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)

R7NHSP **Northern Hardwoods-Spruce**

General Information

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

Modelers		Reviewers
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Vegetation Type

Forested

Dominant Species*

ACSA
FAGR
BEAL2
PIRU

General Model Sources

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

LANDFIRE Mapping Zones

66 63
64 61
65 57

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

Northeastern states, especially ME, NH, VT, northern NY, and likely eastern PA; particularly in the Adirondacks and western ME.

May extend into more southern states at higher elevations in the mountains, especially as glacial relics, such as in the Appalachian Mountains of WV.

Biophysical Site Description

Grows on well-drained mesic sites over a broad range of topographic conditions. Soils are usually rich. At the northern extent of the range, it generally occurs on the foothills of mountain ranges, such as in the Adirondacks and northern Appalachians. At the southern extent of the range, it is restricted to high-elevation mountain sites with cooler, moister microclimates, such as on the ridge tops of the southern Appalachians and Blue Ridge.

Vegetation Description

Tall, broadleaf deciduous forest. Typical pioneer species were aspen, birch, and spruce. Later stages of development were dominated by sugar maple (Acer saccharum), beech (Fagus grandifolia), yellow birch (Betula allegheniensis), and red spruce (Picea rubens).

Disturbance Description

Fire Regime Group V. Fire disturbances were severe and affected large patch sizes but were very rare, occurring only after extended drought, at intervals ranging from 400 to 2,000 years (Fahey and Reiners 1981) (average of 1,000 yrs used in the model). Wind events, usually as a result of periodic hurricanes, were a more frequent disturbance than fire, and may have predisposed the forest to fire during periods of drought. Severe wind events may have affected 15% of stands every 100 years (local expert knowledge), (average of 667 years was used in the model). Interactions between multiple types of disturbances, including fire, wind events, insect attacks, and ice storms, were very important in determining disturbance impacts.

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

Adjacency or Identification Concerns

Red maple (Acer rubrum) and balsam fir (Abies balsamea) although always had a very wide distribution, is now much more common than it used to be, likely due to Euro-American disturbances such as logging. Most of these stands probably had red maple but it was not as abundant as it is now.

The four "Northern Hardwood" models in the Rapid Assessment (R6NHMB, R7NHHE, R7NHNE, and R7NHSP) occur across both the Northeast and Great Lakes model zones and have several similarities, including: high moisture/nutrient gradients; historically included more conifer; often dominated by sugar maple; windthrow is the main disturbance agent with fires occurring every ~1,000-2,000 years. There are also several differences, including: beech has limited extent west of eastern Wisconsin and the central Upper Peninsula of Michigan; the amount of hemlock varies. Additional similar PNVGs include: R7BEMA, R7NHMC, R6MABA.

Scale Description

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

Although the size of historical fires is largely unknown, this model assumes large disturbance areas rather than single-tree or small-gap disturbances.

Issues/Problems

Exotic beech bark disease is an extremely influential disturbance in modern forests of this type.

Model Evolution and Comments

This model grew out of FRCC model NHSP (12/20/04) by D. Cleland, J. Merzenich, and W. Patterson.

Suggested reviewers: Bill Patterson (wap@forwild.umass.edu); especially need a reviewer for the southern parts of the range.

*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

Stands to approximately 30 years old. Young stands were characterized by aspens and paper birch with a red spruce understory. The very early stage was dominated by very low, pioneer vegetation such as Pteridium, Rubus, Kalmia, and Aralia. This stage was followed by one in which pin cherry may have dominated, often with the aspens. Finally birch with aspens became dominant, with young red and/or white spruce and possibly balsam fir and red maple in the understory. Sugar maple and American beech begin appearing but are not abundant.

Dominant Species* and Canopy Position

POTR5	Upper
BEPA	Upper
PRPE2	Mid-Upper
PIRU	Low-Mid

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☑ Tree

Fuel Model 9

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	0 %	80 %
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 25 %

Mid1 Closed

Description

Stands approximately 30 - 150 years old. Intermediate stands were characterized by red and/or white spruce. By the end of this stage, the spruces have outlived the aspens and paper birch. Red maple and balsam fir were still present in the canopy but was probably not abundant. Sugar maple and American beech have become abundant in the mid-canopy.

Dominant Species* and Canopy Position

PIRU Upper
PIGL Upper
ACSA3 Middle
FAGR Middle

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 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

Stands generally greater than 150 years old. Mature stands were dominated by sugar maple and American beech. Yellow birch was also characteristic, and the spruces may still have been important in the mid-canopy. Aspens, paper birch, and red maple would no longer be significant components of the forest.

Dominant Species* and Canopy Position

ACSA3 Upper
FAGR Upper
BEAL2 Upper

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☑ Tree

Fuel Model 8

Structure Data (for upper layer lifeform)

	Min	Max
Cover	60 %	90 %
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 0 %

Late1 All Structu

Description

Dominant Species* and Canopy Position

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	0 %
Height	no data	no data
Tree Size Class	no data	

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

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	

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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	1000	400	2000	0.001	98
Mixed					
Surface					
All Fires	998			0.00102	

References

Burns, Russell M. And Barbara H. Honkala, tech. coords. 1990. Silvics of North America: 1. Conifers; 2. Hardwoods. Agricultural Handbook 654. USDA, Forest Service, Washington, D.C. vol. 2, 877p.

Fahey, Timothy J. and Reiners, William A. 1981. Fire in the forests of Maine and New hampshire. Bulletin of the Torrey Botanical Club: 108 (3): 362-373.

Lorimer Craig G., and White, Alan S. 2003. Scale and frequency of natural disturbances in the northeastern US; implications for early successional forest habitats and regional age distributions. Forest Ecology and Management: 184 (1): 41 64.

Patterson III, William. 2005. Personal communication. Philadelphia, PA: LANDFIRE Reference Conditions Modeling Workshop. 14 - 18 February, 2005.

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