominant Species* and Canopy Position

SCSC Lower
SONU2 Lower

Upper Layer Lifeform

☑ Herbaceous
☐ Shrub
☐ Tree

Fuel Model 1

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	10 %
Height	Herb Short <0.5m	Herb Tall > 1m
Tree Size Class	Sapling >4.5ft; <5"DBH	

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

Class B 15 %

Mid1 Closed

Description

Early successional, shrub or tree thickets, with young trees. There is also herbaceous groundcover but less than in class A or C. Unburned sapling to pole-sized hardwoods with declining herbaceous understory.

Dominant Species* and Canopy Position

JUVIV Middle
QUST Mid-Upper
SCSC Lower

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 Medium 10-24m
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

Savanna with scattered trees, becoming uneven aged as the stand ages (i.e. time since trees began regeneration). Grassy groundcover of mostly little bluestem and Indian grass, which carries fairly frequent fire, every 5 years or so. Many trees are killed by fire, keeping this a semi- open savanna (class C) and keeping patches in open grassland (class A).

Dominant Species* and Canopy Position

SCSC	Lower
QUST	Upper
SONU2	Lower
JUVIV	Middle

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 2

Structure Data (for upper layer lifeform)

	Min	Max
Cover	10 %	50 %
Height	Tree Regen <5m	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:

SCSC - Herbaceous 30-90% cover max height Herb Tall > 1m

Class D 5 %

Late1 Open

Description

Mid- to late savannah/woodland, with widely varying amounts of understory perennial grasses/forbs and old scattered trees.

Dominant Species* and Canopy Position

SCSC	Lower
JUVIV	Mid-Upper
QUST	Upper

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 2

Structure Data (for upper layer lifeform)

	Min	Max
Cover	10 %	50 %
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:

SCSC - Herbaceous 30-90% cover max height Herb Tall > 1m

Class E 10 %

Late1 Closed

Description

Mid- to late successional woodlands, often with senescent herbaceous understory. This is infrequently burned and trees are dense enough that the herbaceous groundcover has declined and is discontinuous. Replacement fire can convert this to open grassland (class A).

Dominant Species* and Canopy Position

QUST	Upper
JUVIV	Mid-Upper

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 9

Structure Data (for upper layer lifeform)

	Min	Max
Cover	50 %	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:

Disturbances

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Disturbances Modeled

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

Historical Fire Size (acres)

Avg: 3000
Min: 5
Max: 50000

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	15			0.06667	46
Mixed	69			0.01449	10
Surface	16			0.0625	44
All Fires	7			0.14366	

References

Abrams, Marc D. 1986. Ecological role of fire in gallery forests in eastern Kansas. In: Koonce, Andrea L., ed. Prescribed burning in the Midwest: state-of-the-art: Proceedings of a symposium; 1986 March 3-6; Stevens Point, WI. Stevens Point, WI: University of Wisconsin, College of Natural Resources, Fire Science Center: 73-80.

Abrams, Marc D. 1992. Fire and the development of oak forests. BioScience. 42(5): 346-353.
Anderson, Roger C. 1982. An evolutionary model summarizing the roles of fire, climate, & grazing animals in the origin & maintenance of grasslands: an end paper. In: Estes, J.; Tyrl, R.; Brunken, J., eds. Grasses and grasslands: systematics and ecology. Norman, OK: University of Oklahoma Press: 297-308.

Anderson, Roger C. 1983. The eastern prairie-forest transition--an overview. In: Brewer, Richard, ed. Proceedings, 8th North American prairie conference; 1982 August 1-4; Kalamazoo, MI. Kalamazoo, MI: Western Michigan University, Department of Biology: 86-92.

Anderson, Roger C. 1990. The historic role of fire in the North American grassland. In: Collins, Scott L.; Wallace, Linda L., eds. Fire in North American tallgrass prairies. Norman, OK: University of Oklahoma Press: 8-18. Anderson, Roger C.; Leahy, Theresa; Dhillion, Shivcharn S. 1989. Numbers and biomass of selected insect groups on burned and unburned sand prairie. The American Midland Naturalist. 122: 151-162.

Anderson, Roger C.; Schwegman, John E. 1991. Twenty years of vegetational change on a southern Illinois barren. Natural Areas Journal. 11(2): 100-107.

Baskin, JM, CC Baskin and EW Chester. 1994. The Big Barrens Region of Kentucky and Tennessee: Further observations and considerations. Castanea.

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.

Bullington, Robert A. 1970. Competition between forest and prairie vegetation in twenty years of secondary

succession on abandoned land in Ogle County, Illinois. In: Schramm, Peter, ed. Proceedings of a symposium on prairie and prairie restoration; 1968 September 14-15; Galesburg, IL. Special Publication No. 3. Galesburg, IL: Knox College, Biological Field Station: 20-23.

Chester, Edward W. , B. Eugene Wofford, Jerry M. Baskin, and Carol C. Baskin .1997.A Floristic Study of Barrens on the Southwestern Pennyroyal Plain, Kentucky and Tennessee. Castanea 62: 161-172.

Eyster-Smith, Nancy M. 1983. The prairie-forest ecotone of the western interior highlands: an introduction to the tallgrass prairies. In: Brewer, Richard, ed. Proceedings, 8th North American prairie conference; 1982 August 1-4; Kalamazoo, MI. Kalamazoo, MI: Western Michigan University, Department of Biology: 73-80.

Kuchler, A. W. 1964. Manual to accompany the map of potential vegetation of the conterminous United States. Special Publication No. 36. New York: American Geographical Society. 77 p.

Lemon, Paul C. 1970. Prairie ecosystem boundaries in North America. In: Schramm, Peter, ed. Proceedings of a symposium on prairie and prairie restoration; 1968 September 14-15; Galesburg, IL. Special Publication No. 3. Galesburg, IL: Knox College, Biological Field Station: 13-18.

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.

Sears, Paul B. 1981. Peninsula or archipelago? In: Stuckey, Ronald L.; Reese, Karen J, eds. The prairie peninsula--in the "shadow" of Transeau: Proceedings, 6th North American prairie conference; 1981 August 12-17; Columbus, OH. Ohio Biological Survey: Biological Notes No. 15. Columbus, OH: The Ohio State University, College of Biological Sciences: 2-3.
Transeau, Edgar Nelson. 1935. The Prairie Peninsula. Ecology. 16(3): 423-437.

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/.

Wuenscher, James E.; Valiunas, Algird J. 1967. Presettlement forest composition of the River Hills region of Missouri. The American Midland Naturalist. 78(2): 487-495.

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