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)

R7BEMA **Beech-Maple**

General Information

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

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Vegetation Type

Forested

Dominant Species*

FAGR
ACSA

General Model Sources

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

LANDFIRE Mapping Zones

62	51	65
52	61	50
63	64	49

Rapid AssessmentModel Zones

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

Geographic Range

This forest type occurs in the northern tier of eastern states extending into southern Canada (southern Ontario) (see Eyre 1980). This forest type occurs wherever the ranges of beech and sugar maple overlap, forming belt from southern New England westward to the western extent of beech (eastern Wisconsin). The best examples and greatest concentration of this forest type occurred around lakes Ontario and Erie on well-drained till plains and glaciolacustrine flats.

Biophysical Site Description

This forest type is comprised of moisture-loving, nutrient-demanding, fire-sensitive species. As such, this forest type was historically restricted to rich mesic sites that rarely burned. Horsley et al (2002) provide a thorough description, stating: "Sugar maple grows best in cool, moist climates. Its presence is limited by low temperature on the northern edge of its range; in the southern portion of its range, sugar maple is found primarily in cool, moist, high elevation areas of the Appalachian Mountains. Sugar maple is sensitive to both drought (Skilling 1964, Westing 1966) and excessive soil moisture (Ward et al. 1966). The species occurs on soils with a range of textures, pH and fertility, though best development occurs on loamy soils with slightly acid to neutral pH (Leak 1978, 1982, Auchmoody 1987, Godman et al. 1990, Whitney1990, 1999, Nyland 1999)."

Vegetation Description

The overstory of this forest type is dominated by sugar maple and beech. It typically occurs on fertile upland sites, preferring circumneutral, well- to moderately well-drained loams and silt loams. These are rich terrestrial ecosystems high in species richness and diversity and structural diversity. Shrubs and herbaceous plants are indicative of rich, mesic conditions, including leatherwood (Dirca palustris), trillium, goldenseal, bluebead lily, hepatica, ginsing, and blue cohosh.

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

Disturbance Description

This "asbestos" forest type historically occurred on moist and protected landscapes where fires were inherently infrequent, such as fine-to-loamy glacial till plains and moraines, glaciolacustrine flats, and toe slopes, coves, and V-shaped valleys. Wind disturbance was the primary disturbance factor. Canopy disturbances are frequent, but of low intensity, often forming single- or small, multiple-tree gaps. Indeed, gap-phase regeneration dominated these long-lived systems. Reciprocal replacement has been suggested for this forest type, whereby sugar maple established under beech and beech under sugar maple (Fox 1977, Woods 1979). Ice storms can cause substantial limb breakage.

Adjacency or Identification Concerns

Representation of beech-maple forests has increased greatly throughout the East since presettlement times due to compositional changes associated with land-use changes. The "Great Cutover" coupled with subsequent burning has largely depleted the conifer (hemlock; white pine) component of mixed forests (e.g., conifer-northern hardwood). This, coupled with declining yellow birch under current harvest regimes (i.e., selection harvesting), has led to mass conversion to beech-maple dominance where these two species co-occur. Beech is currently threatened by beech bark disease complex, which consists of an insect-fungus complex of European scale insect (Cryptococcus fagisuga) and the exotic canker fungus (Nectria spp.).

Scale Description

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

Forest stand dynamics are mainly wind-driven, and patch sizes will vary according to disturbance severity. Gap-phase replacement, resulting from single and small multiple tree death, is most common. Next in importance is meso-scale wind disturbance that causes partial canopy disturbance over 100s to 1000s of acres. Stand-replacing catastrophic disturbance occurs periodically from particularly severe wind events (tornados, microbursts, hurricanes) and may cover 1000s of acres. These catastrophic events often had distinct footprints, such as linear blowdowns reflecting tornado paths or straight-line winds. Fire is more-or-less a secondary disturbance factor, often occurring after blowdown (fuel accumulation) followed by prolonged drought. Under the right fuel and weather conditions, however, large acreages could burn.

Issues/Problems

Model Evolution and Comments

*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 Struct

Description

The stand reinitiation stage occurs immediately after catastrophic disturbance, which is principally wind-driven (e.g., tornados, microbursts, straight-line winds, hurricanes). Tree regeneration unfolds from a combination of stump and root sprouts and the seedbank. This short-lived stage exists until canopy closure occurs and resource competition for growing space begins among trees.

Dominant Species* and Canopy Position

FAGR Upper
ACSA3 Upper

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☑ Tree

Fuel Model 5

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	100 %
Height	Tree Regen <5m	Tree Short 5-9m
Tree Size Class	Sapling >4.5ft; <5"DBH	

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

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Class B 15 %

Mid1 Closed

Description

This is the stem exclusion stage of forest development during which intense competition and resource monopolization reigns. It begins after canopy closure (ca. 20 yrs) and lasts until trees are large enough to form, upon their death, canopy gaps that are not captured by lateral growth of neighboring trees. This "released" growing space that is captured by tree and shrub regeneration.

Dominant Species* and Canopy Position

FAGR Upper
ACSA3 Upper

Upper Layer Lifeform

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

Fuel Model 8

Structure Data (for upper layer lifeform)

	Min	Max
Cover	75 %	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:

Class C 70 %

Late1 Closed

Description

This class encompasses the understory reinitiation and old-growth stages of forest stand development. Structural complexity increases as forests age and canopies disassociate, changing stand character from single- to multiple-ages and layers. This class also includes old, closed-canopied, multi-cohort stands -- stands having distinct age cohorts corresponding to partial canopy disturbances.

Dominant Species* and Canopy Position

FAGR Upper
ACSA3 Upper

Upper Layer Lifeform

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

Fuel Model 8

Structure Data (for upper layer lifeform)

	Min	Max
Cover	75 %	100 %
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 D 10 %

Late1 Open

Description

This class comprises older stands that have experienced recent partial canopy disturbance leading to "open" overstory conditions. Partial canopy disturbances from moderate-level wind events and ice storms are common and lead to multi-cohort stands. These moderate disturbance events generally remove 25 to 50% of the canopy where mortality is concentrated on the largest trees.

Dominant Species* and Canopy Position

FAGR Upper
ACSA3 Upper

Upper Layer Lifeform

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

Fuel Model 10

Structure Data (for upper layer lifeform)

	Min	Max
Cover	25 %	75 %
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:

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This stand structure is short-lived due to aggressive gap capture via ingrowth (recruitment from pre-existing saplings, poles, and overtopped trees), seldom lasting more than 15 yrs. Upon canopy closure, these forests convert back to class C. With an abundance of down material on the forest floor, this class has a higher probability of experiencing replacement fire.

Class E 0 %

Late1 All Structu

Description

Dominant Species* and Canopy Position

Structure Data (for upper layer lifeform)

	Min	Max
Cover	%	%
Height	no data	no data
Tree Size Class	no data	

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

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

Fuel Model no data

Disturbances

Disturbances Modeled

- ☑ Fire
- ☐ Insects/Disease
- ☑ Wind/Weather/Stress
- ☐ Native Grazing
- ☐ Competition
- ☐ Other:
- ☐ Other

Historical Fire Size (acres)

Avg: no data
Min: no data
Max: no data

Sources of Fire Regime Data

- ☑ Literature
- ☐ Local Data
- ☑ Expert Estimate

Fire Regime Group: 5

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	1300			0.00077	97
Mixed					
Surface					
All Fires	1297			0.00079	

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