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):

R6MBOA **Maple Basswood Oak Aspen**

General Information

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

Modelers		Reviewers
James Gallagher	jagallagher@fs.fed.us	
Daniel Yaussy	dyaussy@fs.fed.us	

Vegetation Type

Forested

Dominant Species*

ACSA3 ULMUS
TIAM
QUMA2
POTR5

General Model Sources

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

LANDFIRE Mapping Zones

41
50

Rapid Assessment Model Zones

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

Geographic Range

This mosaic forest type historically occurred within the buffer zone between the "Big Woods" of southeastern Minnesota and the prairie lying to the west (Grimm 1984). This forest type spans northern Minnesota and Wisconsin southward into Iowa and Illinois, and the forest-prairie margin eastward to Lake Michigan. It abuts northern hardwoods to the north and prairies to the west. The western range of beech forms the eastern boundary, whereas its southern margin roughly parallels the maximum extent of past glaciation.

Biophysical Site Description

Following deglaciation, most of the present Maple-Basswood-Oak-Aspen Forest Mosaic became prairie between 9000 and 6000 years before present (Webb et al. 1993). Oak woodland began invading the prairie about 5000 years ago, becoming fully established 2400 years ago (Grimm 1981). Oak woodland persisted until 300 years ago, when elm, basswood, and sugar maple rapidly expanded and became co-dominant with oak in this fire-induced mosaic. The changes from prairie to oak woodland, and from oak woodland to 'bigwoods' must have resulted from reductions in fire frequency, which were probably caused by increased precipitation and possibly decreased temperatures (ibid). Historically, elm dominated the overstory within the maple-beech component, however this species has been largely eliminated from this system due to Dutch elm disease. The elm-basswood-maple forests occurred on rich, mesic sites that were inherently more protected from fire, whereas oak and aspen dominated within analogous edaphic settings that were exposed to fire and repeatedly burned.

Vegetation Description

Early-succession aspen, white birch, oak, openlands (< 60 yrs).
Mid-succession open forests (61-150 yrs)
Mid-succession closed forests (61-150 yrs)
Late-succession open forests maintained by surface fires (>150 yrs)

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

Late-succession closed fire-resistant forests (> 150 yrs)

Disturbance Description

Fire Regimes III (mixed severity) and V (long-interval replacement) are applicable to this type. Mosaic landscapes are composed of both fire-sensitive mesophilic and fire-tolerant pyrophilic hardwood species. Stands historically dominated by elm, basswood, and maple were restricted to fire-protected portions of the landscape, such as east sides (leeward sides) of lakes and rivers, north-facing slopes, mesic ravines, river bottoms, etc. Occasionally during drought conditions, surface fires did burn into these stands, setting back succession. Where fire was more frequent on the landscape, oak-hickory and oak-aspen forests would dominate. However, over time without fire, mesophytic species would regenerate and gain dominance where conditions allowed.

Adjacency or Identification Concerns

This community is the ecotone between prairies and the elm-maple-basswood forests.

Scale Description

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

Disturbance extent likely included large (thousands of acres) surface fires, to moderately large (hundreds to thousands of acres) mixed and replacement fires.

Issues/Problems

Mapping of this community for the Rapid Assessment process is problematic due to its association with the prairie and the maple-basswood communities. Data layers are available within Wisconsin and Minnesota that can accurately define this setting on the landscape.

Model Evolution and Comments

Unmodified MBOA model from FRCC models.

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 All Structures

Description

System is typified by early-successional aspen, white birch, and oak grasslands and is maintained by frequent replacement and surface fires (FRI 10 yrs). If the system lacks fire for several decades, it moves into savannas and open woodlands (Class B).

Indicator Species* and Canopy Position

POTR5	Upper
BEPA	Upper
QUMA2	Mid-Upper
ANGE	Low-Mid

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 3

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	0 %	100 %
Height	Herb Medium 0.5-0.9m	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 B 15%

Mid1 Open

Description

Class B is mid-successional savannas and open woodlands consisting of oak and aspen maintained by frequent surface fires (FRI 25 yrs) and infrequent stressors (drought, windthrow). If the community is more mesic, fire does not recur within several decades and the community changes to a mid-successional closed forest consisting of maple and basswood, Class C. After nearly a century of recurring fires, the system will move to a late-successional open forest of oak and aspen, Class D.

Indicator Species* and Canopy Position

QUMA2	Upper
POTR5	Upper
ANGE	Lower
ACSA3	Middle

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 3

Structure Data (for upper layer lifeform)

	Min	Max
Cover	25 %	60 %
Height	Tree Regen <5m	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 5%

Mid1 Closed

Description

This is a mid-successional closed forest consisting of maple and basswood. Stress and weather events are more frequent than fires due to the moist sites. What fires do occur will set the community back to a mid-successional or early-successional class, based on severity of fire. Nearly a century in this class will change the community to a late-successional closed maple-basswood system, Class E.

Indicator Species* and Canopy Position

ACSA3	Upper
TIAM	Upper
QUMA2	Upper
POTR5	Upper

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 8

Structure Data (for upper layer lifeform)

	Min	Max
Cover	60 %	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:

---

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

Class D 50 %

Late1 Open

Description

This is a late-successional open forest consisting of oaks and aspen maintained by frequent surface fires (FRI 25 yrs). Infrequent weather or stress events may move this system back to the mid-successional stage (Class B). If moisture regimes change such that several decades pass without a fire event, the system will move to a closed, late-successional maple-basswood forest (Class E).

Indicator Species* and Canopy Position

ACSA3	Upper
TILIA	Upper
QUMA2	Upper
POTR5	Mid-Upper

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 8

Structure Data (for upper layer lifeform)

	Min	Max
Cover	25 %	60 %
Height	Tree Medium 10-24m	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 25 %

Late1 Closed

Description

This is a late-successional closed forest consisting of maple and basswood trees, with a low probability of fire. Mixed-severity fires will change the community to a late-successional, open system (Class D). Replacement fires set the system back to shrub-grassland conditions (Class A). Weather or stress conditions may open the community and move it into the mid-successional closed forest (Class C).

Indicator Species* and Canopy Position

ACSA3	Upper
TIAM	Upper

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 8

Structure Data (for upper layer lifeform)

	Min	Max
Cover	60 %	100 %
Height	Shrub Medium 1.0-2.9m	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:

Disturbances

Non-Fire Disturbances Modeled

- ☐ Insects/Disease
- ☑ Wind/Weather/Stress
- ☐ 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: 500
Min: 100
Max: 50000

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.

Sources of Fire Regime Data

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

	Avg FI	Min FI	Max FI	Probability	Percent of All Fires
Replacement	769			0.00130	4
Mixed	476			0.00210	7
Surface	35			0.02857	89
All Fires	31			0.03197	

References

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.

Grimm, Eric C., 1981. Chronology and dynamics of vegetation change in the prairie-woodland region of southern Minnesota, U.S.A. New Phytologist. 93:311-350.

Grimm, E.C., 1984. Fire and other factors controlling the Big Woods vegetation of Minnesota in the mid-nineteenth century. Ecological Monographs 54:291-311.

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.

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/.

Webb, T., III; Bartlein, P.J.; Harrison, S.P.; Anderson, K.H., 1993. Vegetation, lake levels, and climate in eastern North America for the past 18,000 years. Pp. 415-467. In: Wright, H.E, Jr..; Kutzbach, J.E.; Webb, T., III; Ruddiman, W.F.; Street-Perrot, F.A.; Bartlein, P.J., eds. Global Climates since the Last Glacial Maximum. Minneapolis, MN: University of Minnesota Press.