

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):

R7ROPI

Rocky Outcrop Pine - Northeast

General Information

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

Modelers

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Vegetation Type

Woodland

Dominant Species*

PIRI

QUERC

ERICA

VACCI

General Model Sources

Literature

Local Data

Expert Estimate

LANDFIRE Mapping Zones

65

66

64

Rapid Assessment Model Zones

California

Pacific Northwest

Great Basin

South Central

Great Lakes

Southeast

Northeast

S. Appalachians

Northern Plains

Southwest

N-Cent.Rockies

Geographic Range

Scattered areas throughout New England and New York

Biophysical Site Description

This forest type occurred where geological formations formed rocky cliffs, outcroppings, and steep slopes, typically occurring at elevations between 800 and 2600 feet. The shrub layer may vary in composition with hydrology, with drier sites containing scrub oak and wetter sites (generally flat) containing more heaths. Granite substrate is commonly characteristic of these areas with soil depth > 20 cm. In the Shawangunks the substrate is composed largely of conglomerate and not granite.

Vegetation Description

On these depauperate soils and xeric growing conditions, pitch pine (*Pinus rigida*), red pine (*Pinus resinosa*), or jack pine (*Pinus banksiana*) often dominated the canopy, which varied from relatively open and patchy to woodland depending on time since disturbance, severity of conditions, and proximity to surrounding communities. Xerophytic oak species (*Quercus* spp.), especially northern red oak (*Quercus rubra* and *Q. alba*) and white oak with Chestnut Oak making up the major component, would also have shared growing space in the canopy with the pine. Occasional eastern white pine (*Pinus strobus*) may have co-existed with the other pines. Red maple (*Acer pensylvanicum*) and/or gray birch (*Betula populifolia*) may grow during early stages of these woodlands.

Some areas may have had a well-developed mid to lower heath (*Ericaceous* spp.) layer, particularly increasing with time since disturbance. Species may have included brushy mountain-laurel (*Kalmia latifolia*), Meadowsweet (*Spiraea alba* var. *latifolia*), blueberries (*Vaccinium* spp.) and rhododendron (*Rhododendron* spp.), mountain winterberry (*Ilex montana*), hobblebush (*Viburnum alnifolium*), blueberries (*Vaccinium* spp.), black huckleberry (*Gaylussacia baccata*), wild rasin (*Viburnum nudum* var. *cassinoides*) Ground cover may have included sedges (*Carex* spp.) and uncommon herbaceous plants. Rare deciduous

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

species, such as shrub oak (*Quercus illifolia*). Litter layers were usually light but can accumulate in older closed stands.

Disturbance Description

Fire Regime I or III. Maintained by disturbance and stressful conditions that prevent competing species from persisting. Rocky pitch pine communities have a mixed disturbance regime producing the seedbed conditions needed for regeneration. Pitch pine is fire-dependent and strongly fire-adapted, but may regenerate without fire. Both surface fires and stand replacement fires were likely common in this type, with mosaic, patchy effects. Shrubs as well as litter are both able to carry fire in classes C and D. Native Americans were considered a significant ignition source and more recently ignitions caused by blueberry pickers have had a similar effect on the landscape.

Ice and snow could be factors at elevation with extremely variable return intervals of 5-50 years. Gypsy moth may be a factor for tree oak mortality. Drought can also be a major factor in this vegetation type (Abrams, M. and D.A. Orwig, 1995).

Adjacency or Identification Concerns

The sandy outwash pitch pine woodlands are ecologically similar to the coastal pine barrens and are described in PIBA PNVG. The Southeastern Table Mountain/Pitch Pine PNVG is similar to this model, though this model includes northeastern species.

Scale Description

Sources of Scale Data Literature Local Data Expert Estimate

Patch sizes can range from a few acres to 300+ acres but typically are in the range of 10 to 50 acres. The patch sizes in the Shawangunks are greater than 500 acres.

Issues/Problems

Modern day forests at these sites have been subjected to fire suppression. Fire exclusion puts these communities at risk due to the limited ability of pitch pine to regenerate without fire. Pitch and jack pines can persist more frequent fires than red pine due to their ability to either sprout (pitch) or withstand low severity fires. Red Pine has less tolerance for frequent fires. When living on poor growing sites, such as these described as rocky outcrops, these pines tend to persist simply due to lack of competition. Railroad caused fires have probably had a significant influence on these areas.

Model Evolution and Comments

Suggested review by Diane Burbank dburbank@fs.fed.us, Jeff Lougee jlougee@tnc.org, Dr. Bill Patterson, University of Massachusetts, F. Brett Engstrom, University of Vermont, and Glen Motzkin, Harvard Forest

Peer reviewed by Michael S. Batcher, Ecologist, 04/05.

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

Patchy dense pine reproduction. Typically sparse understory. First few years after fire, shrub species dominate. The pines form a regeneration layer with 10-30% canopy closure. Ericaceous shrub species and oak species fill in beneath the pines. Fires occurring in this class are nearly always stand-replacing.

Indicator Species* and Canopy Position

PINUS Upper
 QUERC Upper
 VACCI Low-Mid
 All

Upper Layer Lifeform

- Herbaceous
 Shrub
 Tree

Fuel Model 5**Structure Data (for upper layer lifeform)**

	Min	Max
Cover	0 %	30 %
Height	Tree Regen <5m	Tree Regen <5m
Tree Size Class	Seedling <4.5ft	

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

Class B 10%

Mid1 Open

Description

Mid-development, open canopy. Woodland with herbaceous understory. Fires in this class are usually not stand-replacement, with both surface and mixed fires depending on season of burn. Surface fires maintain the class, while less frequent mixed fires return the stand to class A. Understory is fire-adapted ericaceous vegetation.

Indicator Species* and Canopy Position

PINUS Upper
 QUERC Mid-Upper
 ERICA Low-Mid

Upper Layer Lifeform

- Herbaceous
 Shrub
 Tree

Fuel Model 9**Structure Data (for upper layer lifeform)**

	Min	Max
Cover	10 %	25 %
Height	Tree Regen <5m	Tree Short 5-9m
Tree Size Class	Pole 5-9" DBH	

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

Class C 45%

Late1 Open

Description

Late-development, open canopy pine-oak to oak-pine in composition. Limited understory components. Surface, mixed, and stand-replacing fires all occur in this class. Stand-replacing fires set the stand back to class A; surface fire would maintain the class, and mixed fires would move the stand to class C. Understory consists of fire-adapted ericaceous vegetation.

Indicator Species* and Canopy Position

PINUS Upper
 QUERC Mid-Upper
 ERICA Low-Mid

Upper Layer Lifeform

- Herbaceous
 Shrub
 Tree

Fuel Model 9**Structure Data (for upper layer lifeform)**

	Min	Max
Cover	10 %	25 %
Height	Tree Regen <5m	Tree Short 5-9m
Tree Size Class	Medium 9-21"DBH	

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

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Class D 30%

Late1 Closed

Description

Late-seral, canopy closed in patches, pine with oak or other hardwood in overstory. In the absence of fire, pioneer herbaceous vegetation is often replaced by mountain laurel and/or other woody species and shrubs. In the absence of fire, herbaceous vegetation is eventually replaced by mountain laurel and/or other woody species. Gaps and other openings from overstory mortality are common. Fires occurring in this class are surface, mixed, and replacement fires with mortality dependent on fire intensity and seasonality. Surface fires would move the stand to D, mixed fires would maintain the class in E by removing pines and favoring oaks, and stand-replacement fires would set the stand back to A.

Indicator Species* and Canopy Position

QUERC Upper
PINUS Upper

Upper Layer Lifeform

- Herbaceous
- Shrub
- Tree

Fuel Model 9

Structure Data (for upper layer lifeform)

	Min	Max
Cover	25 %	65 %
Height	Tree Regen <5m	Tree Short 5-9m
Tree Size Class	Medium 9-21"DBH	

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

Class E 0%

Late1 Closed

Description

Indicator Species* and Canopy Position

Upper

Structure Data (for upper layer lifeform)

	Min	Max
Cover	25 %	60 %
Height	Tree Regen <5m	Tree Short 5-9m
Tree Size Class	Medium 9-21"DBH	

Upper Layer Lifeform

- Herbaceous
- Shrub
- Tree

Fuel Model 9

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

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Historical Fire Size (acres)

Avg:
Min:
Max:

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
Sources of Fire Regime Data					
<input type="checkbox"/> Literature	128			0.00781	16
<input type="checkbox"/> Local Data	65			0.01538	32
<input type="checkbox"/> Expert Estimate	40			0.025	52
	21			0.0482	

References

Abrams, M. and D.A. Orwig. 1995. Structure, radial growth dynamics and recent climatic variations of a 320-year-old *Pinus rigida* rock outcrop community. *Oecologia* 101: 353-360.

Batcher, M. 2000. Ecological Processes and Natural Communities of the Northern Shawangunk Mountains. Report Prepared for the Shawangunk Ridge Biodiversity Partnership.

Bernard, J. and F. Seischab. 1996. Pitch pine (*Pinus rigida* Mill.) communities in northeastern New York State. *American Midland Naturalist* 134: 294-306.

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.

Burns, R. M. and Honkala, B.H., tech coords. 1990. *Silvics of North America: 1. Conifers; 2. Hardwoods.* Agricultural Handbook 654. USDA, FS, Wash. DC. Vol.2, 877p.

Edinger, G.J., D.J. Evans, S. Gebauer, T.G. Howard, D.M. Hunt, and A.M. Olivero (editors). 2002 Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reshke's Ecological Communities of New York State (Draft for review). New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.

Hubbs, K. 1995. Fire History of the Northern Shawangunks. The Nature Conservancy, New York Regional Office, Troy, NY.

Laing, C. 1994. Vegetation and Fire History of the Dwarf Pine Ridges, Shawangunk Mountains, New York. Final report submitted to The Nature Conservancy. University of Massachusetts, Department of Forestry and Wildlife Management, Amherst, MA.

Motzkin, G, Orwig, D.A. And David R. Foster. 2002. Vegetation and disturbance history of a rare dwarf pitch pine community in western New England, USA. *Journal of Biogeography*, 29, 1455-1467p.

Olsvig, L.S. 1980. A Comparative Study of Northeastern Pine Barrens Vegetation. Unpublished Ph.D. thesis, Cornell University, Ithaca, New York.

Rees, C. 1997. Fire and *Pinus rigida* Rock Outcrop Communities of the Northern Shawangunk Mountains.

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

Graduate thesis submitted to Bard College, Annandale-on-Hudson, NY.

Thompson, E.H. and E.R. Sorenson. 2000. Wetland, Woodland, Wildland: a guide to the natural communities of Vermont. Vermont Department of Fish and Wildlife and The Nature Conservancy.