FOREST MANAGEMENT PLAN

Prepared for:

[redacted]

Henderson County, North Carolina

April 26, 2018

Prepared by Gary Fitzgerald, Forest Management Technician

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Landowner Information, Location and Acreage

The [redacted] a gated residential community located in the village of [redacted] in Henderson County, NC. The address for the main entrance is:

[redacted]
[redacted]
Hendersonville, NC 28739

[redacted] is a 163-acre subdivision with approximately 117 homesites. Of the 163 acres, 57 acres make up common areas set aside for the enjoyment of the community and this property is owned by all property owners. This common area is managed by the [redacted] Homeowners Association ([redacted]HOA). There is one 18-acre parcel of land contiguous with the primary boundaries of the sub-division which was sold to a private landowner by the developer approximately 10 years ago; this property is included in the management plan. The landowner has expressed interest in working with the [redacted]HOA to develop a common set of goals for our combined community.

The common areas of [redacted] have been divided into six management units for this plan. These management units were selected based on their unique land-use requirements, forest composition, and/or geologic features. The six management units are:

- Main Entrance Management Unit
- Upper Bear Gulch Management Unit
- Lower Bear Gulch Management Unit
- Rock Outcrop Management Unit
- Kangaroo Falls Management Unit
- [redacted] Management Unit

A series of five geo-referenced maps were developed for this management plan and are included at the end of the plan. These maps provide clarification on the location of [redacted] within Henderson County, an aerial map, a topographic map, a soils map and map showing where timber data was collected throughout the sub-division.

General Management Objectives

As stated above, most of the acreage included in this plan is owned jointly by all property owners in [redacted]. To develop management objectives for this plan, an advisory committee consisting of four residents was formed. In addition, [redacted] provided goals for the 18-acre lot they own.

Management goals were developed and prioritized for each management unit based on seven categories as described below:

- **Aesthetics** – Improvements to the visual appearance of the management unit;
- **Timber Stand Improvement (TSI)** – Improvements associated with the quality of forested sections of each management unit;
- **Timber Harvest** – The desire to generate income from timber harvesting in each management unit;
- **Recreation** – Changes to improve the ability of residents to recreate in each management unit;
- **Water Quality** – Changes to improve water quality in, or flowing from, each management unit;
- **Invasive Species** – Actions to control and/or remove invasive plant species from each management unit; and
- **Wildlife Habitat** – Changes to develop habitats to encourage wildlife to reside in [redacted].

The complete list of management objectives proposed by the advisory committee and the [redacted]s is provided in Appendix 1. Additional input from the entire [redacted] will be solicited before funds are committed to implement the recommendations included in this Management Plan.

Schedule of Current Activities

Year	Management Area	Activity
1	All	Identify qualified contractor and implement annual IPM
1	Building lots	Develop and provide invasive species training for residents
1	All, except Rock Outcrop	Develop plan to implement SMZ's
1	Kangaroo Falls	Control growth of saplings in open field
1	Rock Outcrop	Identify and protect milkweed and other important plant species
2	Main entrance	Develop riparian protection zones for ponds
2	Building lots	Develop guidelines for private SMZ's and invasive control
2	All, except Rock Outcrop	Develop trail system plan; implement
2	All, except Rock Outcrop	Develop wildlife corridors
3	All, except Rock Outcrop	Implement trail system enhancements (picnic areas, tree ID, etc.)
5	All, except Rock Outcrop	Timber cruise to assess understory; thin for mast -producing species as needed after stocking reaches 80% or higher.
10	All, except Rock Outcrop	Timber cruise to assess understory; thin for mast -producing species as needed after stocking reaches 80% or higher.
15	All, except Rock Outcrop	Timber cruise to assess understory; thin for mast -producing species as needed after stocking reaches 80% or higher.

Description of the Forest Management and Inventory Process

Forestry data was collected to quantify the status, condition, and health of the forested sections of each management unit. The types of questions this data is intended to answer include:

- What tree species exist in our forested common areas?
- Is there sufficient room for our trees to continue to grow or is the forest overgrown?
- How old are our forests and what does this tell us about past land use?
- Does our forest support wildlife well and can we make it better?
- What is the underlying quality of our forest soils and how does this affect tree growth?
- What is the market value of the timber on our property?
- What actions can we take to improve our forest to better meet the management objectives we want to achieve?
- What threats to our forest exist and what should we do to eliminate them?

Since it is unfeasible to measure every tree in a forest, foresters collect sample data and then expand this data for the entire management unit. The information presented in this plan is based on sample data collected in each management unit at a frequency of approximately one point per acre. Data was also collected in the understory at each point.

Timber inventory data was collected in 5 of the 6 management units. The Rock Outcrop management unit was excluded from timber data collection as most of the timber was removed to expose the rock outcrop for aesthetics. Within each management unit, plot points were selected using GIS mapping; these points are shown on Map 5 in the appendix and at the start of each management unit discussion. GPS was then used to navigate to each point center. A special tool called a “prism” was used to determine which trees to include in that points data. For each tree counted, the tree’s species, diameter at DBH, and its merchantable height was recorded. Data from every point was entered in NED; special USFS (United States Forest Service) software for analysis.

In addition, 2 to 4 trees per management unit were core drilled and growth rings counted to determine the trees age and well as it’s rate of growth. Total tree height was also collected for the trees aged to assess the quality of each site. This data was analyzed to determine if any actions were necessary to ensure the continued health of the stand.

As with most professions, there are a variety of technical terms used whose meanings are not obvious. A **Glossary of Terms** is provided Appendix 2 to explain forestry terms throughout this management plan.

Forest Resources and Management Considerations

Ecological Setting and Natural Communities

[redacted] is located on the western side of Jump Off Mountain in the village of [redacted]. Most of the property has either a western or south-western aspect with slopes up to 85%.

The primary selling feature of the home sites in [redacted] are long range mountain views; as such ridge top property is privately owned building lots. As a result, the forested green space studied in this Management Plan is primarily located in coves and valleys between mountain ridges. Five of the six management units have one or more perennial streams flowing through them and one management unit has both streams and ponds. One large management unit is privately owned acreage contiguous with [redacted]. The landowner has requested that his property be included in this Management Plan. Five of the six management units have sufficient timber reserves to warrant timber cruises to quantify timber volumes and values.

Forest stands are classified by their “natural community”. A natural community is defined as “a distinct and reoccurring assemblage of populations plants, animals, bacteria, and fungi naturally associated with each other and their physical environment” (Schafale). In effect, natural communities describe the species of trees and herbaceous plants likely to be found together based on soil conditions, moisture content, location, topographic orientation, and elevation.

The forested land in this management plan falls under the broad category of an oak-hickory forest. Differences from management unit to management tend to be driven by soil condition (i.e. dry vs moist) and the dominant vegetation in the understory. The natural communities identified in [redacted] are

Montane Oak-Hickory Forest (White Pine Subtype) – Main Entrance
Chestnut Oak Forest (Mesic Subtype) – Upper Bear Gulch
Chestnut Oak Forest (Dry Heath Subtype) – Lower Bear Gulch
Montane Oak-Hickory Forest (Acidic Subtype) – Kangaroo Falls & [redacted]

Wildlife Habitat

The [redacted] is home to a wide variety of wildlife, including black bears, bobcats, white-tailed deer, and wild turkey to name a few. Oaks and hickories generate hard mast (nuts) for food as do plant species which generate soft mast (fruits, berries, etc.). Of the 37 plot points used to collect timber data, 92% had one or more hard mast producing trees and 41% had plants which generate soft mast. Sections of Kangaroo Falls provides an open field setting which provides a completely different habitat for song birds, deer, and other wildlife. Finally, there are ample rock outcrops throughout the property which can provide shelter for den-living wildlife.

Wildlife habitat is a concern for the future. Invasive species threaten the biodiversity needed to support various types of wildlife. In addition, there are very few oaks or hickories in the understory; our capacity to generate food for wildlife will decrease as we lose the oaks and hickories in the overstory to natural disturbances and normal mortality.

The timber stand improvements recommended in this management plan are wildlife-related. Silviculture prescriptions for forested areas focus on periodic thinning with the goal of removing selected tree species which do not support wildlife needs. Oaks, hickories, and species will be given preference to help them develop in the understory. Thinning is not required immediately as all management units are either understocked or at the low end of being fully-stocked. A minimum stocking level of 80% has been set as a guideline. This can be adjusted up or down as needed.

The exception to this is Kangaroo Falls. It is recommended that saplings growing in the grassy areas be removed to maintain the existing eco-system. The biodiversity this provides will help support a wide variety of animal species in the community.

Topography, Soil, and Water Resources

[redacted] is a mountainous area with steep slopes and significant changes in elevation. The lowest elevation occurs at the main entrance at 2,460 ft. The property rises to 3,060 ft. at the northern end of the rock outcrop.

95% of the soil in [redacted] is Ashe stony sandy loam soil (AhF). The remaining 5% is Edneyville fine sandy loam soil (EdE). The Edneyville soil is confined to the main entrance. Neither soil type is well suited for road and trail construction nor do they provide good drainage for septic systems. A complete report on soils properties is included as Attachment 4.

The underlying bed rock of [redacted] is entirely composed of rocks belonging to Henderson Granitic Gneiss formation. The Henderson Gneiss is a regionally extensive medium gray to blueish gray, medium to coarse-grained metamorphic rock which makes up the largest granite pluton in western North Carolina. It is approximately 490 million years old (Carrigan, et al., 2001). The big rock formation along [redacted]way is a small zone of a finer-grained medium to dark gray Biotite

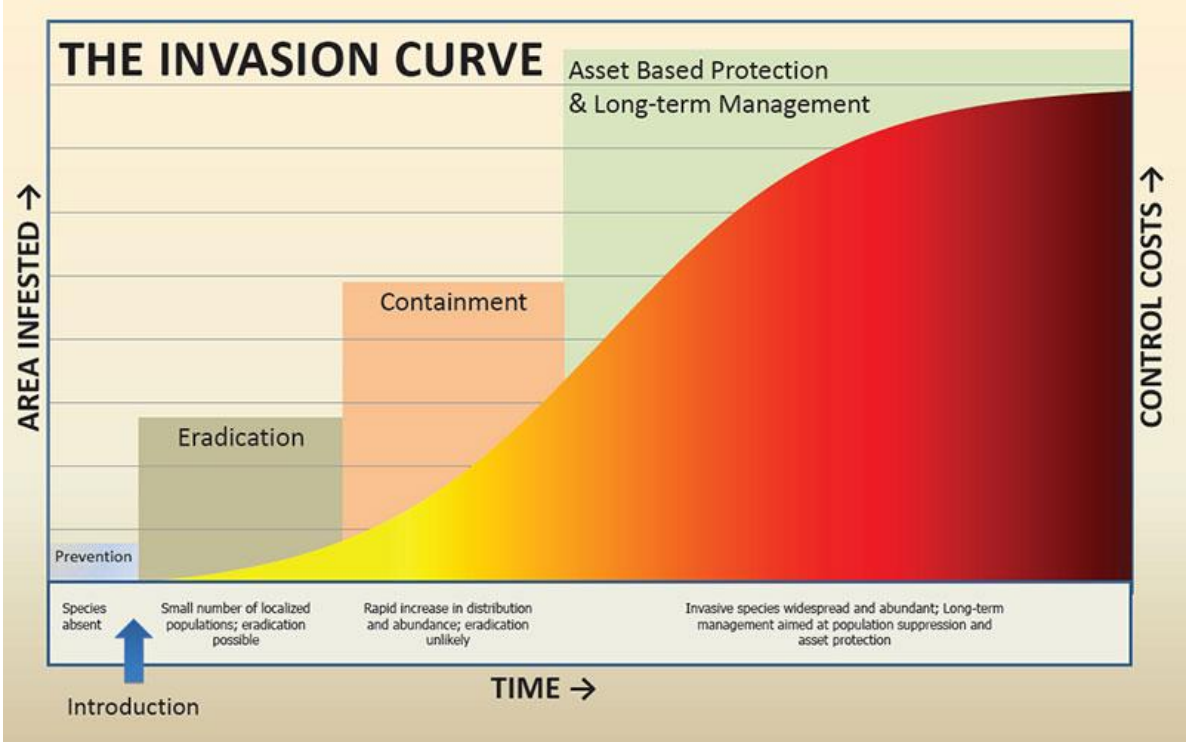
granodioritic gneiss which is a compositional variation of the Henderson Gneiss (Cattansch & Merschat, 2009). (Hamson, 2018)

Except for the rock outcrop, all the management units have perennial streams.

Forest Health and Protection

The Main Entrance, Upper Bear Gulch, and Kangaroo Falls management units all have invasive species. Due to the time of year when this management plan was developed, the findings reported herein **most likely significantly understate the level of invasive species infestation in** [redacted].

The curve below shows the relationship between level of infestation, cost to control, and the level of control possible vs time with respect to invasive species. Early reaction to the presence of invasive plants has the best chance of eradication at reasonable costs. Action should be taken immediately to manage invasive species throughout [redacted].



Additional threats include damage due to fire and erosion**.** There is a significant amount of fuel on the forest fuel which, if ignited, will increase the intensity of wildfires. The most effective way to manage this is through controlled burns. Unfortunately, the risk of initiating controlled burns so close to homes makes this option impractical. Training for homeowners on ways to keep combustible materials away from homesites is recommended.

Erosion is a major concern, especially as it related to water runoff from [redacted] Highway. This matter should be addressed by the [redacted]HOA, working with the village of [redacted].

Water Quality Protection and Timber Harvesting

Silt ponds exist at the main entrance to filter runoff before it enters the ponds and professional services are used to monitor water quality at the ponds. What is not protected or monitored are the many streams flowing through and off the property. It is recommended that the [redacted]HOA develop guidelines to ensure that adequate SMZs (stream management zones) exist where there is potential for runoff. A link to North Carolina Forestry – Quick Reference Best Management Practices Field Guide is provided in the reference section and should be used in establishing stream management policies for the community.

Timber harvesting broadly falls into one of two categories. **Regeneration** cuts are performed to remove timber and prepare the site for the next generation of trees. **Pre-commercial and commercial thinning** are performed to improve the current stand. Pre-commercial thinning is sometimes called "Timber Stand Improvement" or TSI because it involves an upfront cost with no timber sales revenue to offset the expense.

There is no interest in performing regeneration cuts to harvest timber from [redacted]. There are opportunities to implement pre-commercial and/or commercial thinning in future years to manipulate growth rates and to alter species composition to benefit wildlife and to enhance the aesthetics of our forests.

Management Unit	Total Area	Forested Area	Saw Timber, $	Pulpwood, $
Main Entrance	13.0 acres	5.8 acres	$4,250	$502
Upper Bear Gulch	6.0 acres	6.0 acres	$17,495	$214
Lower Bear Gulch	6.0 acres	6.0 acres	$11,468	$256
Kangaroo Falls	8.0 acres	3.0 acres	$7,062	$153
[redacted]	18.0 acres	11.8 acres	$28,555	$1049
Rock Outcrop	6.0 acres	0.0 acres	-	-
Total			$68,830	$2,174

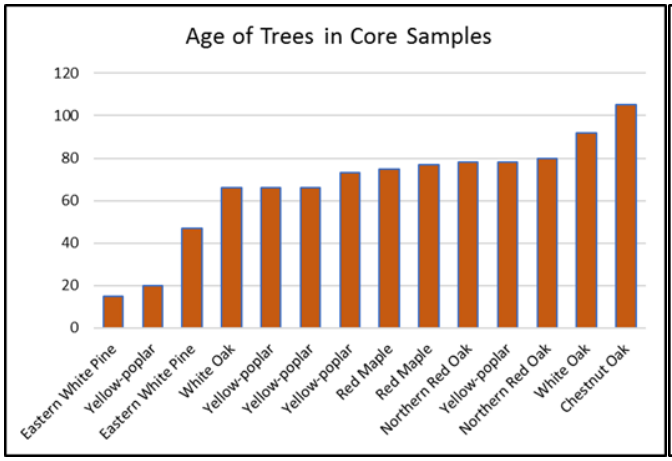
While there are no plans in place to harvest timber, timber cruises were performed to determine the species composition, volume, and value of the timber in the common areas. The total value of timber throughout [redacted] is $71,000 based on timber prices from the *4Q17 TimberMart South Market Bulletin*. A link to their site is provided in the reference section.

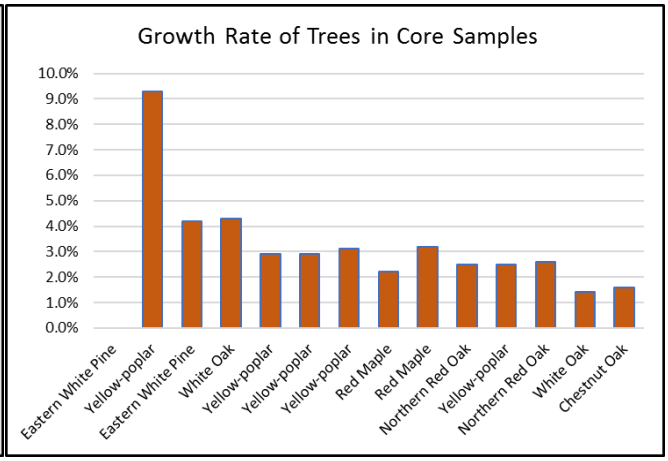
Timber volumes and values by species is provided in the detailed discussions for each management unit which follow.

Forest Age and Past Land Use

Fourteen trees where sampled to estimate their age and rate of growth. Two of the trees were not in the upper canopy; they were aged to confirm they grew as the result of a disturbance created by the construction of [redacted] Highway.

The graph on the left shows that our forest is an **even-aged** forest, 65 to 80 years old. The graph on the right is current rate of tree growth. A growth rate of 2% to 3% is consistent with a mature forest on poor soil.



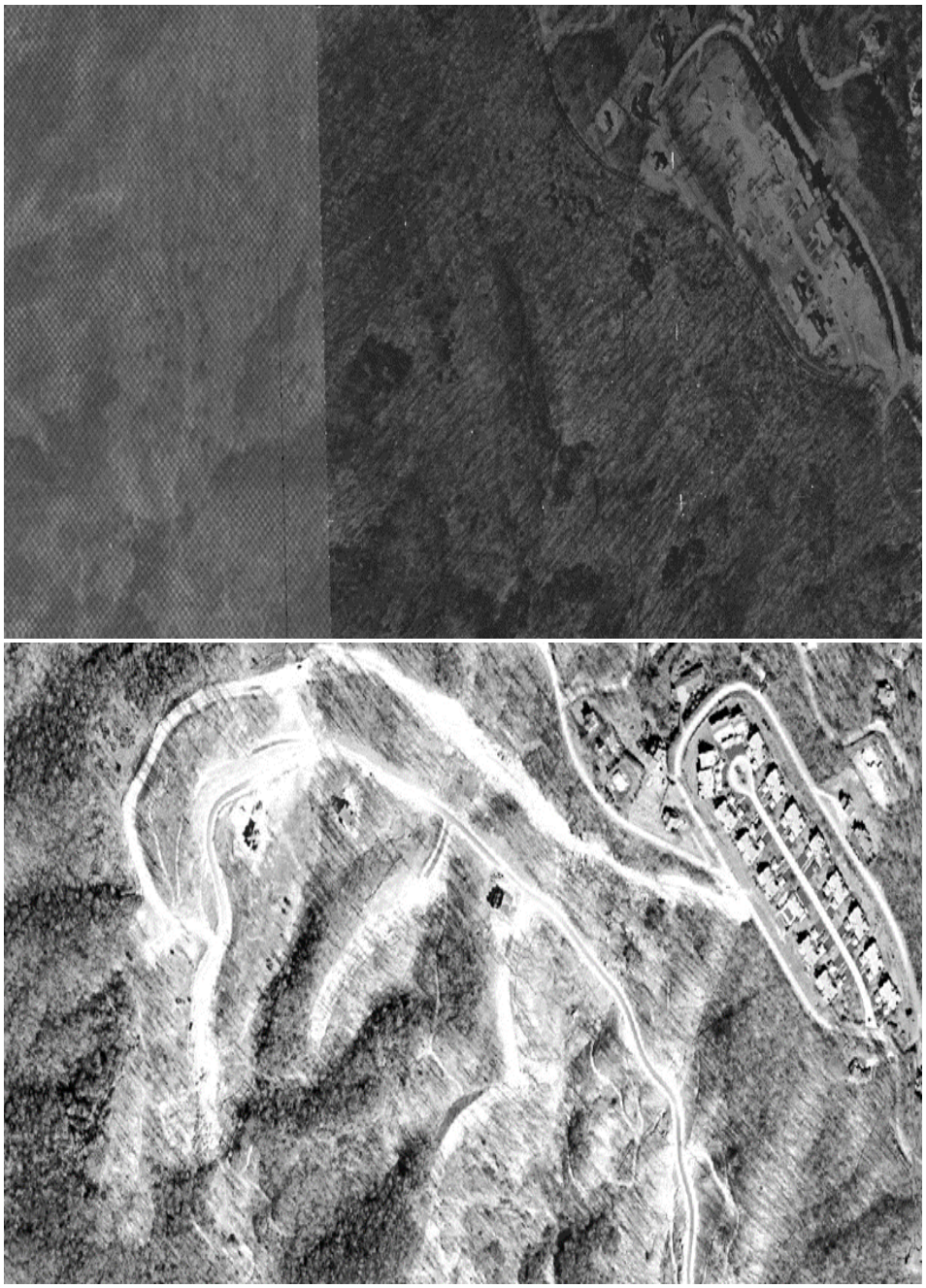


The tree aging data suggests that the current trees in the upper canopy were saplings in the 1940's and 1950's. During this time, the dominate tree species in the southern Appalachians was the American chestnut. American chestnut trees were under attack however by the chestnut blight, a fungal infestation introduced in 1904 in New York. By the 1950's the blight had destroyed most of the chestnut trees in the southern Appalachians. The upper canopy trees in [redacted] today may have been in the understory when the American chestnuts were cut or died from the fungus.

The tree age data did create one question. In 1997, the property which is now [redacted] was sold by the last private landowner to the original developer. A condition of sale in the contract was that all logging operations must cease immediately or the contract would be rendered invalid. It was initially unclear why our canopy trees were 65 to 80 years old if logging was underway 21 years ago.

Aerial photographs available on the Henderson County GIS database were examined to better understand past land-use. The top aerial photograph shows the top of the sub-division and was taken in 1984. While the photo is grainy, there does not appear to be any logging activity underway. The bottom photograph was taken in 2001 shortly after development started. Trees along both sides of the new roads appear to be much lower in density that those in the valleys. The areas of low tree density are much wider than what would be required for road construction.

It is speculated that logging in the 1990's occurred along the ridge tops and that our current road system probably started as skid trails prior to residential development. The logged areas are now privately-owned building lots which were not sampled for this Management Plan.



Access and Operability

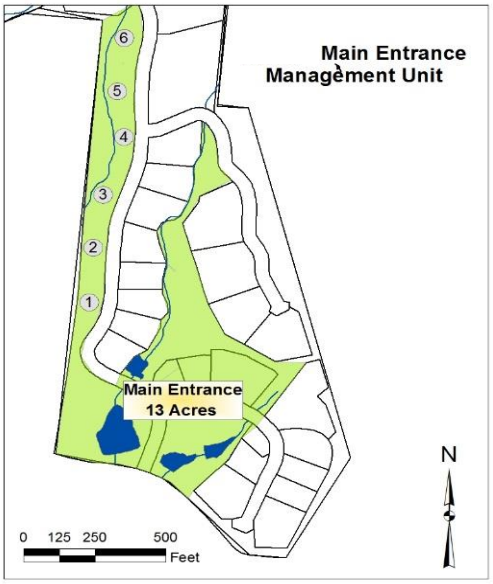
[redacted] has a completely developed road system plus there are numerous skid trails from past logging operations. There are no accessibility issues.

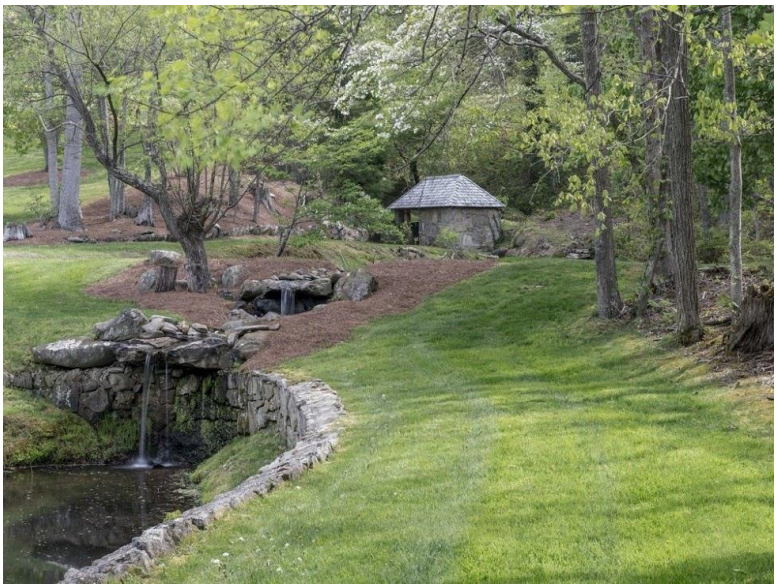
Boundary Line Condition

[redacted] consists of individual building lots, common areas within the boundaries of the sub-division, and a buffer zone around the outer perimeter of the property. Numerous surveying pins identifying individual building lots along with flagging were observed during the timber cruise. Lots appear to be well marked. Outer boundaries were flagged 15+ years ago, however they have not been maintained. Improvements to identify the outer boundary of [redacted] should be considered by the [redacted]HOA.

Management Unit Descriptions and Recommendations

Main Entrance



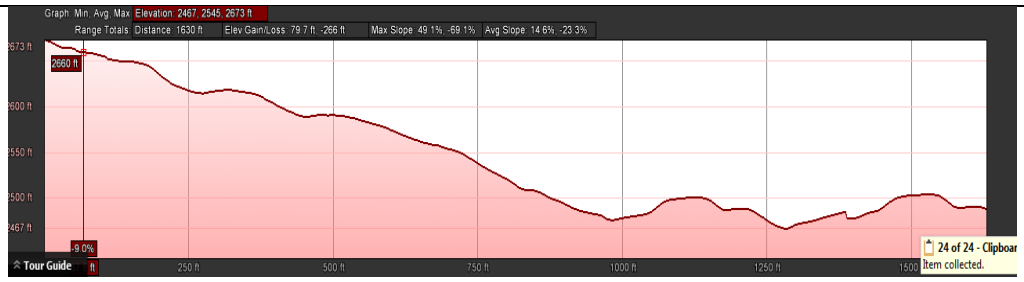
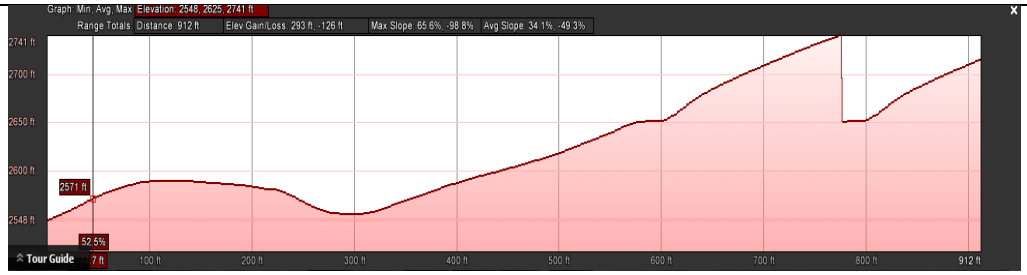


General Description

The Main Entrance management unit is the focal point for the [redacted] at the entrance of the main gate on [redacted] Rd. It is intensively managed with most of the management unit kept in professionally maintained lawn areas. Of special note are three ponds which are stocked with brim, sunfish, and largemouth bass. Residents and their guests use the ponds for catch and release fishing. Both sets of ponds (one on the left, two on the right) have recirculating pumps which create artificial waterfalls. Silt ponds are present where natural stream flows enter the ponds to help minimize sediment. The waterfalls exist for aesthetic reasons and they also aerate the water to benefit wildlife in the ponds. A focal point in the main entrance management unit is the foundation of an old homestead along with its fireplace and springhouse (shown above).

Topographic, Soil, and Geologic Description

Main Entrance				
Acres	Aspect	Slope	Elevation	Soil Series
13 acres	Primarily south-facing with some west-facing slopes	0% to 50%	2,460 to 2,720 ft.	AhF & EdE

North to South Slope Profile	
West to East Slope Profile	

The main entrance management unit is 13 acres in size and predominately has a south-facing aspect with a modest slope (0% to 5%). The slope increases to 17% along the [redacted] Highway corridor. The section along the [redacted]way Highway which was sampled for timber is the exception; it is west-facing and has side slopes up to 50%. The above elevation plots were generated in **Google Earth Pro** and show selected cross-sections of the elevation of the Main entrance. The top elevation plot runs from north (left side) to south (right side). The bottom elevation plot runs from west (left side) to east (right side). The level section in the bottom plot is [redacted] Highway. The steep drop-off on the bottom plot is not real; it is a glitch on this, and several other, elevation plots in this plan. The Main Entrance management unit is at the bottom of the subdivision at an elevation of 2,460 ft. to 2,720 ft.

The predominate soil type (8.6 acres) in the Main Entrance management unit is an Edneyville (EdE) fine sandy loam soil with 15% to 25% slopes. The balance is an Ashe (AhF) stony sandy loam with 25% to 45% slopes. Both soil types are rated as very limited with respect to road construction, trails, and septic tank absorption with the primary reason being slope. More information regarding the soils found in the Main Entrance management unit is available in Appendix 4.

Forest Description - Overview

Main Entrance – Stand Summary						
Average Tree Diameter, DBH	BA/A, sqft /acre	Trees / acre	Stand Age, yrs.	Growth rate, %	Site Index	Stocking
9.1	54.3	108.1	18 / 85	4.6%	91	43% - Understocked

Due to diverse make-up of the Main Entrance management unit, the following analysis is based on the 5.8 acres which makes up the [redacted]way corridor (refer to above map for the location of plot points 1 – 6).

The [redacted]way corridor contains tree species dominated by oaks and yellow-poplars. The mean tree diameter is 9.1" DBH and this mean is highly dependent on species. More so than any other stand within [redacted], this stand also contains eastern white pine. The site is xeric and drains to a small perennial stream. This stand falls within the **Montane Oak-Hickory Forest (White Pine Subtype)** natural community.

Basal area and TPA (trees per acre) are both measures of forest density. When used together, they can be used to determine if a forest stand has an appropriate amount of timber in the stand. This can be useful, for example, when deciding if a forest stand's growth could be improved by thinning trees to reduce competition for essential resources (water, nutrients, and space). It is also used in conjunction with growth data to determine when a stand has reached maturity and is ready for harvesting. Stocking guides are used to compare a stand's basal area and TPA to ideal forest densities to determine if the stand is understocked, fully stocked, or overstocked.

Following these guidelines, the Main Entrance management unit has a tree density which is 43% of a fully stocked forest. This level of density is considered understocked. An upland hardwood stocking guide is provided below for your reference. Stocking density is determined by finding the intersection of the TPA line and the basal area / acre line and then reading the stocking percent shown along the right side of the stocking curves. Thinning is not necessary to promote the growth of this stand.

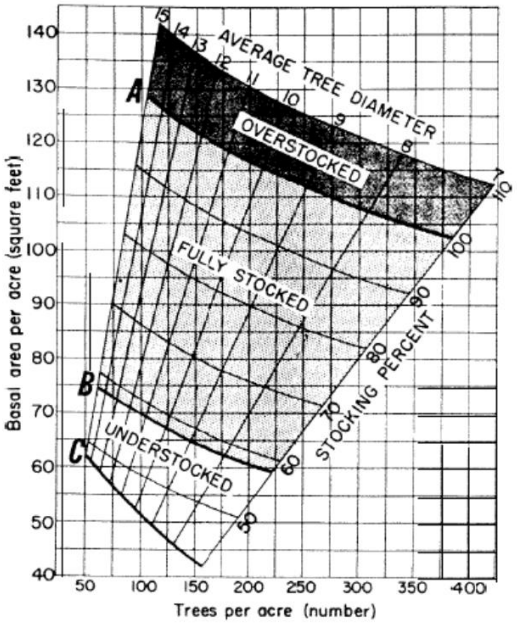


Figure 1.--Stocking chart for upland central hardwoods. (Gingrich 1967)

Age and growth rates were determined by using a hollow drill called an increment bore to pull core samples from selected trees. Since trees add one growth ring per growing season, the tree's age is determined by counting the number of rings in the sample. Growth rates are estimated by counting the number of years it took the tree to add it's last 1" of radial growth. In addition, the total height of each tree core-drilled was measured with a clinometer. The age and height data can be used to assess the quality, or productivity, of the site. This is done with site index curves.

Four trees were sampled to estimate the age and growth rate of the Main Entrance. Data is presented below. As suspected based on visual observations, the area sampled is a **two-aged stand** with relatively young yellow-poplars and eastern white pines and much older oaks, maples, and other hardwoods. Based on sales records of the property to the original developer, it is documented that the property was sold for development in 1997. This was 21 years ago and matches well with the age of the yellow-poplars and eastern white pines. Both species are classified as pioneer species, which means they typically are the first trees to grow after a disturbance. It appears these trees grew after the area was cleared for the development of [redacted] Highway. The older and larger oaks and maples were generally found to be the furthest away from the road and were most likely left standing during road construction.

Growth rates for the older hardwoods have slowed considerably due to poor site conditions and the age of the trees. The yellow-poplars are still very young and are increasing in basal area about 9.3% per year. Eastern white pine growth rate data is not available. Eastern white pines add one whirl of branches per year so their age can be estimated by counting annual whirls. A core sample was not pulled for the eastern white pine aged below.

There are numerous, rapidly growing, smaller diameter yellow-poplar stems growing along the [redacted] Highway corridor. No immediate action is required, however they should be

reevaluated on five year intervals and pre-commercial thinning started to remove inferior trees and allow room for continued growth.

Main Entrance – Age & Growth Rate Data						
Tree Species	Diameter, DBH	Age, years	Tree Height	Site Index	Rings, last inch	Growth rate
White oak	14.7”	92	78’	99’	22	1.4%
Yellow-poplar	7.5”	20	53’	100’	7	9.3%
Red maple	14.7”	77	88’	73	9	3.2%
Eastern white pine	8.3”	15	33’	130’	n/a	n/a

Forest Description – Overstory Species Composition

Main Entrance Timber Data by Species									
			Timber Volume			Timber Value			
Species	Basal Area (sq.ft./ac.)	Mean Diameter, DBH	Total Net Board-foot Volume (bd.ft.)	Total Net Pulpwood Cubic Volume (cu.ft.)	Total Net Cubic Volume (cu.ft.)	Total Board-foot Value ($)	Total Pulpwood Value ($)	Total Timber Value ($)	% total
yellow-poplar	27.1	8.5	2,976	1,624	2,030	$893	$334	$1,227	25.8
white oak	4.3	15.0	2,964	0	385	$1,114	$0	$1,114	23.5
northern red oak	4.3	20.5	2,873	0	329	$1,054	$0	$1,054	22.2
hickory	2.9	15.7	2,130	0	275	$656	$0	$656	13.8
chestnut oak	1.4	16.8	705	0	81	$265	$0	$265	5.6
white ash	1.4	11.6	652	0	79	$177	$0	$177	3.7
red maple	1.4	20.0	668	0	81	$91	$0	$91	1.9
eastern white pine	4.3	8.3	0	325	325	$0	$78	$78	1.6
sourwood	2.9	10.8	0	219	219	$0	$45	$45	0.9
black locust	1.4	7.0	0	71	71	$0	$15	$15	0.3
blackgum	1.4	9.6	0	77	77	$0	$16	$16	0.3
sweet birch	1.4	6.0	0	66	66	$0	$14	$14	0.3
		9.1	12,966	2,382	4,019	$4,250	$502	$4,752	

Timber density, size, volumes, and value are shown above for the Main Entrance management unit. Yellow-poplar, northern red oak, and white oak make up 71.5% of the timber in this stand based on value. Hickory accounts for another 13.8%. Timber volumes are segregated into one of two classifications; saw timber (measured in board feet) and pulpwood (measured in cubic feet). A board foot is a measure of volume equal to a board 1' long, 1' wide, and 1" thick. Trees whose diameters are 12" DBH or larger are classified as higher value saw timber. Saw timber is cut to produced boards for various industries (e.g. construction, cabinetry, furniture, etc.). Pulpwood is generally smaller trees, less than 12" DBH, which are chipped and used for paper processing or biomass.

Due to the low density and an abundance of small stems below a minimum saw timber size of 12" DBH, the value of the timber is insignificant; $4,250 in saw timber and $502 in pulpwood. There are no regeneration silviculture prescriptions recommended for this stand as there is no desire to harvest timber by the landowner. Periodic assessments (5-year intervals) are recommended to consider pre-commercial thinning treatments to alter the understory species composition to favor mast-producing species for wildlife. No thinning is recommended until the stand is at least 80% stocked to mitigate the spread of invasive species.

Forest Description – Understory Species Composition

The understory contains numerous black birch, tulip poplar, red maple, mountain laurel, and rhododendron saplings. No oak saplings were observed which is problematic with respect to future wildlife habitat. Oaks and hickories generate hard mast (i.e. acorns and nuts); a vital food source for many wildlife species. Wild grape vines are present as is multi-flora rose and wineberry. Multi-flora rose and wineberry are invasive plant species. There is a large concentration of multi-flora rose near plot point #5 due to an opening in the tree canopy. Patches of multi-flora rose also can be found along the entire length of [redacted] Highway.

Recommendations

Landowner Priorities for the Main Entrance (1 to 5)						
Aesthetics	TSI	Timber Harvest	Recreation	Water Quality	Invasive Species	Wildlife
5	1	1	5	5	5	4

Landowner representatives place a very high priority on the aesthetics for the Main Entrance and recreational opportunities associated with the ponds and the homesite. As such, maintaining high water quality and controlling invasive species rated equally high. Wildlife habitat rated moderately high. There is no support for timber harvesting or timber stand improvements. Specific recommendations which support these priorities include:

1. Strengthen the current water monitoring contract to ensure that all aspects of maintaining high levels of water quality in, and coming to, the ponds are addressed. Consider additional pond aeration as required.
2. Develop a landowner policy for maintaining and protecting stream banks that run through private property (1).
3. Investigate the possibility of establishing stream management zones (SMZs) around the ponds to minimize surface runoff while still maintaining access for recreation activities.


4. Contract with a specialist certified in Integrated Pest Management (IPM) to address multi-flora rose, wineberry, and other invasive species (1).
5. Develop a landowner policy for controlling invasive species on private property with special focus on undeveloped lots (1).
6. Develop a training program for residents to teach them invasive species identification and control techniques (1).
7. Schedule periodic timber cruises (5-year intervals) to assess the species composition in the understory with the goal of implementing TSI to promote species which generate hard mast for wildlife (1).

(1) – These recommendations are common to most other management units within the [redacted]. Unless otherwise stated, it should be assumed that these actions apply to all of the management unit recommendations which follow.

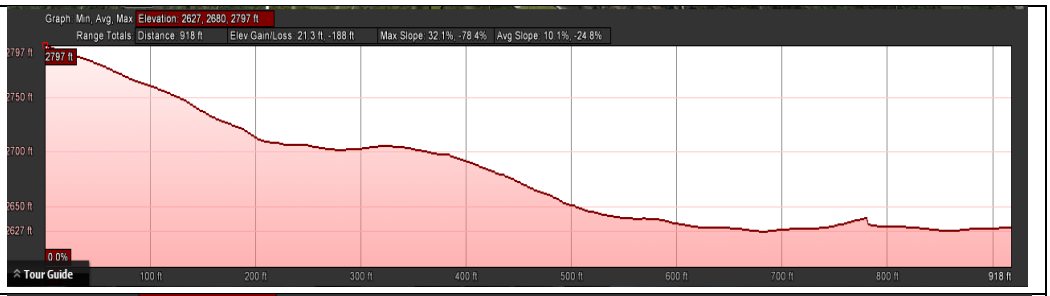
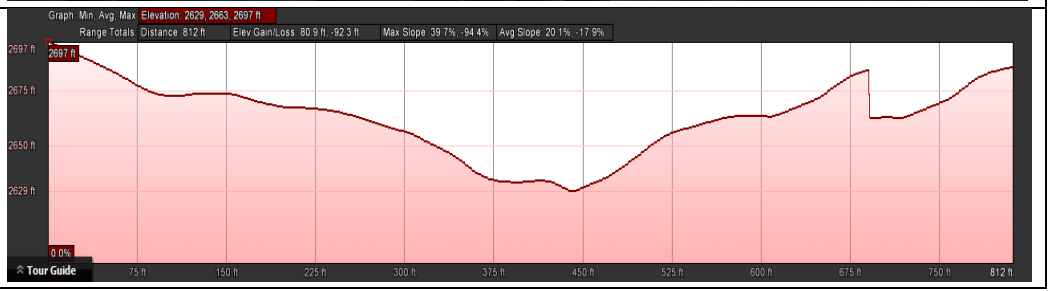
Upper Bear Gulch

General Description

Upper Bear Gulch is a 6-acre stand east of Lady Fern Trail in a section commonly refer to as the “Orr Section”. The stand was named Upper Bear Gulch for this plan due many black bear sightings on critter cams over the last several years. It is bordered to the north by [redacted] Highway. Three homesites exist on the property although they have never been sold to a private owner. Two streams flow from north to south, converging near the southern end of the stand. A walking trail enters the stand on Lady Fern Trail and exits near plot point #4.

Topographic, Soil, and Geologic Description

Upper Bear Gulch				
Acres	Aspect	Slope	Elevation	Soil Series
6.0 acres	South-facing	0% to 40% with steepest section at north end.	2,630 to 2,810 ft.	AhF

North to South Slope Profile	
West to East Slope Profile	

Upper Bear Gulch has a predominant south-facing aspect. The northern end along [redacted] Highway is the steepest section with slopes up to 40%. The southern half is relatively level. From west to east, the management unit forms a bowl or cove. Streams flow from the road, through the cove to Lower Bear Gulch. Soil in Upper Bear Gulch is an Ashe (AhF) stony sandy loam. While not well suited for road or trail construction or septic drainage, soil quality is generally better than the Main Entrance due to increased moisture. Elevation ranges from 2,630 ft. to 2,810 ft.

Forest Description - Overview

Upper Bear Gulch – Stand Summary						
Average Tree Diameter, DBH	BA/A, sqft /acre	Trees / acre	Stand Age, yrs.	Growth rate, %	Site Index	Stocking
12.7	96.3	95.1	69	3.1%	81 avg	Fully Stocked – 76%

Upper Bear Gulch is dominated by yellow-poplar (34.3%) followed by four oak species (53% total). The yellow-poplars tend to be found along old skid trails (i.e. logging roads) in the management unit which would have exposed the forest floor to sunlight. Yellow-poplar is intolerant of shade and is found in areas exposed to sunlight. Unlike the Main Entrance management unit, this site is mesic and is best classified as a **Chestnut Oak Forest (Mesic Subtype).**

With respect to density and stocking, the basal area in Upper Bear Gulch is 96.3 sqft / acre with 95.1 TPA. Upper Bear Gulch is 76% of a fully stocked forest and is considered fully stocked. The average tree diameter is 12.7” DBH with the average for most species ranging from 11.8” to 20.5”.

Three trees in the overstory were core-drilled to determine age and growth rate. The three trees ranged from 66 to 75 years old based on tree ring analysis which classifies the management unit as an **even-aged stand**. 10-year growth rates are modest, ranging from 2.2% to 4.3%. The site index for yellow-poplar is 105 ft. and is very similar to the site index for yellow-poplar in the Main entrance management unit. Site indices for white oak and red maple were 65 ft. and 74 ft. respectively.

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Upper Bear Gulch – Age & Growth Rate Data						
Tree Species	Diameter, DBH	Age, years	Tree Height	Site Index	Rings, last inch	Growth rate
Yellow-poplar	16.0”	66	144’	105’	9	2.9%
Red maple	16.2”	75	89’	74’	12	2.2%
White oak	12.8”	66	76’	65’	8	4.3%

Forest Description – Overstory Species Composition

Upper Bear Gulch Timber Data by Species									
			Timber Volume			Timber Value			
Species	Basal Area (sq.ft./ac.)	Mean Diameter, DBH	Total Net Board-foot Volume (bd.ft.)	Total Net Pulpwood Cubic Volume (cu.ft.)	Total Net Cubic Volume (cu.ft.)	Total Board-foot Value ($)	Total Pulpwood Value ($)	Total Timber Value ($)	% total
yellow-poplar	31.3	11.8	20,049	321	2,897	$6,015	$66	$6,081	34.3
chestnut oak	11.3	14.2	8,305	69	987	$3,123	$14	$3,137	17.7
northern red oak	7.5	20.5	6,064	0	696	$2,225	$0	$2,225	12.6
white oak	8.8	14.7	5,401	71	743	$2,031	$15	$2,045	11.5
scarlet oak	6.3	17	5,412	0	597	$1,986	$0	$1,986	11.2
red maple	22.5	12.4	7,698	447	1,404	$1,055	$92	$1,147	6.5
hickory	6.3	13.4	2,853	71	440	$879	$15	$893	5.0
black cherry	1.3	20	654	0	74	$183	$0	$183	1.0
black locust	1.3	6.4	0	62	62	$0	$13	$13	0.1
		12.7	56,435	1,041	7,900	$17,495	$214	$17,710	

The overstory is dominated by yellow-poplar and four different oak species. As described above, the yellow-poplars tend to be found along skid trails in the management unit where road construction exposed the forest floor to sunlight. Chestnut oak is the largest single oak species in the canopy, followed by northern red oak, white oak, and scarlet oak. Timber in Upper Bear Gulch is valued at $17,710 and most of this is saw timber.

Forest Description – Understory Species Composition

The understory in Upper Bear Gulch consists of a variety of tree species and herbaceous vegetation. The bowl in the center of the management unit has two streams flowing through it and as such is moist and shaded. Ferns are present as are mountain laurel and rhododendron. Trees growing in the understory include black birch, northern red oak, hickory, eastern white pine, American holly, serviceberry, yellow-poplar, and red maple.

Two invasive species were noted during the timber cruise. A single winged burning bush was found and there are several patches of multi-flora rose present. Areas near plot points 5 & 6 are heavily infested with multi-flora rose as is the area between plot point 8 and [redacted] Highway.

Recommendations

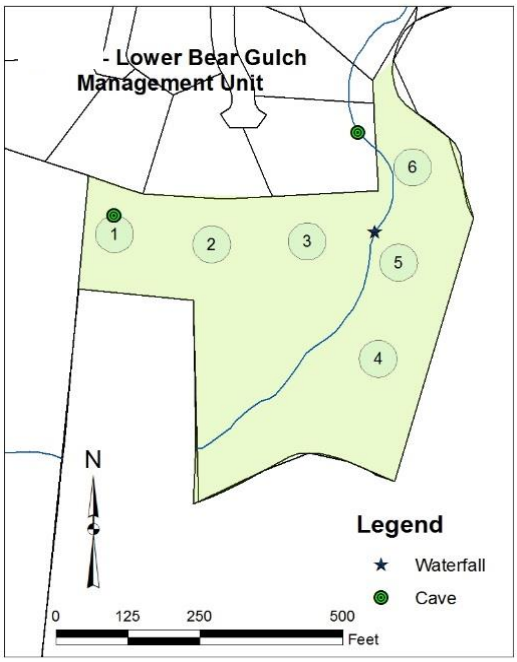
Landowner Priorities for Upper Bear Gulch (1 to 5)						
Aesthetics	TSI	Timber Harvest	Recreation	Water Quality	Invasive Species	Wildlife
5	4	1	4	4	4.5	4

The understory in Upper Bear Gulch has a very diverse species mix and yet it visually appears to be open. Invasive plants are becoming threat however they are not so pervasive as to make the area unusable for recreation. The presence of north red oak and hickory saplings is encouraging with respect to future wildlife habitat.

Trees in the overstory are growing at a modest rate and the area is far from being overstocked. There is little reason to perform any thinning in the canopy (e.g. crop tree release), especially since there are no plans for future regeneration cuts. Several recommendations for Upper Bear Gulch include:

1. Pre-commercial thinning in the understory should be performed on 5-year intervals for aesthetic reasons and to control the understory species composition, favoring the oak and hickory saplings. Oaks are difficult to regenerate and the presence of naturally regenerated saplings should be encouraged as a potential future source of food for wildlife.
2. Multi-flora rose is a significant threat to this management area. Action should be taken quickly to eradicate it.
3. One trail currently runs through Upper Bear Gulch; maintenance is required to keep the trail open. Upper Bear Gulch is a potential candidate for trail improvements, such as the addition of picnic tables for walkers should there be interest by the [redacted] HOA.

Lower Bear Gulch

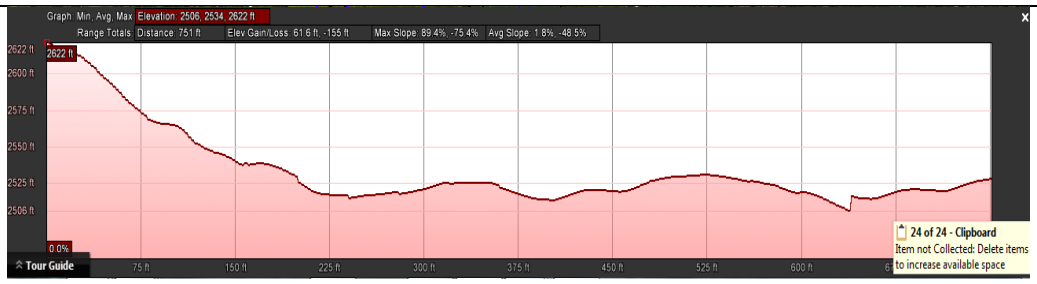
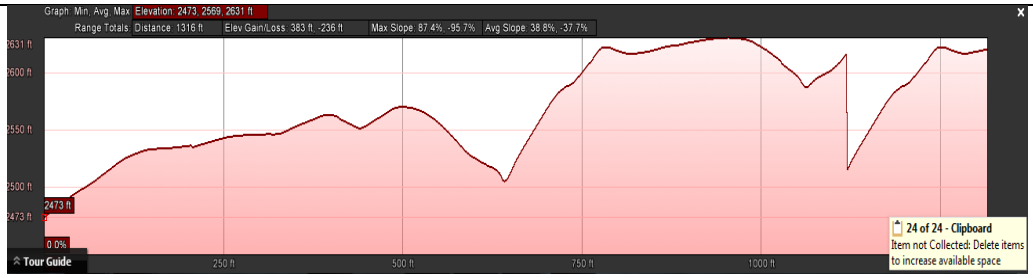


General Description

Lower Bear Gulch is a 6-acre stand directly south of Upper Bear Gulch. Upper and Lower Bear Gulch were originally combined, however once the timber cruise was performed they were divided because the topography and species composition were significantly different. It is also worth noting that this 6-acre tract is a bit of a mystery to residents as the original developer appears to still own the property. It is not clear why this parcel wasn't deeded to the [redacted] HOA with the rest of the common areas when the developer turned over common areas to the community. The property is bounded by several [redacted] lots to the north, private property to the west and south, and a dirt trail leading down to [redacted] Road. A picturesque skid trail exists just west of the creek.

Topographic, Soil, and Geologic Description

Lower Bear Gulch				
Acres	Aspect	Slope	Elevation	Soil Series
6.0 acres	South-facing	North to South slope ranges from 78% to 0%. West to east slope ranges from 10% to 70%.	2,470 ft. – 2,630 ft.	AhF

North to South Slope Profile	
West to East Slope Profile	

Lower Bear Gulch has a southern aspect with slopes up to 78% along the northern boundary. From west to east the property follows the ridgeline until the property drops down to a stream which starts in Upper Bear Gulch. The eastern side of the stream is a steep embankment with 70% slopes up to a wide skid trail. Elevation ranges from 2,470 ft. to 2,630 ft.

Unlike Upper Bear Gulch, much of which is a protected cove, Lower Bear Gulch is a xeric site with full southern exposure. As with most of [redacted], the soil is an AhF stony sandy loam soil. Unlike Upper Bear Gulch however, Lower Bear Gulch has numerous rock outcrops, some of which are large enough to provide dens for wildlife. The cave in the above photo was found along the stream near plot #6; another series of caves were found near plot #1.

Forest Description - Overview

Lower Bear Gulch – Stand Overview						
Average Tree Diameter, DBH	BA/A, sqft /acre	Trees / acre	Stand Age	Growth rate, %	Site Index	Stocking
11.2	71.7	93.2	85	2.3%	90	Understocked – 58%

The primary tree species in Lower Bear Gulch are oaks (78.8%) and yellow-poplar (9.5%). Most of the yellow-poplars observed were found along the road on the east side of the management area. The understory is a dense mat of rhododendrons and mountain laurel. The forest near plot points 1, 2, and 3 has steep slopes along high ridgelines with full southern exposure making the site very dry (xeric). The natural community designation for this management area is **Chestnut Oak Forest (Dry Heath Subtype).**

The basal area is only 71.7 sqft /acre with 93.2 TPA. This management unit in [redacted] is understocked.

Two trees were core-drilled to estimate the age of the trees and the sight quality. One chestnut oak was sampled and found to be 105 years old; the oldest tree sampled for this management plan. The estimated site quality for this tree is only 66 and this poor site quality is consistent with the tree's very low growth rate of 1.6%. The yellow-poplar was 66 years old and is growing at 2.9%/year. The site index for the yellow-poplar was 115; very consistent with other yellow-poplars in [redacted]. It is worth noting that the yellow-poplar tested was along the creek near plot point #6 in a sheltered site with moist soil. The difference in ages between the two trees justifies classifying this area as a **two-aged stand**.

Lower Bear Gulch – Age & Growth Rate Data						
Tree Species	Diameter, DBH	Age, years	Tree Height	Site Index	Rings, last inch	Growth rate
Yellow-poplar	15.8"	66	129'	115'	9	2.9%
Chestnut oak	17.9"	105	79'	65'	16	1.6%

Forest Description – Overstory Species Composition

Lower Bear Gulch Timber Data by Species									
			Timber Volume			Timber Value			
Species	Basal Area (sq.ft./ac.)	Mean Diameter, DBH	Total Net Board-foot Volume (bd.ft.)	Total Net Pulpwood Cubic Volume (cu.ft.)	Total Net Cubic Volume (cu.ft.)	Total Board-foot Value ($)	Total Pulpwood Value ($)	Total Timber Value ($)	% total
chestnut oak	21.7	15.5	14,810	93	1,740	$ 5,568	$ 19	$ 5,588	47.7
northern red oak	11.7	13.8	6,379	95	891	$ 2,341	$ 20	$ 2,361	20.1
tuliptree	6.7	8.7	680	132	560	$ 1,092	$ 27	$ 1,119	9.5
white oak	3.3	14.7	1,739	0	231	$ 654	$ -	$ 654	5.6
black oak	3.3	17.4	1,718	0	196	$ 631	$ -	$ 631	5.4
hickory	1.7	19.3	1,596	0	197	$ 492	$ -	$ 492	4.2
red maple	8.3	10.2	2,492	286	610	$ 341	$ 59	$ 400	3.4
sourwood	8.3	8.9	0	364	496	$ 182	$ 75	$ 256	2.2
blackgum	3.3	9.1	1,220	89	287	$ 167	$ 18	$ 185	1.6
black locust	1.7	9.2	0	92	92	$ -	$ 19	$ 19	0.2
white ash	1.7	10	0	94	94	$ -	$ 19	$ 19	0.2
		11.2	30,634	1,246	5,395	$ 11,468	$ 256	$ 11,724	

The overstory is dominated by chestnut oaks (47.7%). Chestnut oaks are commonly found on dry upland ridges with poor site quality; an accurate description of Lower Bear Gulch. Northern red oak is the 2nd most abundant species (20.1%). Most of the northern red oak observed was found along points 4, 5, and 6 which were mesic sites along the stream running through Lower Bear Gulch. Yellow-poplar was confined to the same plots, primarily along the road along the eastern border of the management unit. Timber in Lower Bear Gulch is valued at $11,724.

Forest Description – Understory Species Composition

The understory along the creek contains a wide variety of tree species. Black birch, yellow-poplar, northern red oak, red maple, and sourwood saplings plus mountain laurel and rhododendron are all present along the eastern side of the management unit. The understory along the northern ridge of Lower Bear Gulch contains only minimal tree saplings; this section is dominated by mountain laurel and rhododendron. The mountain laurel and rhododendron thickets are so dense that travel through the management is extremely difficult. The heath thicket also appears to be suppressing the growth and development of new trees.

No invasive species were observed in Lower Bear Gulch.

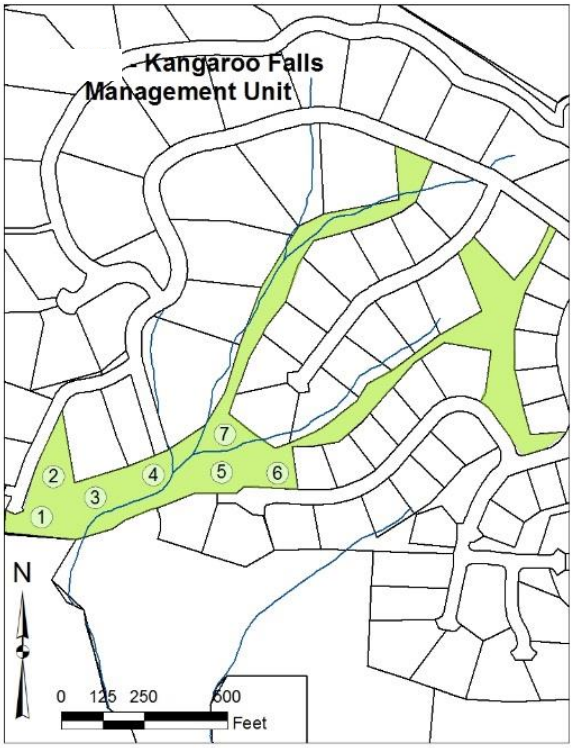
Recommendations

Landowner Priorities for Lower Bear Gulch						
Aesthetics	TSI	Timber Harvest	Recreation	Water Quality	Invasive Species	Wildlife
5	4	1	4	4	4.5	4

The above landowner priorities for Lower Bear Gulch are a bit deceiving. When meetings were held to discuss landowner objectives, Lower and Upper Bear Gulch were combined into one management unit. The above priorities are more associated with Upper Bear Gulch which landowners are more familiar with. It is very unlikely that any [redacted] landowners have explored Lower Bear Gulch prior to the timber cruise performed for this management plan.

There are no recommendations for Lower Bear Gulch now, mostly because [redacted] does not own the property. If this situation changes, the skid trail running along the creek could be developed as part of a trails program. Long term, some clearing of the mountain laurel and rhododendron understory should be considered to promote the regeneration of trees. Without some action, this section of [redacted] will move towards a heath-bald in the future.

Kangaroo Falls

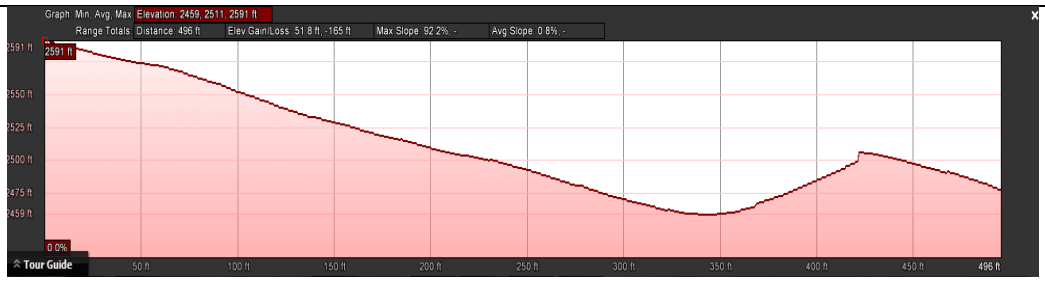
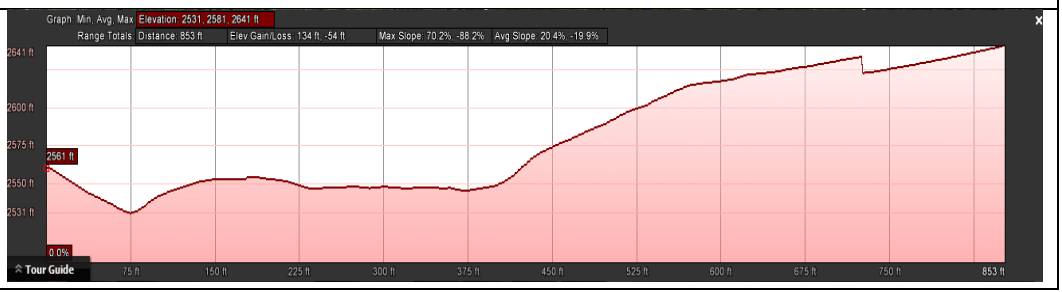


General Description

Kangaroo Falls is an irregularly shaped management unit, 8.0 acres in total size. For this management plan, 3.0 acres are considered forested green space. The property is bounded on all sides with private lots. The timber cruises performed on Kangaroo Falls focused on the main section at the southwest corner of the management unit. The name of this management unit comes from a small waterfall at the border of [redacted] and the [redacted] property which was named by a resident as part of a fund-raising activity several years ago. Plots 1,2, and 3 are wooded as are 6 and 7. The middle of the management area near plots 4 and 5 was cleared by the developer when an unnamed gravel road was extended into the property from [redacted] Highway approximately 15 years ago.

Topographic, Soil, and Geologic Description

Kangaroo Falls				
Acres	Aspect	Slope	Elevation	Soil Series
8.0	South-facing	0% to 38%	2,480 ft. to 2,830 ft.	AhF

North to South Slope Profile	
West to East Slope Profile	

Kangaroo Falls has a southern aspect with north to south slopes up to 38%. The management unit is relatively level from west to east with most of the slope occurring on the eastern side where the property slopes up toward private lots. Two small streams flow through Kangaroo Falls, starting in the coves between mountain ridges and converging between plot points 5 and 7. Even with a south-facing aspect, the site is mesic due to the presence of multiple streams. Like most of [redacted], the soil series in Kangaroo Falls is Ashe (AhF) stony sandy loam.

While Kangaroo Falls is not a large property per se, it's unusual shape and steep slopes results in elevations which range from 2,480 ft. to 2,830 ft.

Forest Description - Overview

Kangaroo Falls – Stand Summary						
Average Tree Diameter, DBH	BA/A, sqft /acre	Trees / acre	Stand Age	Growth rate, %	Site Index	Stocking
12.2	82.9	90.3	76 yrs.	2.8%	102	66% - Fully Stocked

Oaks and hickory dominate the overstory with yellow-poplars present in disturbed areas of the stand where sufficient sunlight is present. Mesic conditions favor northern red oaks and hickories over chestnut oaks. Kangaroo Falls is classified as **Montane Oak-Hickory Forest (Acidic Subtype)** natural community based on species composition in the canopy and the presence of both mountain laurel and rhododendron in the understory.

The basal area is 82.9 sqft/acre and the trees per acre is 90.3 TPA. The stand density is 66% and considered fully stocked.

Two trees were core-drilled to estimate the age of the stand. A northern red oak was found to be 78 years old with a site index of 103 ft. The yellow-poplar was 73 years old and has a site index of 100 ft. Both trees have modest growth rates of 2.5% and 3.1% respectively and both trees are located near plot points 1 and 2. Based on the above ages, the Kangaroo Falls management unit is an **even-aged stand.**

Kangaroo Falls – Age & Growth Rate Data						
Tree Species	Diameter, DBH	Age, years	Tree Height	Site Index	Rings, last inch	Growth rate
Northern red oak	17.8”	78	120’	103’	9	2.5%
Yellow-poplar	18.2”	73	112’	100’	8	3.1%

Forest Description – Overstory Species Composition

Kangaroo Falls Timber Data by Species									
			Timber Volume			Timber Value			
Species	Basal Area (sq.ft./ac.)	Mean Diameter, DBH	Total Net Board-foot Volume (bd.ft.)	Total Net Pulpwood Cubic Volume (cu.ft.)	Total Net Cubic Volume (cu.ft.)	Total Board-foot Value ($)	Total Pulpwood Value ($)	Total Timber Value ($)	% total
northern red oak	18.6	16.3	5,965	57	764	$2,189	$12	$2,201	30.5
yellow-poplar	17.1	10.1	4,077	286	811	$1,223	$59	$1,282	17.8
hickory	11.4	13.3	3,606	97	561	$1,111	$20	$1,131	15.7
chestnut oak	7.1	15.5	2,756	0	313	$1,036	$0	$1,036	14.4
white oak	5.7	14.8	1,642	0	227	$617	$0	$617	8.6
scarlet oak	2.9	22.9	1,196	0	128	$439	$0	$439	6.1
eastern white pine	2.9	14.7	913	0	114	$125	$0	$125	1.7
southern red oak	2.9	11.7	308	41	82	$113	$8	$121	1.7
American beech	4.3	12.6	742	41	124	$102	$8	$110	1.5
red maple	2.9	14.9	778	0	98	$107	$0	$107	1.5
shortleaf pine	1.4	10.6	0	57	57	$0	$14	$14	0.2
sourwood	2.9	12.2	0	82	82	$0	$17	$17	0.2
sweet birch	1.4	6.0	0	34	34	$0	$7	$7	0.1
sycamore	1.4	8.8	0	39	39	$0	$8	$8	0.1
		12.2	21,983	733	3,434	$7,062	$153	$7,215	

Kangaroo Falls wide variety of tree species in the overstory. The dominant species, like much of [redacted], continues to be oaks and yellow-poplar however northern red oak (30.5%) exceeds chestnut oak (14.4%) due to moister conditions which favor the northern red oaks. Several tree species were observed in Kangaroo Falls that were not commonly found in other management units. Several American beech trees were observed, one of which was large enough to categorize as saw timber. Scarlet oak, southern red oak, eastern white pine, and an American sycamore were also observed. Timber in Kangaroo Falls is valued at $7,215.

Forest Description – Understory Species Composition

Like the diversity observed in the overstory, Kangaroo Falls has a wide variety of understory vegetation. Tree species include red maple, mountain laurel, rhododendron, black birch, yellow-poplar, black locust, and black cherry. Serviceberry, an American chestnut, and a red mulberry tree were also observed. In addition, there are numerous herbaceous plants in open areas, including ferns, various grasses, wild strawberry, and Carolina violets. Additional wildflowers have been observed in Kangaroo Falls on previous visits however none were in bloom for identification during the timber cruise.

Unfortunately, the growing conditions leading to the above diversity also exposes the area to invasive species. The center of the stand as well as the two private lots north of plot points 3 and 4 is overrun with kudzu. In addition, multi-flora rose and oriental bittersweet were both observed in the understory.

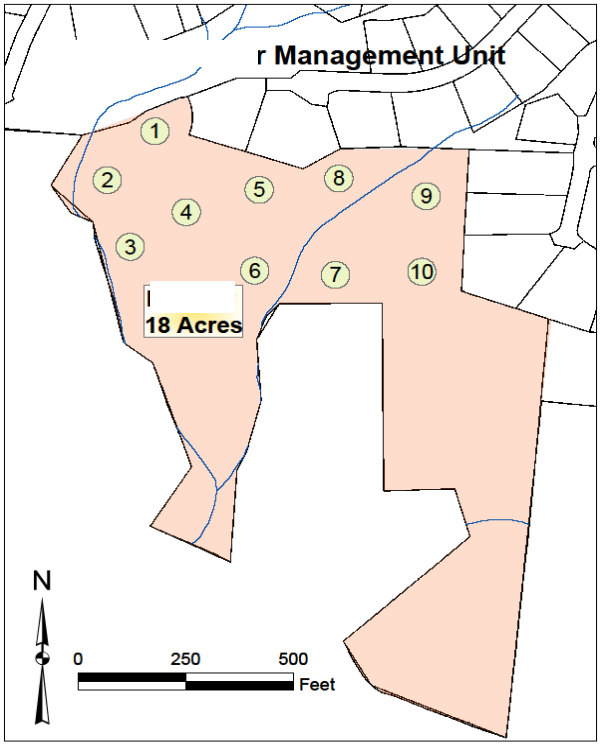
Recommendations

Landowner Priorities for Kangaroo Falls (1 to 5)						
Aesthetics	TSI	Timber Harvest	Recreation	Water Quality	Invasive Species	Wildlife
4.5	4	1	4	4.5	5	4

More than any other management unit, invasive species control is required immediately to prevent their continued expansion to other areas in [redacted]. This problem is known to the community as actions to kill and/or control kudzu have been taken in past years. Nothing was done in 2017; IPM needs to be reinstituted.

In addition to the control of invasive plants, sections of Kangaroo Falls have a unique eco-system consisting mostly of grasses and non-woody herbaceous plants rather than trees. If left alone, normal forest succession will occur and return the area to forest. In its present form, this area provides habitat and a source of food and shelter to a variety of animal species. It is recommended that this area be managed to retain its current condition to benefit wildlife. This will require the periodic removal of tree saplings plus a concerted effort to eradicate, or at least control, invasive plants.

[redacted]



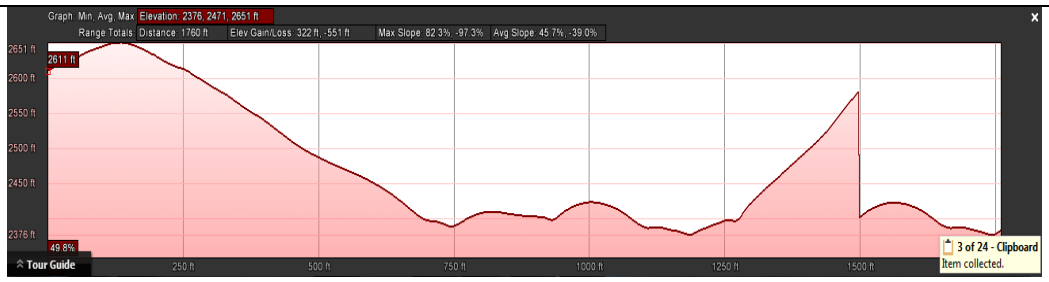
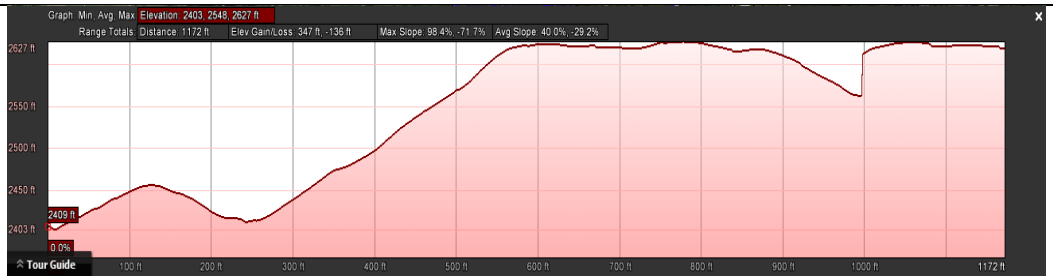
General Description

The [redacted] management unit is an 18-acre tract privately owned by Larry and Carol [redacted]. The property was owned by the developer of [redacted] and, to the best of my knowledge, was going to be incorporated into [redacted] in a later phase of the development project. That did not happen and the property was sold separately; is not a legal part of [redacted]. Mr. & Mrs. [redacted] have goals that are consistent with [redacted] landowner goals and expressed interest in incorporating their property with [redacted] for this Management Plan.

The horseshoe-shaped [redacted] management unit borders [redacted] to the north and east and [redacted] Road to the south. Property south of plot points 3 and 6 has been cleared for the [redacted] residence. Property south of plot point 10 is forested but is being sold. Of the 18 acres, 11.8 acres is forested property.

Topographic, Soil, and Geologic Description

[redacted]				
Acres	Aspect	Slope	Elevation	Soil Series
18.0 acres	South-facing	0% to 61.4% north to south; 0% to 75.9% west to east	2,380 ft. to 2,660 ft.	AhF

North to South Slope Profile	
West to East Slope Profile	

The [redacted] management unit has a southern aspect. The property is sloped up to 61.4% from north to south with the steepest areas at the northern end of the property. From west to east the property slopes up from a mountain stream which borders the property on the west to [redacted] on the east. West to east slopes range up to 75.9%.

Timber data was collected in the northern half of the property and in this area, the site is mesic due to an abundance of streams and canopy cover. As with most of [redacted] the soil series is an Ashe (AhF) stony sandy loam. The soil is poorly suited for septic systems and road development. A more detailed report for the soil is included as an Attachment. The property ranges from 2,380 ft. to 2,660 ft. in elevation.

Forest Description - Overview

[redacted] – Stand Summary						
Average Tree Diameter, DBH	BA/A, sqft /acre	Trees / acre	Stand Age	Growth rate, %	Site Index	Stocking
10.3”	101.0	150.1	79	2.6%	103	84% - Fully Stocked

Oaks and hickory dominate the overstory with yellow-poplars present in disturbed areas of the stand where sufficient sunlight is present. Mesic conditions favor northern red oaks over chestnut oaks. The [redacted] management unit is classified as **Montane Oak-Hickory Forest (Acidic Subtype)** natural community based on species composition in the canopy and the presence of both mountain laurel and rhododendron in the understory. The basal area is 101.0 sqft/acre and the trees per acre is 150.1 TPA. The stand density 84% and considered fully stocked.

Three trees were core-drilled to estimate the age of the stand. The northern red oak and yellow-poplar trees were 80 years old and 78 years old respectively. One eastern white pine was also core-drilled and was 47 years old. The age of the eastern white pine suggests this may be a two-aged stand however based on core samples in the other management units, the [redacted] management unit is part of an **even-aged forest**.

[redacted] – Age & Growth Rate Data						
Tree Species	Diameter, DBH	Age, years	Tree Height	Site Index	Rings, last inch	Growth rate
Eastern white pine	14.7”	47	77’	77’	7	4.2%
Northern red oak	20.5”	80	116’	86’	8	2.6%
Yellow-poplar	18.7”	78	140’	120’	9	2.5%

Forest Description – Overstory Species Composition

Doebler Timber Data by Species									
			Timber Volume			Timber Value			
Species	Basal Area (sq.ft./ac.)	Mean Diameter, DBH	Total Net Board-foot Volume (bd.ft.)	Total Net Pulpwood Cubic Volume (cu.ft.)	Total Net Cubic Volume (cu.ft.)	Total Board-foot Value ($)	Total Pulpwood Value ($)	Total Timber Value ($)	% total
northern red oak	25.0	13.2	29,904	706	4,292	$10,975	$145	$11,120	37.6
chestnut oak	15.0	10.9	14,807	506	2,224	$5,567	$104	$5,672	19.2
hickory	7.0	10.3	8,037	329	1,346	$2,475	$68	$2,543	8.6
scarlet oak	4.0	15.1	6,182	111	772	$2,269	$23	$2,292	7.7
tuliptree	5.0	13.8	7,272	0	1,017	$2,182	$0	$2,182	7.4
white oak	5.0	14.3	5,476	197	941	$2,059	$41	$2,100	7.1
sugar maple	3.0	13.1	3,203	156	547	$887	$32	$919	3.1
red maple	12.0	8.6	3,992	1,088	1,591	$547	$224	$771	2.6
shortleaf pine	4.0	12.9	4,357	156	665	$597	$37	$634	2.1
eastern white pine	4.0	13	4,077	112	621	$559	$27	$585	2.0
sweet birch	2.0	13.2	1,202	156	313	$165	$32	$197	0.7
American beech	2.0	10.9	990	197	310	$136	$41	$176	0.6
blackgum	3.0	6.8	0	201	301	$138	$41	$179	0.6
sourwood	7.0	8.8	0	758	758	$0	$156	$156	0.5
eastern hemlock	2.0	6.5	0	197	197	$0	$47	$47	0.2
white ash	1.0	7	0	152	152	$0	$31	$31	0.1
		10.3	89,501	5,022	16,047	$28,555	$1,049	$29,605	

Oaks dominate the [redacted] management unit with all oak species making up 71.6% of the overstory. Northern red oak makes up the largest of the oak species at 37.6%. The [redacted] property was never part of any development activity until very recently which explains why shade intolerant pioneer species like yellow-poplar (7.4%) are less dominant.

It is worth noting that three sugar maples were found in the overstory at plot point 5 and an American beech was found in the overstory at plot point 1. Both species are very shade tolerant and their presence in the overstory suggests that the [redacted] property is old growth forest in late succession.

Forest Description – Understory Species Composition

As with most of the understory in [redacted], the understory contains significant amounts of rhododendron and mountain laurel. Thickets are so dense near plot points 9 and 10 that the property is almost impassable. Red maple saplings dominate the understory with respect to tree species.

No invasive species were documented at the plots taken, however multi-flora rose was observed along the stream banks between plot points 5, 6, and 7 during the timber cruise.

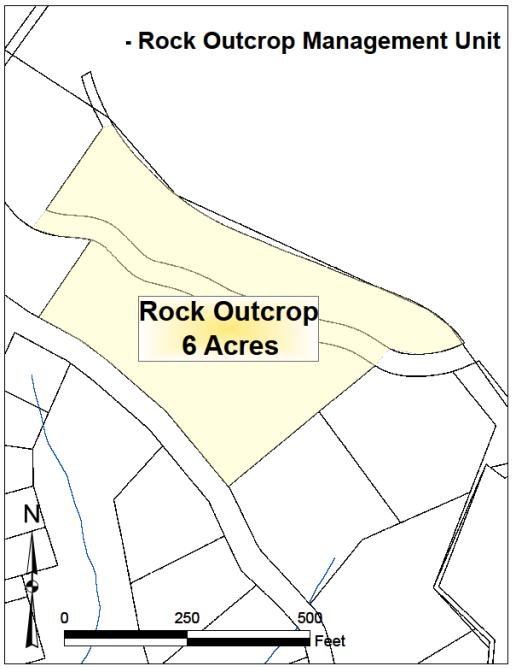
Recommendations

Landowner Priorities for [redacted] (1 to 5)						
Aesthetics	TSI	Timber Harvest	Recreation	Water Quality	Invasive Species	Wildlife
5	4	1	4	5	3	5

The [redacted]s have expressed interest in further developing a trail system through their property and tying it into trails existing or planned for [redacted]. There are numerous skid trails throughout the property, some of which have been cleared for hiking; this can be expanded. The existing trails are wide, relatively level, and very picturesque which fits with the high priorities assigned to aesthetics and recreation.

There is no desire to harvest timber on the [redacted] property however some clearing may be performed to open an area for another house. Care is suggested to avoid inviting unwanted invasive plants to fill the openings. The multi-flora rose noted above should be removed .

Rock Outcrop



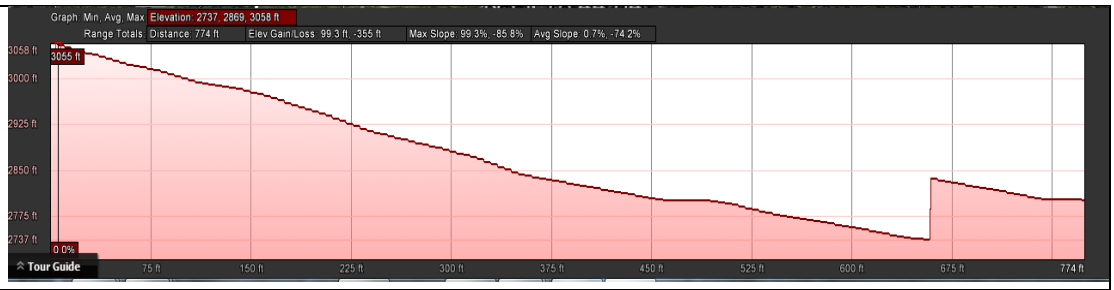
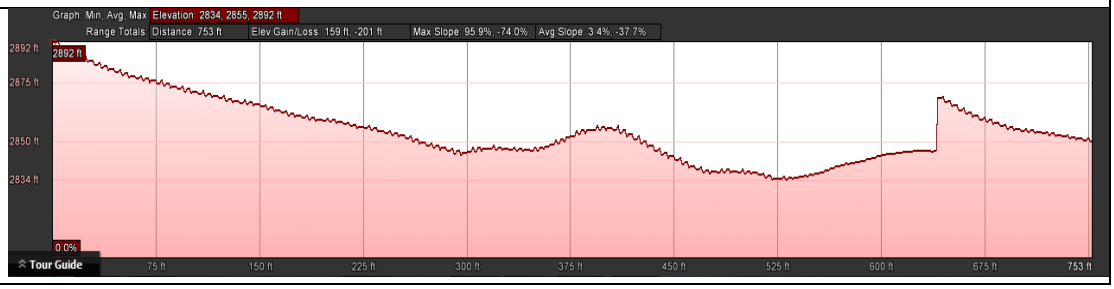
General Description

The 6-acre Rock Outcrop is located near the top of [redacted] and is bordered by [redacted] Highway to the south-west and the upper boundary of [redacted] to the northwest. The property was set aside as green space by the developer due to its unique geologic features, aesthetic appeal to residents, and the habitat it provides to larger wildlife that lives in [redacted]. From a practical matter, building on the rock outcrop would have been extremely costly at best.

Due to its aesthetic appeal, most of the trees on this management unit were removed. While some trees remain, no timber data was collected for this management unit.

Topographic, Soil, and Geologic Description

Rock Outcrop				
Acres	Aspect	Slope	Elevation	Soil Series
6.0 acres	Southwest	0% to 85.1% perpendicular to road; up to 15.6% parallel to road	2,800 ft. to 3,060 ft.	AhF

Perpendicular to [redacted] Highway	
Parallel to [redacted] Highway	

The rock outcrop has a southwest aspect with steep slopes. The steepest slopes are perpendicular to [redacted] highway and are as high as 85.1%. The slope parallel to the road is more modest. The rock outcrop is the highest management unit studied; elevations range from 2,800 ft. to 3,060 ft.

The soil series on the rock outcrop is an Ashe (AhF) stony sandy loam. The rock structure is a common metamorphic rock called Gneiss.

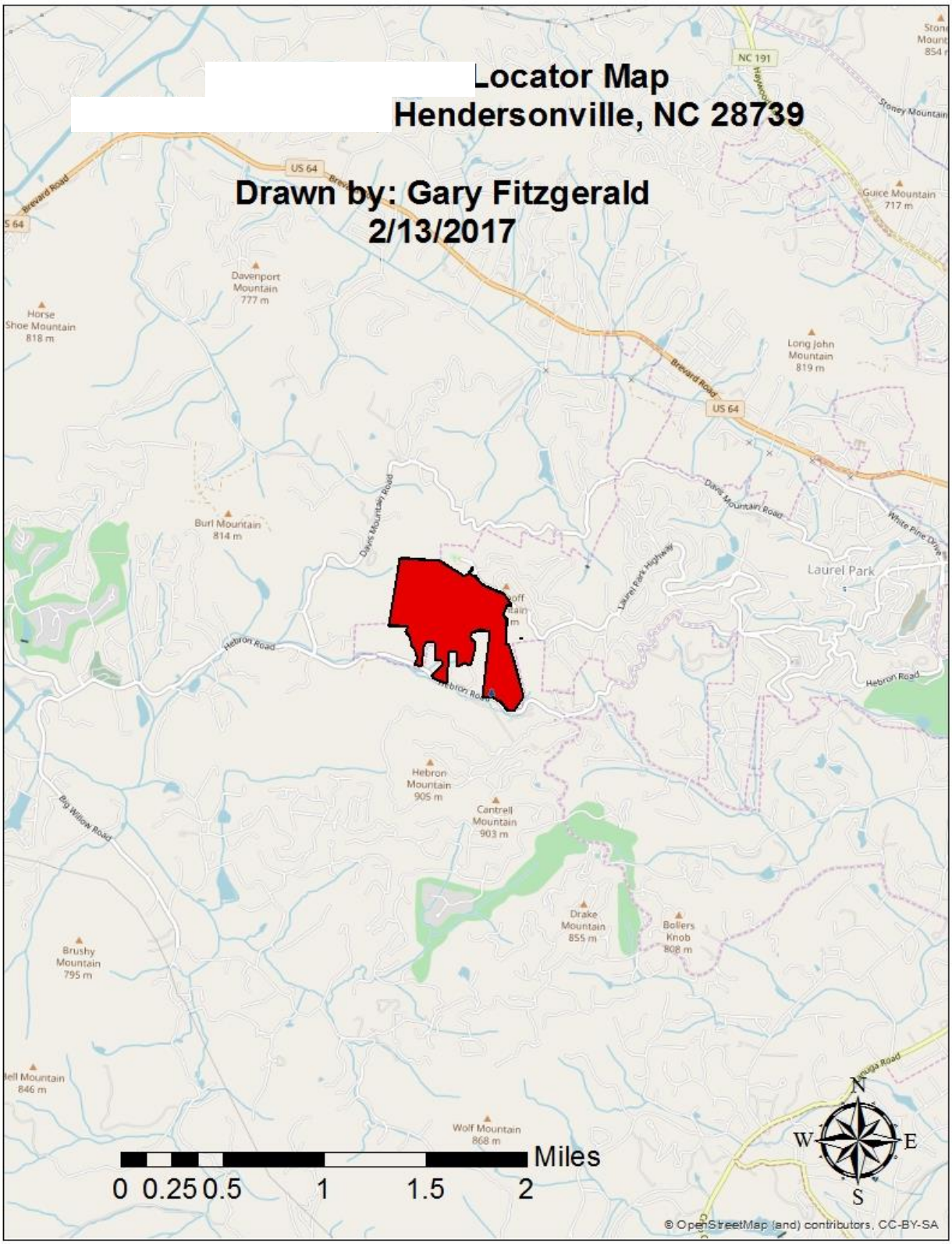
Recommendations

Landowner Priorities for the Rock Outcrop (1 to 5)						
Aesthetics	TSI	Timber Harvest	Recreation	Water Quality	Invasive Species	Wildlife
5	4	1	4	5	3	5

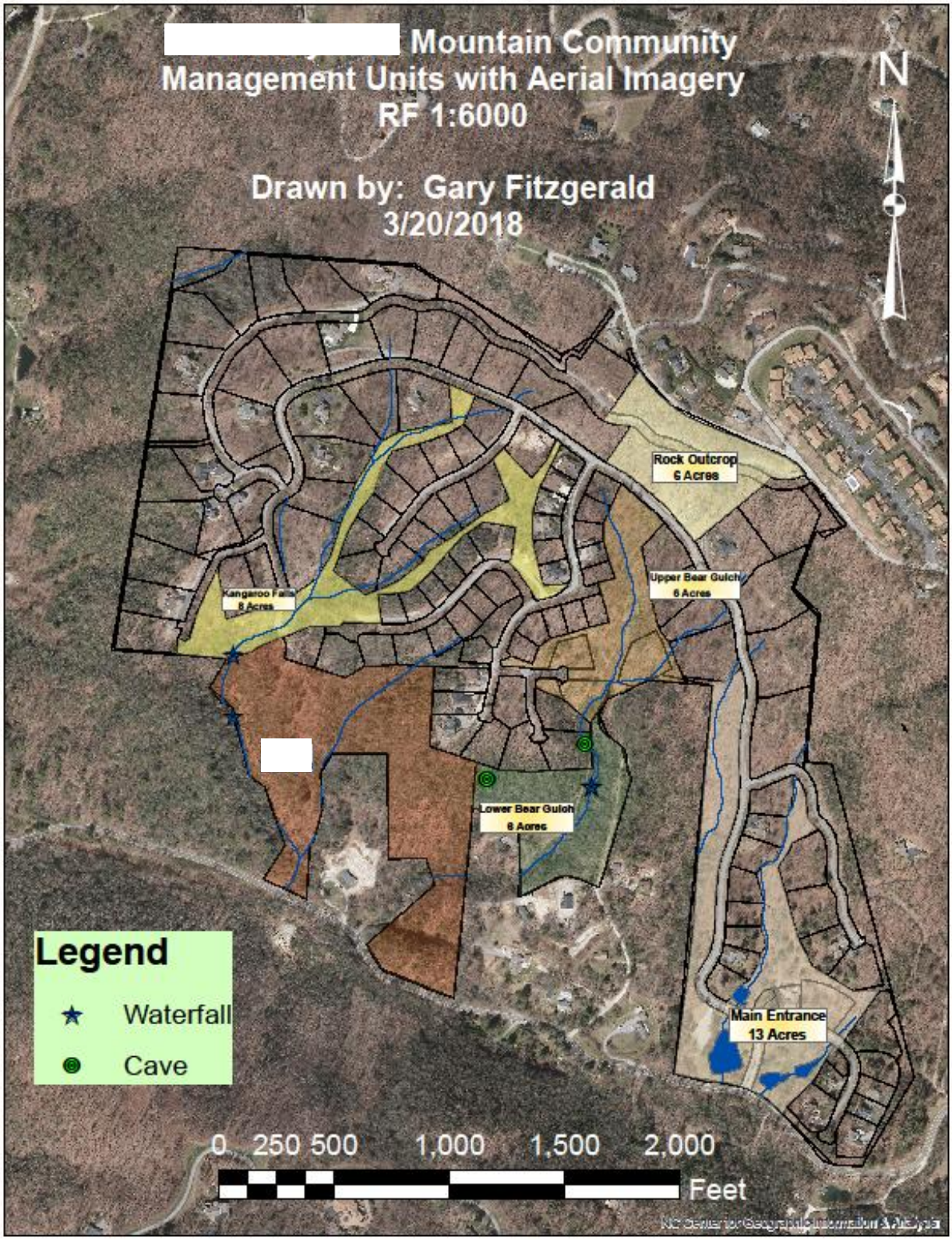
Maintenance (cutting and weed control) is already incorporated into the contract between the [redacted]HOA and the professional landscapers who maintain the entrances and roadsides. Due to the steepness of the rock outcrop care needs to be taken to avoid removing too much vegetation and creating erosion problems.

One resident has reported the presence of milkweed on the Rock Outcrop which is vital to the Monarch butterfly during migration. This should be investigated during the growing season and the area protected from mechanical removal or herbicide treatments.

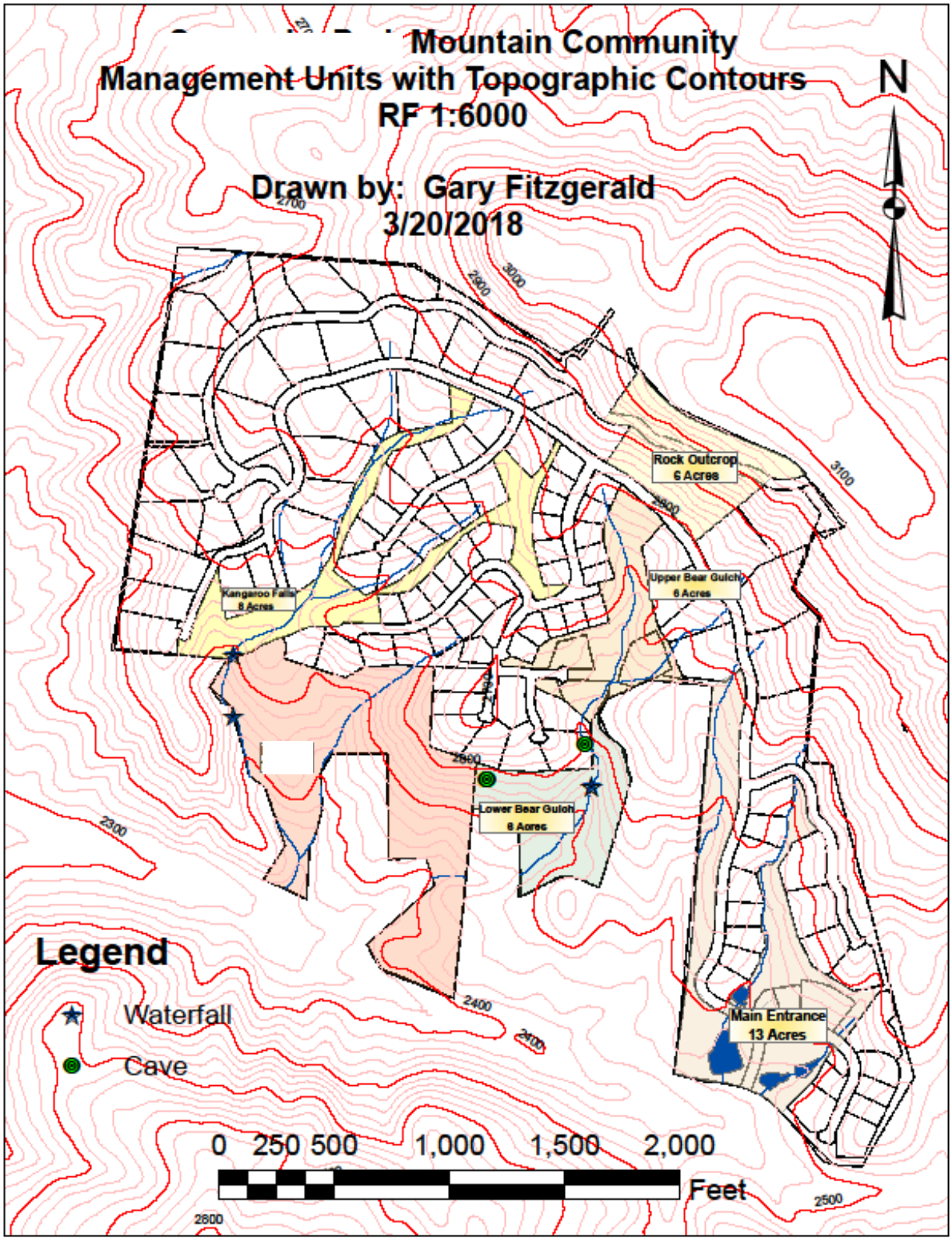
Map 1 – [redacted] Locator Map



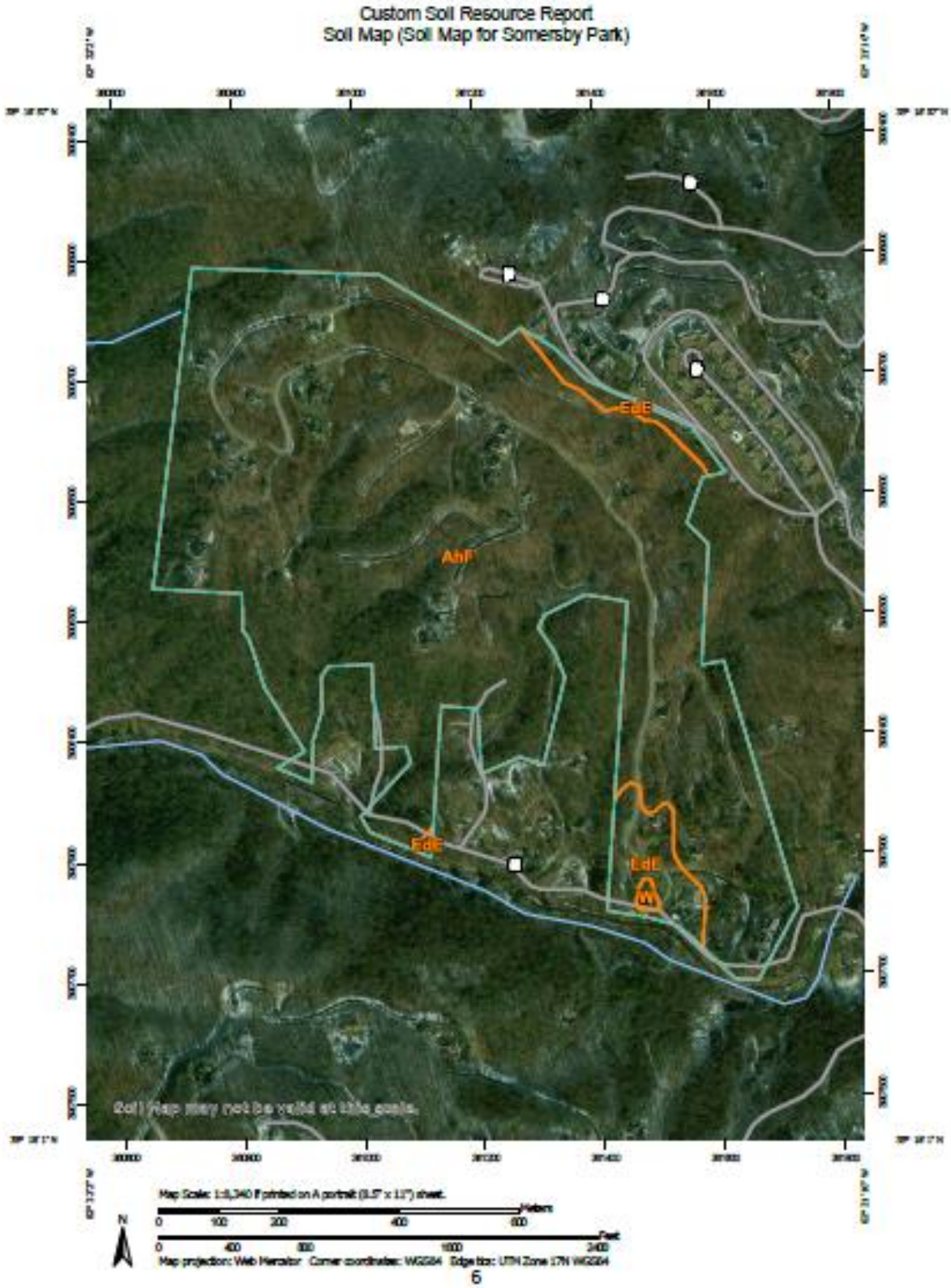
Map 2 – [redacted] Aerial Map



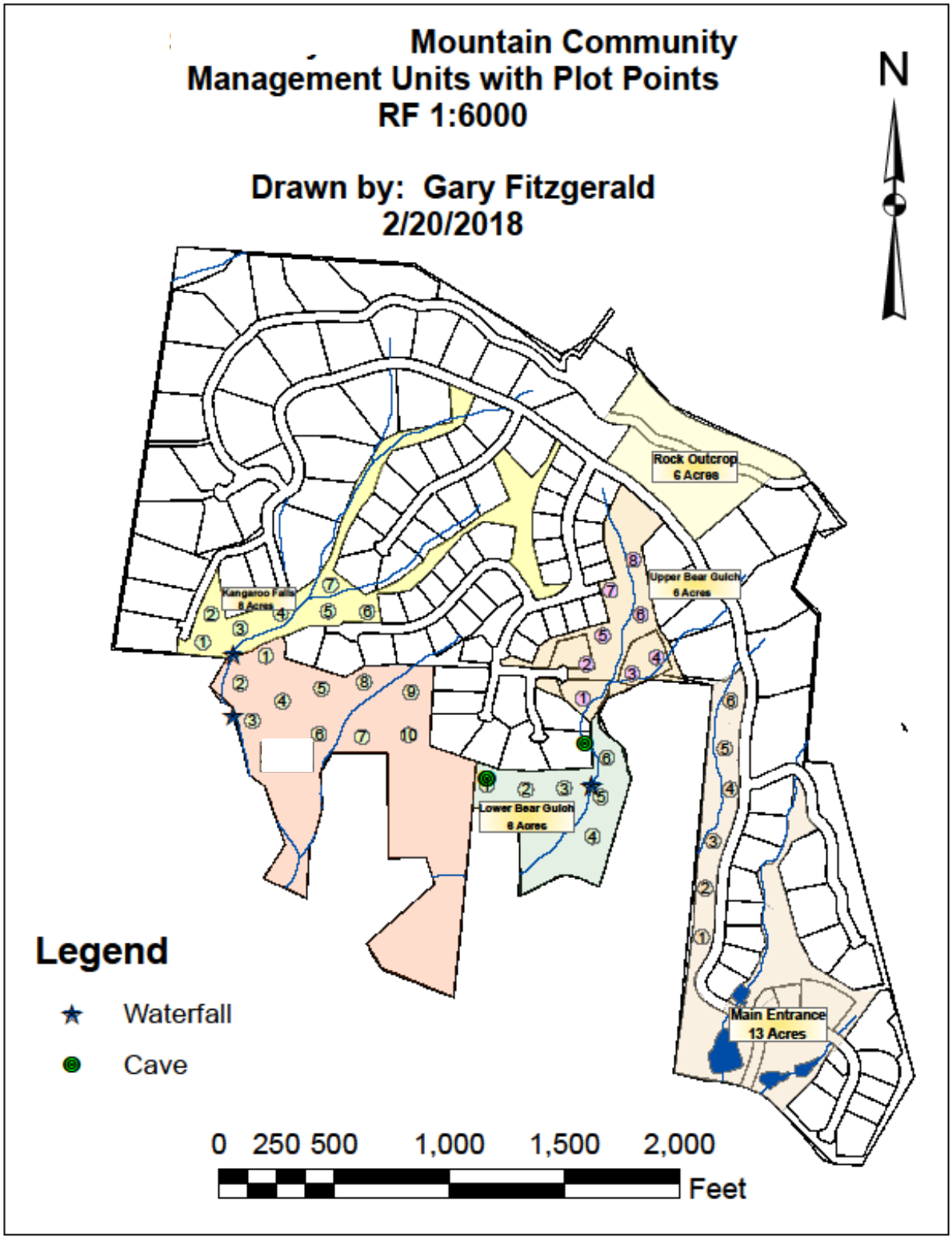
Map 3 – [redacted] Topographic Map



Map 4 – [redacted] Soils Map



Map 5 – [redacted] Timber Cruise Plot Points



Appendix 1 - [redacted] Landowner Objectives

[redacted] Landowner Objectives and Priorities							
Management Unit	Aesthetics	TSI	Timber Harvest	Recreation	Water Quality	Invasive Species	Wildlife Habitat
Main Entrance	5	1	1	5	5	5	4
Maintain lights, gates, docks							
Maintain mowed areas, flower beds							
Monitor ponds for water quality, fishing							
Maintain homestead, spring house							
Add pavilion							
Develop HOA policy for lot riparian zones							
Bear Gulch	5	4	1	4	4	4.5	4
Enhance and add to trail system							
Add benches along trails							
Add a resident campsite							
Add tree and feature markings							
Implement IPM for invasive species							
Provide for wildlife corridors							
Kangaroo Falls	4.5	4	1	4	4.5	5	4
Enhance and add to trail system							
Add erosion control for stream and waterfall							
Develop early succession habitat							
Implement IPM for invasive species							
Provide for wildlife corridors							
Rock Outcrop	5	4	1	2	2	4.5	4.5
Herbaceous plant control for aesthetics							
Implement IPM for invasive species							
[redacted]	5	4	1	4	5	3	5
Further develop trail system; integrate with [redacted] system							
Develop viewscapes to minimize tree removal							
Develop wildlife corridors							
Develop riparian zones to protect streams; erosion control							

Not Important	1	Against; will not support
Less Important	2	Not against but unwilling to spend money to achieve
Moderately Important	3	Willing to learn more; may support one-time expense
Fairly Important	4	Support ongoing, but modest, expenses to achieve
Vert Important	5	I support fully and agree to spend money to achieve

Appendix 2 - Glossary of Terms

Aspect – Aspect is the direction or compass bearing a property faces.

Basal area – Basal area is the sum of the cross-sectional areas of all trees in a specific area in square feet. It is sometimes used to reference the cross-sectional area of one tree; most commonly however, basal areas are reported on a per acre basis.

DBH – DBH stands for “diameter at breast height”. The standard method for measuring tree diameters in forestry is to do so at a height of 4-1/2’ from the ground. All references to tree diameters in this plan use this standard.

Mesic – A site with a moderate amount of moisture.

Quadratic Mean Diameter (QMD) – The average tree diameter in each management unit.

Slope – Slope is a measure of steepness and is expressed as a percent.

Site Index – Site index is a measure of the quality or productivity of an area with respect to timber growth. It is evaluated by determining the age and height of selected trees in an area and then comparing them to standards developed for the forestry industry.

Stand – A basic unit of forestry management defined as a contiguous group of trees with similar species composition, age structure, site quality, or some other distinguishable characteristic.

Timber Cruise – A timber cruise is the collection of timber data (species, diameter, tree height, etc.) at specific preselected points in a management unit. This is sample data which is then expanded to estimate timber composition and volumes for the entire management unit.

TPA – TPA stands for “trees per acre” and is a measure of the number of trees in a stand. It is usually used in conjunction with basal area to quantify the density of trees on a per acre basis.

TSI – TSI stands for “timber stand improvement” and refers to activities to improve the health of a forest which have an up-front cost without any offsetting timber revenue.

Xeric – A site containing very little moisture.

Appendix 3 - References

1. Guide to the Natural Communities of North Carolina, Fourth Approximation, Schafale, Michael - North Carolina Heritage Program, Department of Environment and Natural Resources

2. Forester's Field Handbook, N.C. Division of Forest Resources – North Carolina Department of Environment and Natural Resources.

3. TimberMart-South Quarterly Market Bulletin, 4th Quarter 2017, Harris, Tom et.al. www.TimberMart-South.com

4. North Carolina Forestry – Quick Reference Best Management Practices Field Guide, North Carolina Division of Forest Resources, http://ncforestry.info/ncdfr/best_management_practices_reference/

5. [redacted] Geology, Hamson, Daniel, Unpublished analysis of rock formations in [redacted], April 5, 2018

Appendix 4 – [redacted] Soils Report

Attached for your reference is the Soils Report for [redacted], generated from the Web Soil Survey website. Access is free and it can be found at:

https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm