

Shawangunk Ridge Fire Learning Network – Homework #2

Landscape Description

In 1994, the Shawangunk Ridge Biodiversity Partnership defined the Shawangunk landscape roughly by physiographic and land use boundaries. The landscape boundary generally follows waterways (e.g. Walkill River, Roundout Creek and the Shawangunk Kill) or major roadways (e.g. Route 209) located in the valleys that surround the Ridge. The valleys are largely disturbed by agricultural and residential development and represent significant ecological barriers in most places. In addition, the valleys represent a transition between the characteristic fire-influenced vegetation of the Shawangunks and the surrounding areas that are dominated by more mesic hardwood forest communities (e.g. Catskill Mountains).

Table 1. Cover type descriptions

Conservation Targets	Chestnut oak forest	Dwarf pine ridge	Pitch pine-oak-heath rocky summit	Other, non-fire dependent targets (see below)
Community Size	Matrix	Large Patch	Large Patch	
Associated Community Types	Chestnut oak forest Ice Cave Talus Vernal Ponds	Dwarf pine ridge, dwarf shrub bog, highbush blueberry bog thicket, ice cave talus, pitch pine-blueberry peat swamp, sparse dwarf pine ridge, sparse pitch pine-oak-heath rocky summit	Pitch pine-oak-heath rocky summit, pitch pine-heath rocky summit, scrub oak rocky summit, heath rocky summit	
General Species Composition	<u>Tree</u> : Chestnut oak, red oak with some red maple and white oak <u>Shrub</u> : Black huckleberry, mountain laurel <u>Groundlayer</u> : Pennsylvania sedge, wild sarsaparilla, wintergreen, pin cushion moss	<u>Tree</u> : Dwarf pitch pine <u>Shrub</u> : black huckleberry, with-with-rod, black chokeberry, gray birch, low-bush blueberry, sheep laurel, Canada dogwood <u>Groundlayer</u> : wintergreen, Canada mayflower, cow-wheat	<u>Tree</u> : Pitch pine with some chestnut oak <u>Shrub</u> : black huckleberry, scrub oak, low bush blueberry, mountain laurel <u>Groundlayer</u> : tufted hairgrass, cow-wheat, wintergreen, Pennsylvania sedge, little bluestem	
Structure	Somewhat fire-suppressed forest. Canopy and shrub layer densities exceed desired conditions in some places. No oak regen.	Fire suppressed pine barrens with uncharacteristically tall and dense dwarf pine and heath layers.	Fire suppressed pine barrens with dense ericaceous shrub layer.	
Mgmt Status	Fire suppression. No current ecological mgmt	Fire suppression. No current ecological mgmt	Fire suppression. No current ecological mgmt	
Biophysical environment	Occurs at all elevations throughout the Ridge	Occurs at higher elevations on flat-topped summit of the Ridge on thin soils with thick organic layer	Occurs at high and mid-elevations on thin soils with thick organic layer.	
Natural Fire Regime	Primarily spring or summer fires every 25-50? years. Low-moderate intensity and severity.	Primarily spring or summer fires every 5-25 years. Intense with moderate-to-high severity.	Primarily spring or summer fires every 5-25 years. Moderately intense and moderately severe.	

Other, non-fire dependent targets/cover types include the following large and small patch communities: Appalachian oak-hickory forest, Appalachian oak-pine forest, Beech-maple mesic forest, Hemlock-northern hardwood forest, northern hardwood forests, vernal pools, acidic talus slope woodland, cliff communities, exposed bedrock/talus, floodplain forest, hemlock-hardwood swamp, natural lakes, red maple-hardwood swamp, sedge meadow/emergent marsh and shrub swamp. Although these communities may not depend on fire at regular intervals, it is likely most, if not all of them have been influenced to varying degrees by infrequent fires (>every 100 years)

Management Goals and Challenges

Current and desired future conditions

A report completed on behalf of the Shawangunk Ridge Biodiversity Partnership suggests relatively little change in the spatial distribution of the natural communities of the has occurred during the past 300 years. Most of the observed change occurred in smaller patches and along edges of larger patches and were almost always in the direction of increased tree cover. Historic photos clearly illustrate that the vegetation structure is also generally more dense than 100 years ago.

Table 2. Quantification of current and future desired conditions

Conservation Target/Cover Type	Chestnut oak forest	Dwarf pine ridge	Pitch pine-oak-heath-rocky summit
# acres (% study area)	25,655 (29%)	2,000 (2%)	5,890 (7%)
Range in desired future acres	22,000-27,000	2,000-2,500	5,000-7,000
General dominant structure(s) (CURRENT)	Primarily oak overstory cover >50% with tree subcanopy (mostly maple) up to 60% cover. Mixed shrub layer reaching nearly 100% in many places. Groundlayer species richness is low. No oak regeneration, white oak drastically reduced by historic logging events.	While a gradient in structure exists, two variants characterize the extremes of the dwarf pine ridge community. 1. <u>Dwarf pine ridge</u> : Dwarf pines >6' tall, nearly 100% canopy cover. Emergent hardwoods 5-20% cover. Heath shrub layer nearly 100% cover. Bare ground <5%. 2. <u>Sparse Dwarf Pine Ridge</u> : Dwarf pines 4-8'tall, <70% cover. Emergent hardwoods <5% cover. Heath shrub layer <70% cover. Bare ground >=50% cover	Total canopy cover >50% consisting of pitch pine 10-20% and oak/mixed hardwoods. Dense ericaceous understorey (>75%). Groundlayer diversity poor.
General dominant structure (s) (DESIRED)	Primarily oak overstory cover 30-70% with oak tree subcanopy cover 10-50%. Increase groundlayer diversity, oak recruitment and white oak composition.	1. <u>Dwarf Pine Ridge</u> : Dwarf pines 2-5' tall, 50- 90% canopy cover. Heath shrub layer <50% cover. 2. <u>Sparse Dwarf Pine Ridge</u> : Dwarf pines 3-6'tall, <70% cover. Heath shrub layer <70% cover. Bare ground/nonvascular cover >=50%	Total canopy cover 30-70% consisting of pitch pine and oak/mixed hardwoods. Ericaceous understorey cover 30-70%. Increase groundlayer diversity and oak recruitment.
Embedded Targets	See Table 1 for associated communities. <i>Apharetra dentata</i> , <i>Crotalus horridus</i> , <i>Zale curema</i>	See Table 1 for associated patch communities. <i>Apharetra dentata</i>	See Table 1 for associated patch communities. <i>Apharetra dentata</i> , <i>Crotalus horridus</i>

Since the vegetation community spatial distribution has changed relatively little, fire management efforts will focus on restoring the natural range of variation in community structure rather than creating shifts among community types. Table 2 describes the current and desired future conditions for the extent and structure for each fire-dependent conservation target/cover type. The Nature Conservancy recently received funding to support the completion of an Ecological Integrity Assessment (EIA) in cooperation with partners from the ecological fire management and fire suppression communities.

Through a series of three workshops, partners will use the EIA format to quantify the range of variation for a suite of key ecological factors for the dominant New York pine barrens communities and matrix communities at three priority sites. In addition, the EIA process will standardize measures of success and identify key management strategies. The New York pine barrens EIA's will vary somewhat from TNC's strict definition of an EIA in that they will address ecological social and physical indicators for success (not just ecological). These workshops will also help build consistency and support among the ecological fire management and fire suppression communities in New York State.

Assumptions, difficulties, data gaps and barriers

Based on recent planning efforts by the Shawangunk Ridge Biodiversity Partnership, approximately 30,000 acres of the 90,000 acres in the northern Shawangunks need to burn with a fire return interval of 5-50 years. On October 3 and 4, representatives from The Nature Conservancy, NYS Department of Environmental Conservation, NYS Office of Parks, Recreation and Historic Preservation and a local fire department attended a field trip to discuss challenges and strategies for implementing a successful fire management program in the Shawangunk Mountains. Based on our discussion, the top two challenges for going to scale include:

1. Institutional constraints, including lack of internal/TNC understanding and support at the state and division level for developing a successful fire management program and similar constraints among potential partners.
2. Lack of adequate resources for planning and implementation.

We also recognized the need to gather and document the sources used to predict the anticipated species, fuel and natural community responses and to implement a monitoring program to measure changes in fuel loads and species responses. This information will largely be defined by the Ecological Integrity Assessment and will be essential to maintaining the support of state and other partners. Skepticism among important partners currently exists regarding whether fire will achieve the desired goals. We have been told that monitoring is needed to maintain long-term support. See the attached table for a full list of the challenges and strategies identified during the October workshop.

Non-spatial desired future conditions include site specific and state-wide factors, such as:

- Involvement of state representatives and local fire departments in prescribed burns.

- A better understanding and increased use of natural and existing barriers for fire suppression.
- Stronger relationships with State agencies which benefit fire management in other parts of New York.
- Demonstrated success in “going to scale” to foster TNC support for fire management,.
- Increased support for prescribed burning from the communities that surround the ridge.

Table 4. **Community values** that influence future conditions. A rating system has yet to be determined.

<i>Community Values/Concerns</i>	<i>Rating</i>
Maintaining access for recreational use	
Aesthetics associated with “charring the landscape”	
Maintaining the blueberry and huckleberry crop	
Maintaining the rare natural communities – there is some belief that due to the long absence of fire, we may use the natural communities if an overly intense Rx or wildfire occurs	
Protecting the historic blueberry picker’s camps	
Reducing wildfire risk	
Potential adverse impacts to wildlife	

Management Strategies and Immediate Priorities

Based on the assumption that the structure of fire-dependent communities in the Shawangunks is more “out of whack” than their spatial distribution, changes *within* specific cover types were considered rather than effects of management on creating changes *among* cover types. Specifically, three “management scenarios” were evaluated for the dwarf pine ridge community using a computer simulation model, VDDT (Vegetation Dynamics Development Tool):

1. Determination of the historic fire regime (Historic Range of Variation) needed to maintain the desired conditions for the dwarf pine ridge community.
2. Implement Moderate Ecological Management, including prescribed fire, mechanical thinning followed by fire and fire suppression
3. Continue with the Current Fire Suppression Approach

Table 5 highlights the key assumptions for each management scenario and conclusions regarding their effects on the the dwarf pine ridge. Other cover types were not modeled due to time constraints.

Non-spatial strategies: Based on the October 3-4 workshop mentioned earlier, a number of non-spatial strategies were identified. A complete list of strategies identified are included in the attached table. Highlights include: develop an outreach program, establish a successful site-based program to leverage fire management needs across New York State and the NE/Caribbean Division, implement a monitoring program, hire staff dedicated to only fire management planning and implementation and work with NYSDEC to determine the most efficient process for public review of fire management plans.

Table 4. Assumptions and conclusions for different management scenarios in the dwarf pine ridge community of the Shawangunk Ridge.

Management Alternative	Assumptions	Conclusions
Historic Range of Variation	<ul style="list-style-type: none"> - Fire suppression absent - Moderate to high severity fires are needed to restore open DPR - DPR always experience high intensity burns (crown fires) - Later successional stages (characterized by hardwood invasion) experience fires with mixed severity and intensity 	<p>a fire return interval of no more than 10 years is needed to maintain dwarf pine ridge (DPR) variants at the desirable levels:</p> <ul style="list-style-type: none"> - Open DPR cover 50-80% - Closed DPR cover 20-50% - DPR/Mixed hardwood <20% cover - Mixed hardwood = 0% cover
Moderate Ecological Management	<ul style="list-style-type: none"> - Fire suppression occurs - Mechanical thinning followed by fire, and low severity Rx fires are primary mgmt tools - Approximately 200 acres treated annually (with wildfire, Rx fire, thinning/fire) 	<p>With 200 acres treated annually (aggressive by NY's current standards), we will lose the DPR. This loss is slow (50% reduction would take >200 years), providing time to change NY's perception of aggressive fire management</p>
Fire Suppression	<p>Active fire suppression reduces fire return interval to every 50 years or less frequent</p>	<p>If we continue with current fire suppression actions, we will lose 90% of the DPR in approximately 75 years.</p>

Describe 3-year action priorities:

1. Complete internal/TNC fire management plan to provide clear short- and long-term guidance to TNC's overall Shawangunk Ridge Fire Management Program.
2. Prepare prescriptions for a suite of research burns in each of the priority conservation targets/cover types. Starting with research burns will expedite state review and approval of individual burn plans so we can get fire on the ground sooner. Research burns will also provide information needed to eventually gain the full support of state and fire department officials for a full fire management program at scale).
3. Hire one staff person dedicated to fire management planning and implementation in the Shawangunk Ridge.
4. Develop priority outreach materials and conduct essential public outreach regarding the research burns and ecological fire management.
5. Conduct the first research burns in a visible location and in a location that ensures a safe and effective prescribed burn can be conducted (e.g. in the dwarf pine ridge along the shores of Lake Maratanza and in the pitch pine-oak-heath rocky summits surrounded by carriageroads in Minnewaska State Park Preserve).
6. Implement a monitoring program.

3-year prioritization criteria:

1. Guidance from the NYS Department of Environmental Conservation, fire department officials and local public regarding how we should proceed to maintain long-term support for fire management (e.g. conduct research burns to demonstrate success then build up to "scale").
2. The need to build staff and equipment capacity to adequately address/support the needs of a successful fire management program.