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)

R6MBMHW Great Lakes Maple-Basswood Mesic Hardwood Forest

General Information

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

Modelers

Jim Gallagher jagallagher@fs.fed.us

Reviewers

Vegetation Type

Forested

Dominant Species*

ACSA
TIAM
POTR5
BEPA

General Model Sources

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

LANDFIRE Mapping Zones

41
50

Rapid AssessmentModel Zones

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

Geographic Range

Mesic hardwood forest communities are present in the Laurentian Mixed Forest Province on uplands. This forest type extends from northern Minnesota and Wisconsin southward into Iowa and Illinois. The western range of beech forms the eastern boundary, whereas its southern margin roughly parallels the maximum extent of past glaciation. From west to east, it includes mesic hardwood forest (Minnesota Department of Natural Resources 2003)in Minnesota, including Minnesota drift and lakes plains and northern Superior uplands sections. It extends through Wisconsin across the southern portion of the Chequamegon and Nicolet National Forests, corresponding to landform changes (i.e. Chippewa End Moraine and Subsection 212Jh and southward) .

Biophysical Site Description

System occurs on upland sites with moist soils, usually in settings protected from fire. Plants in these communities have access to predictable supplies of water and nutrients, but they are often limited by light because of the dense forest canopy. Typical sites are buffered from seasonal drought by fine-textured moisture-retaining soils or dense subsoil layers. Essential nutrients are mineralized from decaying organic matter at twice the rate of that in fire-dependent forest or wet forest communities.

Vegetation Description

Sites are characterized by continuous, often dense, canopies of deciduous trees and understories of shade-adapted shrubs and herbs. Distribution of basswood is limited in northeast Minesota to areas inland from Lake Superior.

Disturbance Description

Communities historically had low to very low rates of catastrophic disturbance from fires and windstorms, with rotation in excess of 400 years and often greater than 1,000 years. Stand-replacement fire disturbances for the mesic northern hardwood landscape ecosystem (equates to the ELT scale) on the Minnesota drift and lakes plain section were estimated to be between 1000 to 2000 years (USDA FS 2004). This average

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

replacement interval of 1,500 years also reflects that observed in Wisconsin and Michigan (D. Cleland personal communication 2005).

Adjacency or Identification Concerns

Among other characteristics, this setting is distinguished from R6MABA and R6MBOA by lack of any surface fire. It is distinguished from R6NHHEgl by lack of hemlock and by physical site. Uncharacteristic conditions in this setting include infestation by exotic earthworms of European species that have affected or begun to affect soil conditions, herb/forb species representation, and tree regeneration (Hale et al. 1999). Habitat for the rare Great Lakes endemic fern, Botrychium mormo, is largely eliminated after worm invasion.

Scale Description

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

The most common disturbance extent could best be characterized as a single-tree or small-group gap-phase dynamic. Replacement events would have encompassed hundreds to thousands of acres. Patch sizes would generally conform to landforms on which they are found.

Issues/Problems

Several mapping issues need to be resolved. Areas in Minnesota are mapped as R6MABA or R6MBOA. This results in modeled surface fire disturbance where it didn't occur and longer disturbance rates than occurred historically in hardwoods adjacent to the prairie transition. In Wisconsin, setting is mapped as NHDW. In the northern Superior uplands section in Minnesota, the fire-replacement interval was more frequent (400 yrs), though this represents a small portion of the setting.

Model Evolution and Comments

Model is very similar to R6MABA model; however, it does not use surface fire and uses a longer replacement interval to reflect more mesic conditions than implied in MABA. John Almendinger, Ecological Services, MN DNR; Jim Barot, Chippewa NF; Mark White, TNC; Dave Shadis, Region 6, USDA FS.

*Succession Classes***

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

Class A 2 %

Early1 Closed

Description

Paper birch and aspen dominate areas disturbed by stand-replacement fires, but many other species are present, including yellow birch, bur oak, red oak, balsam fir, green ash, red maple, elm, white spruce, and white pine. Sugar maple (with basswood and ironwood present) dominate areas disturbed by wind. As stands age, paper birch and aspen continue to dominate the stands created by fire, but all the tree species listed here could be present. Sugar maple dominance would continue in areas disturbed by wind (0-35 years).

Dominant Species* and Canopy Position

ACSA3 Upper
POTR5 Upper
BEPA Upper
TILIA Upper

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☑ Tree

Fuel Model 5

Structure Data (for upper layer lifeform)

	Min	Max
Cover	30 %	95 %
Height	Shrub Medium 1.0-2.9m	Tree Short 5-9m
Tree Size Class	Seedling <4.5ft	

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

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

Class B 5 %

Mid1 Closed

Description

Aspen and paper birch continue to dominate. The composition of white pine and the other tree species increase in the canopy layer. The understory includes a diverse mix of shade-tolerant species such as balsam fir, sugar maple, and basswood. Sugar maple continues to dominate the areas disturbed by wind. (36-75 years).

Dominant Species* and Canopy Position

ACSA3 Upper
POTR5 Upper
BEPA Upper

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☑ Tree

Fuel Model 8

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	30 %	95 %
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:

Class C 6 %

Late1 Closed

Description

Aspen and paper birch are replaced by northern hardwood species and conifer species that live longer and can regenerate without a disturbance. Other species representation is variable by landscape. Sugar maple continues to dominate the areas disturbed by wind (76-120 years).

Dominant Species* and Canopy Position

ACSA3 Upper
TILIA Upper

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☑ Tree

Fuel Model 8

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	40 %	95 %
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:

Class D 87 %

Late2 Closed

Description

The areas previously disturbed are dominated by northern hardwood species with a scattered white pine supercanopy tree. Other species representation is variable by landscape. The fire origin stands have a larger component of light-requiring species such as white pine, bur oak, red oak, yellow birch and green ash, mixed with sugar maple and basswood. The wind-disturbed areas are dominated by sugar maple and basswood (121 years and greater).

Dominant Species* and Canopy Position

ACSA3 Upper
TILIA Upper

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☑ Tree

Fuel Model 8

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	40 %	95 %
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:

---

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

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: 5000
Min: 10
Max: 10000

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	1500	1000	2000	0.00067	97
Mixed					
Surface					
All Fires	1496			0.00069	

References

Brown, Terry and Mark White, 2001. Drift and Lake Plains: A comparison of Range of Natural Variation and current conditions. Prepared for Minnesota Resource Council. Unpublished report. University of Minnesota, Natural Resources Research Institute, Duluth, MN. 19 p.

Brown, Terry and Mark White, 2001. Northern Superior Uplands: A comparison of Range of Natural Variation and current conditions. Prepared for Minnesota Resource Council. Unpublished report. University of Minnesota, Natural Resources Research Institute, Duluth, MN. 19 p.

Frelich, Lee E., 1998a. Natural disturbance and variability of forested ecosystems in northern Minnesota. Prepared for the Minnesota Forest Resources Council and the National Forests in Minnesota. Unpublished report. 18 p.

Frelich, Lee E., 1998b. Natural disturbance and variability of forested ecosystems in northern Minnesota: A brief summary. Prepared for the Minnesota Forest Resources Council and the National Forests in Minnesota. Unpublished report. 4 p.

Frelich, Lee E., 1999. Range of Natural Variability in forest structure for the Northern Superior Uplands. Prepared for the Minnesota Forest Resources Council and the National Forests in Minnesota. Unpublished

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

report. University of Minnesota, Department of Forest Resources, St. Paul, MN, 13 p.

Frelich, Lee E., 2000. Natural Range of Variability estimates for forest vegetation growth stages of Minnesota's Drift and Lake Plains. Prepared for the Minnesota Forest Resources Council and the National Forests in Minnesota. Unpublished report. University of Minnesota, Department of Forest Resources, St. Paul, MN, 15 p.

Hale, C., L. Frelich and P. Reich, 1999. Unpublished. Research proposal concerning earthworms and population dynamics and diversity of native plant species. University of Minnesota. St. Paul, Minnesota.

MN Department of Natural Resources, 2003. Native Plant Communities of Minnesota.

USDA Forest Service, 2004. Forest Plan for the Chippewa National Forest. Milwaukee, WI.

USDA Forest Service, 2004. Forest Plan for the Superior National Forest. Milwaukee, WI.

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