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):

R5BSOW **Interior Highlands Dry Oak/Bluestem Woodland/Glade**

General Information

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

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Vegetation Type

Woodland

Dominant Species*

QUST
QUVE
QUMU
SCHIZ4

General Model Sources

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

LANDFIRE Mapping Zones

44
43
49

Rapid Assessment Model Zones

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

Geographic Range

Missouri Ozark Highlands, southern Illinois, portions of northern Arkansas and eastern Oklahoma. This vegetation type occupied primarily rocky, well drained to somewhat excessively drained dissected plains, hills and breaks with increasing importance where in transition with upland prairies and savannas. Important ecoregions in Missouri included the White River Hills, Osage River Hills, Gasconade River Hills, Meramec River Hills and Current River Hills subsections, especially where these subsections transected the Central Plateau Subsection.

Biophysical Site Description

Soils are well to somewhat excessively drained, shallow to moderately deep with an extremely acid to moderately acid soil reaction in areas underlain by chert, sandstone and igneous rock while neutral to basic in areas underlain by dolomite or limestone. These occupy moderately dissected to deeply dissected borders of undulating plains, especially those regions bordering the Central Plateau Subsection of the Ozark Highlands. The moisture regime is adequate to allow tree and shrub seedling establishment in the absence of fire. Elevations range from 1,700 to 1,000 feet in the St. Francois Mountains Subsection, and between 1,500 feet to as low as 400 feet along the southeastern portion of the Ozarks Plateau. Precipitation ranges from 40 to 45 inches fairly evenly distributed over the growing season. Descriptions include all dry woodland types, dolomite glades, sandstone glades and igneous glades described in Nelson (2005); CES202.692, CES202.691, CES202.707 in the Terrestrial Ecological Systems of the Great Lakes Region. Most of this group is included in Kuchler's. A rule set based on these PNVs, current cover, precipitation, elevation, aspect, and growing days will be needed to spatially map this type.

Vegetation Description

Historic range of variability: Mixed oak, and to a lesser extent some shortleaf pine locally within its narrower range, formed a dominant open canopy ranging from as low as 30% (less than 10% in expansive, open glades of southwest Missouri) to as high as 80%. Understory is generally sparse with an abundant ground layer of perennial grasses, sedges and forbs. The understory consisted of variable-age oak regeneration, some scattered shrubs. Densities vary widely depending on the random nature of historical ignition sources. Highly diverse groundcover vegetation consisting of many flammable forbs interspersed in warm season grasses left this fuel type succeptible to rapid drying, moderate fire spread rates and area coverage. Post oak and black oak codominate with incursions of of blackjack oak and shortleaf pine in acidic soils formed by chert, sandstone and igneous substrates. Chinquapin oak and post oak codominate on soils underlain by dolomite/limestone -- especially in association with dolomite glades. Because of modern-day fire suppression and a 100 year history of domestic livestock overgrazing of grass/forb fuels, the current vegetation will usually be dominated by second growth trees and shrubs (red, scarlet, black oaks and red cedar).

Disturbance Description

Historically, variable fire and native herbivore grazing patterns maintained a wide diversity of variably aged layers of oaks and shrubs among a uniform grass/forb groundcover. Frequent surface fires promoted an open understory dominated by a groundcover of grasses and forbs. Drought-prone glade and other shallow or bedrock natural communities remained open for longer periods following fire or severe drought disturbance, especially glades. Stand replacement fires likely occurred during extreme drought but were limited in extent by the inability of fires to rapidly spread over often dissected plains or near permanent waterways. Frequent fire dominated this vegetation group through replacement fires associated with productive grass fuels and cycles of moisture and drought. Native ungulate grazing may have played a small role in replacement where buffalo and elk concentrated, but fire generally maintained systems. Drought and moist cycles play a strong role interacting with both fire and native grazing. Wind, tornados and ice storms affected stands less frequently, ranging in size from ten acres to thousands of acres.

Adjacency or Identification Concerns

This vegetation group can be modeled and mapped as distinct from the dry to dry-mesic oak-hickory woodlands or forests primarily based on the topographic roughness of the landscape and proximity to surrounding oak savanna, prairie and White River glades. Another distinct breaking point between this and dry-mesic oak/pine woodlands is the dominance or strong presence of warm season grasses, generally south and west-facing aspects and only moderate dissection of the landscape (ranging from gently dissected plains to moderately steep hills). This vegetation type feathers out in portions of the most deeply dissected Ozarks Section, especially around and east of the Current River. Uncharacteristic current conditions: much reduced groundcover diversity due to overgrazing, scattered remnant herbs and grasses suppressed beneath dense second growth stands of increased black oak, red cedar, hickory and red oak-lowbush blueberry, aromatic sumac. These conditions are pervasive throughout all classes. Also, observations of native grazing bison and elk in certain enclosed refuges suggests that they played an important role in shaping and modifying the character of woodlands, in conjunction with fire effects. Uncharacteristic red oak, scarlet oak, white oak and red cedar along with shrubs aromatic sumac, lowbush blueberry and buckbrush (Symphoricarpos occidentalis) dominate in 5-9 inch or larger mid story canopy. Canopy is near 100% closed. Fuel model 9.

Scale Description

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

Dry oak/bluestem woodland occurred over much of the Ozark Highlands Section of Missouri (need description for other surrounding states). Analysis of historic vegetation shows that this vegetation type ranges from small patches (<ten acres) across more deeply dissected, topographically complex subsections to matrix-sized patches (>1,000 acres) within the remaining geographic range where landforms were more gently dissected. In the aggregate, this vegetation type likely exceeded 5 million acres across the Ozarks Landscape.

Issues/Problems

This type is mapped partly as the mosaic bluestem #39 and 45 on Bailey's map and #45 of the Oak-Hickory zone in Kuchler's Potential Natural Vegetation Groups. The Historical Vegetation Project of the Missouri Geographic Resources Center at University of Missouri, Columbia mapped this as open woodland across the Ozarks with as much as 35 to 50% covering the Ozark Highlands. For the most part, dominant grasses and forbs were the primary available fuel that dictated fire behavior. This former fuel type is mostly converted to deciduous artifact leaf litter today under an essentially closed canopy cover. Modeling attributes to map the spatial extent of this vegetation group should focus on southwest aspects, dry rocky soils, glade occurrences and association with coarse-scale historic vegetation models from UMC for shrublands, barrens and open woodlands. Larger patches of this group (1,000 acres or greater) are strongly associated with gentle to moderate undulations associated with dissected landscapes less than 150 feet in elevation change. These decrease in cover as landscapes become more deeply dissected with greater elevation changes. With respect to the coarser-scale grouping of alliances, the descriptions for all dry woodland natural communities published in Nelson 2005 (in press and available) are more accurate, descriptive and functional.

Model Evolution and Comments

Much of this vegetation group is masked by 150 years of intense overgrazing and fire suppression resulting in a much changed composition and structure more indicative of ecosystem degradation -- especially from overgrazing. This degradation leaves impressions that current vegetation conditions are part of the expected "natural succession" from a former woodland/savanna-dominated landscape to one of natural "forest". Reviewers need to be experienced in recognizing and assessing this much-altered vegetation artifact. Reviewers recognize the 5 classes represent vegetation variation (expressed in patch size, variable effects of fire intensity and mortality) as dictated by topographic variations, soils, differences in ignition sources and characteristic variations of ecological subsections in Ozark Highlands. Suggested reviewers include: Ken McCarty, Missouri Department of Natural Resources, Division of State Parks (573-751-8660); Doug Ladd, The Nature Conservancy-Missouri Chapter (314-968-1105). References were added as suggested by peer review.

Succession Classes

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

Class A 15 %

Early1 All Structures

Description

Post stand-replacing fire -- grass and oak shrub regrowth; perennial grass seedlings and forbs. Little bluestem, big bluestem, asters and goldenrods. Some of this landscape will remain permanently in an open condition due to edaphic conditions. May include scattered relict old growth trees up to 30 inches and over 200 years old. Oak sprouts make up the dominant life form.

Indicator Species* and Canopy Position

SCHIZ4	Lower
HEHI2	Lower
ASTU2	Lower
ANGE	Lower

Upper Layer Lifeform

- [ ] Herbaceous
- [x] Shrub
- [ ] Tree

Fuel Model 1

Structure Data (for upper layer lifeform)

	Min	Max
Cover	50 %	80 %
Height	Shrub Dwarf <0.5m	Shrub Short 0.5-0.9m
Tree Size Class	no data	

[x] Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Grasses and forbs still likely comprise most of the available fuel affecting fire behavior. Herbs will be the upper life form for approximately 15% of the landscape permanently.

Class B 20 %

Mid1 Closed

Description

Early-seral mixed grass and oak shrub regeneration, particularly on more productive sites associated with open drainages, headwater draws, north and east-facing backshoulders, narrow ridges. Glade regions retain openness with few shrubs. This condition can succeed to C or E and move back to A.

Indicator Species* and Canopy Position

QUST	Low-Mid
QUVE	Low-Mid
SCHIZ4	Lower
HEHI2	Lower

Upper Layer Lifeform

- [ ] Herbaceous
- [x] Shrub
- [ ] Tree

Fuel Model 4

Structure Data (for upper layer lifeform)

	Min	Max
Cover	90 %	100 %
Height	Shrub Short 0.5-0.9m	Shrub Medium 1.0-2.9m
Tree Size Class	Seedling <4.5ft	

- [ ] Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Class C 30 %

Mid1 Open

Description

Mid-seral mixed grass and scattered groupings or individual oaks; glade openings maintained. Trees age slowly on generally dry soils and/or in competition with dense, highly diverse grass/forb structure. Tree structure is highly variable depending on topographic position. Many characteristic forbs could be included equally in the class dominant species.

Indicator Species* and Canopy Position

QUST	Upper
QUVE	Upper
SCHIZ4	Lower

Upper Layer Lifeform

- [ ] Herbaceous
- [ ] Shrub
- [x] 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	Pole 5-9" DBH	

- [x] Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

A nearly 100 percent cover of warm season grasses and forbs with a few scattered shrubs make up the primary fuel type despite the presence of trees in varying canopy closures.

Class D 30 %

Late3 Open

Description

Late-seral open oak woodland with continued maintained grass/forb groundcover. Some scattered oak grubs. Glades and openings on southwest-facing slopes maintained. Some mixed, widely distributed younger trees and oak grubs may be prevalent. Larger trees demonstrate occasional scars and are subject to wind disturbance. Dominance of old growth oak individuals may

Indicator Species* and Canopy Position

QUST	Upper
QUVE	Upper
SCHIZ4	Lower

Upper Layer Lifeform

- [ ] Herbaceous
- [ ] Shrub
- [x] Tree

Fuel Model 2

Structure Data (for upper layer lifeform)

	Min	Max
Cover	30 %	50 %
Height	Tree Short 5-9m	Tree Medium 10-24m
Tree Size Class	Large 21-33"DBH	

- [x] Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

A nearly 100 percent cover of warm season grasses and forbs with a few scattered shrubs make up the primary fuel type despite the presence of trees in varying canopy closures.

decrease over several hundred years due to wind disturbance, burning out of scarred hollow trees, lightning strikes and competition with grass/forb matrix thereby reducing total canopy cover. Mid and initial late canopy dominance are likely artifacts of post settlement domestic livestock grazing and soil loss.

Class E **5 %**

Mid2 Closed

Description

Early-seral closed woodland. Productive areas missed by fire with thick patches of oak shrubs, sometimes interspersed with variable age and/or late seral oak groves; grasses and forbs suppressed beneath a dense leaf litter. These occur on sites missed by fire due to randomness of ignitions on an otherwise moderately dissected landscape and especially where not associated with more widespread savannas and prairies where fires could propagate over large areas in excess of 10,000 acres. Class E can succeed to some late open on a very small scale.

Indicator Species* and Canopy Position

QUST	Upper
QUVE	Upper
VAPA4	Lower

Upper Layer Lifeform

- [ ] Herbaceous
- [ ] Shrub
- [x] Tree

Fuel Model 9

Structure Data (for upper layer lifeform)

	Min	Max
Cover	60 %	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:

Disturbances

Non-Fire Disturbances Modeled

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

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

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

Historical Fire Size (acres)

Avg: 2000
Min: 100
Max: 10000

Sources of Fire Regime Data

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

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	25	10	100	0.04	16
Mixed	100			0.01	4
Surface	5	2	7	0.2	80
All Fires	4			0.25	

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