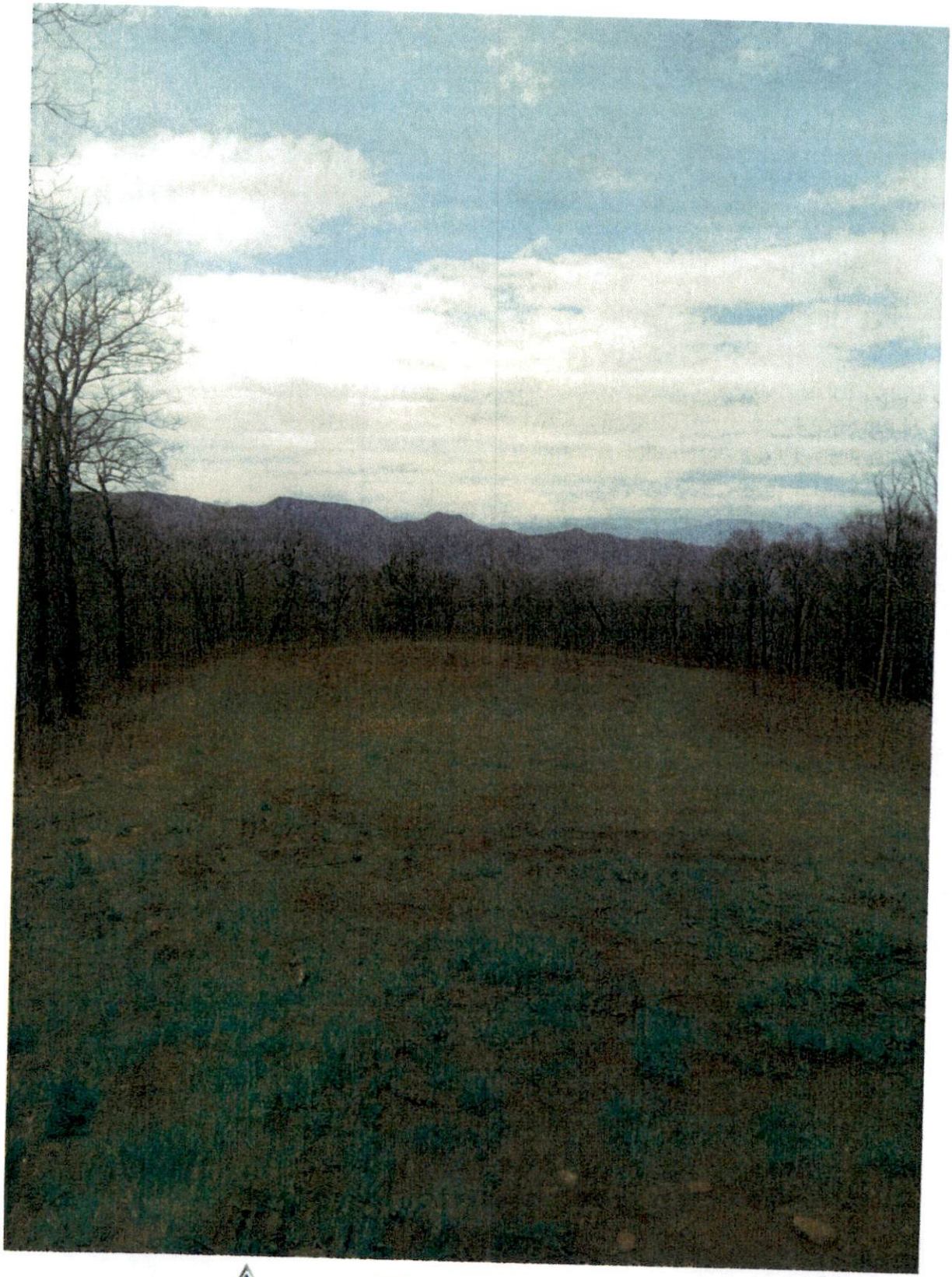
Forest Stewardship Plan for the Lickstone Ridge Project Area

EBCI – Tribal Reserve



EcoForesters.org

Forestry. Conservation. Education.

Updated:
April 2026, Version 2.1

EcoForesters.org
Forestry. Conservation. Education.

TABLE OF CONTENTS

1| INTRODUCTION AND LANDOWNER OBJECTIVES 1
2| PROJECT AREA & NATURAL RESOURCE SUMMARY 1
2.1 Project Area Description & Summary 1
2.2 Management History 2
2.3 Invasive Species 2
2.4 Forest Ecology & Wildlife Habitat 3
3| STEWARDSHIP OVERVIEW 6
3.1 Stewardship Plan Summary 6
3.2 Management Unit Recommendations 8
3.3 General Recommendations 11
4| NATURAL COMMUNITIES, RESOURCES & STEWARDSHIP 14
Forest Type #1: Montane Oak-Hickory Forest (48 acres) 14
Forest Type #2: Northern Hardwood Forest (45 acres) 18
Forest Type #3: Chestnut Oak Forest (40 acres) 20
Forest Type #4: Acidic Cove Forest (26 acres) 24
Forest Type #5: Wildlife Openings (15 acres) 27
5| HELPFUL LINKS 31

6| GLOSSARY OF FORESTRY TERMS 34

Appendix A: Maps

Location Map
Contour Map
Management Unit Map
Stand Map
Slope Map
Canopy Height Map
West side Early Successional
East side Early Successional

1| INTRODUCTION AND LANDOWNER OBJECTIVES

In the spring of 2023, EcoForesters conducted a forest assessment of the approximately 174-acre project area on Tribal Reserve Land owned by the Eastern Band of Cherokee Indians located in outside of Cherokee, NC (see Location Map, Appendix A) to create a forest stewardship plan. The purpose of this plan is to map and describe the general forest condition and set forth management actions that will improve the forest based on the landowner's objectives.

1. Maintain and/or increase biodiversity, improve habitat for wildlife, and protect rare & unique species.
2. Conduct ecologically-based management to improve the health and vitality of the forest ecosystem.
3. Protect and improve water and soil quality.
4. Maintain and improve the forest's recreation.
5. Maintain aesthetic appeal.

2| PROJECT AREA & NATURAL RESOURCE SUMMARY

2.1 Project Area Description & Summary

Location, Terrain & Access: The project area is located within the Southern Blue Ridge ecoregion and is part of Lickstone Ridge and its eastern side slope consisting of various microtopography including ridges, shoulders, midslopes, coves. The generalized aspect (direction-facing) is south facing, with various slope aspects to the various slopes and microtopography. This project area has been previously defined by its ease of access and less-severe slopes, both factors in practical forest management. The slope steepness typically ranges from gentle to moderate (10-45% slope). Steeper slopes can be found, along some streams and cresting Lickstone Ridge (see Slope Map, Appendix A). The elevation ranges between 4660 and 5240 feet. This area consists of forested slopes and wildlife openings (see Stand Map, Appendix A). A few old logging or tractor roads exist and are in very rough or unpassable condition. They will require maintenance/re-establishment to be used for future forestry or wildlife management operations. Existing roadbeds should be used as much as possible before establishing new roads.

Forest, Water & Soils: This project area consists of four main forest types (see Table 1 and Section 4, Natural Communities, Resources, and Stewardship). The diversity of forest types is due to a variation in topography, soils, and aspect. The soils vary from more productive in coves and bottomlands, to rocky and more nutrient-poor on upper slopes with convex topography (see Soil Reports and Soil Map, Appendix B). The multiple streams are tributaries to the Soco Creek which is within the Little Tennessee River watershed.

Table 1: Forest Types of the Project Area

Forest Type*	Acres
1. Montane Oak-Hickory	48
2. Northern Hardwood	45
3. Chestnut Oak	40
4. Acidic Cove	26
5. Wildlife Openings	15
TOTAL:	174

* To classify forest types, EcoForesters uses the ecological community classification system based on the North Carolina Natural Heritage Program's Fourth Approximation of Natural Community Types. (http://cvs.bio.unc.edu/pubs/4thApproximationGuideFinalMarch2012.pdf

2.2 Management History

This project area is part of the ancestral homeland of the Indigenous Cherokee people. Currently it is part of the Tribal Reserve owned by the Eastern Band. Access is allowed to all enrolled members. Past land use has occurred including recent creation / management of wildlife openings throughout the forest.

2.3 Invasive Species

Non-Native Invasive Plants: No infestations of non-native invasive plants were found throughout the project area. However, sites of higher disturbance such as wildlife openings, along old roads, field to forest ecotone (edge), and disturbances (natural; wind sheared trees, blow down, ice damage OR manmade; further clearings, daylighting roads, etc.) should all be monitored for possible future infestations.

Non-Native Invasive Insects: The Hemlock Wooly Adelgid (HWA) has decimated hemlocks in the southeast including this and surrounding properties. It is a small insect introduced from Asia that feeds on the base of hemlock needles significantly damaging the tree's health. Over a period of 5-10 years, the HWA can kill mature hemlocks. While most hemlocks have already been impacted and have died, some trees have showed slower decline possibly due to isolation from larger stands.

Similarly, several ash trees were also observed on site. Ash trees are currently under attack from the Emerald Ash Borer (EAB) across the southeast. Perhaps due to the high elevation and isolation from larger communities of ash in moister mid-to-low elevation environments, many ash species observed appear to yet be affected by this invasive insect. It is optional to treat trees still in good health. Early treatment is key because it may already be too late to treat trees showing signs of decline from EAB.

The loss of ash and hemlocks in this area is the result of the continued introduction of non-native pests and diseases into forests around the world. The process of occasional tree death is natural and contributes greatly to the process of stand dynamics. It creates canopy gaps for advanced tree regeneration to grow into and provides standing dead wood for wildlife that eventually falls to become coarse woody material. However, the loss of an entire species over the forest landscape is not natural.

2.4 Forest Ecology & Wildlife Habitat

Forest Ecology & Succession: The overall condition, and ecological process, of these stands are due to other factors including forest condition, health, slope position, elevation, aspect, and closed canopy. The majority of this area is generally south facing and is high elevation. Due to the location these forest types should be expected to receive greater amounts of precipitation, be subjected to more winter weather and greater wind forces yet should be considered drier than the north facing side of the same mountain chain.

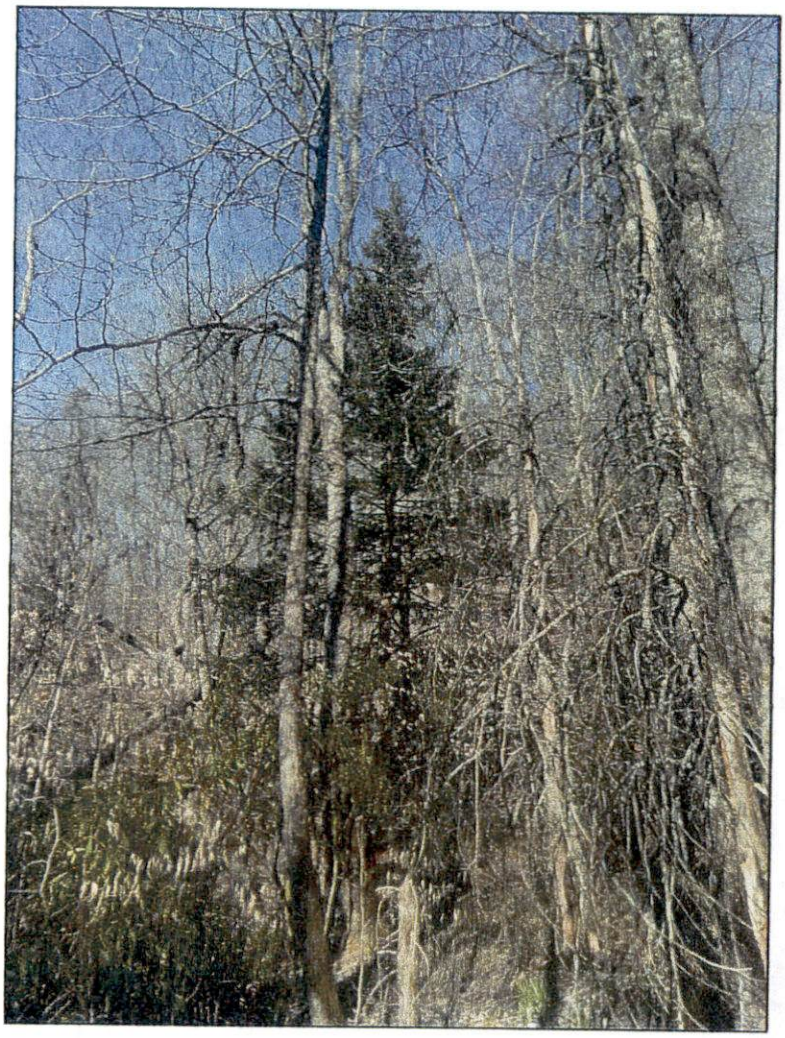


Photo #1: Many suppressed red spruce found in the midstory. located in Stands 3.1, 4.2 & 5.1

These forested stand are all uneven aged, due to past land history use and management. This area is currently in an understory re-initiation phase of forest succession. The trees will continue to grow, forcing some individuals out of the canopy through competition. In several decades, some of the largest of the trees will begin to decline in place or by falling which creates canopy gaps, allowing the growth of a younger age class of trees. The presence of younger trees creates multiple age-classes which sustains structural and biological diversity. The increase of sunlight unto the understory allows them to advance towards the overstory. However, the partial light conditions will promote primarily shade-tolerant trees (exs. maple species, birch species, buckeye, silverbell). Shade-intermediate and -intolerant species (such as oak species, black cherry, red spruce, basswood, yellow-poplar, can be outcompeted well in such conditions. In the acidic coves, and other areas of dense rhododendrons, deep cover and deep shade are impeding advanced regeneration. Where eastern hemlocks have died, additional sunlight has become available for advanced regeneration. Sometimes younger trees are able to become established, though mostly they are shade tolerant species (ex. yellow birch). More often, the communities of rhododendron groves gain the advantage and increases its establishment, reducing the efficacy for advanced regeneration to move into the midstory and beyond.

The wildlife openings are prime examples of early successional habitat. This stage of forest succession is ideal for management objectives and is essential for a myriad of wildlife species. This forest succession

stage requires a regular series of disturbances to maintain the early successional component and prolong its successional transition into the stem exclusion stage.

Wildlife Habitat: Wildlife requires food, water, shelter, and breeding habitat. Our management recommendations also benefit wildlife. A diversity of wildlife habitat is represented in this project area from the multiple distinct forest types, open areas, and multiple streams. The amount of available browse will be greatest in the wildlife openings, along disturbed edge, and around large canopy openings where mature trees have fallen. This is due to the increase in sunlight to the forest's edge increasing advanced tree regeneration and forcing shrubs to re-sprout while increasing berry production and the abundance of herbaceous plants. This habitat provides shelter and food for wildlife. Snags (dead standing trees), and coarse woody material are important for wildlife, as well as fungal communities. These can provide important habitat for birds, small mammals, and amphibians.

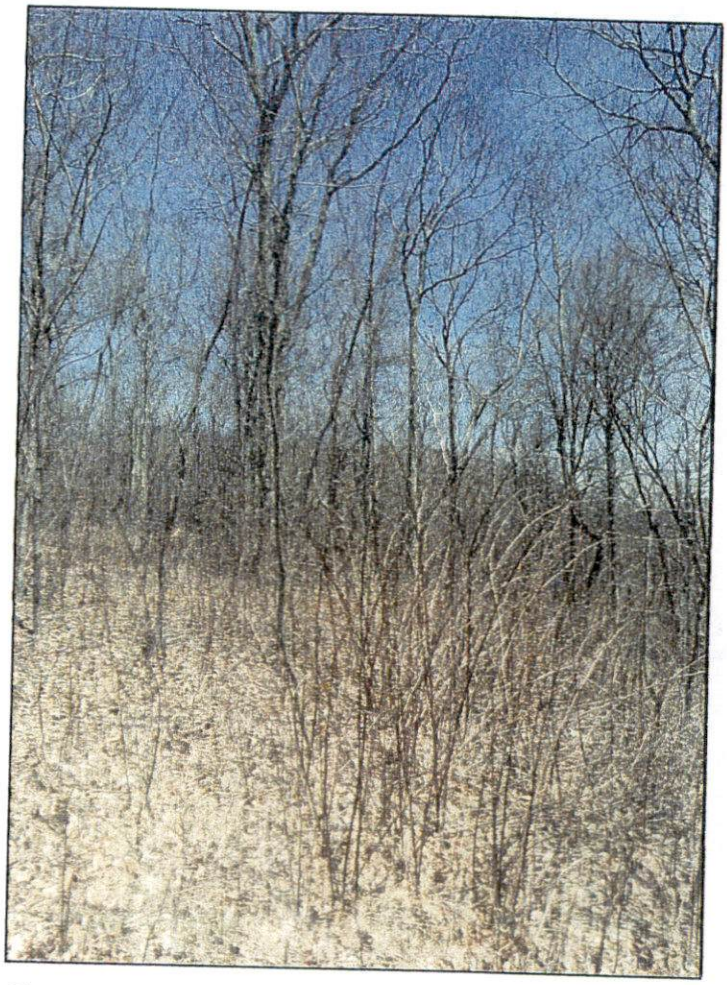


Photo #2: Early successional habitat in the project area

The woods surrounding springs, branches, and creeks, also provides critical habitat for wildlife. Numerous species are dependent on these buffer zones as their proximity to water creates habitats ideal for many insects, amphibians, mammals, and birds. It is essential to maintain relatively undisturbed buffer zones between the surface water and the upland forest types. Healthy riparian areas are crucial for maintaining good water quality as they provide a filter for pollutants such as nutrients and sediment.

Early successional habitat (i.e., meadows or very young forests) have previously been established in the wildlife openings (see Stand Map in Appendix A). As such habitats provide shelter and food sources for wildlife, they also increase wildlife diversity and abundance. Additionally, forests with over-mature trees, snags (dead standing trees), and coarse woody material are important for wildlife, as well as fungal communities. These can provide important habitat for birds, small mammals, and amphibians. Because of their structure, and sometimes hollow insides, old-growth trees can provide important nesting and denning habitat for numerous wildlife species. Over many decades as the forest matures, more of this oldgrowth habitat will develop. As large trees die, additionally valuable wildlife habitat is created in the form of large snags and downed coarse woody material. The openings caused by large fallen trees also create more diverse structure, creating valuable habitat and browse for many species.

This project area is connected to a larger section of unfragmented forested land through EBCI's own Tribal Reserve, the National Park Service's Blue Ridge Parkway & Great Smoky Mountains National Park providing wildlife corridors ensuring a variety of species' ease of travel. Such connectivity to larger blocks of public or conserved land increases the ecological value, substantiates its importance to the greater area, and may help attract a variety of species. Observation, or signs of wildlife, included eastern cottontail rabbit, wildcat, grey squirrel, deer, elk, ruffed grouse, turkey, crows, woodpecker, dark eyed Junco & other numerous song birds, salamanders, and butterflies & other flying pollinators.

3| STEWARDSHIP OVERVIEW

3.1 Stewardship Plan Summary

In consideration of the forest management history, current conditions, and the landowner's objectives, EcoForesters, in consultation with the landowner, suggests the management actions as follows. Tables 2-3 will serve as a summary of the forest conditions and management recommendations which will be put forth and further described, by Forest Type, in Section 4: Natural Communities, Resources & Stewardship.

Table 2: Management Actions by Forest Type

Management Unit / Forest Type	Suggested Management Action	Target Date	Recommendation Execution Level
Mgt Units D & LCBR	Improve / Maintain Forest Roads for Management Access and Soil & Water Conservation	2023-2028	Highest*
Mgt Units A,B,C,D & LCBR	Maintain Wildlie Opening	As soon as Accessible (2023-2028)	Highest*
Mgt Units B Ext., E F	Create New Early Successional Habitat Corridor Connectivity	2023 - 2038	High*
Mgt Unit LCBR	Cull Tree Removal for Golden Wing Warbler Habitat	2023-2033	High*
Mgt Units G & H (Stand 1)	Midstory Reduction (+ Heath Shrub Reduction)	2028-2033	Medium*
Mgt Units G & H (Stand 1)	Oak Release Treatment (Cull Tree)	4-7 Years ***AFTER*** Midstory Reduction	Medium*
Mgt Units A, B, C, D & LCBR Stands 1, 3.1, 3.2	Prescribed Fires at Appx 3 - 7-yr Intervals	Whenever possible	High -Medium*
Mgt Unit I	Red Spruce Release (Crown Thinning)	2023 - 2038	Medium*
Mgt Unit I	Plant Red Spruce Seedlings	2023 - 2038	Optional (Low)*
Stands 2, 3.1, 3.2, 4.1, 4.2	Free Thinning for Diversity	2033-2043	Optional (Low)*
Entire Project Area	**Reassess** Project Area and Update Plan.	2033	Highly Recommended*

*Cost-share funding available. See Funding & Financial Assistance info below.

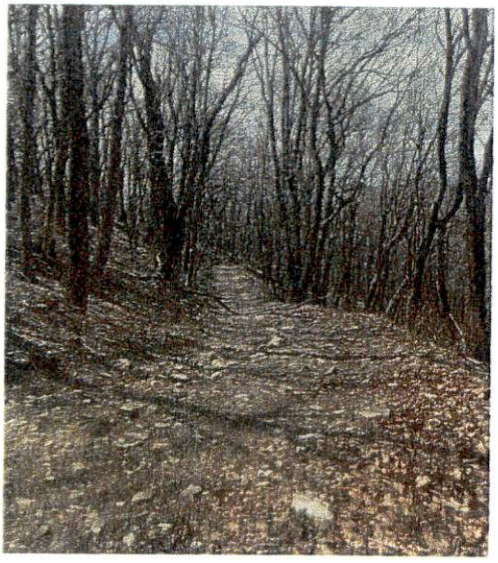
Table 3: Basal Area* (sqft) per acre by diameter class (DBH) and Forest Type

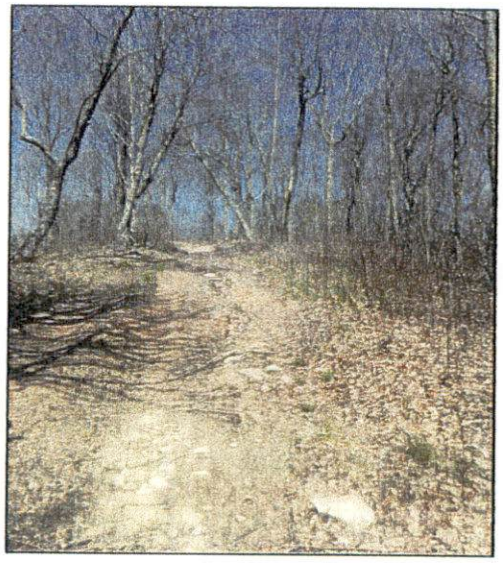
Forest Type	<4"	4-8"	8-12"	12-16"	16-20"	20-24"	>24"	Total BA	Acres
Montane Oak-Hickory	0	20	18	30	30	34	4	136	48
Northern Hardwood	0	13	17	43	40	37	17	167	45
Chestnut Oak	0	18	18	38	33	13	3	120	40
Acidic Cove	0	20	23	33	33	13	10	133	26
Wildlife Opening (LCBR)	0	0	3	37	13	13	0	87	12

*Basal area is defined as the cross-sectional area of a tree at 4.5 ft (breast height). It is a common term that is used to describe tree density of a stand.

***Funding & Financial Assistance:** Financial assistance is available for many of the recommended forest improvement actions that are beneficial for the ecological and economic health of the forest. These include:

USDA-NRCS Environmental Quality Incentive Program (**EQIP**): Cost-share funding for forest stewardship actions, road maintenance, forest stand improvement (FSI) work, and prescribed fires, may be available through the NRCS EQIP program. For more information, please see *NRCS-Environmental Quality Incentive Program (EQIP) Take Home Points & Practices* in Appendix D.





Photos # 3 & 4: Degraded forest roads are impeding access and lowering soil and water quality. These two roads can be found in Stands 5.1 (left) and 5.2 (right)

3.2 Management Unit Recommendations

The EBCI Natural Resources Department has their own lettering system for wildlife openings. This updated plan will accept the use of the lettering system, any additional areas for management recommendations (from EcoForesters) will continue the lettering system. Further updates of the system may be required as mgt units / wildlife openings change or expand. However, attached maps to this plan should be referred to for clarification. Further details of practices found below can be found in Section 3.3 General Recommendations.

Management Units A (1ac), B (1ac), C (1ac), D (2.5ac) & LCBR (11ac) Existing Wildlife Openings

Recommendation #1: **Manage Wildlife Openings:** Establish a mowing routine / prescribed burning practices to maintain the wildlife opening. Small and dense brush may be appropriate for habitat, food and cover. Herbaceous species can be established / enhanced by seeding, routine management, and by reducing woody competition.

Additionally: LCBR may benefit from crown thinning to improve habitat for golden winged warbler.

Recommendation #2: **Forest Road Improvement:** Access by existing roads is limited or impossible due to the condition of the road for Mgt Units D & LCBR. In many cases deep rutting and erosion has occurred and the path may be impassible by utility vehicles to service and maintain the wildlife openings. Improvements to this forest road may include, but are not limited to, regrading, installation of water bars, addition of gravel, re-routing the path, and installing rolling dips where applicable.

Management Units B Ext. (2.5ac), E (2.5ac) & F (3.5ac) Projected Future Early Successional Habitat – Connectivity & Corridors

Recommendation #1: **Additional Early Successional Habitat:** Prior methods to create wildlife openings have included mechanical site preparation to remove many large trees and stumps using heavy machinery.

Between existing wildlife openings / management units B & C, the road that connects them has gentle topography on either side (and more to the south side of the road). This area could be cleared and/or daylighted to create additional "open space" habitat, increase connectivity, and would create early successional habitat, connecting units B and C. This would create approximately 4.5 acres of connected Early successional habitat, and allow for a reset of the canopy overstory across the 2.4 acres of Unit B Ext. to support the regeneration of the preferred mix of tree types, including a variety of oaks and hickories.

For Management Unit E; there is an existing soil road that runs along the ridgeline from the northern end of wildlife opening / management unit D. This soil road can be daylighted (removal of trees and woody shrubs) on either side to increase sunlight and create an additional corridor that leads the Blue Ridge

Parkway. The width of the daylighting will vary and should be dependent on the slope severity and safety to daylight / maintain this opening.

An existing soil road (that comes off of BIA 434, briefly begins in Stand 4.2, and crosses into Stand 1) may be used, with improvements, to get heavy machinery to the northern portion of Stand 1 (where the is a small knoll, with gentler topography) to create Management Unit F. This could be another key area to consider for creating additional early successional habitat. Careful planning and consideration should be given prior to any disturbance on steeper side slopes as it may increase soil and water degradation if not carefully planned and executed. Proper creation of access road may be another obstacle in converting the entire management unit (or the greater majority) due to slope steepness and ensuring proper water diversion methods can be sustained. Another option for access may be to come down from the soil road that will be daylighted in Mgt Unit E, and quarter downslope. Both options may be used for continuous roads / future firebreaks for ongoing forestry purposes.

It is highly recommended to consult with US F&WS and NCWRC prior to any major tree removal and ground disturbance as there are many key habitats and possibly endangered or highly threatened plant or wildlife species that occur in this area.

Management Unit G (4 acres) & Management Unit H (2 acres)

Recommendation #1: **Midstory Reduction:** Cultivate oak species in the mid-and-understory by thinning the midstory. All species, with the exception of desired species (exs. white oak and northern red oak) up to 10 inches in diameter should be culled. This can be done by girdling with herbicide, basal bark spray, or felling and treating the cut stump with herbicide.

Recommendation #2: **Prescribed Fire:** Conduct routine prescribed fires (in conjunction with the Midstory Reduction) to reduce woody debris, flush herbaceous / vegetative growth, and to reduce competition of desired midstory species.

Recommendation #3: **Oak Release Treatment (Cull Tree):** After conducting a midstory reduction, the desired midstory trees will not continue into the overstory unless they are released from nearby competition trees. The overstory trees must be removed to allow these midstory trees to continue into the overstory. If the overstory remains a closed canopy, the midstory trees will begin to decline and lose their form, habit, and vigor. Selective removal involves a release treatment approximately 4-7 years after the midstory reduction, assuming desired regeneration is present (commercial or non-commercial) by means of girdling (with herbicide), hack-and-squirt, or basal bark herbicide treatment.

Management Unit I (6 acres)

Recommendation #1: ***Red Spruce Release (Non-Commercial Crown Thinning):*** In this small management unit many red spruces were documented and a ruffed grouse was heard drumming and was later flushed. Red spruces in the overstory and midstory should be crown thinned. If competing trees are not a hard mast producing species, any tree that is overtopping or competing at the same canopy class should be culled. By culling competitive adjacent trees, increased sunlight should reach the spruces' crown. Increasing vigor and cone production (an essential wildlife food source).

Recommendation #2: ***Red Spruce Seedling Plantings (Optional):*** Additional spruce seedlings could be planted on this management unit to enhance / sustain the red spruce component. Additional spruce seedlings would require a non-commercial release to allow them to move into the canopy. This could be timed to coincide with the Recommendation #1 found above, but the most optimal technique would be to perform a red spruce release for existing trees, followed by planting of additional spruce seedlings, which later should be followed by an additional release to free all spruce (natural and planted) after planting the seedlings. The timing of when to schedule the second thinning could range from 2-15 years, which is quite broad. If seedlings are planted, and annual observation / inventory should be conducted which will help to narrow down a time frame of when to thin based on seedling health, height, and competition.

3.3 General Recommendations

Recommendation #1: ***Forest Road Improvement / Maintenance (Erosion Mitigation)*** *[Highest⁺]* There is significant erosion occurring along some of the forest roads (see Photos # 3 & 4) which is impacting the nearby streams. Water diversions and control structures (like broad-based dips, water bars, or slope reversals) should be installed to slow the erosion and improve access. We recommend consulting with a professional engineer regarding road improvements and maintenance.

Recommendation #2: ***Prescribed Fire*** *[High⁺]*: Conduct prescribed fires to promote fire-intolerant vegetation, encourage wildlife, and to enhance forest health in the drier forest types (Montane OakHickory, Chestnut Oak, & Wildlife Openings). Potential damage to timber quality and value is a possibility. Although such burns would still be beneficial for wildlife and forest health. Prescribed fires can help diversify forest composition by improving growing conditions for shade intermediate-and-intolerant species such as oak, cherry, and spruce species; as well as promote structural diversity, and as a result, improve wildlife habitat and forage. In addition, these fires can help reduce the abundance of fuels in the understory,

A more frequent restoration burn interval is recommended for the first rounds of prescribed fires until healthy forest conditions have been restored and a less frequent maintenance fire interval can be continued.

While fire serves an ecological function that cannot be totally replicated, prescribed burning can be difficult or impractical. However, many of the benefits of fire can be mimicked through mechanical and/or chemical means (exs. hack and squirt, girdling, basal bark treatment)

Recommendation #3: ***Midstory Reduction FSI*** *[Medium⁺]* Conduct targeted midstory reduction forest stand improvement work to reduce shade-tolerant mid/understory trees to promote the advancement of oak and other desired species for wildlife seedlings on the forest floor which otherwise would not make it past the seedling stage in the dense shade. Common target species to remove include maples, sourwood, white pine, sweet birch, and beech. Desirable seedlings need to be established before this treatment. This treatment will then allow them to grow to at least 5 feet in height at which point they will benefit from more direct sunlight by opening the canopy to let them advance towards the overstory. If a burn is used, it should be conducted 2-4 years after oak & hickory seedling establishment. Once the desired saplings have reached the size where they can compete – 5-10 feet tall (after about 4 to 7 years) and above the competition – then a release treatment should be conducted to recruit these oaks into the future forest.

This treatment can be best achieved through hack-and-squirt herbicide treatment of less desirable trees up to 10-inches in diameter. While the hack-and-squirt method will prevent the less-desired stems from re-sprouting through chemical means, the cut-and-leave method, if followed by several prescribed fires after completion, could achieve similar results.

Recommendation #4: ***Heath Shrub Reduction*** *[Low+]* The dense heath layers often formed by evergreen ericaceous shrubs can suppress native tree regeneration. Over the last century, rhododendron and mountain laurel have been expanding into more forests due to a lack of forest fires and other natural disturbance regimes. In areas where tree regeneration is desired, it may be necessary to control the heath layer. It is important to note that rhododendron and mountain laurel are native and provide benefits to wildlife and forest ecosystems.

Therefore, any heath shrub management should be viewed as a control and not as an eradication program. Repeat treatment may be necessary. This treatment can be best achieved through hack-andsquirt herbicide treatment of dense heath shrubs where advanced regeneration of desirable species like oak and hickory are present. The cut and leave method could also apply in circumstances where coppicing the shrub layer would allow trees to advance enough to establish their position, similar to the effect of a prescribed fire.

Recommendation #5: **Oak Release Treatment (Cull Tree)** *[Medium+]* This stand improvement work focuses on removing less desirable trees (for wildlife) from the canopy and targets trees that are of poor form and vitality while inversely selecting the most vital, healthy, and vigorous trees for release (especially diverse oak but also red spruce). This would speed up the growth of the remaining trees that were retained while also introducing enough light onto the forest floor to spur the regeneration of desired species. Because a commercial harvest may not be acceptable for this treatment, overstory trees could alternatively be removed by girdling a few individuals every few years or by mechanically falling the trees as a forest stand improvement treatment. When implemented, any established oak, hickory, or other valuable trees for wildlife in the over-and-midstory should be left.

Recommendation #6: ***Free Thinning FSI*** *[Optional (Low)]* Free thinnings are best applied to a rather healthy forest stand, where only a light touch could be used to make overall improvements to the stand. This method is intended to release specific trees, while the remainder of the stand goes untreated. Thinning criteria can be highly versatile, depending on structural and compositional conditions, and produces stands with large amounts of diversity. As free thinning combines a holistic approach with

contemporary forestry practices, it is highly recommended that a Consultant Forester be used to help assess which trees should be thinned and or released (freed from competition).

This treatment can be conducted by removing one to several competition trees by cutting the stem and leaving them to decompose on the forest floor or painting the stump with herbicide (depending on species). Alternatively, an herbicide hack-and-squirt treatment can also be used to kill the less desired trees.

Recommendation #7: ***Hemlock Treatment*** *[Optional+]*: The hemlocks in good enough health for treatment (>30-50% green foliage), could be considered for treatment. We recommend treating those hemlock in best health and those which have the best future growth potential. Under and midstory hemlocks should not be considered for treatment. Preserving these hemlocks may preserve the species in this forest. Hemlocks need to be chemically retreated with insecticide every 4-8 years. More information on the HWA and hemlock treatment can be found in Appendix C or contact us for an estimate of our HWA treatment services.

Recommendation #8: ***Ash Treatment*** *[Optional+]*: Several ash trees appear healthy enough for treatment were observed in this project area. Only about 0.1% of ash trees are thought to be resistant to the insect. The emerald ash borer generally moves through the landscape killing all ash within 5-6 years when the insect's numbers begin to drastically decline. If desired, it may be possible to treat some healthy ash trees to preserve their genetics. As the insect would likely reoccur (though at lower numbers) in the future, this may render large-scale treatment impractical and expensive (retreatment every 1-3 years is also necessary depending on the chemical used). It may be best to treat prized and easily accessed trees. More information on EAB and treatment methods can be found in Appendix C.

4| NATURAL COMMUNITIES, RESOURCES & STEWARDSHIP

Forest Type #1: Montane Oak-Hickory Forest (48 acres)

Description of Typical Forest Type: Montane Oak-Hickory Forests are unique in that white oak, which competes best only in very specific sites, is a significant component, though it is uncommon to see forests with this characteristic today on private land. As white oak is one of the most valuable trees in the mountains, it was often targeted for harvest during logging events over the past century reducing the species' presence in the forest. This forest type is found predominantly on upper to middle slopes and ridges below 4000 feet in elevation. They occur on moderately productive soils on the less steep slopes which can hold some moisture but are also subject to dry periods. These sites are more xeric (dry) and have less productive soils than found in Rich Cove Forests, but more mesic (moist) and more productive than Chestnut Oak Forests. The generally common white oak in the overstory is complemented by a mixture of other oaks, hickories, and pines. The shrub layer may often have components of mountain laurel.

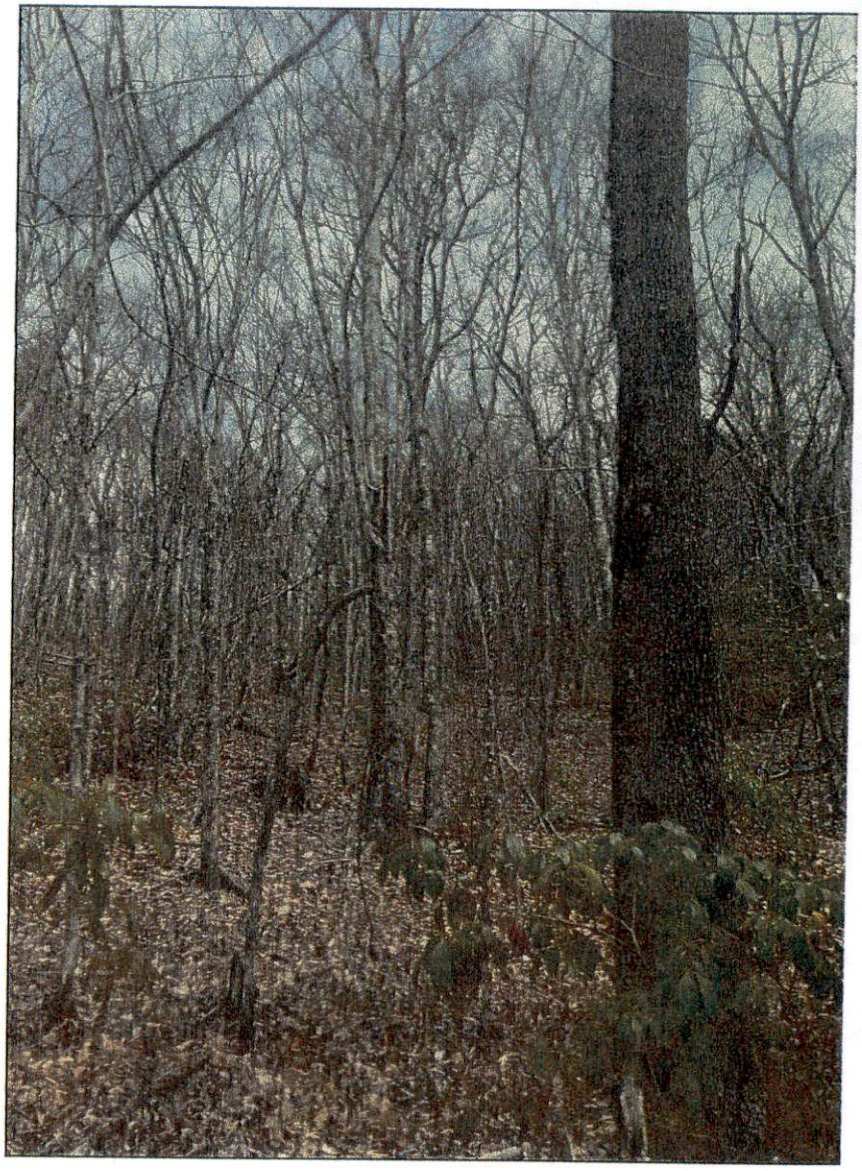


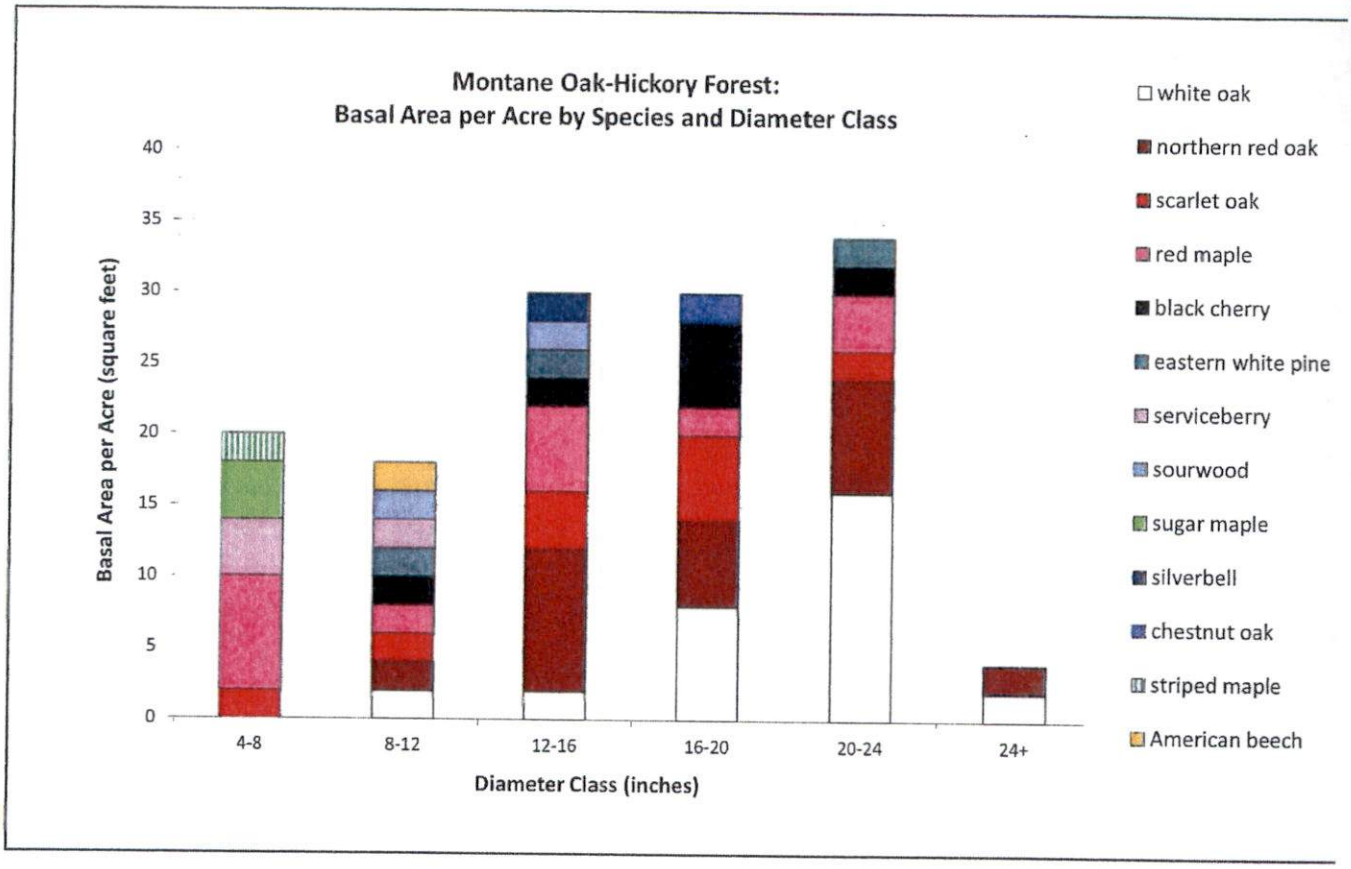
Photo #5: Montane Oak-Hickory forest in Management Unit B

Historically, a fire regime has been an integral part of managing these oak-dominated forest types in the Southern Appalachians by controlling shade-tolerant and fire-intolerant species such as red maple, sourwood, mountain laurel, and others for the benefit of oaks, hickories, southern yellow pines, and the herbaceous ground layer.

Composition & Resources: The primary overstory species include white oak, northern red oak, red maple, black cherry, white pine, and chestnut oak. The midstory

includes similar species as well as striped maple, silverbell, sugar maple, ash species, sourwood, serviceberry, Fraser magnolia, American beech, and deciduous mountain holly. While there were good observed occurrences of oak species in the midstory, very few were observed in the advanced regeneration layer. Advanced regeneration generally was sparse, with some areas being denser while others were lighter, in relation to quantity. Recorded species include American beech, white pine, red & sugar maple, sweet birch, sourwood, and silverbell. The shrub layer also varied greatly. Dense communities of mountain laurel & rhododendron were found in some areas, where in others it was not observed at all. Other shrub species noted included vaccinium, deciduous azalea, and buffalo nut.

The average basal area is 136 ft^2/ac. Overstory species (12" dbh or greater) comprised 98 ft^2/ac, while midstory species comprised the remainder. Primary wildlife hard and soft mast species of any diameter, such as oaks, beech, serviceberry, and black cherry, accounted for over 105 ft^2/ac. Management recommendations found below will help to enhance the existing forest species composition including culturing more oak species in the under-and-midstory. While active management may not be practical for the entire stand, specific management units have been highlighted were current conditions are favorable and slope is practical.



Management Recommendations:

Recommendation #1: ***Prescribed Fire*** *[Medium⁺]* Conduct prescribed fires with a restoration fire interval of 3-7 years and a maintenance fire interval of 5-15 years. The overall objective is to increase oak germination and reduce mesophytic species in the under-and-midstory. See the General Recommendations section for details.

Recommendation #2: ***Midstory Reduction FSI*** *[Medium⁺]* We recommend the use of targeted Midstory Reduction where oak and other desired seedling are present. See the General Recommendations section for details.

Forest Type #2: Northern Hardwood Forest (45 acres)

Description of Typical Forest Type:

Northern Hardwood Forests are typically found on moderate to steep slopes above 4000 feet elevation. These sites can be rich because of their orientation and high levels of rainfall but are often only moderately productive because of exposure, steepness of slope, high elevation, and often rocky soils. Typical species include combinations of moist-site hardwoods such as yellow birch, beech, yellow buckeye, red and sugar maple, ash species, silverbell, and other hardwood species such as northern red oak, basswood, and occasionally elms. The herb and shrub layers are often lush if natural conditions persist and can be fairly diverse.

The boundary between Rich Cove Forests and Northern Hardwood Forests is gradual and is one of the most difficult community boundaries to define. However, the central concept of Northern Hardwood Forest, on open slopes at high elevation, with a reduced and distinctly high elevation flora, is quite distinct from the typical Rich Cove Forest. This is particularly true of the Rich Subtype, which shares more species, and may extend into high-elevation concave slopes at the heads of coves.

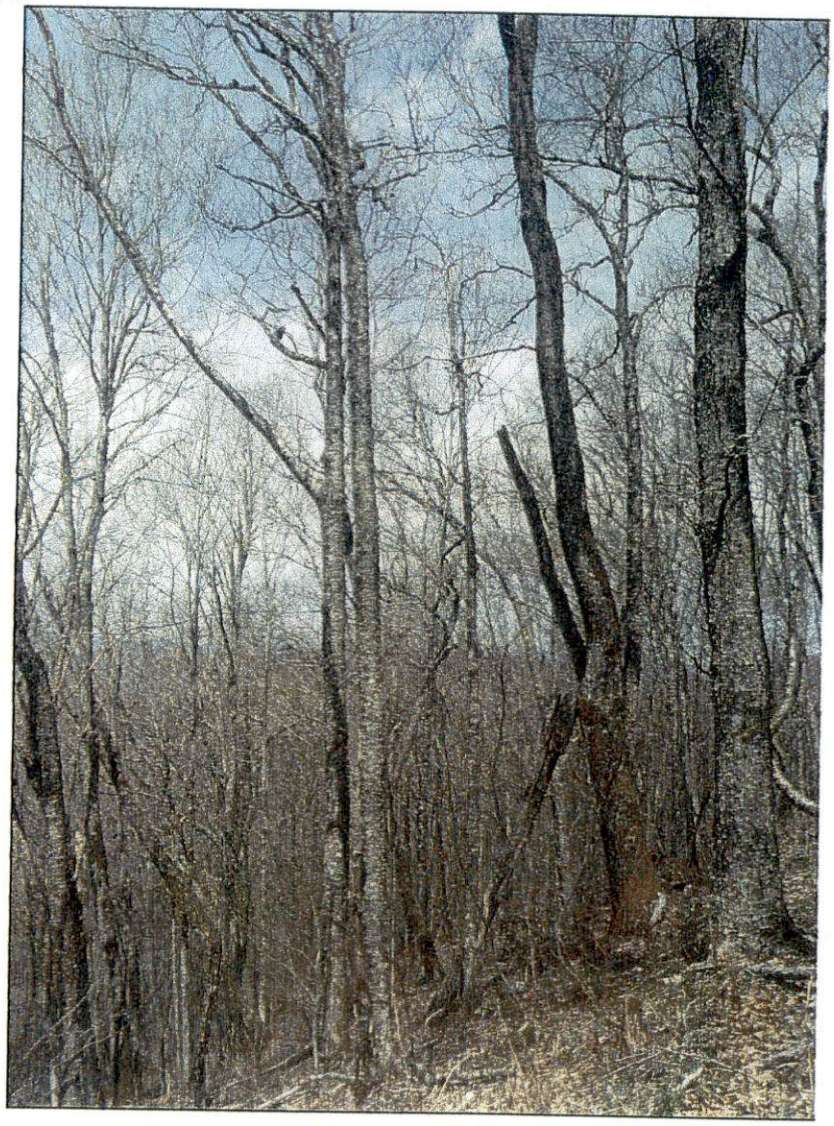
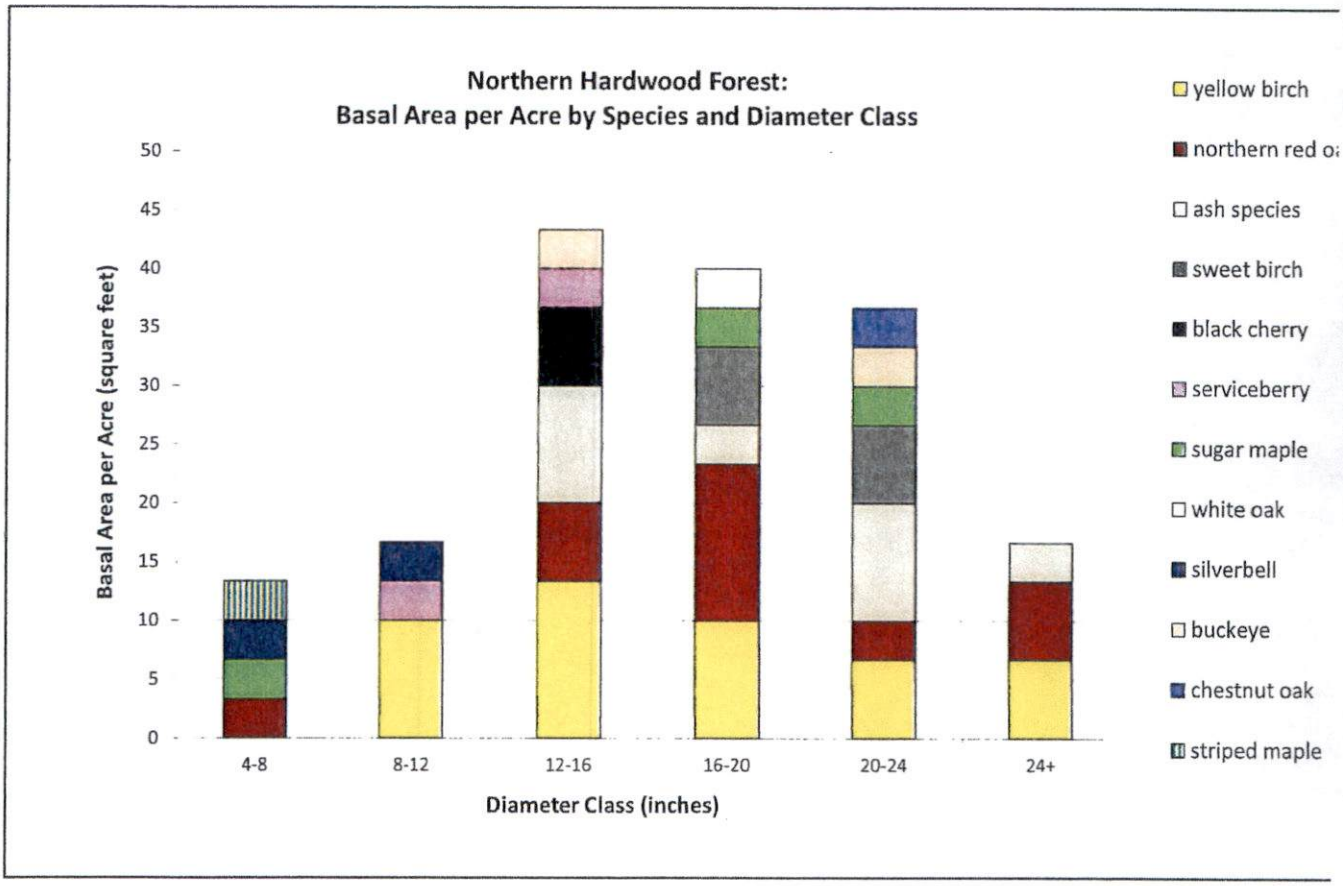


Photo #6: Northern Hardwood Forest, well stocked with yellow birch and ash species.

Composition & Resources: The primary overstory species include yellow birch, northern red oak, and ash species. Other overstory species are listed in the bar graph below. The midstory includes similar overstory species as well as striped maple, American beech, silverbell, and occasional red spruce. The advanced regeneration includes buckeye, yellow birch, ash species, black cherry, sugar maple, and silverbell. Shrubs observed include elderberry, viburnum species, and mountain hydrangea. The herbaceous layer is also quite vast and diverse. The average basal area is 137 ft^2/ac, of which yellow birch comprises 47 ft^2/ac. Acorn producing oak species accounts for approximately 40 ft^2/ac, approximately 30% of overall stand composition.



Management Recommendations:

Recommendation #1: ***Free Thinning FSI*** *[Optional (Low)†]* As common species of this forest type are not as well fire adapted as other drier oak-dominant communities in the project area, we urge caution at extensive use of prescribed fire in this stand.

We recommend an optional, low intensive, thinning for biodiversity in this stand. The use of a Consultant Forester is strongly encouraged for selection of keep/leave trees. See the General Recommendations section for details.

Recommendation #2: ***Ash Treatment*** *[Optional]* Some of the ash trees found within this forest type may be treated for the emerald ash borer, if desired. A thorough examination of individual trees may be needed to determine if it has/has not been effected by EAB. See Section 3.3 and Appendix C for details on EAB and its treatment.

Forest Type #3: Chestnut Oak Forest (40 acres)

Description of Typical Forest Type: Chestnut Oak Forests are found on dry sites, predominantly ridgelines, and exposed convex slopes. Given their topographical position, soils here tend to be drier, rockier, thinner, and lower in nutrients; this subsequently causes slower tree growth. However, these are also the sites where slowergrowing, more drought-tolerant trees like oaks and hickories can compete best. Generally, these forests are dominated by chestnut oak with a codominance of scarlet oak, black oak, or northern red oak and may include just as large components of sourwood, black gum, and several other scattered tree species in the over- and midstory. The understory can be composed of dominating rosebay rhododendron, mountain laurel, or an herb layer instead of shrubs. The Chestnut Oak Communities are fire-adapted systems. They were regularly burned for thousands of years by both Native Americans and naturally occurring fires. This process reduced competition for fire-adapted oak and yellow pine species from non-fire-adapted shade-tolerant species such as red maple, sourwood (when young), and white pine that often crowd the understory's advanced tree regeneration. Some hotter fires also created canopy gaps (as did storms and ice) by killing fire-intolerant species in the overstory such as red maple which in turn allowed the surviving fire-tolerant oak and others to establish into advanced tree regeneration and thrive in better light conditions.

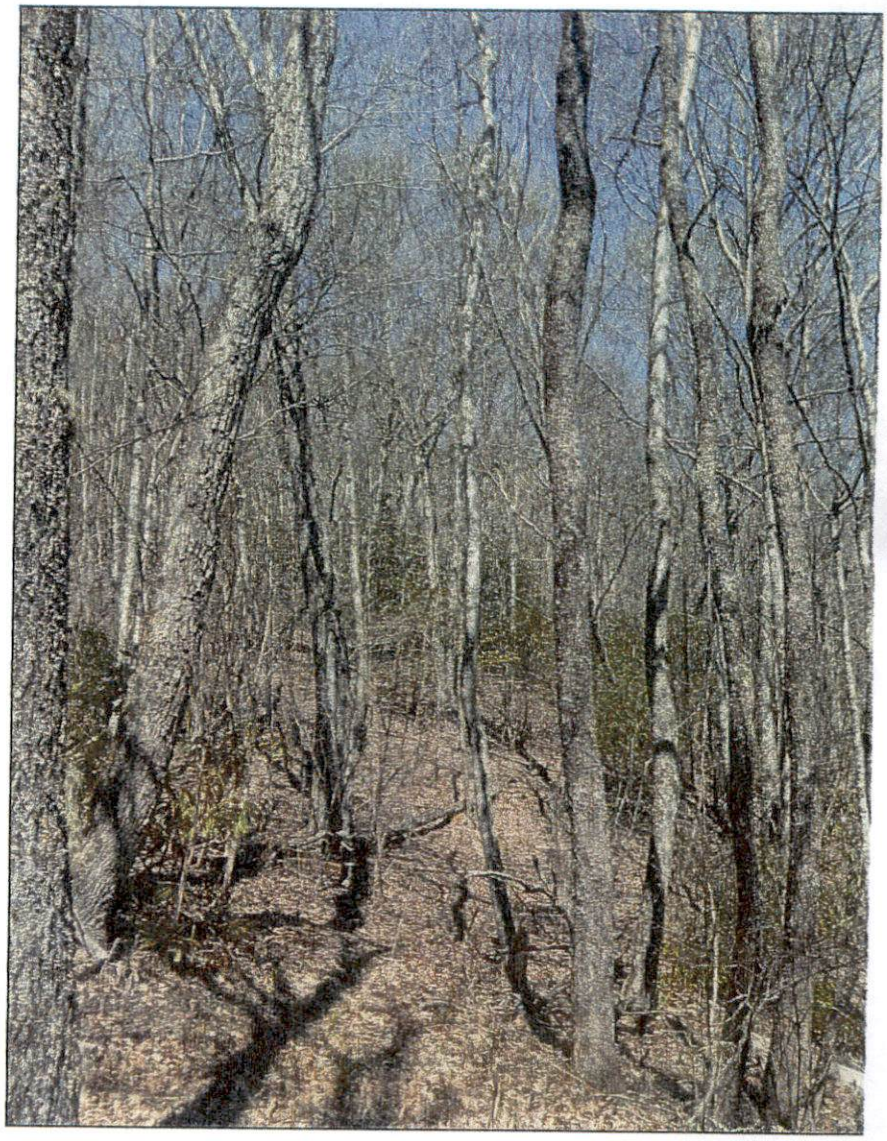
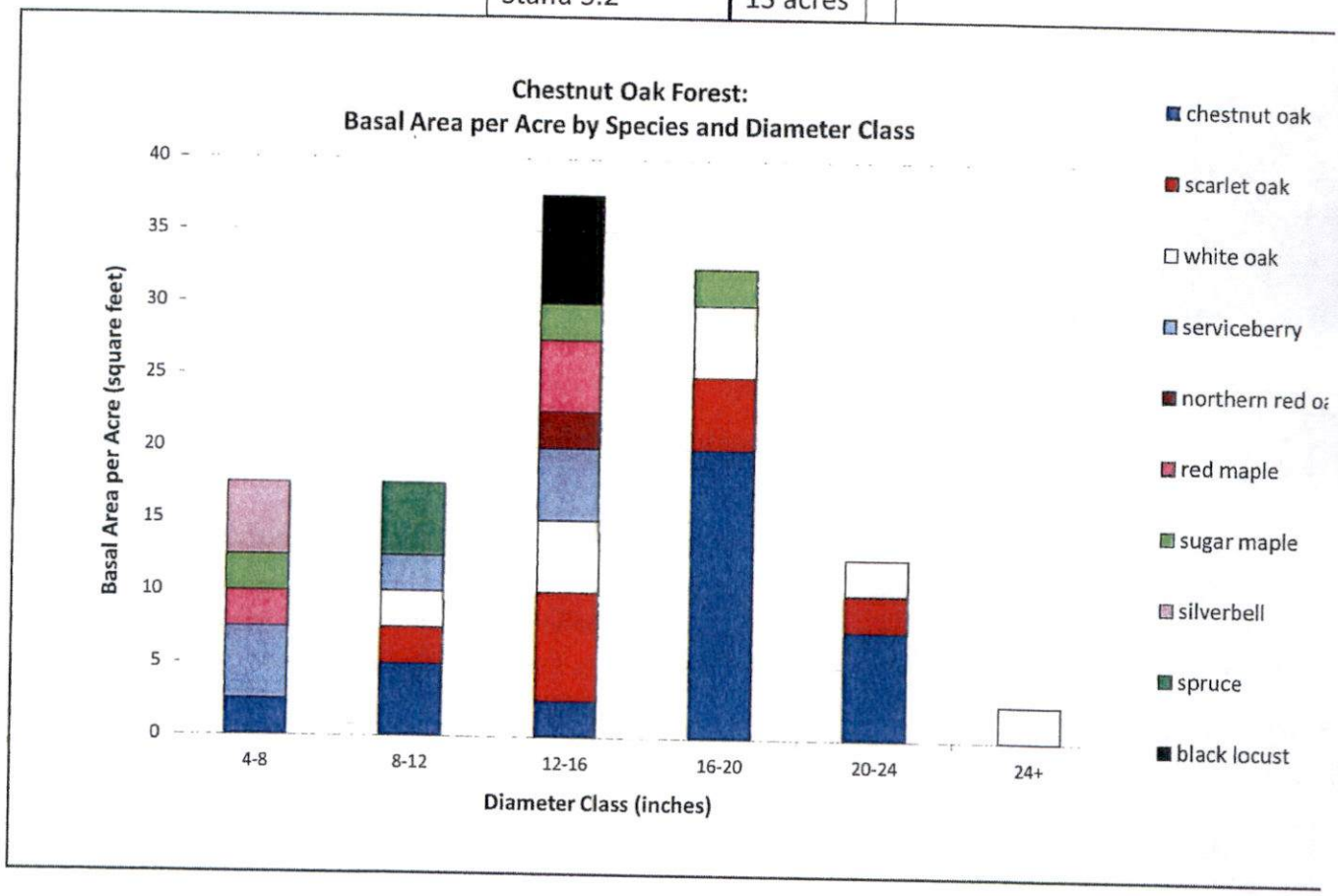


Photo #7: Chestnut Oak Forest Stand 3.2 note scattered heath shrubs. Both stands appear to be a Dry Heath subtype, with a High Elevation Component

Stand Acreages	
Stand 3.1	27 acres
Stand 3.2	13 acres



Composition & Resources: The primary overstory species include chestnut oak, as well as scarlet oak, white oak, red maple, and serviceberry. Midstory species include fire cherry, dogwood, alternate leafed dogwood, American chestnut root sprouts, serviceberry, silverbell, white pine, red & sugar maple, and occasional red spruce. Very few oak species were observed in the midstory. Advanced regeneration species are similar to midstory species noted and lacked the oak component. The shrub layer varied. Where this forest type transitioned to acidic coves, a deeper cover of rhododendron was found. Elsewhere isolated clusters of mountain laurel and rhododendron were observed. It is thought that the increase in rhododendron is a factor of the cooler and moister high elevation environment and also due to increased fire suppression.

About half of the average basal area of 120 ft^2/ac is composed of acorn producing oak species greater than 12" dbh. Chestnut oak alone comprises over 2/3 of the composition of oak species. Whereas, in stems under 1" dbh the average basal area is 35 ft^2/ac, and oak species only account for less than 10 ft^2/ac, and shade tolerant species (maples, silverbell, white pine, etc.) account for over 2/3 of the composition underneath the closed canopy.

This forest type is one of the drier forest types in the project area, but a trend can be seen that mid-and-understory species are shifting towards mesophytic and shade tolerant species. Management methods which mimic natural disturbance regimes of gap-phase dynamics should be implemented. This will improve the light-conditions for oak regeneration to promote and assist their advancement into the mid- and overstory. While increasing light conditions will benefit oaks, they may also benefit other shade intolerant-or-intermediate species such as red spruce and black cherry as well, which are beneficial food sources for wildlife, including the northern hardwood flying squirrel.

Management Recommendations:

Recommendation #1: ***Prescribed Fire*** *[Medium⁺]* Conduct prescribed fires with a restoration fire interval of 3-7 years and a maintenance fire interval of 5-15 years. The overall objective is to increase oak germination and reduce mesophytic species in the under-and-midstory. See the General Recommendations section for details.

Recommendation #2: ***Free Thinning FSI*** *[Optional, Low⁺]* We recommend an optional, low intensive, thinning for biodiversity in this stand. The use of a Consultant Forester is strongly encouraged for selection of keep/leave trees. See the General Recommendations section for details.

Forest Type #4: Acidic Cove Forest (26 acres)

Description of Typical Forest Type: Acidic Cove natural communities are found in sheltered coves and on mesic and sheltered slopes on more acidic soils in the mountains and upper piedmont. The canopy is dominated by a mix of yellow-poplar, sweet birch, eastern hemlock, and red maple. Other tree species may include white pine and magnolias. The shrub layer is usually dominated by rosebay rhododendron and dog hobble. Mountain laurel, witch hazel, and mountain pepper bush may also be present. Disturbance in these stands is largely caused by wind and ice storms that open-up small to medium gaps in the canopy. In the last few decades, the most impactful disturbance in these forests has occurred through the demise of the eastern hemlocks by the hemlock woolly adelgid. Before the adelgid outbreak, hemlocks were often the most dominant tree in this forest community.

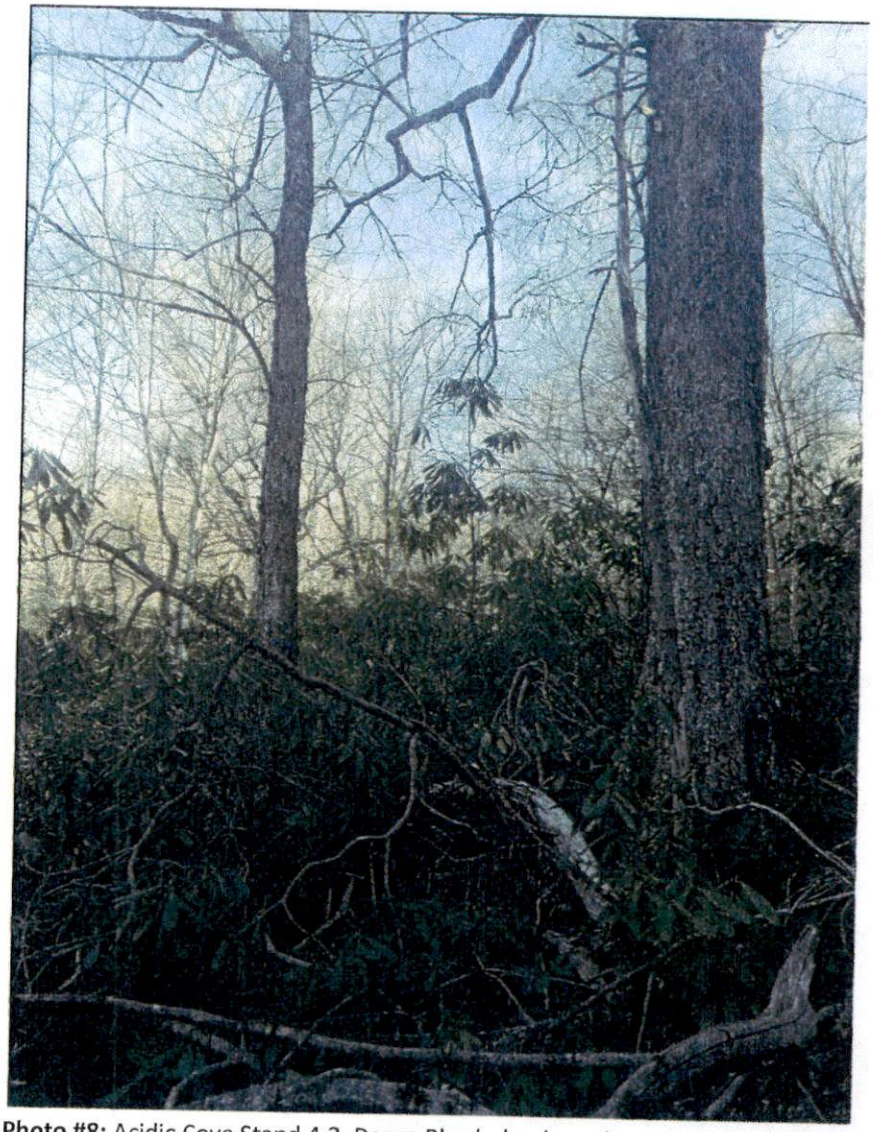
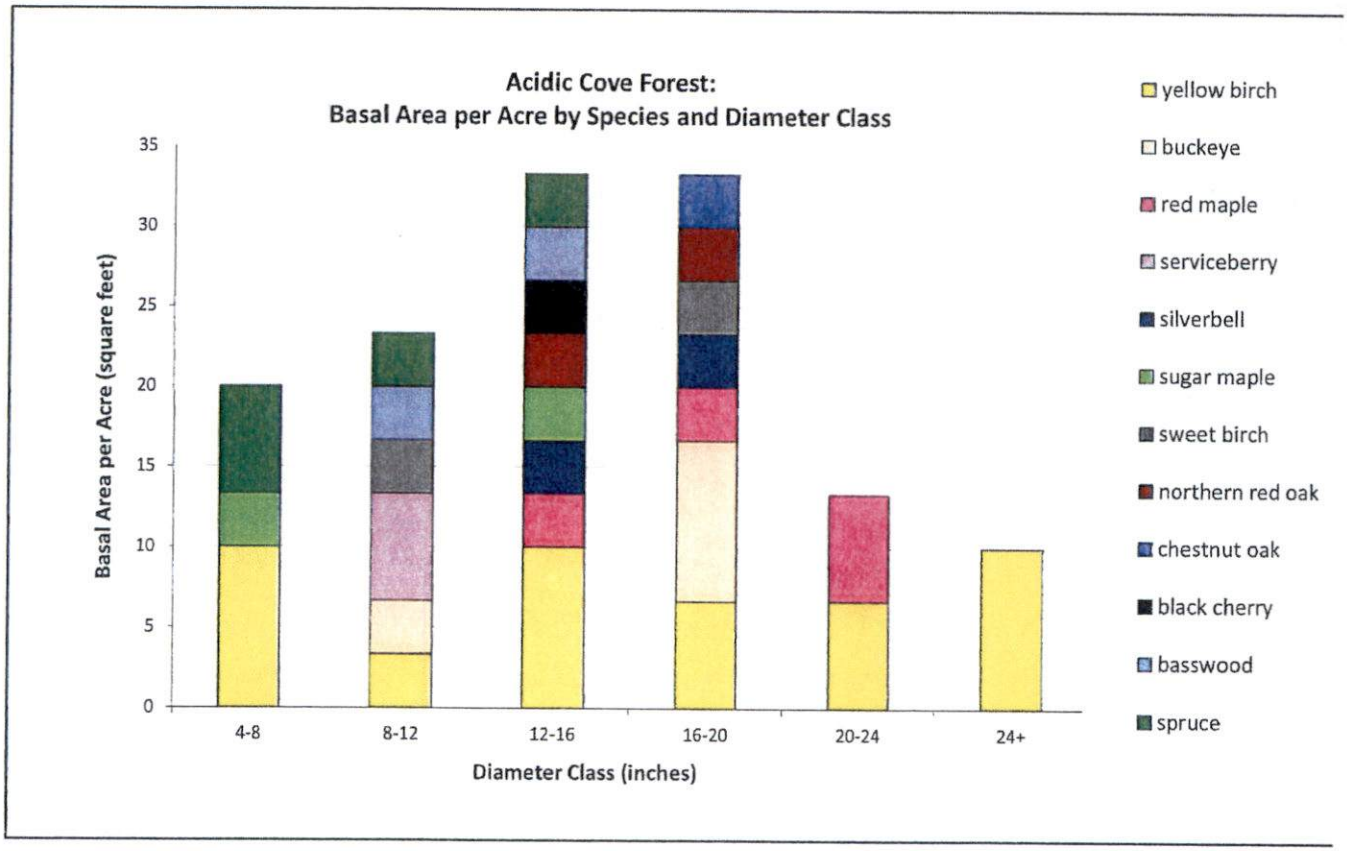


Photo #8: Acidic Cove Stand 4.2. Dense Rhododendron along the Understory

Composition & Resources: The primary overstory species include yellow birch, red maple, and buckeye. Other overstory species include silverbell, serviceberry, sugar maple, northern red oak, chestnut oak, and basswood. The midstory is composed of (a similar composition) as well as other typical midstory species such as alternate dogwood, elm, striped maple, and beech. Red spruce was found in the overstory and midstory in the northern parts of Stand 4.2. The shrub layer is comprised almost wholly of rhododendron. Along streams and in occasional breaks in the rhododendron thicket other shrubs such as doghobble, viburnum, witch-hazel. and buffalo nut were noted. Due to the nearly continuous cover of rhododendron on the understory, advanced regeneration was very sparse. Occasional species found include silverbell, hemlock, yellow birch, and maple species. The average basal area is 133ft^2/ac of which the majority is 12–20-inch diameter groupings. Only 20 ft^2/ac is composed of deciduous hard/soft mast species (oak, cherry, serviceberry) and approximately 15 ft^2/ac is composed of red spruce, of all diameter classes.

Stand Acreages

Stand 4.1	13 acres
Stand 4.2	13 acres



Management Recommendations:

Acidic Cove Forests are critical to good water quality and are valuable riparian areas that provide unique habitats contributing to the overall diversity of the forest. As rhododendron cover has dramatically increased since the decline of hemlock, its removal or reduction would also foster a better environment to strengthen a future generation of trees in this stand. The preservation of some living eastern hemlocks in these forests may also be beneficial if desired. Refer to Section 3.2 for specific management recommendations inside management units.

Recommendation #1: ***General*** *[High⁺]* As this stand is a good buffer to important riparian areas on the project area, we recommend limiting disturbance around streams and setting a minimum 25' buffer which allows this forest to continue to provide important wildlife habitat, help maintain high water quality, and to let it follow natural disturbance regimes.

Recommendation #2: ***Prescribed Fire*** *[Low⁺]* As this forest type will likely not allow a fire to carry very far into these stands and would travel at very low intensity, stands in this forest type could get burned in a patchy mosaic of burnt and unburnt areas with the objective to reduce some of the rhododendron shrub layer. See the General Recommendations section for details.

Recommendation #3: ***Free Thinning FSI*** *[Optional, Low⁺]* We recommend an optional, low intensive, thinning for biodiversity in this stand. The use of a Consultant Forester is strongly encouraged for selection of keep/leave trees. See the General Recommendations section for details.

Forest Type #5: Wildlife Openings (15 acres)

Composition & Resources: While wildlife openings are typically considered "open" or devoid of trees, Stand 5.1 (aka Management Unit LCBR) has many residual trees since conversion into a wildlife opening. The description below relates to Stand 5.1.

Photo #9: Wildlife Opening Stand 5.1 (aka Mgt Unit LCBR). Dense with woody and herbaceous bush while retaining large diameter trees.

Overstory sized trees noted include chestnut oak and scarlet oak, as well as occasional white oak, red and sugar maple, and occasional hemlock. Midstory sized trees include black-locust, serviceberry, fire cherry, sourwood, white pine, and American chestnut stump sprouts. Advanced regeneration sized trees include similar species as the midstory sized trees. There were at times large thickets of black-locust and sassafras stems. Silverbell, cucumber tree, and various oak species were also noted. The shrub layer varied but included blackberry bramble, greenbrier, viburnum, and occasional vaccinium. The average basal area is 87 ft^2/ac of which is nearly all tress diameters from 12 inches and up. No stems under 8 inches were counted in field data, using standard methods. As this area has been prior converted from a closed canopy forest into wildlife opening, increased sunlight reaching the floor has greatly increased the

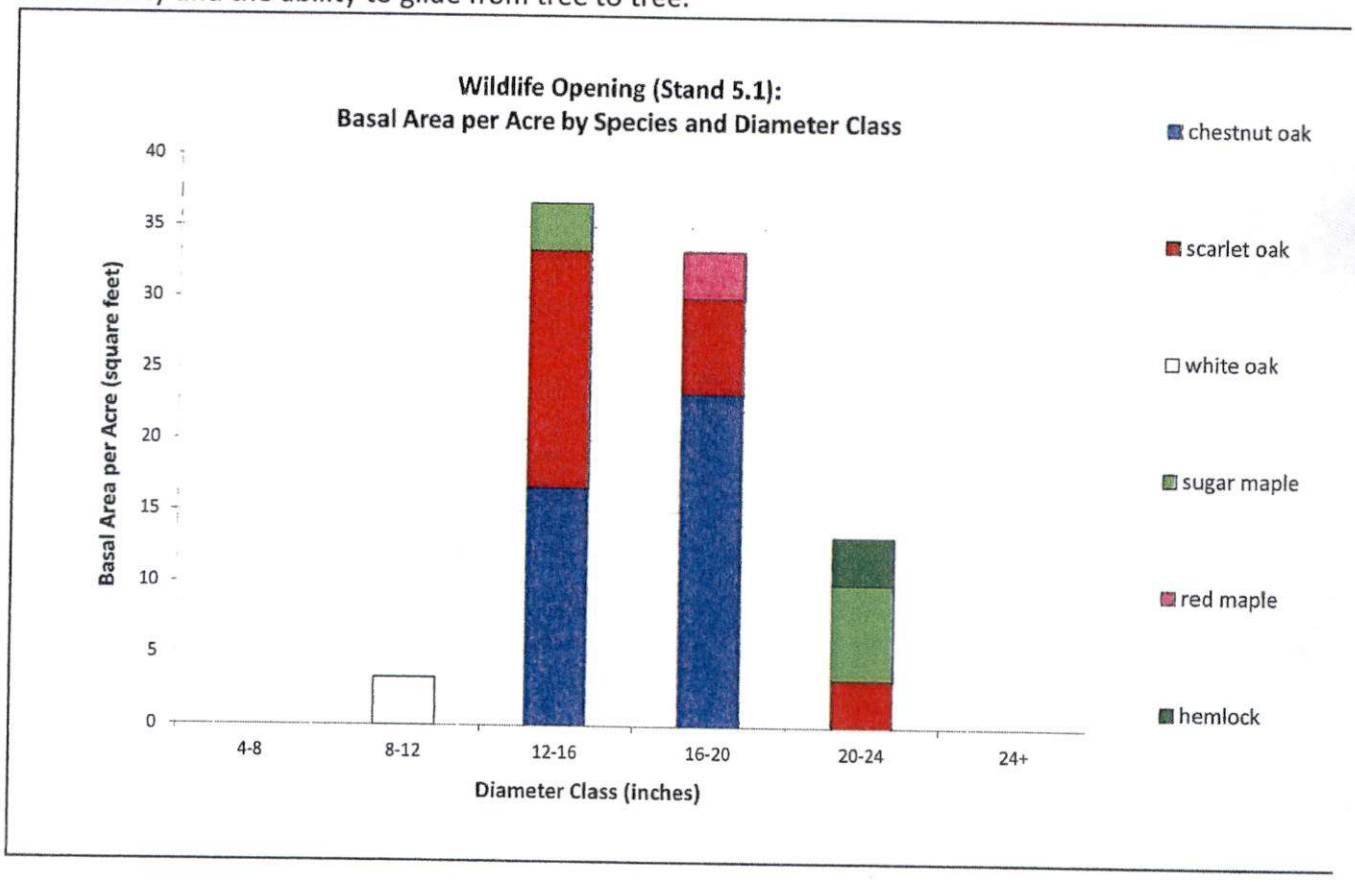
Mgt Unit A	1 acre
Mgt Unit B	1 acre
Mgt Unit C	1 acre
Mgt Unit D	2.5 acres
Mgt Unit LCBR	11 acres

woody and herbaceous growth at the mid-and-understory level. This has created an irregular early successional habitat.

Mgt. Unit

Acreages

As previously stated, early successional habitat it crucial for many wildlife species including insects, pollinators, reptiles, amphibians, songbirds, large birds such as wild turkey and ruffed grouse, as well as many mammal species, including elk, deer, bear, and squirrel. As these stands should be managed to sustain the early successional habitat, a desired residual basal area must be kept allowing for northern flying squirrels to have connectivity and the ability to glide from tree to tree.



The following management recommendations will be similar to management recommendations found in Section 3.2 for the corresponding Management Units D & LCBR.

Management Recommendations:

Recommendation #1: ***Create Additional Early Successional Habitats*** *[High+]* See Section 3.2 for further details regarding creation of additional early successional habitat.

Recommendation #2: ***Prescribed Fire*** *[High+]* Conduct prescribed fires with a semi-regular interval with objective to oak germination and top-kill much of the less desired woody growth (exs. maple, silverbell, and white pine)

Recommendation #3: ***Native Grassland / Wildflower Enhancement*** *[Medium+]* Open habitats can tremendously contribute to increasing the biodiversity of the ecosystem. By implementing a plan to enhance these open areas to a native grassland/wildflower meadow with a focus on native flora, various species of insects, birds, and mammals could be attracted increasing the species diversity for this area. Grassland areas are easy to manage once established by mowing regimes from annually to every few years in the dormant-season for the plants to develop seed and persist. A once annual late winter – early spring mow is recommended to allow for pollinators to emerge from overwintering in hollow herbaceous stems, to all for spring ephemerals to proliferate with less competition, and to increase vigor of stump sprouts of woody brush. The persistence of native grasses and wildflowers could also be improved by occasional prescribed burning of the meadow.

Furthermore, the already present species composition could be diversified and improved by supplementary seedings/or complete re-establishment of native wildflowers and grasses. In areas with dense woody stump sprouts, a suite of herbicide treatments (either hack and squirt, cut stump, or foliar/basal bark spray) may be a pre-requisite before and mowing, seeding, or burning to reduce the vigor of the woody species.

Recommendation #4: ***Woody Edge Habitat Improvement*** *[Optional+]* In addition to maintaining the wildlife openings. The field-to-forest ecotone could be feathered by promoting/planting low growing and increasingly taller growing shrubs along the edge to ease the transition of field to forest which would provide different habitats for various species of wildlife and limit the direct infiltration of light into the forest interior.

Recommendation #5: ***Cull Tree Removal*** *[High+]* Cull trees by girdling with herbicide treatment of less desired overstory trees. Trees that are not hard mast producing could be considered for culling. Culling trees by leaving them standing allows for increased sunlight and nutrients to the forest floor yet also provides snags, another

habitat source. Over time standing dead trees will break down and limbs will make their way to the forest floor, again creating habitat for decomposers and recycling nutrients into the soil again.

5| HELPFUL LINKS

General

EcoForesters Website
http://www.ecoforesters.org/
Best Management Practices Manual
http://ncforestservice.gov/water_quality/bmp_manual.htm
Guide to NC's Forestry Present Use Valuation (PUV) Property Tax Program
https://content.ces.ncsu.edu/north-carolinas-forestry-present-use-valuation-puv-property-taxprogram
Financial Incentives for Forest Management
https://content.ces.ncsu.edu/financial-incentives-for-forest-management
Maintaining Forest Property Boundaries
https://content.ces.ncsu.edu/maintaining-forest-property-boundaries

Funding Availabilities

USDA NRCS Funding through the Environmental Quality Incentive Program (EQIP)
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/eqip/?cid=nrcseprd13 42638
USDA Conservation Practices and Codes

https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849

Community Protection Plan
https://www.ncforestservice.gov/fire_control/fc_cpp.htm

Non-Native Invasive Plants

Non-Native Invasive Plants of Southern Forests
https://www.invasive.org/eastern/srs/Common Invasive Plants Easy ID

Common Invasive Plants – Easy ID Cards
https://dnr.maryland.gov/wildlife/Documents/Invasive_plants_cards.pdf

Native Plant Information and Resources

Landscaping for wildlife with native plants
https://content.ces.ncsu.edu/landscaping-for-wildlife-with-native-plants Western North Carolina Native Plant Recommendations
http://www.montreatlandcare.org/wp-content/uploads/2021/03/western-north-carolina-nativeplant-recommendations.pdf

NCFS Tree Seedling Store (includes grasses and herbaceous species, not exclusive to native plants) https://nc-forestry.stores.yahoo.net/index.html

https://www.ncforestservice.gov/nursery/pdf/NCFS_Tree_Seedling_Catalog.pdf North Carolina Botanical Garden
https://ncbg.unc.edu/plants/plant-sales/

Trail Construction and Maintenance

USFS Trail Construction and Maintenance Notebook
https://www.fs.fed.us/t-d/pubs/htmlpubs/htm07232806/toc.htm

Guide for Forest Access Road Construction and Maintenance in the Southern Appalachian Mountains
https://www.ncforestservice.gov/publications/WQ0214.pdf

Wildlife

Wildlife and Forest Stewardship
https://content.ces.ncsu.edu/wildlife-and-forest-stewardship
More Wildlife and Forestry Links
https://forestry.ces.ncsu.edu/forestry-wildlife/
NC Wildlife Conservation Land Program
https://www.ncwildlife.org/Conserving/Programs/Land-Conservation-Program

Fire

The Fire Manager's Guide to Blue Ridge Ecozones
https://tnc.app.box.com/s/mhrjd7y41gpy5c1xhqe164ss5ym5zdhy
Considerations for Wildlife and Fire
https://static1.squarespace.com/static/546cbcc7e4b06ce240c13156/t/5b31edb1352f53ec8162c417/1 529998959248/Considerations-for-Wildlife-and-Fire_AWarwick-compressed+(1).pdf
Fire History of the Appalachian Region
https://www.srs.fs.usda.gov/pubs/gtr/gtr_srs219.pdf
FireWise Landscaping https://content.ces.ncsu.edu/firewise-landscaping-in-north-carolina

Non-Timber Forest Products

Non-Timber Forest Products Resources

https://www.appalachianforestfarmers.org/videos
Mushroom Resources
https://newcropsorganics.ces.ncsu.edu/specialty-crops/mushrooms/ Medicinal Herbs and Non-Timber Forest Products Resources
https://newcropsorganics.ces.ncsu.edu/herb/medicinal-herbs-and-non-timber-forest-products/

6| GLOSSARY OF FORESTRY TERMS

Advanced (Tree) Regeneration: Regeneration that is already in place in the understory before the canopy is removed. Generally, a tree is classified as advanced regeneration if it is taller than 4.5 feet.

Age Class: A group of trees which are all roughly the same age and usually belong to a single cohort.

Basal Area (BA): The area of the cross section of a tree bole at 4.5 feet from groundline (DBH). A 12-inch diameter tree for example, has a basal area of 113 square inches or 0.79 square feet. Unless otherwise indicated, basal area units are in square feet.

Basal Area per Acre: The total area of the cross sections of all trees occupying a given acre of land. This measurement is used because it offers the forester the best estimate of how well any given forest site is stocked, and whether the site is achieving its optimum growth potential compared to its site quality. Unless otherwise indicated, basal area units are in square feet.

Best Management Practice (BMPs): Forest management practices that reduce erosion and prevent or control water pollution.

Biodiversity: The variety of life forms within a given area can be categorized in terms of number of species, variety of plant and animal communities, genetic variability, or some combination of these categories.

Board Foot: A unit of measure equal to a board that is 1 inch thick, 12 inches long, and 12 inches wide; or 144 cubic inches.

Canopy Closure: The canopy is considered to be "closed" if the crowns are touching and the forest floor is fully shaded.

Canopy: The general level of the tree crowns in any given forest stand. This zone may be well-defined and unbroken, such as with plantations and classic even-aged forest, or it may be multi-leveled and weakly defined, such as with multi-stage, uneven aged forests, and woodlands.

Chestnut Blight: A fungal disease introduced from Asia in the early 1900s that attacks American chestnut trees. The disease eventually killed nearly all mature chestnut trees by 1940. Most of the chestnut trees were harvested before or shortly after the blight killed them. Fortunately, the root system is fairly resistant to the blight and the chestnut persists as shoots from the old root systems.
Unfortunately, they are only able to grow for several years before the blight attacks them.

Clear-cut: A harvesting and regeneration method that removes all trees within a given area that is generally larger than a couple of acres.

Co-dominant Tree- A tree that is level with the general level of the canopy, receiving full sun from above but only partial sun from the sides of the crown.

Competition: The struggle between trees to obtain sunlight, nutrients, water, and growing space. Every part of the tree, from the roots to the crown, competes for space and food.

Controlled Burn: See **Prescribed Fire**

Crown Class: A definition of a tree's position within the forest canopy. The basic four tree positions are defined as dominant, co-dominant, intermediate, and suppressed.

Crown Thinning: The silvicultural technique when trees are removed from the upper crown classes in order to open up the canopy and favor the development of the most promising trees of the same canopy position.

Crown: The branches and foliage at the top of a tree.

DBH (Diameter at Breast Height): The measured diameter of a tree at 4.5 feet from ground level. In hilly or mountainous terrain 4.5 feet is measured from the highest side of the stump (uphill side on upslope). Certain rules for exceptions are used for trees with forks butt swell or cankers at normal 4.5 feet bole height.

Dominant Tree: A dominant tree is above the general level of the canopy and receives full sun from above and from one or more sides of the crown.

Ecotone: The transition between two types of vegetation but especially between two natural community types.

Edge: The transition between two different types or ages of vegetation such as between field and forest.

The edge between two natural communities is commonly also referred to as Ecotone.

Emerald Ash Borer (EAB): An insect introduced from Asia that attacks ash trees (in the genus Fraxinus) and a few other related species such as fringe trees. The insect feeds on the inner bark of the trees cutting off the flow of nutrients up and down the tree killing it within just a few years.

Even-aged: Trees are of that are of the same age or at least the same cohort.

Even-Aged Management: A forest management method used to produce stands that are all the same age or nearly the same age by harvesting all trees in an area at one time or in several cuttings over a short time.

Femelschlag Harvest: An expanding-group selection harvest for which the edges of a traditional group selection are sequentially expanded to create a multi-aged forest structure. This silvicultural method was developed in Germany and has shown great promise for fostering oak regeneration.

Forest Stand Improvement (FSI): Also known as Timber Stand Improvement (TSI), includes activities or treatments that improve the composition, structure, condition, health, and growth of forest stands.

Forest Type: A stand or group of stands which has been designated to one category or natural community type (i.e. Montane Oak-Hickory or White Pine Planation) because of similarities such as species composition, age, structure, or site characteristics.

Group Selection: The removal of small groups of trees to regenerate shade-intolerant trees in the opening (usually at least 1/4 acre but generally not bigger than 2-3 acres).

Growing Space: A reference to the amount of resources (water, sunlight, soil nutrients) available to allow for tree growth. Growing space decreases and becomes very limited as competition between trees increases.

Hack & Squirt / Cut & Leave: The hack & squirt method uses herbicide to kill target trees leaving snags and reducing stump sprouts. This method ensures the herbicide only impacts the desired tree and does not spread unintentionally. It is commonly used in invasive plant control and targeted/crop tree release. The cut & leave method reduces the use of herbicide while accomplishing a similar treatment but allowing cut stumps to resprout.

Hemlock Woolly Adelgid (HWA): Native to southern Japan, this insect was introduced to the U.S. in the 1920s and has now been established in eleven eastern states, from Georgia to Maine and Nova Scotia. Appearing as a small cottony pinhead (the protective covering for the eggs), the insect feeds on the ray parenchyma of hemlocks, attaching itself at the base of the needles. After infestation, in the southern Appalachians, 90% mortality of all hemlocks can be expected within several years.

High-Grading: A harvesting technique that removes only the biggest and most valuable trees from a stand and provides high returns at the expense of the future growth potential of the forest. Poor quality, shade-loving trees tend to dominate in continually high-graded forests.

Intermediate Tree: A tree that is generally below the general level of the canopy but occupies the lower canopy levels. Its crown receives partial sun from above, but no sun from the sides.

Live Crown to Height Ratio: The height of the live crown (the part of the tree with live branches, excluding smaller epicormic sprouts below) divided by the total height of the tree. It is a useful indicator of a tree's health. Trees with low live crown-to-height ratios are generally less vigorous and more susceptible to insect attacks and disease.

Low Thinning: A technique when trees are removed from only the lower crown classes while leaving the trees in the upper crown classes.

Mast: Fruits or nuts used as a food source by wildlife. Soft mast includes most fruits with fleshy coverings, such as persimmon, dogwood berries, or blackgum berries. Hard mast refers to nuts such as acorns and beech, pecan, and hickory nuts.

Mesic: A site that generally has moderate or generally well-balanced soil moisture levels.

Midstory: Trees and shrubs that occupy the space between the shrub layer and the trees of the lowest canopy class.

Midstory Removal: A non-commercial forest stand improvement (FSI) method that removes the unwanted trees in the midstory to benefit the growth of overshadowed advanced tree regeneration of herbaceous species. It generally mimics the results of a natural fire regime and can, under circumstances, be accomplished by prescribed fires.

Natural Regeneration: The growth of new trees in one of the following ways without human assistance: (a) from seeds carried by gravity, wind, water, or animals, (b) from seeds stored on the forest floor, or (c) from stumps that sprout.

Old-growth: This occurs when the process of Understory Re-initiation is complete and pockets of the initial oldest cohort have been naturally replaced by younger cohorts of trees or other vegetation. As this creates many age classes of trees, structural and biological diversity is increased. The forest is heavily stratified with foliage extending from treetops to the forest floor in some places. Biodiversity is also enhanced by many standing and fallen dead trees present. Production of wood and organic matter tend to be balanced by loss and decay. Sometimes, old-growth is also used for large old trees that are remnants of the forest before any logging took place in a given area. (Note this is a unique definition of old-growth and there are many others which are based on other factors such as forest structure or tree age.)

Prescribed Fire: The practice of using regulated fires to reduce or eliminate fuel or material on the forest floor, for seedbed preparation or to control competing vegetation. Prescribed firing simulates, in a safe way, one of the most common natural disturbances, which is wildfire. It is also called prescribed burning or prescribed fire.

Salvage Cut: The harvesting of dead or damaged trees, or the harvesting of trees in danger of being killed by insects, disease, flooding, or other factors in order to save their economic value.

Selective Thinning: Dominant trees are removed in order to stimulate the growth of the trees in lower crown classes. This method of timber harvesting is useful in order to favor shade-tolerant species. However, in forests, such as most of the southern Appalachian forests, that are dominated by shadeintolerant or intermediate species, selective thinning degenerates into the practice of harvesting the best trees and leaving the poorest, also known as high-grading.

Shade-intermediate: Trees that can survive in partial shade, but generally do best in full sun.

Shade-intolerant: Trees that require full sunlight to thrive and cannot grow in the shade of larger trees.

Shade-tolerant: Trees that have the ability to grow in the shade of other trees and in competition with them.

Shelterwood Harvest: The silvicultural technique of removing trees in a harvest area in a series of two or more cuttings so that new seedlings can grow from the seeds of older trees. The first harvest normally retains about 40-70 square feet of basal area per acre which is then removed by a second harvest a few years later. This method produces an even-aged forest.

Silviculture: The art, science, and practice of establishing, tending, and reproducing forest stands of desired characteristics. It is based on knowledge of species' characteristics and environmental requirements.

Site Index: A measurement used to quantify site quality for any given piece of forest land. Site Index is normally expressed, in southern Appalachian forest types, by the total height of the dominant trees in the stand at 50 years of age. Site Index is always expressed for specific species or species type, as the Site Index value varies between tree species (i.e. White Pine versus Upland Oak).

Site Quality: The inherent productivity of a given piece of forest land. Soil type, soil depth, slope aspect, general terrain, elevation, position on the slope, local climate, and local precipitation patterns all affect the site quality of a forest stand. Site quality determines the limits of any given piece of land to produce volume and tree growth, and it normally influences the tree species occupying this piece of land.

Snag: A standing dead or dying tree.

Stand Initiation: After a lethal disturbance has created a unit of vacant growing space, the trees that become established in it do not fully occupy the space. Until they do there is an opportunity for additional plants to fill the empty spaces such as herbaceous annuals.

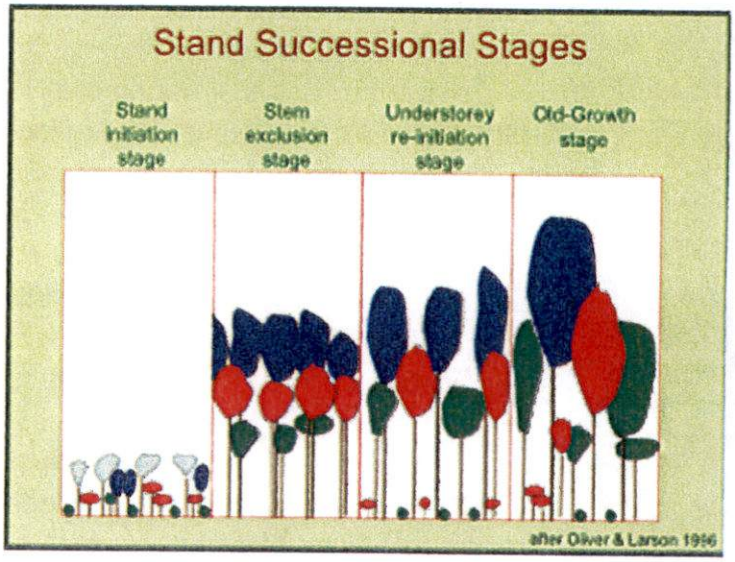
Stand: A delineated portion of forest land that shares similar characteristics in such a way that this portion of the forest can be separated from adjoining forest lands. These shared characteristics can include tree species (conifer, hardwood, mixed oaks, cove hardwoods, etc.), age of the trees, stand structure (even-aged or uneven-aged), site index or site quality, elevation, slope, aspect, or special site conditions (swamp, wetlands, rocky, heavy clay soils, special wildlife habitats, etc.). This concept always needs to be used with some care, because natural diversity is such that forest land cannot be completely pigeonholed or defined fully by what is essentially a broad-brush approach.

Stem Exclusion: When canopy closure is reached and trees begin to compete with each other for limited resources. The more vigorous trees usurp the growing space and weaker ones die. This competition also limits the regeneration of a younger cohort of tree species.

Stem Injection: See Hack & Squirt.

Stocking: A measurement or calculated number that expresses the number of trees found on a tract or on a given unit of area (acre, hectare). This is most often expressed by actual number counts of trees (i.e. trees per acre, stems per hectare) or in Basal Area per unit area (i.e. square feet per acre, square meters per hectare). The total number of trees on a tract is meaningful and normally calculated for a timber sale bid offering, but Total Basal Area on a tract is meaningless and is never calculated.

Succession or Stand Development: A given aggregation of trees of a single age class or cohort proceeds from birth to death in a sequence of developmental steps. The steps in the following model were developed by Oliver and Larson in 1996. The states are Stand Initiation, Stem Exclusion, Understory Re-initiation, and Old-Growth (though the latter is sometimes referred to as Steady State).



Suppressed Tree: A tree that is generally below the level of the canopy, does not occupy the canopy layer, and is fully shaded from the top and sides.

Targeted Tree Release: Also known as Crop Tree Release, is a management technique when competing trees are removed whose crowns are impeding the growth of a crop tree or more favorable tree. The crop/favorable tree is selected usually based on species, form, superior health, and/or larger size. It is similar to a crown thinning but usually applied to younger stands of trees still in the Stem Exclusion phase.

Two-aged: A stand that contains only two cohorts of trees.

Understory Re-initiation: Scattered trees that have previously been successful in competition with other trees begin to be lost to pests or other damaging agents. The surrounding tree crowns do not fully close again, and the vacancies of growing space thus allow for the growth of new trees. These trees are often advanced tree regeneration of shade-tolerant species.

Understory: The area below the forest canopy that comprises shrubs, small trees, and herbaceous vegetation. Because the understory receives little light, many of the plants at this level are tolerateshade and will remain part of the understory. Others will grow and replace older trees that fall.

Uneven-aged: A stand that contains three age-classes intermingled intimately in the same area.

Xeric: A site that is regularly deficient in moisture.

Yellow Pines: Refers to a group of several pine species that are native to the southeastern United States. In terms of this plan, these include shortleaf pine (*Pinus echinate*), pitch pine (*Pinus rigida*), and Table Mountain pine (*Pinus pungens*). This group does not include white pine (*Pinus strobus*).

Lickstone Appendix A: Maps Amended

Pairs with EBCI Lickstone Ridge 2023 FMP

Location Map

Contour Map

Management Unit Map

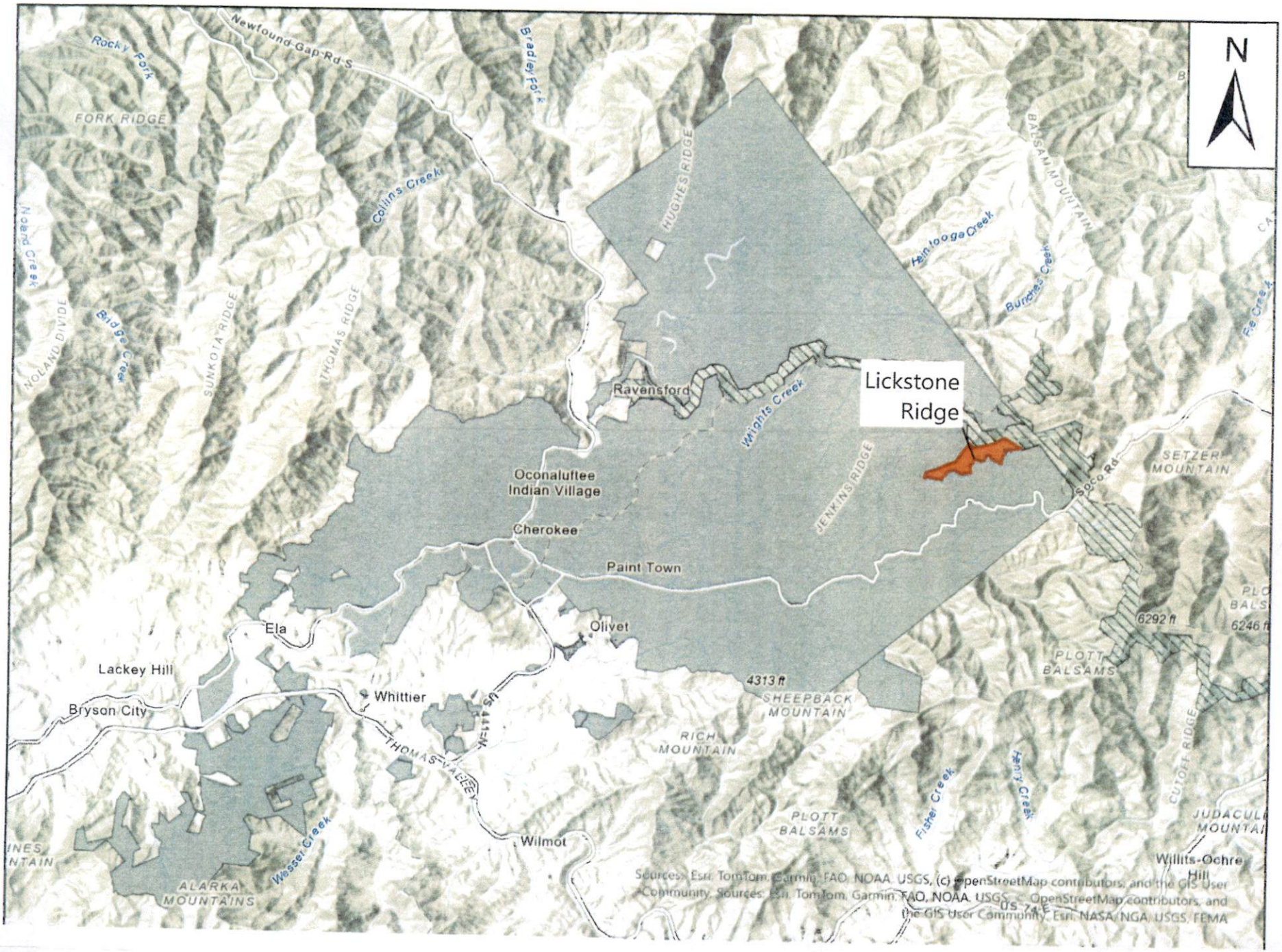
Stand Map

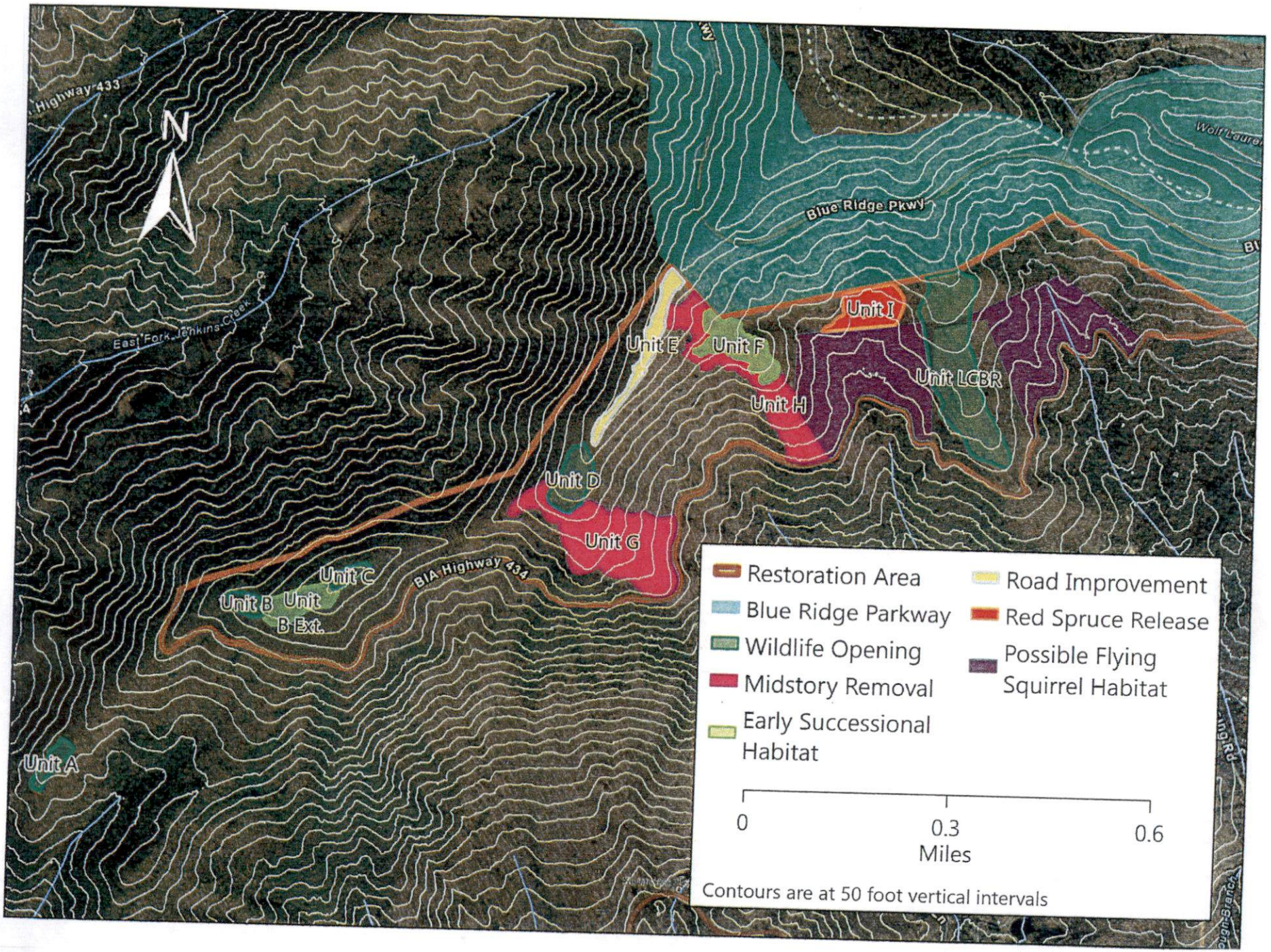
Slope Map

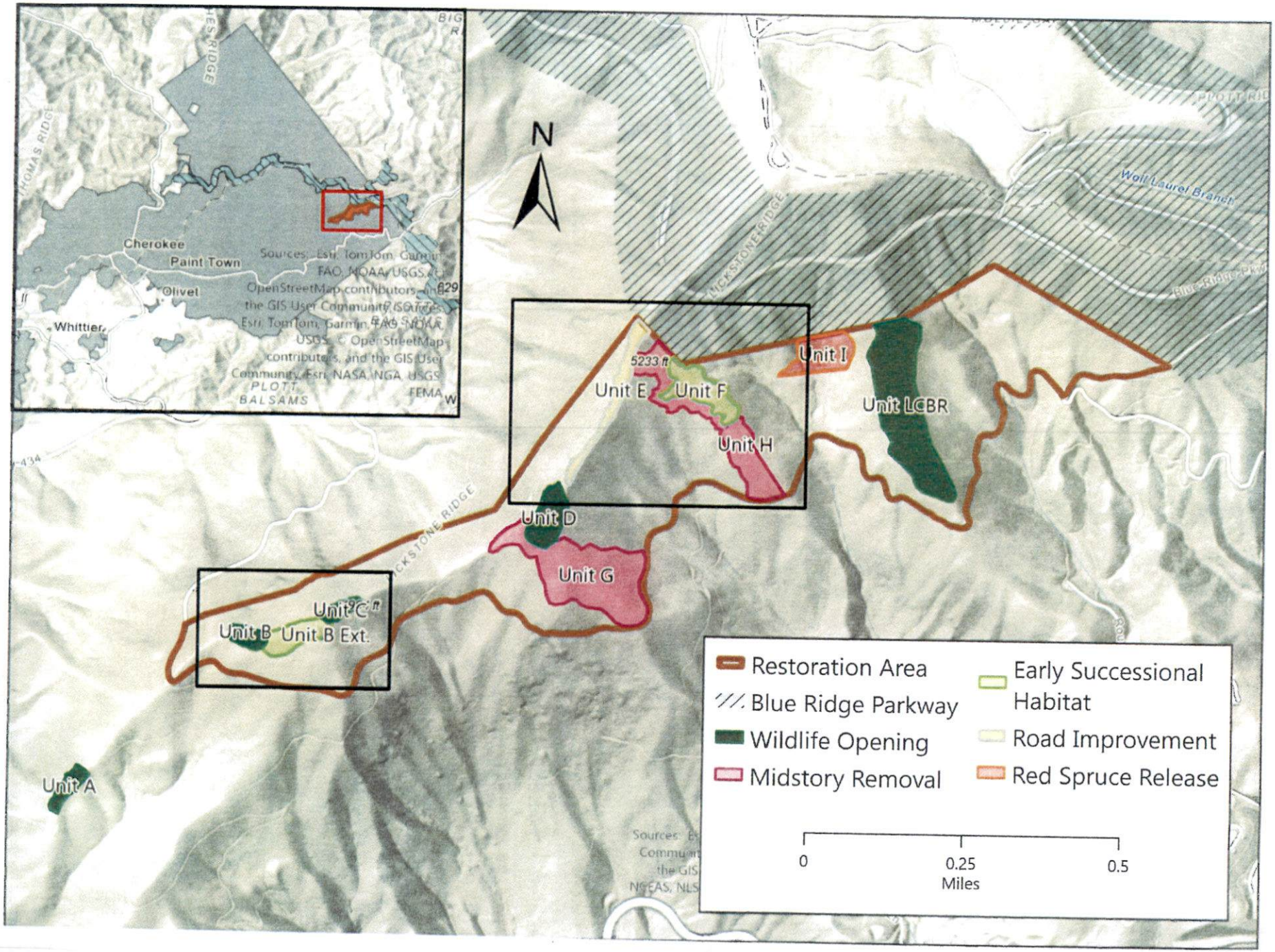
Canopy Height Map

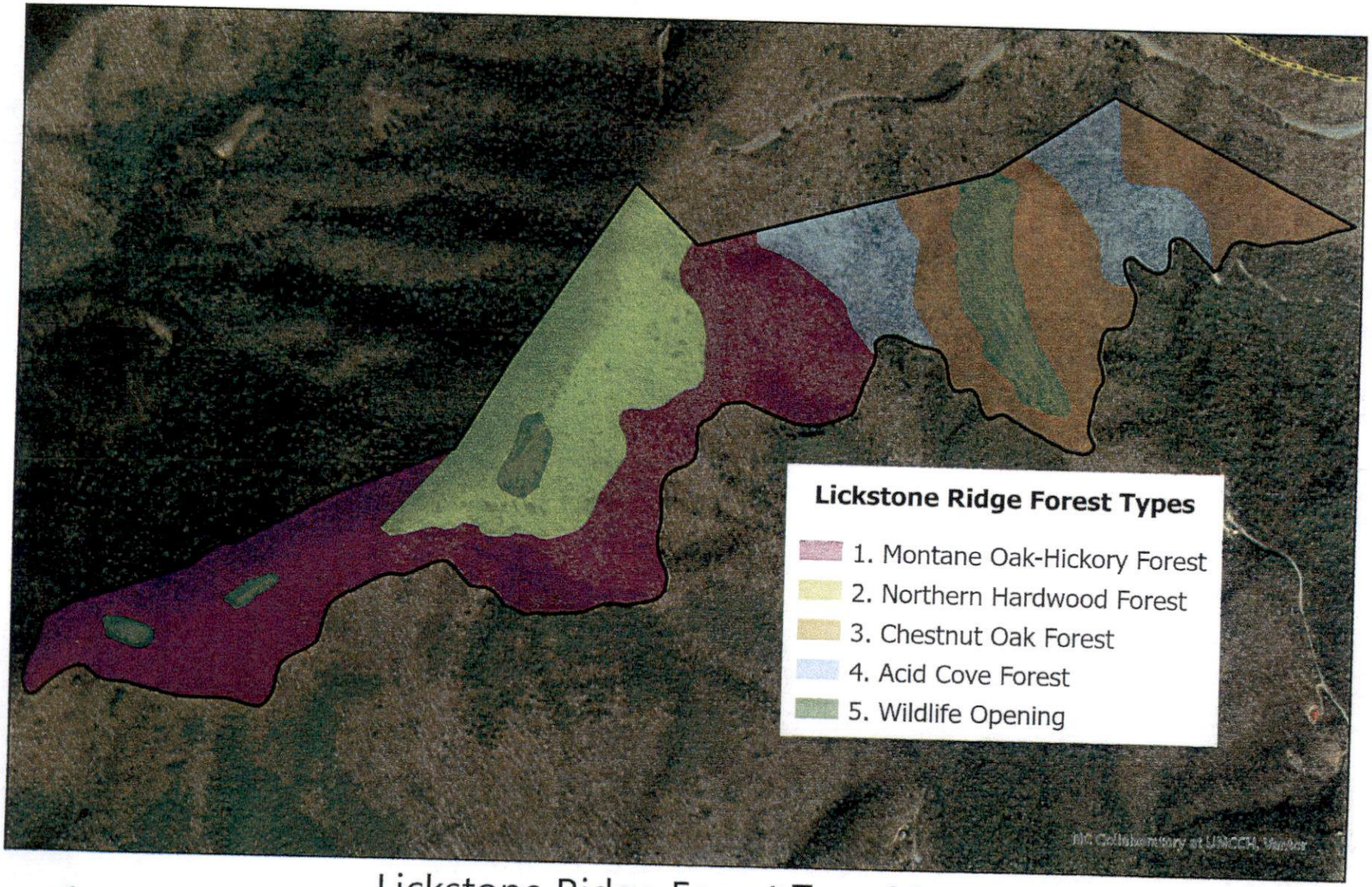
West side Early Successional

East side Early Successional


N
Lickstone Ridge
Newfound Gap Rd S
Rocky Fork
Bradley Fork
FORK RIDGE
Collins Creek
HUGHES RIDGE
BALSAM MOUNTAIN
Hemlooga Creek
Bunches Creek
Fie Creek
Noland Creek
NOLAND DIVIDE
Bridge Creek
SUNKOTA RIDGE
THOMAS RIDGE
Ravensford
Wrights Creek
JENKINS RIDGE
Soco Rd
SETZER MOUNTAIN
Oconaluftee Indian Village
Cherokee
Paint Town
Ela
Olivet
6292 ft
6246 ft
PLOTT BALSAMS
Lackey Hill
Bryson City
Whittier
US 441 N
4313 ft
SHEEPBACK MOUNTAIN
RICH MOUNTAIN
THOMAS VALLEY
Fisher Creek
Henry Creek
CUTOFF RIDGE
Wesser Creek
Wilmot
ALARKA MOUNTAINS
Willits-Ochre Hill
US 74 E
Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Esri, NASA, NGA, USGS, FEMA


Highway 433
N
Blue Ridge Pkwy
East Fork Jenkins Creek
Unit I
Unit E
Unit F
Unit LCBR
Unit H
Unit D
Unit G
Unit C
BIA Highway 434
Unit B
Unit B Ext.
Unit A
Restoration Area
Blue Ridge Parkway
Wildlife Opening
Midstory Removal
Early Successional Habitat
Road Improvement
Red Spruce Release
Possible Flying Squirrel Habitat
0
0.3
Miles
0.6
Contours are at 50 foot vertical intervals


N
Cherokee
Paint Town
Olivel
Whittier
PLOTT BALSAMS
Wolf Laurel Branch
LICKSTONE RIDGE
5233 ft
Unit A
Unit B
Unit B Ext.
Unit C
Unit D
Unit E
Unit F
Unit G
Unit H
Unit I
Unit LCBR
Restoration Area
Blue Ridge Parkway
Wildlife Opening
Midstory Removal
Early Successional Habitat
Road Improvement
Red Spruce Release
0
0.25
0.5
Miles

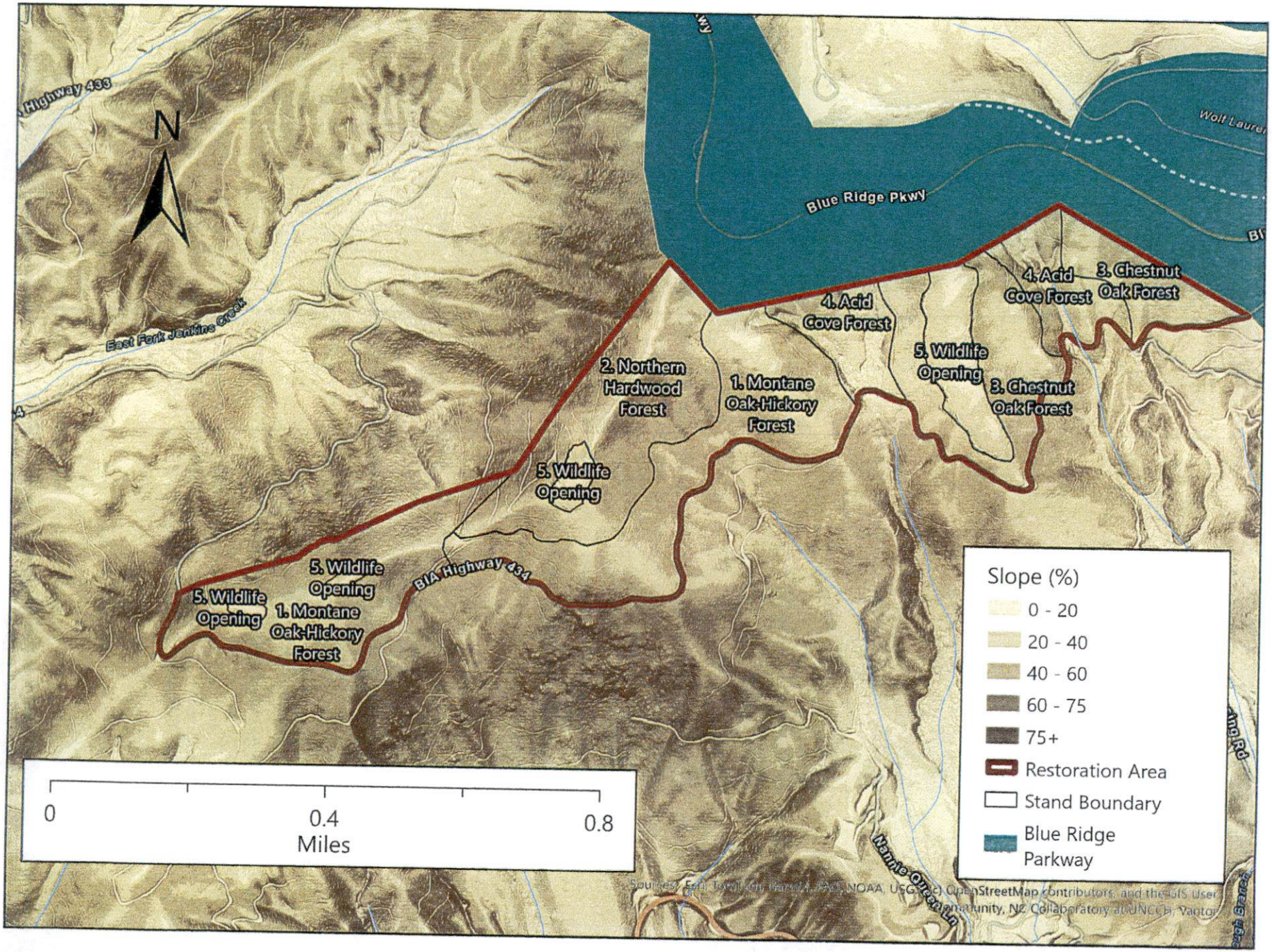


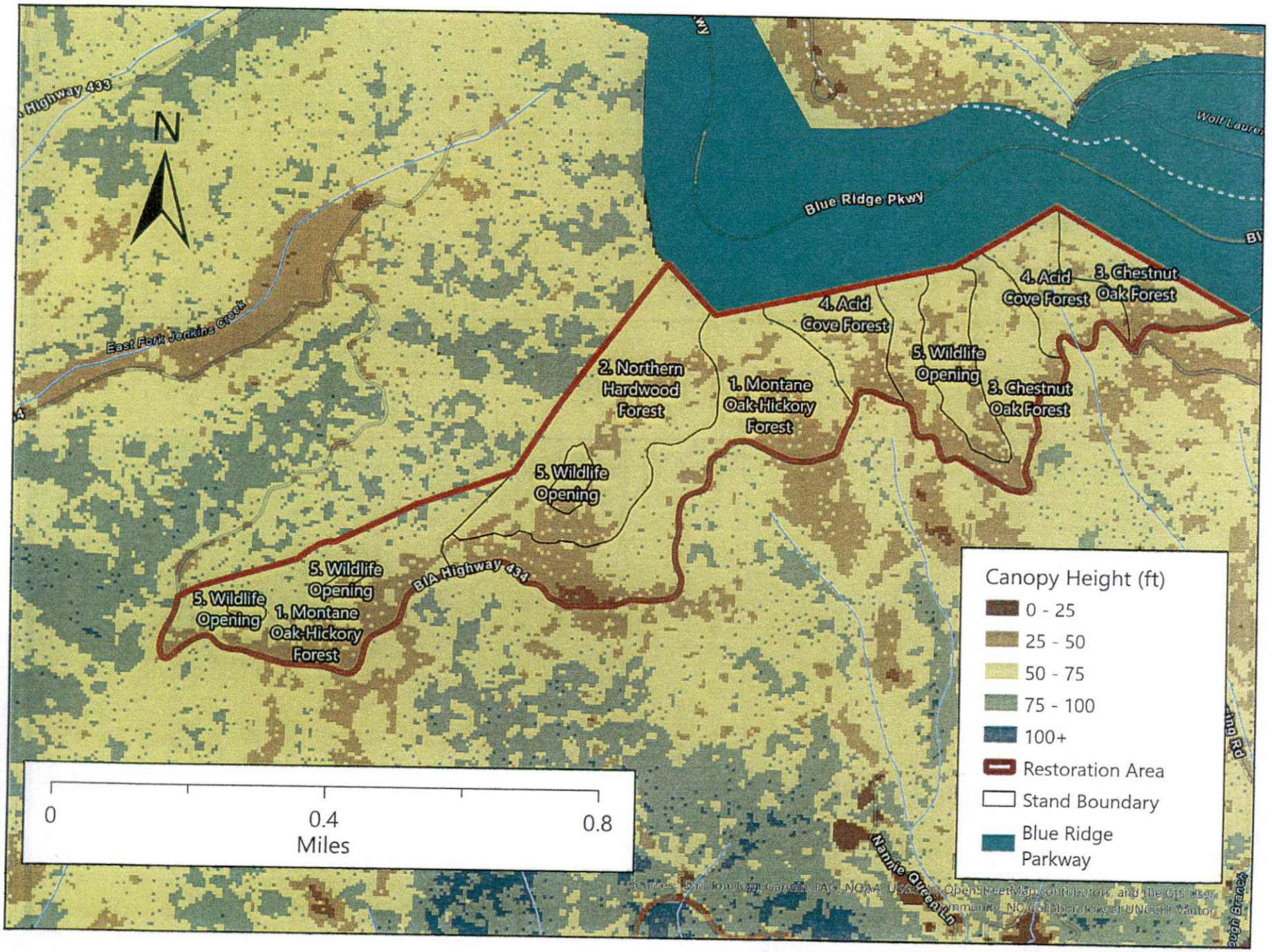
Lickstone Ridge Forest Type Map

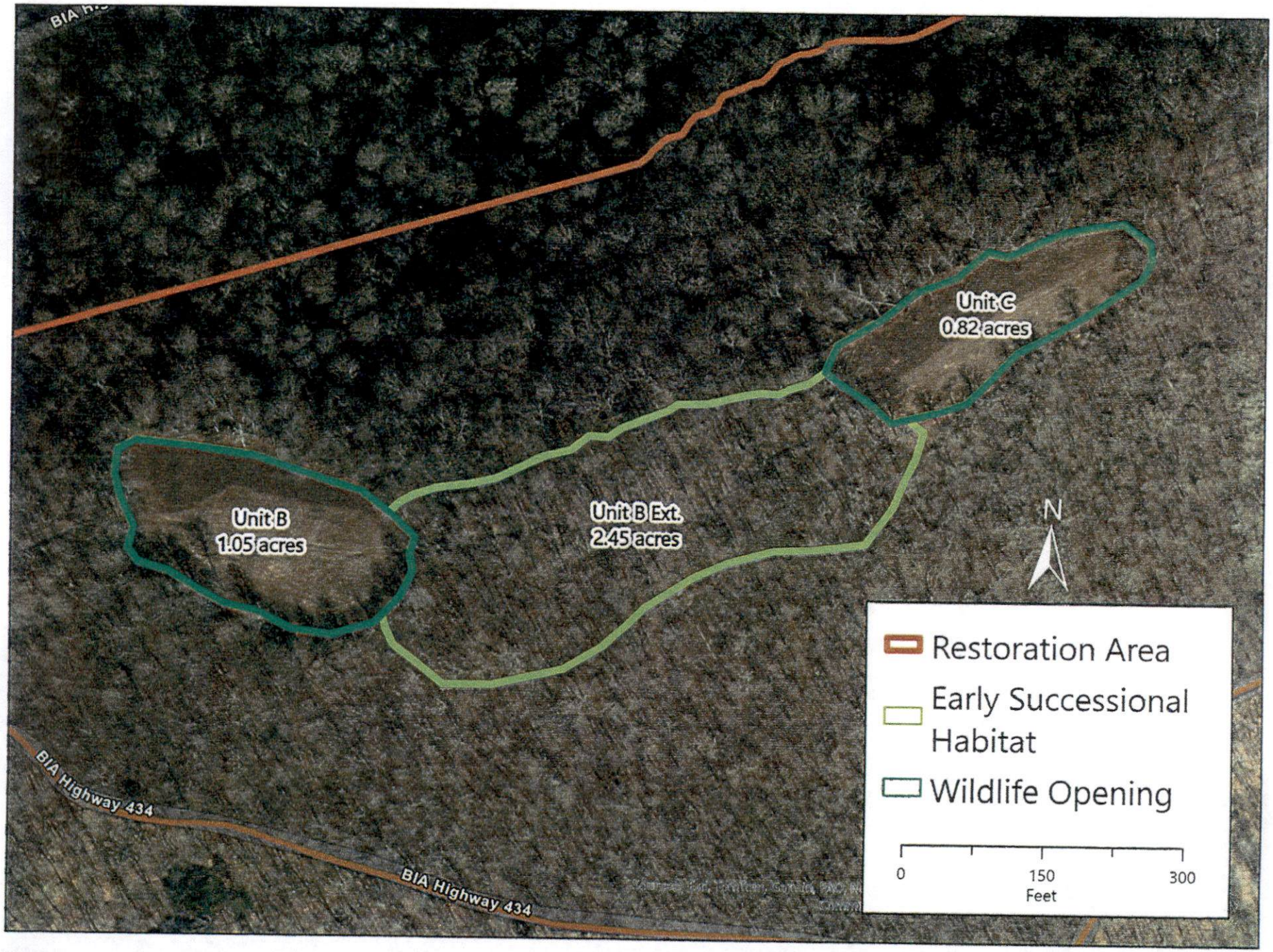
2019 True Color Aerial Orthoimagery

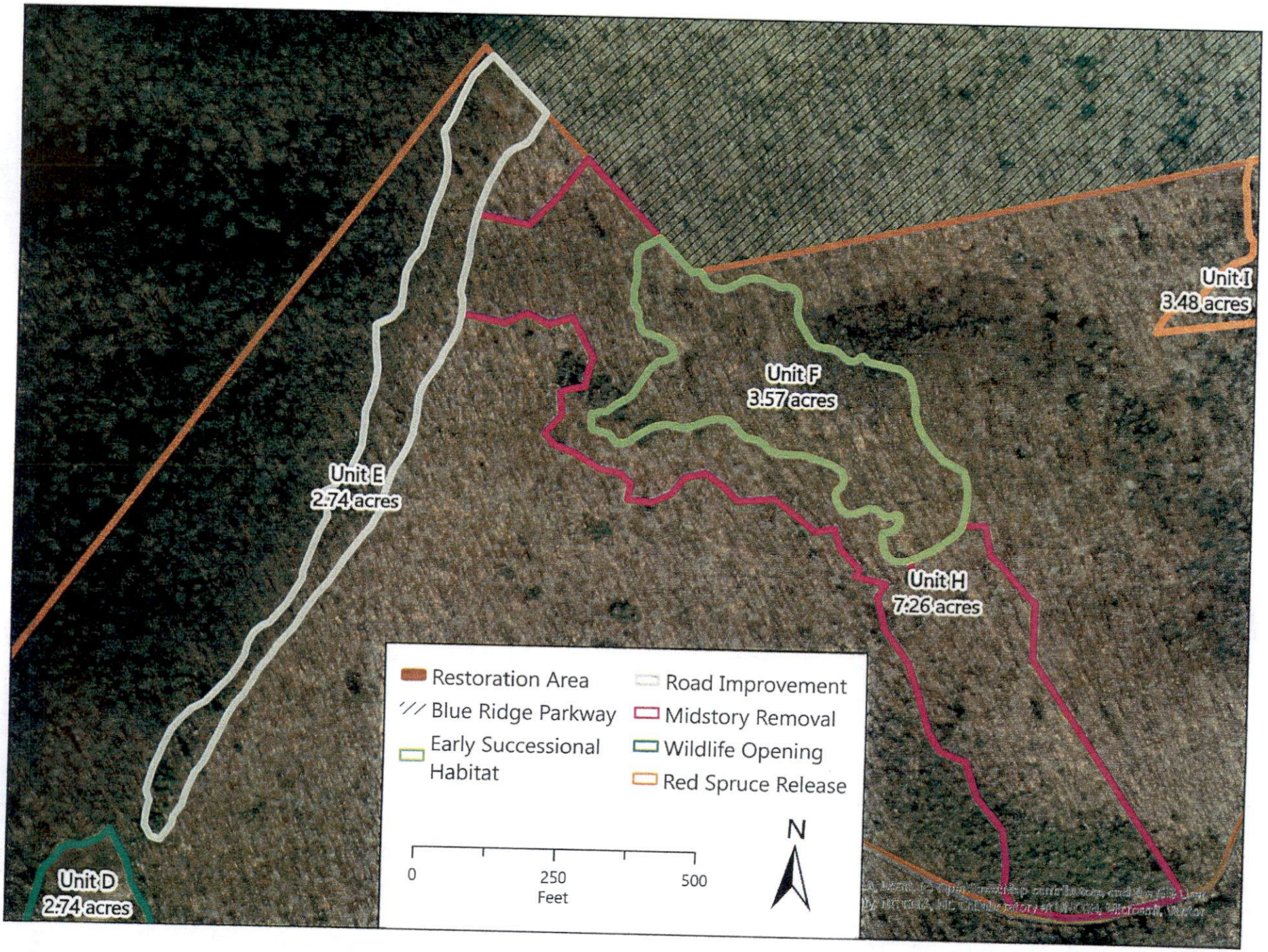
0 500 1,000 2,000 3,000 4,000 Feet

N W E S


Highway 433
N
East Fork Jenkins Creek
Blue Ridge Pkwy
Wolf Laurel
4. Acid Cove Forest
3. Chestnut Oak Forest
4. Acid Cove Forest
5. Wildlife Opening
3. Chestnut Oak Forest
2. Northern Hardwood Forest
1. Montane Oak-Hickory Forest
5. Wildlife Opening
5. Wildlife Opening
5. Wildlife Opening
1. Montane Oak-Hickory Forest
BIA Highway 434
Nannie Queen Ln
Slope (%)
0 - 20
20 - 40
40 - 60
60 - 75
75+
Restoration Area
Stand Boundary
Blue Ridge Parkway
0
0.4
0.8
Miles


N
Highway 433
East Fork Jenkins Creek
Blue Ridge Pkwy
Wolf Laurel
4. Acid Cove Forest
3. Chestnut Oak Forest
4. Acid Cove Forest
5. Wildlife Opening
3. Chestnut Oak Forest
2. Northern Hardwood Forest
1. Montane Oak-Hickory Forest
5. Wildlife Opening
5. Wildlife Opening
5. Wildlife Opening
1. Montane Oak-Hickory Forest
BIA Highway 434
Nannie Green Ln
Canopy Height (ft)
0 - 25
25 - 50
50 - 75
75 - 100
100+
Restoration Area
Stand Boundary
Blue Ridge Parkway
0
0.4
0.8
Miles


Unit C
0.82 acres
Unit B
1.05 acres
Unit B Ext.
2.45 acres
N
Restoration Area
Early Successional Habitat
Wildlife Opening
0
150
300
Feet
BIA Highway 434
BIA Highway 434


Unit I
3.48 acres
Unit F
3.57 acres
Unit E
2.74 acres
Unit H
7.26 acres
Unit D
2.74 acres
Restoration Area
Blue Ridge Parkway
Early Successional Habitat
Road Improvement
Midstory Removal
Wildlife Opening
Red Spruce Release
0
250
500
Feet
N