

# FOREST STEWARDSHIP PLAN

**For the Property of: Larry Mueller**  
**Plan Prepared by: Patrick Curtin**

New

Revision

## INTRODUCTION

A healthy and productive forest is the primary focus of forest management. Developing a plan is a reflection of your intent to follow a balanced approach to forest management that considers your forest resources, expectations and goals. This plan will help guide you in achieving the benefits of managing your forest and forest related resources.

Many forest and wildlife management terms are unfamiliar to landowners. A glossary is included (APPENDIX V) to help clarify terms and concepts used in this report.

This forest management plan will meet the unique requirements of the following: U.S. Forest Service's Forest Stewardship Program, the NRCS's Farm Bill Programs, the American Tree Farm System's Tree Farm Program, and the Missouri Department of Conservation's Missouri Managed Woods Program.



### SIGNATURES AND APPROVALS

This plan is provided as a guide to help you accomplish your objectives and achieve the benefits of managing your forest and forest related resources.

I certify that this FOREST STEWARDSHIP PLAN meets the requirements of the federal Forest Stewardship Program.

\_\_\_\_\_  
Plan Preparer

Date

I certify that this FOREST STEWARDSHIP PLAN meets the requirements of the federal Forest Stewardship Program.

\_\_\_\_\_  
Forestry Regional Supervisor

Date

I certify that this FOREST MANAGEMENT PLAN meets the requirements of the USDA Environment Quality Incentives (EQIP) Program and/or the Quality Criteria for forest activity plans in Section III of the USDA NRCS Field Office Technical Guide.

\_\_\_\_\_  
Technical Service Provider

Number

Date

I accept this plan as written and certified by the Technical Service Provider and approve the item for payment as scheduled in the landowner's Environmental Quality Incentives Program (EQIP) contract.

\_\_\_\_\_  
NRCS Forester

Date

I have reviewed this plan and approve its content.

\_\_\_\_\_  
Landowner

Date

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## PROPERTY INFORMATION

Landowner	Larry Mueller	Plan Writer	Pat Curtin
Address	P.O. Box 7086	Address	2630 N. Mayfair Ave.
Phone	(417) 496-3984	Phone	(417) 895-6190
Email	Larry.Mueller@gmail.com	Email	Patrick.Curtin@mdc.mo.gov

County	Christian	Farm Number	<a href="#">Click here to enter text.</a>
Township	25; 26	Tract Number	<a href="#">Click here to enter text.</a>
Range	21W	Tracking Number	ChriMueller262135
Section	2,3; 34, 35	EQIP Contract Number	<a href="#">Click here to enter text.</a>

Plan Preparation Date	September, 2018
Plan Acres	425
Forested Acres	368
Total Acres	425

## LANDOWNER OBJECTIVES

The purpose of forest management is to achieve and maintain a healthy and productive forest. Depending upon your goals, forest health and productivity can be measured by the amount or quality of wood products, diversity of wildlife species, variety of recreational opportunities, or intensity of personal enjoyment your woodlands provide.

The following objectives have been identified as important to you and your property:

Manage the property to improve the health, vigor, diversity and quality of individual trees and natural communities.

Enhance the quality of wildlife habitat, particularly for deer and turkey.

Conduct periodic timber sales to provide income and facilitate other objectives.

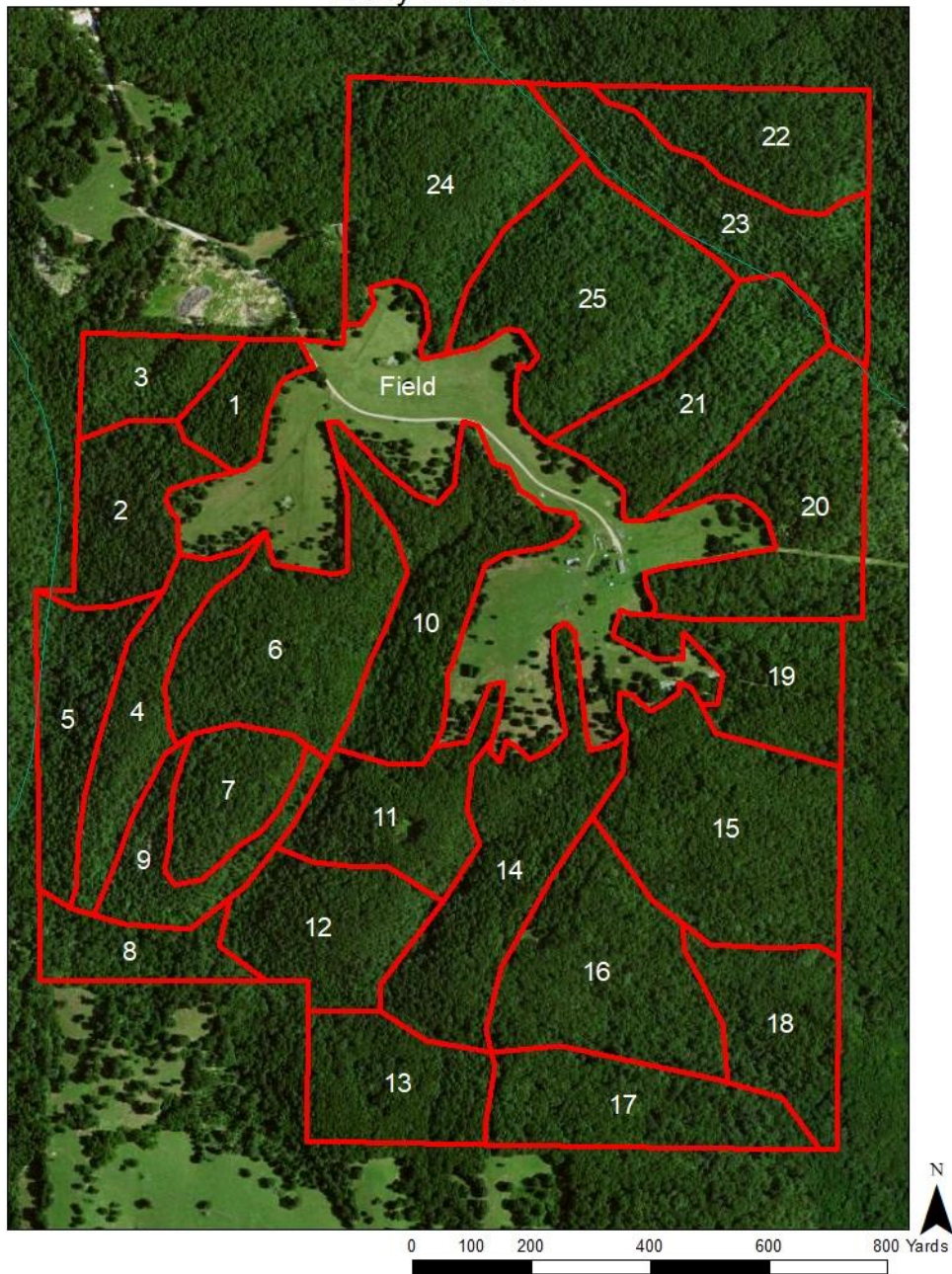
## PAST MANAGEMENT ACTIVITIES

Most of the property was aerial sprayed at some point in the past to clear for pasture. We assume that much of the forested acres of the property regenerated after aerial spraying. A large proportion of the ridgetop is currently open pasture for cattle.

### PLAN/STAND MAP

A forest stand is a community of trees and plants growing together. The trees in a stand are generally similar in size, age, and/or species composition. Forest stands can be distinguished from other stands by these characteristics, as well as by aspect, slope, and other dividing features. The map shown below identifies these stands on your property.

Larry Mueller



**RECORD OF DECISIONS - SUMMARY/ACTIVITY SCHEDULE**

To assist with meeting your individual objectives, the following planned practices and treatment activities will help achieve and insure sustained forest health, improve water quality, and increase wildlife habitat associated with your forest. Additional details about each stand can be found on the following pages. The plan should be implemented according to the following prioritized schedule.

Stand	Acres	Practice Code or Treatment Activity	NRCS Resource Concern	Treatment Details	Planned Date	Completed Date
1	5	666 Forest Stand Improvement	DEGRADED PLANT CONDITION	Remove 25 ft <sup>2</sup> /acre of basal area.	2026	
2	11	338 Prescribed Burn	FISH WILDLIFE -HABITAT	Low to medium intensity dormant season burn.	2022	
3	7	338 Prescribed Burn	FISH WILDLIFE -HABITAT	Low to medium intensity dormant season burn.	2022	
4	11	666 Forest Stand Improvement	DEGRADED PLANT CONDITION	Remove 20 ft <sup>2</sup> /acre of basal area.	2026	
5	11	338 Prescribed Burn	FISH WILDLIFE -HABITAT	Low to medium intensity dormant season burn.	2022	
6	21	666 Forest Stand Improvement	DEGRADED PLANT CONDITION	Remove 40 ft <sup>2</sup> /acre of basal area.	2022	
7	8	666 Forest Stand Improvement	DEGRADED PLANT CONDITION	Remove 40 ft <sup>2</sup> /acre of basal area.	2019	
8	7			Leave. Continue monitoring for forest health and invasive species.		
9	8	338 Prescribed Burn	FISH WILDLIFE -HABITAT	Low to medium intensity dormant season burn.	2021, 2026	
10	19	666 Forest Stand Improvement	DEGRADED PLANT CONDITION	Remove 20 ft <sup>2</sup> /acre of basal area.	2027	
11	12	338 Prescribed Burn	FISH WILDLIFE -HABITAT	Low to medium intensity dormant season burn.	2021, 2026	
12	14	338 Prescribed Burn	FISH WILDLIFE -HABITAT	Low to medium intensity dormant season burn.	2021, 2026	
12	14	666 Forest Stand Improvement	DEGRADED PLANT CONDITION	Remove 20 ft <sup>2</sup> /acre of basal area.	2027	
13	12	Harvest	DEGRADED PLANT CONDITION	Harvest approximately 30 ft <sup>2</sup> /acre of basal area.	2023	
13	12	666 Forest Stand Improvement	DEGRADED PLANT CONDITION	Remove 30 ft <sup>2</sup> /acre of basal area.	2024	
13	12	338 Prescribed Burn	DEGRADED PLANT CONDITION	Low to medium intensity dormant season burn.	2020	
14	21	666 Forest Stand Improvement	DEGRADED PLANT CONDITION	Remove 20 ft <sup>2</sup> /acre of basal area.	2027	
15	26	666 Forest Stand Improvement	DEGRADED PLANT CONDITION	Remove 30 ft <sup>2</sup> /acre of basal area.	2019	

16	21	666 Forest Stand Improvement	DEGRADED PLANT CONDITION	Remove 30 ft <sup>2</sup> /acre of basal area.	2018	
17	14	338 Prescribed Burn	DEGRADED PLANT CONDITION	Low to medium intensity dormant season burn.	2020	
17	14	Harvest	DEGRADED PLANT CONDITION	Harvest approximately 20-30 ft <sup>2</sup> /acre of basal area after establishing oak regeneration.	2023	
18	12	Harvest	DEGRADED PLANT CONDITION	Harvest approximately 20-30 ft <sup>2</sup> /acre of basal area.	2023	
18	12	666 Forest Stand Improvement	DEGRADED PLANT CONDITION	Remove 20 ft <sup>2</sup> /acre of basal area.	2024	
19	12	Harvest	DEGRADED PLANT CONDITION	Harvest approximately 15 ft <sup>2</sup> /acre of basal area.	2023	
19	12	666 Forest Stand Improvement	DEGRADED PLANT CONDITION	Remove 20 ft <sup>2</sup> /acre of basal area.	2024	
20	21	Leave		Leave. Continue monitoring for forest health and invasive species.		
21	16	666 Forest Stand Improvement	DEGRADED PLANT CONDITION	Remove 30 ft <sup>2</sup> /acre of basal area.	2025	
22	13	666 Forest Stand Improvement	DEGRADED PLANT CONDITION	Remove 30 ft <sup>2</sup> /acre of basal area.	2025	
23	17	338 Prescribed Burn	DEGRADED PLANT CONDITION	Low to medium intensity dormant season burn.	2021, 2024	
23	17	643 Restoration of Rare Habitats	DEGRADED PLANT CONDITION	The combination of fire and mechanical woody vegetation removal should remove approximately 40 ft <sup>2</sup> /acre of basal area.	2025	
24	24	666 Forest Stand Improvement	DEGRADED PLANT CONDITION	Remove 25 ft <sup>2</sup> /acre of basal area.	2020	
25	25	666 Forest Stand Improvement	DEGRADED PLANT CONDITION	Remove 20 ft <sup>2</sup> /acre of basal area.	2021	

**Annually:**

- Maintain boundaries.
- Monitor and control invasive species.
- Monitor for insect and disease outbreaks.
- Review forestry plan for needed changes – update accordingly.
- Keep good records.
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**Within ten years:** Re-inventory your forested acres with the assistance of a professional forester. Contact your agency forester, private consulting forester, or biologist with any questions you have about implementing any part of this plan. Progress should be evaluated at least every five years to ensure that management of your forest land is consistent with existing planning standards and your current objectives. This management plan is for a ten year period and should be updated in September, 2028



## THREATENED AND ENDANGERED SPECIES

Over 600 native plants and 300 native animals in Missouri are of concern because they are uncommon, rare, or because their numbers are low or rapidly declining. Many of these species occur on private land. As a consequence, private land owners can have a significant impact on these rare plants, animals, critical habitat, and natural communities (e.g., caves, high conservation value forests).

As the owner of forest land, you have the opportunity to maintain or improve habitat that is essential to many types of wildlife, including threatened and endangered species. Based on a review of the Missouri Natural Heritage Database, the following state or federally listed threatened or endangered species may be present on or associated with your property. Guidelines for protecting threatened or endangered species associated with your property are shown below. Policy for addressing Threatened or Endangered species may differ among state and federal agencies. Therefore, before implementing any conservation practice, especially practices that may involve tree removal, on your property that will be cost-shared or reimbursed through state or federal monetary sources, consult the MDC Private Land Conservationist or NRCS planner in your county to determine program requirements that mitigate impacts to Threatened or Endangered species and if any additional species have been added since the development of this plan.

<b>Endangered or Threatened Species (Common Name)</b>	<b>Practice/Activity with Potential to Impact</b>	<b>General Guidelines for Protection</b>
Gray bat	TSI, timber harvest	Impact is unlikely; no intermittent or perennial streams were found on the property. Refer to the current version of the Bat Habitat Conservation Priorities in Missouri publication for guidelines.

## EXISTING CONDITIONS/FIELD EXAMINATION FINDINGS

The forest inventory data used in this plan was collected on March-April 2018. Below is a summary of findings by stand. Additional stand information can be found in APPENDIX VI. Further detailed inventory/plot data can be provided upon request.

**Stand: 1**

**Acres: 5**

<b>Dominant Aspect:</b>	Northwest	<b>Total Basal Area:</b>	90.0
<b>Average Slope:</b>	20% - 30%	<b>AGS Basal Area:</b>	40.0
<b>Soil Type(s):</b>	73325	<b>B-level Basal Area:</b>	61.2
<b>Predominant Stand Age:</b>	58 years	<b>C-level Basal Area:</b>	47.5
<b>Site Index &amp; Species:</b>	Black oak: 61	<b>Average DBH:</b>	8.0
<b>Stocking Level (%):</b>	85.3	<b>Trees/Acre:</b>	258
<b>Merch Volume/Acre and Scale:</b>	2000 International 1/4	<b>Snags/Acre:</b>	0
		<b>Den Trees/Acre:</b>	5
<b>Common Overstory Trees:</b>	Black oak, white oak, red oak		
<b>Common Midstory Trees:</b>	Black oak, white oak		
<b>Common Tree Regeneration:</b>	Oak		
<b>Common Understory Plants:</b>	Blueberry		
<b>Ecological Site(s) (# and name):</b>	F116AY049MO: Low-base Chert Exposed Backslope Woodland		

### **Description of Stand Condition:**

Stand 1 is a northwest facing backslope. The overstory is dominated by black oak, white oak, and some red oak. This is a young stand of small sawtimber and pole size classes. Stems are straight and clear, indicative of an even-aged stand growing under competition. The understory and midstory are open, with scattered oak regeneration and some Vaccinium.

### **Stand Management Objectives:**

Increase overstory growing space, increase woody and herbaceous ground cover.

### **Desired Future Condition:**

A healthy, even-aged oak forest with improving ground cover composition.

### **Stand Management Recommendations:**

TSI: Young even-aged stands with good quality timber (straight, clear trunks) are perfect candidates for Timber Stand Improvement (TSI). TSI is a non-commercial thinning used to improve growing space, growth rate, species composition and tree quality. Thinning should focus on removing smaller trees with small crowns, individuals with defects and injuries along the stem, individuals whose crowns are crowding more valuable trees, and less economically valuable species such as hickories. Remove approximately 25 ft<sup>2</sup>/acre of basal area, focusing on UGS (unacceptable growing stock, see glossary) pole-timber.

**Stand: 2****Acres: 11**

<b>Dominant Aspect:</b>	West	<b>Total Basal Area:</b>	73.3
<b>Average Slope:</b>	30% - 40%	<b>AGS Basal Area:</b>	40.0
<b>Soil Type(s):</b>	73584, 73325	<b>B-level Basal Area:</b>	59.1
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	45.8
<b>Site Index &amp; Species:</b>	Black oak: 61	<b>Average DBH:</b>	7.2
<b>Stocking Level (%):</b>	72.0	<b>Trees/Acre:</b>	256
<b>Merch Volume/Acre and Scale:</b>	1200 International 1/4	<b>Snags/Acre:</b>	44
		<b>Den Trees/Acre:</b>	0
<b>Common Overstory Trees:</b>	Black oak, white oak, blackjack oak		
<b>Common Midstory Trees:</b>	Black oak, white oak, cedar		
<b>Common Tree Regeneration:</b>	Black oak, white oak		
<b>Common Understory Plants:</b>	Blueberry		
<b>Ecological Site(s) (# and name):</b>	F116AY049MO: Low-base Chert Exposed Backslope Woodland		

**Description of Stand Condition:**

Stand 2 is a west-facing backslope, with abundant chert rock fragments. The overstory is predominately black and white oak. Blackjack oak dominates on extreme exposures. Most of the stand has more of an open woodland structure. Timber quality is only fair overall, although quality improves down-slope.

**Stand Management Objectives:**

Reduce understory and mistory woody density, increase herbaceous ground cover composition.

**Desired Future Condition:**

An open woodland managed for wildlife habitat and natural community diversity.

**Stand Management Recommendations:**

The more extreme exposures on this stand help explain its relative timber quality and productivity. Steep, southwest facing slopes typically have shallow soils and low water availability. While this stand could potentially produce modest timber someday, this will never be a particularly productive stand. Rather, this stand can be managed as an open woodland for wildlife habitat and natural community diversity. Compared to forests, woodlands have relatively open canopies, sparse midstories, and dense herbaceous ground flora.

Prescribed burning: To facilitate woodland structure and composition, you can conduct a prescribed burn in this stand. Prescribed fire is a tool that can be used to meet certain objectives. In this stand, we would be looking to enhance woodland structure and composition by topkilling smaller woody vegetation and promoting herbaceous cover. Consult with an MDC or NRCS representative for assistance developing a burn plan, or to sign up for a landowner prescribed burn workshop.

**Stand:** 3**Acres:** 7

<b>Dominant Aspect:</b>	<b>South</b>	<b>Total Basal Area:</b>	63.3
<b>Average Slope:</b>	30% - 40%	<b>AGS Basal Area:</b>	26.7
<b>Soil Type(s):</b>	73584, 73325	<b>B-level Basal Area:</b>	60.9
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	47.3
<b>Site Index &amp; Species:</b>	Black oak: 61	<b>Average DBH:</b>	7.9
<b>Stocking Level (%):</b>	60.3	<b>Trees/Acre:</b>	186
<b>Merch Volume/Acre and Scale:</b>	100 International 1/4	<b>Snags/Acre:</b>	16
		<b>Den Trees/Acre:</b>	6
<b>Common Overstory Trees:</b>	Black oak, white oak, blackjack oak		
<b>Common Midstory Trees:</b>	Black oak, white oak		
<b>Common Tree Regeneration:</b>	Sassafras, cedar		
<b>Common Understory Plants:</b>	Blueberry		
<b>Ecological Site(s) (# and name):</b>	F116AY049MO: Low-base Chert Exposed Backslope Woodland		

**Description of Stand Condition:**

Stand 3 is a south-facing exposed slope that is black oak dominant, with less white oak. Blackjack oak is more prevalent on the south-facing points, where the soil is very cherty. This mostly a woodland stand of squatty oaks; there is a mix of pole timber with some scattered wolf trees. There are also small, imbedded glade habitats. Overall, regeneration is low. There is evidence of wildfires in catfaces and burned logs throughout the stand. Stocking is low at 60.3%.

**Stand Management Objectives:**

Limit woody encroachment, promote herbaceous vegetation.

**Desired Future Condition:**

This stand should be maintained as a woodland/glade complex.

**Stand Management Recommendations:**

Compared to Stand 2, this stand is even further on the spectrum toward low productivity woodland communities. Despite no harvesting in the recent past, this stand has maintained a low stocking value, with small treeless glades or "balds". Glades are open, rocky barren areas dominated by drought-adapted forbs, grasses, and fauna. They are often located on western or southern exposures or high summits. Like woodlands, glades are maintained through a combination of shallow droughty soils and disturbance such as fire.

Prescribed burning: While some areas have fair timber that could be thinned, this stand should be managed for wildlife habitat more than timber production. A complex of woodland and glade habitats provide excellent habitat for suite of game and non-game species. For example, research has shown that grasshopper populations are up to four times higher in woodlands compared to forests, which is an excellent food source for turkey poults. As is, this stand is already a fair quality woodland. We recommend burning periodically to maintain open structure and limit woody encroachment.

**Stand:** 4**Acres:** 11

<b>Dominant Aspect:</b>	<b>South</b>	<b>Total Basal Area:</b>	86.7
<b>Average Slope:</b>	10% - 20%	<b>AGS Basal Area:</b>	46.7
<b>Soil Type(s):</b>	73237, 73584, 73227	<b>B-level Basal Area:</b>	66.9
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	51.9
<b>Site Index &amp; Species:</b>	Black oak: 61	<b>Average DBH:</b>	10.4
<b>Stocking Level (%):</b>	75.1	<b>Trees/Acre:</b>	147
<b>Merch Volume/Acre and Scale:</b>	2300 International 1/4	<b>Snags/Acre:</b>	42
		<b>Den Trees/Acre:</b>	2
<b>Common Overstory Trees:</b>	Black oak, white oak		
<b>Common Midstory Trees:</b>	Black oak, white oak		
<b>Common Tree Regeneration:</b>	Sassafras		
<b>Common Understory Plants:</b>	Blueberry, dogwood		
<b>Ecological Site(s) (# and name):</b>	F116AY012MO: Low-base Chert Upland Woodland		

**Description of Stand Condition:**

Stand 4 encompasses a narrow ridge and south-facing backslope. It is pole-sized stand of black oak, with a smaller white oak component. Timber quality is good; stems are mostly straight and clear. The understory is open, with little vegetation other than *Vaccinium* and scattered sassafras and dogwood. Soils data indicate this is medium-low productivity site. The stand is fully stocked at 75.1%.

**Stand Management Objectives:**

Consider a light thinning to improve overstory growing space and create some structural diversity.

**Desired Future Condition:**

A healthy, even-aged forest-woodland complex.

**Stand Management Recommendations:**

TSI: Management of this site should be a medium priority moving forward. While it is capable of growing quality timber, the mediocre site productivity suggests that growth will be slow over time. The stand could benefit from a light TSI to increase overstory growing space and understory structure for wildlife. At 75%, this stand is not overstocked. Thus, thin no more than 20 ft<sup>2</sup>/acre basal area.

**Stand:** 5**Acres:** 11

<b>Dominant Aspect:</b>	West	<b>Total Basal Area:</b>	60.0
<b>Average Slope:</b>	30% - 40%	<b>AGS Basal Area:</b>	36.7
<b>Soil Type(s):</b>	73584, 73227	<b>B-level Basal Area:</b>	59.0
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	45.8
<b>Site Index &amp; Species:</b>	Black oak: 61	<b>Average DBH:</b>	7.2
<b>Stocking Level (%):</b>	59.0	<b>Trees/Acre:</b>	211
<b>Merch Volume/Acre and Scale:</b>	300 International 1/4	<b>Snags/Acre:</b>	22
		<b>Den Trees/Acre:</b>	0
<b>Common Overstory Trees:</b>	Black oak, blackjack oak, post oak, white oak		
<b>Common Midstory Trees:</b>	Black oak, blackjack oak		
<b>Common Tree Regeneration:</b>	Oak		
<b>Common Understory Plants:</b>	Little bluestem, blueberry		
<b>Ecological Site(s) (# and name):</b>	F116AY049MO: Low-base Chert Exposed Backslope Woodland		

**Description of Stand Condition:**

Stand 5 is a steep, west-facing backslope. This is a rugged woodland dominated by pole-sized blackjack oak, post oak, white oak, and black oak. Little bluestem and Vaccinium are common, with diverse oak and hardwood saplings. There is evidence of past wildfire in catfaces and burned logs. This could be combined with stand 2, as they are similar.

**Stand Management Objectives:**

Limit understory woody encroachment, promote herbaceous vegetation.

**Desired Future Condition:**

A high quality dry chert woodland natural community.

**Stand Management Recommendations:**

Prescribed burning: Similar to stands 2 and 3, this is a poor site for growing quality timber, but a great site for natural community management. After 20th century fire suppression, oak woodlands have become declining natural communities in the Midwest. Your property, on the other hand has several stands of potential high-quality woodlands. Maintenance of this community type relies on periodic prescribed fire to limit encroachment of woody species. From our discussions and field observations, it is apparent that you already burn this part of the property occasionally. We recommend continuing burning this stand every 5-10 years under safe conditions.

**Stand: 6****Acres: 21**

<b>Dominant Aspect:</b>	<b>South, East</b>	<b>Total Basal Area:</b>	112.0
<b>Average Slope:</b>	10% - 20%	<b>AGS Basal Area:</b>	52.0
<b>Soil Type(s):</b>	73220, 73584	<b>B-level Basal Area:</b>	60.2
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	46.7
<b>Site Index &amp; Species:</b>	Black oak: 53	<b>Average DBH:</b>	7.6
<b>Stocking Level (%):</b>	107.9	<b>Trees/Acre:</b>	352
<b>Merch Volume/Acre and Scale:</b>	2200 International 1/4	<b>Snags/Acre:</b>	6
		<b>Den Trees/Acre:</b>	12
<b>Common Overstory Trees:</b>	Black oak, blackjack oak		
<b>Common Midstory Trees:</b>	Black oak		
<b>Common Tree Regeneration:</b>	Oaks		
<b>Common Understory Plants:</b>	Blueberry		
<b>Ecological Site(s) (# and name):</b>	F116AY012MO: Low-base Chert Upland Woodland F116AY049MO: Low-base Chert Exposed Backslope Woodland		

**Description of Stand Condition:**

Stand 6 is a fairly large stand of pole-sized black oaks. The southern points are exposed, with heavy chert fragments and squatty blackjack oaks. These woodlands are negligible compared to the rest of the stand, however, which is better quality timber. Fire damage on butt logs was significant. This stand is overstocked at 107.9%.

**Stand Management Objectives:**

Reduce overstory stocking, limit fire damage to overstory trees

**Desired Future Condition:**

An economically viable even-aged oak forest, with small embedded woodlands.

**Stand Management Recommendations:**

TSI: Stocking values over 100% indicate severe overcrowding. In these situations, a lack of growing space and resources limits the growth of all trees, increases stress, and increases the possibility of tree health decline. Thin up to 40 ft<sup>2</sup>/acre of basal area, focusing on UGS pole timber and culls (see glossary). This includes trees with significant fire scars at the base (damage more than 1.5' tall and 20% of tree circumference).

Limit prescribed burning: Prescribed burning is an important tool that can be used to meet certain objectives, such as improving oak regeneration, increasing herbaceous vegetation diversity, restoring natural communities and improving wildlife habitat. However, fire does have the potential to damage trees and lower future timber value, both by lowering volume and changing lumber grades. Land management is a balancing act based on management goals and objectives. Unlike several other stands, we see most of this stand as having potential to produce timber. If this of interest to the landowner, we recommend limiting prescribed fire in this stand, either entirely, or under weather conditions where damage will be limited.

**Stand: 7****Acres: 8**

<b>Dominant Aspect:</b>	<b>South</b>	<b>Total Basal Area:</b>	95.0
<b>Average Slope:</b>	0% - 5%	<b>AGS Basal Area:</b>	35.0
<b>Soil Type(s):</b>	73220, 73584	<b>B-level Basal Area:</b>	54.9
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	42.6
<b>Site Index &amp; Species:</b>	Black oak: 53	<b>Average DBH:</b>	5.9
<b>Stocking Level (%):</b>	100.4	<b>Trees/Acre:</b>	497
<b>Merch Volume/Acre and Scale:</b>	1000 International 1/4	<b>Snags/Acre:</b>	18
		<b>Den Trees/Acre:</b>	0
<b>Common Overstory Trees:</b>	Black oak, white oak, post oak		
<b>Common Midstory Trees:</b>	Black oak, white oak		
<b>Common Tree Regeneration:</b>	Oak		
<b>Common Understory Plants:</b>	Blueberry		
<b>Ecological Site(s) (# and name):</b>	F116AY012MO: Low-base Chert Upland Woodland F116AY049MO: Low-base Chert Exposed Backslope Woodland		

**Description of Stand Condition:**

Stand 7 encompasses an upland summit and shoulder topographies. The overstory is pole-sized black and white oaks, with a smaller post oak component. It was originally lumped with stand 9, but was separated due to different management recommendations. It is similar in structure and composition to stands 4 and 6. This stand is overstocked at 100.4%, with high tree density (497 trees/acre).

**Stand Management Objectives:**

Reduce overstocked conditions, increase structural complexity and ground cover.

**Desired Future Condition:**

Even-aged upland oak forest, with stocking values closer to 60% - 70%.

**Stand Management Recommendations:**

TSI: Similar to Stand 6, this is an overstocked stand of good quality pole timber. This stand, as well as several others, are also lacking in structural diversity, such as woody ground cover for deer bedding and downed woody debris. Downed woody debris provides excellent habitat for many species of small mammals and amphibians. TSI can simultaneously meet several of these goals at once: increase growing space in the canopy and increase sunlight on the forest floor to stimulate ground cover. As a bonus, the felled trees will provide excellent wildlife habitat. Remove up to 40 ft<sup>2</sup>/acre of basal area, focusing on UGS pole timber and culls.

Limit prescribed burning: See stand 6 recommendations.



**Stand: 8****Acres: 7**

<b>Dominant Aspect:</b>	<b>North</b>	<b>Total Basal Area:</b>	83.3
<b>Average Slope:</b>	20% - 30%	<b>AGS Basal Area:</b>	36.7
<b>Soil Type(s):</b>	73227	<b>B-level Basal Area:</b>	58.8
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	45.6
<b>Site Index &amp; Species:</b>	Black oak: 58	<b>Average DBH:</b>	7.1
<b>Stocking Level (%):</b>	82.2	<b>Trees/Acre:</b>	300
<b>Merch Volume/Acre and Scale:</b>	4100 International 1/4	<b>Snags/Acre:</b>	2
		<b>Den Trees/Acre:</b>	0
<b>Common Overstory Trees:</b>	Red oak, walnut, elm, sugar maple, hickory		
<b>Common Midstory Trees:</b>	Sugar maple, hickory, ash		
<b>Common Tree Regeneration:</b>	Sugar maple, hickory		
<b>Common Understory Plants:</b>	Ironwood, dogwood, pawpaw, christmas fern, spring beauty, sharp-lobed hepatica		
<b>Ecological Site(s) (# and name):</b>	F116AY002MO: Chert Protected Backslope Forest		

**Description of Stand Condition:**

Stand 8 is steep north-facing stand in the southwest corner of the property. Unlike the rest of the property, this is a mesic forest following a perennial stream. This is an uneven-aged stand, with a mix of mature, small sawtimber, and pole timber. Sawtimber is straight and of good quality. Red oak is common, along with a variety of more mesic species such as walnut, maple, hickory, and elm. The understory is predominately shade-tolerant mesic species such as maple and hickories. There is no access to this stand with equipment.

**Stand Management Objectives:**

Leave. Continuing monitoring for forest health and invasive species.

**Desired Future Condition:**

This will remain an uneven-aged mixed hardwood forest, slowly transitioning into a maple/hickory forest.

**Stand Management Recommendations:**

This is an interesting and unique stand to this property. The protected, north-facing slope has led to a very productive growing site. This explains both the stand structure (large, maturing overstory), and species composition (mesic species such as red oak, walnut and sugar maple). Ideally, this would be a promising and challenging stand to manage for oak timber production. Unfortunately, there is no access to this stand for logging equipment, making timber management all but impossible.

Leave: We recommend leaving this stand alone. As is, it provides plant and habitat diversity to your property for forest-specialists. It is also an incredibly picturesque stand, and can be left solely for aesthetic beauty. Over time, we expect it may transition into more shade-tolerant species in the overstory, such as sugar maple. Simply continue to monitor this stand.

**Stand: 9****Acres: 8**

<b>Dominant Aspect:</b>	<b>Southwest-southeast</b>	<b>Total Basal Area:</b>	60.0
<b>Average Slope:</b>	30% - 40%	<b>AGS Basal Area:</b>	15.0
<b>Soil Type(s):</b>	73227, 73584	<b>B-level Basal Area:</b>	61.1
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	47.4
<b>Site Index &amp; Species:</b>	Black oak: 58	<b>Average DBH:</b>	8.0
<b>Stocking Level (%):</b>	57.0	<b>Trees/Acre:</b>	174
<b>Merch Volume/Acre and Scale:</b>	0 International 1/4	<b>Snags/Acre:</b>	0
		<b>Den Trees/Acre:</b>	0
<b>Common Overstory Trees:</b>	Post oak, blackjack oak, black oak		
<b>Common Midstory Trees:</b>	Post oak, blackjack oak, black oak		
<b>Common Tree Regeneration:</b>	Blackjack oak		
<b>Common Understory Plants:</b>	Dogwood, cedar, blueberry, little bluestem		
<b>Ecological Site(s) (# and name):</b>	F116AY049MO: Low-base Chert Exposed Backslope Woodland F116AY062MO: Chert Exposed Backslope Woodland		

**Description of Stand Condition:**

Stand 9 is a woodland/glade complex that wraps around the broad ridge of Stand 7. Exposed chert fragments are common. The overstory is post oak/blackjack oak dominant, with a smaller component of black oak. While there are scattered good quality pole timber, much of the overstory is 30' - 40' tall with gnarly growth forms. There is a small glade on the southern-most point. The understory is a mix of herbaceous glade species and invading cedar and dogwood.

**Stand Management Objectives:**

Reduce understory woody density, promote herbaceous vegetation.

**Desired Future Condition:**

A woodland/glade complex with diverse herbaceous ground cover.

**Stand Management Recommendations:**

Prescribed burning: This is a glade/woodland complex that is slowly being invaded by woody species such as cedar and dogwood. Ideally, we would burn this stand to maintain open conditions for native herbaceous species. However, this is a challenging stand to separate from Stand 7, where fire is less advisable. Thus, you should consider the pros and cons of each scenario. 1) You could try to separate Stands 7 and 9 with a control line, using a bulldozer or leaf blower and hand tools. 2) Stands 7 and 9 could be lumped into one burn unit. In this scenario, you could use more conservative ignitions techniques such as backfiring and small strip-headfires in Stand 7. 3) It is justifiable to leave Stand 9. Expect slow encroachment of woody species.

**Stand:** 10**Acres:** 19

<b>Dominant Aspect:</b>	<b>West, South</b>	<b>Total Basal Area:</b>	78.0
<b>Average Slope:</b>	30% - 40%	<b>AGS Basal Area:</b>	38.0
<b>Soil Type(s):</b>	73584	<b>B-level Basal Area:</b>	56.8
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	44.1
<b>Site Index &amp; Species:</b>	Black oak: 61	<b>Average DBH:</b>	6.5
<b>Stocking Level (%):</b>	79.6	<b>Trees/Acre:</b>	338
<b>Merch Volume/Acre and Scale:</b>	900 International 1/4	<b>Snags/Acre:</b>	3
		<b>Den Trees/Acre:</b>	5
<b>Common Overstory Trees:</b>	Black, white oak		
<b>Common Midstory Trees:</b>	Black, white oak		
<b>Common Tree Regeneration:</b>	Oak		
<b>Common Understory Plants:</b>	Blueberry		
<b>Ecological Site(s) (# and name):</b>	F116AY049MO: Low-base Chert Exposed Backslope Woodland		

**Description of Stand Condition:**

Stand 10 is on predominately west and south facing backslopes, and includes several drainages with interesting rock formations. The overstory is pole-sized black and white oak. The far southern end displays more of an open woodland/glade structure. The stand is fully stocked at 79.6%, with a relatively high density of small stems.

**Stand Management Objectives:**

Reduce stand stocking.

**Desired Future Condition:**

A healthy forest-woodland complex.

**Stand Management Recommendations:**

Similar to stand 4, this is a low productivity stand that is still capable of growing some decent quality timber. As such, it could be managed in one of several ways depending on landowner interest.

Forest management: If there is an interest in future timber production, then this could be a low priority TSI stand. Remove approximately 20 ft<sup>2</sup>/acre of UGS pole timber and culls. We would recommend this option.

Woodland management: Alternatively, you may accept the low productivity and manage as a forest-woodland complex. In this scenario, you may TSI up to 30 ft<sup>2</sup>/acre basal area and prescribed burn.

In either scenario, this is a low priority stand. It is justified to leave and wait 10 years to reinventory.

**Stand: 11****Acres: 12**

<b>Dominant Aspect:</b>	West	<b>Total Basal Area:</b>	82.5
<b>Average Slope:</b>	20% - 30%	<b>AGS Basal Area:</b>	30.0
<b>Soil Type(s):</b>	73220, 73584	<b>B-level Basal Area:</b>	58.7
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	45.5
<b>Site Index &amp; Species:</b>	Black oak: 53	<b>Average DBH:</b>	7.1
<b>Stocking Level (%):</b>	81.5	<b>Trees/Acre:</b>	299
<b>Merch Volume/Acre and Scale:</b>	1100 International 1/4	<b>Snags/Acre:</b>	0
		<b>Den Trees/Acre:</b>	0
<b>Common Overstory Trees:</b>	Black oak, white oak, blackjack oak, red oak		
<b>Common Midstory Trees:</b>	Black oak, blackjack oak, white oak		
<b>Common Tree Regeneration:</b>	Scattered oak and hickory		
<b>Common Understory Plants:</b>	Blueberry		
<b>Ecological Site(s) (# and name):</b>	F116AY012MO: Low-base Chert Upland Woodland F116AY049MO: Low-base Chert Exposed Backslope Woodland		

**Description of Stand Condition:**

Stand 11 encompasses a ridgetop, along with east- and west-facing backslopes. A large area on the ridgetop has been cut for deer hunting, reducing the effective stand acreage and amount of quality timber. What remains on the ridgetop and protected slope is mostly pole-sized black and white oak. Most of the remaining stand is an exposed woodland, with stunted black oak, blackjack oak, and white oak, grading downslope to pole-sized mesic hardwoods. Vaccinium dominates the understory, with infrequent oak, hickory, and cedar regeneration.

**Stand Management Objectives:**

Enhance woodland structure on the exposed backslope by reducing small tree density.

**Desired Future Condition:**

A healthy forest-woodland complex managed for wildlife habitat, ecosystem health, and low productivity timber production.

**Stand Management Recommendations:**

Prescribed burning: You could utilize prescribed burning on the western slope in order to retain woodland structure and reduce small tree density.

TSI: While the pole-sized area on the ridgetop could benefit from thinning, this is effectively a small area. If there is an interest, remove 20 ft<sup>2</sup>/acre basal area of UGS pole timber. This should be a low priority.

**Stand:** 12**Acres:** 14

<b>Dominant Aspect:</b>	<b>West, South, East</b>	<b>Total Basal Area:</b>	90.0
<b>Average Slope:</b>	20% - 30%	<b>AGS Basal Area:</b>	42.5
<b>Soil Type(s):</b>	73220, 73584, 73227	<b>B-level Basal Area:</b>	62.2
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	48.3
<b>Site Index &amp; Species:</b>	Black oak: 53	<b>Average DBH:</b>	8.4
<b>Stocking Level (%):</b>	83.9	<b>Trees/Acre:</b>	234
<b>Merch Volume/Acre and Scale:</b>	700 International 1/4	<b>Snags/Acre:</b>	5
		<b>Den Trees/Acre:</b>	15
<b>Common Overstory Trees:</b>	Black oak, white oak, red oak, hickory		
<b>Common Midstory Trees:</b>	Black oak, white oak, red oak, hickory		
<b>Common Tree Regeneration:</b>	Oak, hickory		
<b>Common Understory Plants:</b>	Blueberry, serviceberry		
<b>Ecological Site(s) (# and name):</b>	F116AY012MO: Low-base Chert Upland Woodland F116AY049MO: Low-base Chert Exposed Backslope Woodland		

**Description of Stand Condition:**

Stand 12 encompasses a ridgetop, along with east- and west-facing backslopes. The ridgetop contains pole-sized black oaks, with fewer white oaks. The west- and south-facing slopes are dominated by squatty red oak, black oak, white oak, and hickory. Vaccinium is dense in some areas, with oaks, hickories, and serviceberry also in the understory. There are pockets of fire damage throughout the stand. This stand could possibly be broken into "ridgetop" and "woodland" stands, similar to stands 7 and 9.

**Stand Management Objectives:**

Enhance woodland structure on the exposed backslope, reduce overstory stocking on the ridgetop to enhance forest health and facilitate future timber production

**Desired Future Condition:**

A healthy forest-woodland complex managed for wildlife habitat, ecosystem health, and low productivity timber production.

**Stand Management Recommendations:**

**Prescribed burning:** You could utilize prescribed burning on the western and southern slope in order to retain woodland structure and reduce small tree density. Like stands 7 and 9, it would be best to limit fire intensity on the ridgetop in order to limit fire damage to timber.

**TSI:** The ridgetop portion of this stand can be thinned by approximately 20 ft<sup>2</sup>/acre basal area, focusing on UGS pole timber and culls. This is a low priority.

**Stand:** 13**Acres:** 12

<b>Dominant Aspect:</b>	North	<b>Total Basal Area:</b>	116.7
<b>Average Slope:</b>	20% - 30%	<b>AGS Basal Area:</b>	46.7
<b>Soil Type(s):</b>	73584, 73220	<b>B-level Basal Area:</b>	64.2
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	49.8
<b>Site Index &amp; Species:</b>	Black oak: 61	<b>Average DBH:</b>	9.2
<b>Stocking Level (%):</b>	105.3	<b>Trees/Acre:</b>	252
<b>Merch Volume/Acre and Scale:</b>	3900 International 1/4	<b>Snags/Acre:</b>	57
		<b>Den Trees/Acre:</b>	0
<b>Common Overstory Trees:</b>	Black oak, white oak		
<b>Common Midstory Trees:</b>	Black oak, white oak		
<b>Common Tree Regeneration:</b>	Hickory, oak		
<b>Common Understory Plants:</b>	Blueberry, dogwood, sassafras		
<b>Ecological Site(s) (# and name):</b>	F116AY012MO: Low-base Chert Upland Woodland F116AY013MO: Low-base Chert Protected Backslope Woodland		

**Description of Stand Condition:**

Stand 13 is a predominately north-facing slope, although not as steep, mesic, or likely productive as stand 8. The overstory is heavily black oak dominant, with less white oak and scattered red oak and hickory. Mature black oaks are scattered among dense small sawtimber and pole-sized black oaks. Vaccinium, hickory, dogwood, sassafras, and some suppressed oaks make up the midstory and understory layers. This stand is overstocked at 105.3%.

**Stand Management Objectives:**

Reduce overstocked conditions, harvest maturing overstory, remove UGS timber, facilitate oak regeneration and recruitment.

**Desired Future Condition:**

A healthy, uneven-aged oak forest with adequate oak regeneration.

**Stand Management Recommendations:**

This protected slope is one of the more productive stands on the property, with the highest potential for a timber sale now.

Harvest: Ideally, this stand should be harvested to gain income from maturing overstory trees and reduce stand stocking. According to inventory data, approximately 30 ft<sup>2</sup>/acre basal area can be harvested from mature and UGS sawtimber size classes. This would be roughly equivalent to 12000 BF for the stand. Ideally, this stand would be combined with other stands to make a larger timber sale.

TSI: If a sale is feasible, it should be followed by a post-harvest TSI. Remove approximately 30 ft<sup>2</sup>/acre basal area of UGS pole timber, culls, and trees damaged during harvesting operations.

Prescribed burning: Prescribed burning may be justified in this stand in order to topkill undesirable species in the understory and place oak regeneration at a competitive advantage. However, there are many considerations that should go into burning this stand, including timber damage, fuel loading, and the ease of establishing control lines.

**Stand:** 14**Acres:** 21

<b>Dominant Aspect:</b>	<b>West, South</b>	<b>Total Basal Area:</b>	78.0
<b>Average Slope:</b>	10% - 20%	<b>AGS Basal Area:</b>	34.0
<b>Soil Type(s):</b>	73584, 73220	<b>B-level Basal Area:</b>	63.4
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	49.2
<b>Site Index &amp; Species:</b>	Black oak: 61	<b>Average DBH:</b>	8.9
<b>Stocking Level (%):</b>	71.4	<b>Trees/Acre:</b>	182
<b>Merch Volume/Acre and Scale:</b>	800 International 1/4	<b>Snags/Acre:</b>	6
		<b>Den Trees/Acre:</b>	11
<b>Common Overstory Trees:</b>	Black oak, white oak, red oak		
<b>Common Midstory Trees:</b>	Black oak, white oak		
<b>Common Tree Regeneration:</b>	Oak		
<b>Common Understory Plants:</b>	Blueberry		
<b>Ecological Site(s) (# and name):</b>	F116AY049MO: Low-base Chert Exposed Backslope Woodland F116AY012MO: Low-base Chert Upland Woodland		

**Description of Stand Condition:**

Stand 14 is predominately west- and south-facing backslopes, bordered by a road to the east. Most of the stand is pole-sized black oak, with fewer white and red oak and scattered wolf trees. Many of these pole-sized trees are poor quality, with some fire damage, butt rot, epicormic branching, and forking. The southern point has a woodland/glade structure with no potential timber value.

**Stand Management Objectives:**

Reduce the high proportion of UGS and cull timber.

**Desired Future Condition:**

This stand should be a low productivity forest-woodland complex, with improving timber quality and dense oak regeneration.

**Stand Management Recommendations:**

TSI/group openings: This stand can potentially be managed as a low productivity timber stand. If this is desirable, there should be a focus to slowly remove the high proportion of UGS and cull timber in this stand. TSI approximately 20 ft<sup>2</sup>/acre focusing on UGS pole timber and culls. Although there is a higher proportion of UGS pole timber and culls in this stand, I would be hesitant to remove much more than this in order to limit epicormic branching on AGS sawtimber. Cut trees can be spatially aggregated in order to create temporary group openings. This is a low priority.

**Stand:** 15**Acres:** 26

<b>Dominant Aspect:</b>	<b>Southeast</b>	<b>Total Basal Area:</b>	88.3
<b>Average Slope:</b>	10% - 20%	<b>AGS Basal Area:</b>	45.0
<b>Soil Type(s):</b>	73220, 73237, 73584	<b>B-level Basal Area:</b>	57.5
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	44.6
<b>Site Index &amp; Species:</b>	Black oak: 53	<b>Average DBH:</b>	6.7
<b>Stocking Level (%):</b>	89.1	<b>Trees/Acre:</b>	360
<b>Merch Volume/Acre and Scale:</b>	1200 International 1/4	<b>Snags/Acre:</b>	5
		<b>Den Trees/Acre:</b>	0
<b>Common Overstory Trees:</b>	Black oak, white oak		
<b>Common Midstory Trees:</b>	Black oak, white oak		
<b>Common Tree Regeneration:</b>	Oak		
<b>Common Understory Plants:</b>	Blueberry		
<b>Ecological Site(s) (# and name):</b>	F116AY012MO: Low-base Chert Upland Woodland F116AY049MO: Low-base Chert Exposed Backslope Woodland		

**Description of Stand Condition:**

Stand 15 is a broad ridge and relatively gently sloping south and east-facing backslopes. The overstory is pole-sized black oak, with fewer white oak. Timber is relatively straight and of good quality. The understory and midstory are open, with scattered Vaccinium and stunted oaks.

**Stand Management Objectives:**

Reduce overstory stocking, improve structural complexity, maintain forest health.

**Desired Future Condition:**

A healthy even-aged oak forest, with potential for future timber production.

**Stand Management Recommendations:**

This stand is representative of several young pole-sized stands on the property, which seems to roughly match what is known about management history on the property. The landowner mentioned that most of the property was aerial sprayed years ago in an attempt to make pasture. I would assume that much of the ridge tops and shallow slopes remain open as pasture, but most of the steep slopes and difficult to reach areas quickly regenerated back to forest.

TSI: This is a higher priority stand to TSI. Timber quality is fairly good; we just need to focus on reducing overstory stocking. Remove up to 30 ft<sup>2</sup>/acre basal area of UGS pole timber and culls.



**Stand: 16****Acres: 21**

<b>Dominant Aspect:</b>	<b>South</b>	<b>Total Basal Area:</b>	102.0
<b>Average Slope:</b>	10% - 20%	<b>AGS Basal Area:</b>	56.0
<b>Soil Type(s):</b>	73220, 73584, 73237	<b>B-level Basal Area:</b>	63.0
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	48.8
<b>Site Index &amp; Species:</b>	Black oak: 53	<b>Average DBH:</b>	8.7
<b>Stocking Level (%):</b>	93.9	<b>Trees/Acre:</b>	247
<b>Merch Volume/Acre and Scale:</b>	2300 International 1/4	<b>Snags/Acre:</b>	9
		<b>Den Trees/Acre:</b>	7
<b>Common Overstory Trees:</b>	Black oak, white oak, post oak		
<b>Common Midstory Trees:</b>	Black oak		
<b>Common Tree Regeneration:</b>	White oak, hickory, sassafras		
<b>Common Understory Plants:</b>	Blueberry, dogwood		
<b>Ecological Site(s) (# and name):</b>	F116AY012MO: Low-base Chert Upland Woodland F116AY049MO: Low-base Chert Exposed Backslope Woodland		

**Description of Stand Condition:**

Stand 16 is a gently sloping south-facing slope, with multiple small draws. The overstory is heavily black oak dominant, with less white oak and post oak. It is predominately pole- and small-sawtimber sized; timber quality is good overall. The sapling layer is predominately white oak (many are suppressed), with hickory, dogwood, sassafras, and Vaccinium in the understory. Overall, this stand is very similar to Stand 15.

**Stand Management Objectives:**

Reduce overstory stocking, improve structural complexity, maintain forest health.

**Desired Future Condition:**

A healthy even-aged oak forest, with potential for future timber production.

**Stand Management Recommendations:**

This stand is in the latter stages of stem exclusion. After the aerial spraying, entire stands of oak seedlings began to develop and recruit at the same time (an even-aged system). As growing space becomes limited, stems begin to compete with one another, heavily investing resources toward height growth in attempt to outgrow competitors. Eventually, individuals begin to differentiate: taller and faster-growing individuals survive, while shorter individuals stagnate and slowly die.

TSI: We mimic this process through TSI, allowing us to decide which individuals live and die. Remove approximately 30ft<sup>2</sup>/acre of basal area from UGS pole timber and culls.

**Stand:** 17**Acres:** 14

<b>Dominant Aspect:</b>	North	<b>Total Basal Area:</b>	70.0
<b>Average Slope:</b>	10% - 20%	<b>AGS Basal Area:</b>	40.0
<b>Soil Type(s):</b>	73584	<b>B-level Basal Area:</b>	66.9
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	51.9
<b>Site Index &amp; Species:</b>	Black oak: 61	<b>Average DBH:</b>	10.4
<b>Stocking Level (%):</b>	60.6	<b>Trees/Acre:</b>	118
<b>Merch Volume/Acre and Scale:</b>	3700 International 1/4	<b>Snags/Acre:</b>	7
		<b>Den Trees/Acre:</b>	0
<b>Common Overstory Trees:</b>	Black oak, white oak, red oak, hickory		
<b>Common Midstory Trees:</b>	Sparse		
<b>Common Tree Regeneration:</b>	Maple, hickory		
<b>Common Understory Plants:</b>	Dogwood, spicebush, serviceberry, sassafras		
<b>Ecological Site(s) (# and name):</b>	F116AY013MO: Low-base Chert Protected Backslope Woodland		

**Description of Stand Condition:**

Stand 17 is a north-facing slope with several draws. The overstory is a mix of widely spaced sawtimber-sized black oak and white oak, with less red oak and hickory. Some are poor quality, having grown under heavy competition. The sapling layer is a diverse and somewhat dense mix of dogwood, spicebush, serviceberry, sassafras, maple, and hickory. This stand is nearly understocked at 60.6%.

**Stand Management Objectives:**

Facilitate oak regeneration, harvest maturing overstory.

**Desired Future Condition:**

This will transition into a two-aged stand, with an overstory of AGS sawtimber and an understory with adequate oak regeneration.

**Stand Management Recommendations:**

This is another unique stand to the property. The protected aspect and deeper soils suggest this stand has higher potential for future timber production. However, some land use disturbance in the past has led to an interesting stand structure: widely spaced sawtimber trees of varying quality, little pole timber, and patches of dense saplings associated with more mesic sites.

Midstory removal: While slightly more mesic sites such as these are more productive for timber production, they are also more challenging to maintain oak regeneration, as oaks can be outcompeted by more mesophytic species. We recommend some type of midstory removal in this stand to facilitate oak regeneration. Repeated prescribed burns are effective at topkilling competing species and preparing the seedbed for acorn germination, particularly if timed with a good acorn mast year. However, prescribed fire also has the potential to scar merchantable trees, leading to volume loss, so you should weigh these pros and cons. Generally speaking, several low intensity fires followed by a harvest within 5-10 years minimizes timber damage. You may also consider a targeted mechanical midstory removal followed by herbicide application, though this is generally more costly to implement. If you decide to use an approved herbicide, always read and follow the label.

Harvest: Ideally, you could harvest some of the maturing overstory. However, considering that this stand is already fairly open (close to B-level stocking), harvesting much out of this stand could create open enough conditions to release undesirable understory species and form epicormic sprouting on residual trees. We would recommend lumping this stand in a sale with some other stands, and only removing 20-30 ft<sup>2</sup>/acre basal area

initially. You can follow this with a subsequent sale in 15 or so years after establishing better oak regeneration. This two-step cutting process is called a shelterwood regeneration method.

**Stand:** 18**Acres:** 12

<b>Dominant Aspect:</b>	<b>South,</b>	<b>Total Basal Area:</b>	82.5
<b>Average Slope:</b>	10% - 20%	<b>AGS Basal Area:</b>	25.0
<b>Soil Type(s):</b>	73237, 73584	<b>B-level Basal Area:</b>	67.3
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	52.2
<b>Site Index &amp; Species:</b>	Black oak: 61	<b>Average DBH:</b>	10.6
<b>Stocking Level (%):</b>	71.0	<b>Trees/Acre:</b>	134
<b>Merch Volume/Acre and Scale:</b>	2000 International 1/4	<b>Snags/Acre:</b>	7
		<b>Den Trees/Acre:</b>	23
<b>Common Overstory Trees:</b>	Black oak, white oak, red oak		
<b>Common Midstory Trees:</b>	Hickory, oak		
<b>Common Tree Regeneration:</b>	Hickory, oak		
<b>Common Understory Plants:</b>	Dogwood, sassafras, spicebush		
<b>Ecological Site(s) (# and name):</b>	F116AY049MO: Low-base Chert Exposed Backslope Woodland F116AY012MO: Low-base Chert Upland Woodland		

**Description of Stand Condition:**

Stand 18 is a broad ridgetop, with north and south-facing backslopes. The ridgetop and protected slopes are heavily black oak dominant, with less white oak and some red oak. The overstory is pole and small sawtimber-sized, with few scattered mature trees. The midstory is dense with hickories, oaks, dogwood, sassafras, and spicebush. The overstory has pockets of severe basal scarring and butt rot, presumably due to fire. The south-facing slope is more of an open woodland with an invading woody shrub layer.

**Stand Management Objectives:**

Reduce the high proportion of UGS timber, harvest scattered maturing overstory trees.

**Desired Future Condition:**

An even-aged stand of healthy overstory trees with dense regeneration.

**Stand Management Recommendations:**

Harvest: Ideally, this stand could be lumped with several others to remove some of the maturing and UGS sawtimber. This would remove approximately 20-30 ft<sup>2</sup>/acre of basal area.

TSI: If a harvest can be conducted, it should be followed by TSI. TSI maintains stand health and vigor in stands that would ordinarily resemble a high-grade after a harvest. You can TSI as much as 20 ft<sup>2</sup>/acre of basal area after a sale. This will leave a fairly open overstory with a dense sapling layer, which is excellent for both future timber growth and deer and turkey habitat.

**Stand:** 19**Acres:** 12

<b>Dominant Aspect:</b>	<b>Flat</b>	<b>Total Basal Area:</b>	90.0
<b>Average Slope:</b>	10% - 20%	<b>AGS Basal Area:</b>	50.0
<b>Soil Type(s):</b>	73220	<b>B-level Basal Area:</b>	61.7
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	47.9
<b>Site Index &amp; Species:</b>	Black oak: 53	<b>Average DBH:</b>	8.2
<b>Stocking Level (%):</b>	84.6	<b>Trees/Acre:</b>	246
<b>Merch Volume/Acre and Scale:</b>	2400 International 1/4	<b>Snags/Acre:</b>	29
		<b>Den Trees/Acre:</b>	12
<b>Common Overstory Trees:</b>	Black oak, white oak, red oak, blackjack oak		
<b>Common Midstory Trees:</b>	White oak, black oak		
<b>Common Tree Regeneration:</b>	Oak		
<b>Common Understory Plants:</b>	Sparse		
<b>Ecological Site(s) (# and name):</b>	F116AY012MO: Low-base Chert Upland Woodland		

**Description of Stand Condition:**

Stand 19 is a small stand that includes a ridgetop, south, and north-facing backslopes. The exposed backslope has a dense sapling layer of straight white oaks and some black oak. The overstory is open, with scattered and decaying wolf trees (red oak, black oak, blackjack oak). The ridgetop and protected backslope is a decent area of sawtimber-sized black oak, with less white oak and red oak. The sapling layer has decent advanced regeneration of oak present.

**Stand Management Objectives:**

Harvest maturing overstory trees and UGS pole timber.

**Desired Future Condition:**

An uneven-aged stand of AGS oak species in all size classes, with adequate oak regeneration.

**Stand Management Recommendations:**

While this is a low productivity stand overall, it has potential for a timber sale now and low priority timber production in the future.

Harvest: This is certainly too small of a sale on its own, but could be combined with several other stands in one sale. A harvest would be almost entirely restricted to the ridgetop and north-facing shoulder of this stand. A harvest should focus on removing maturing black oak and UGS sawtimber using single-tree selection. This should remove approximately 15 ft<sup>2</sup>/acre of basal area.

TSI: Eventually, a harvest should be followed up by a post-sale TSI. Post-harvest TSI treatments prevent stands from resembling a high-grade, where only the best trees are removed from the stand and the worst trees are left. High-grades degrade stand quality over time, are not a sustainable form of forest management. Instead, we follow up a timber sale with TSI in order to remove poor quality, non-merchantable trees. Approximately 20 ft<sup>2</sup>/acre basal area can be removed from cull trees and UGS pole timber.

**Stand:** 20**Acres:** 21

<b>Dominant Aspect:</b>	East	<b>Total Basal Area:</b>	80.0
<b>Average Slope:</b>	20% - 30%	<b>AGS Basal Area:</b>	26.0
<b>Soil Type(s):</b>	73220, 73584, 73227	<b>B-level Basal Area:</b>	62.5
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	48.5
<b>Site Index &amp; Species:</b>	Black oak: 53	<b>Average DBH:</b>	8.5
<b>Stocking Level (%):</b>	74.2	<b>Trees/Acre:</b>	203
<b>Merch Volume/Acre and Scale:</b>	1800 International 1/4	<b>Snags/Acre:</b>	7
		<b>Den Trees/Acre:</b>	4
<b>Common Overstory Trees:</b>	Red oak, black oak, black walnut,		
<b>Common Midstory Trees:</b>	Cedar, elm, hickory		
<b>Common Tree Regeneration:</b>	Cedar, elm, hickory		
<b>Common Understory Plants:</b>	Buckbrush, dogwood		
<b>Ecological Site(s) (# and name):</b>	F116AY012MO: Low-base Chert Upland Woodland F116AY013MO: Low-base Chert Protected Backslope Woodland F116AY002MO: Chert Protected Backslope Forest		

**Description of Stand Condition:**

Stand 20 is a fairly heterogeneous stand containing three main community types. 1) The ridgetop contains more evidence of past grazing than seen thus far, including poor quality walnuts, cedar, elm, and buckbrush. It also contains many sapling-sized straight oaks and hickories. 2) The north-facing slope contains pockets of good quality maturing red oak and black oak, with less white oak. The understory/midstory is elm, dogwood, and hickory. 3) The south- and east-facing aspects are open, with defective wolf trees (various oak spp.) and some nicer quality pole-sized oaks.

**Stand Management Objectives:**

Possibly harvest some maturing trees in conjunction with other stands, otherwise leave.

**Desired Future Condition:**

A diverse complex of old field, forest, and woodland.

**Stand Management Recommendations:**

This stand is challenging to manage for several reasons. First, stands that have histories of intense grazing (like some of this stand appears to) have been disturbed so heavily that it is difficult to revert to high quality natural communities. Second, this stand is quite variable in structure and composition, making one recommendation difficult. If we can market a timber sale in this stand, it would be worthwhile to remove some of the maturing red and black oak before they die. Otherwise, I would leave this stand.

**Stand:** 21**Acres:** 16

<b>Dominant Aspect:</b>	Northeast	<b>Total Basal Area:</b>	90.0
<b>Average Slope:</b>	10% - 20%	<b>AGS Basal Area:</b>	27.5
<b>Soil Type(s):</b>	73584, 73227, 73220	<b>B-level Basal Area:</b>	59.6
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	46.2
<b>Site Index &amp; Species:</b>	Black oak: 61	<b>Average DBH:</b>	7.4
<b>Stocking Level (%):</b>	87.6	<b>Trees/Acre:</b>	300
<b>Merch Volume/Acre and Scale:</b>	1600 International 1/4	<b>Snags/Acre:</b>	29
		<b>Den Trees/Acre:</b>	5
<b>Common Overstory Trees:</b>	Black oak, red oak, blackjack oak, post oak, white oak		
<b>Common Midstory Trees:</b>	Hickory, black oak, white oak, post oak, elm		
<b>Common Tree Regeneration:</b>	Hickory, black oak, white oak, post oak, elm		
<b>Common Understory Plants:</b>	Dogwood, cedar		
<b>Ecological Site(s) (# and name):</b>	F116AY012MO: Low-base Chert Upland Woodland F116AY013MO: Low-base Chert Protected Backslope Woodland F116AY002MO: Chert Protected Backslope Forest		

**Description of Stand Condition:**

Stand 21 is a linear knob between two draws. The ridgetop is dense, with short pole-sized black oak, blackjack oak, hickory, elm, and post oak. Both slopes contain scattered good quality sawtimber of red oak, black oak, and white oak, but mostly poorer quality wolf trees. The midstory is dense with hickory, oak, elm, dogwood, and cedar.

**Stand Management Objectives:**

Reduce overstory stocking and the high proportion of UGS and cull trees.

**Desired Future Condition:**

A healthy stand transitioning toward uneven-aged structure, managed for future timber production and forest health.

**Stand Management Recommendations:**

TSI: This is a medium priority TSI. Remove approximately 30 ft<sup>2</sup>/acre of basal area, focusing on UGS pole timber and culls. This will reduce stand stocking to approximately B-level stocking.

**Stand:** 22**Acres:** 13

<b>Dominant Aspect:</b>	<b>Flat</b>	<b>Total Basal Area:</b>	90.0
<b>Average Slope:</b>	20% - 30%	<b>AGS Basal Area:</b>	42.5
<b>Soil Type(s):</b>	73220, 73584	<b>B-level Basal Area:</b>	62.7
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	48.7
<b>Site Index &amp; Species:</b>	Black oak: 53	<b>Average DBH:</b>	8.6
<b>Stocking Level (%):</b>	83.2	<b>Trees/Acre:</b>	223
<b>Merch Volume/Acre and Scale:</b>	2500 International 1/4	<b>Snags/Acre:</b>	18
		<b>Den Trees/Acre:</b>	9
<b>Common Overstory Trees:</b>	Black oak, white oak, post oak, hickory.		
<b>Common Midstory Trees:</b>	Black oak, white oak, hickory		
<b>Common Tree Regeneration:</b>	Hickory, oak		
<b>Common Understory Plants:</b>	Dogwood, serviceberry		
<b>Ecological Site(s) (# and name):</b>	F116AY013MO: Low-base Chert Protected Backslope Woodland F116AY012MO: Low-base Chert Upland Woodland		

**Description of Stand Condition:**

Stand 22 is a broad ridgetop dominated by black oak, with less white oak, post oak, and hickory. The overstory is pole- to small sawtimber-sized. Sawtimber quality is decent overall. The midstory and regeneration layers are dominated by a diversity of hickories, oaks, dogwood, and serviceberry.

**Stand Management Objectives:**

Reduce high proportion of UGS pole timber and cull trees.

**Desired Future Condition:**

A healthy, even-aged upland oak stand, managed for future timber production and forest health.

**Stand Management Recommendations:**

TSI: This is another medium priority TSI. Remove approximately 30 ft<sup>2</sup>/acre of basal area, focusing on UGS pole timber and culls.



**Stand:** 23**Acres:** 17

<b>Dominant Aspect:</b>	Southwest	<b>Total Basal Area:</b>	63.3
<b>Average Slope:</b>	40% - 50%	<b>AGS Basal Area:</b>	16.7
<b>Soil Type(s):</b>	73427	<b>B-level Basal Area:</b>	59.8
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	46.4
<b>Site Index &amp; Species:</b>	Black oak: 42	<b>Average DBH:</b>	7.5
<b>Stocking Level (%):</b>	61.4	<b>Trees/Acre:</b>	207
<b>Merch Volume/Acre and Scale:</b>	700 International 1/4	<b>Snags/Acre:</b>	44
		<b>Den Trees/Acre:</b>	6
<b>Common Overstory Trees:</b>	Black oak, post oak, red oak, chinquapin oak, hickory, cedar		
<b>Common Midstory Trees:</b>	Cedar, hickory, oak		
<b>Common Tree Regeneration:</b>	Cedar, hickory, oak		
<b>Common Understory Plants:</b>	Dogwood, spicebush		
<b>Ecological Site(s) (# and name):</b>	R116AY020MO: Shallow Dolomite Upland Glade/Woodland		

**Description of Stand Condition:**

Stand 23 is a very steep southwest facing backslope. The overstory is dominated by squatty black oak, post oak, red oak, chinquapin oak, hickory, and cedar. The midstory and understory is dominated by cedar, dogwood, spicebush, hickory, and oaks. This stand is an invaded woodland/glade complex, with scattered small pocket glades throughout.

**Stand Management Objectives:**

Reduce density of woody vegetation, promote herbaceous glade vegetation

**Desired Future Condition:**

An open glade/woodland complex, with diverse and abundant ground flora

**Stand Management Recommendations:**

This stand is notable as probably the least "productive" stand on the property. The steep exposed slope leads to shallow droughty soils. The slightly deeper soils are able to grow squatty, gnarled oaks, while especially shallow soils appear as treeless glades. Glades support diverse and specialized herbaceous vegetation. These natural communities are excellent habitat not only for generalist game animals like deer and turkey, but also for many threatened species of reptiles and songbirds that are habitat specialists.

Prescribed burning: Glades were historically maintained through a combination of site factors and prescribed burning. With the advent of overgrazing and fire suppression, these communities are slowly invaded by redcedar, reducing habitat quality. We recommend regularly burning this stand every 2-5 years.

Midstory removal: Prescribed fire alone will not restore this natural community, as some woody stems have grown too large to kill with fire. Instead, these stems would need to be manually cut down with a chainsaw. The combination of fire and mechanical thinning should remove approximately 40 ft<sup>2</sup>/acre of basal area. Ideally, cut hardwood stumps would be treated with an appropriate herbicide to limit resprouting. We would then recommend waiting 3-5 years after cutting before burning again, in order to allow cut stems to decompose. Burning immediately after cedar cutting with heavy fuel loads can lead to overly intense fires. We realize that cutting along this slope is a laborious task.

**Stand:** 24**Acres:** 24

<b>Dominant Aspect:</b>	Northeast	<b>Total Basal Area:</b>	81.7
<b>Average Slope:</b>	20% - 30%	<b>AGS Basal Area:</b>	40.0
<b>Soil Type(s):</b>	73220, 73584, 73227	<b>B-level Basal Area:</b>	57.9
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	44.9
<b>Site Index &amp; Species:</b>	Black oak: 53	<b>Average DBH:</b>	6.8
<b>Stocking Level (%):</b>	81.8	<b>Trees/Acre:</b>	321
<b>Merch Volume/Acre and Scale:</b>	700 International 1/4	<b>Snags/Acre:</b>	11
		<b>Den Trees/Acre:</b>	3
<b>Common Overstory Trees:</b>	Black oak, white oak, red oak		
<b>Common Midstory Trees:</b>	Hickory, black oak, white oak		
<b>Common Tree Regeneration:</b>	Hickory, oak		
<b>Common Understory Plants:</b>	Dogwood, cedar		
<b>Ecological Site(s) (# and name):</b>	F116AY012MO: Low-base Chert Upland Woodland F116AY013MO: Low-base Chert Protected Backslope Woodland F116AY002MO: Chert Protected Backslope Forest		

**Description of Stand Condition:**

Stand 24 is a large stand encompassing a broad ridge and north-facing backslope. The overstory is dominated by black and white oak, with less red oak. The ridgetop is slightly denser, with more uniform pole-sized trees. The north-facing slope has scattered sawtimber trees of average quality. The midstory is dominated by hickories, oaks, dogwood, and some cedar.

**Stand Management Objectives:**

Reduce high proportion of UGS pole timber.

**Desired Future Condition:**

A healthy, even-aged upland oak forest, managed for future timber production and forest health.

**Stand Management Recommendations:**

TSI: This is another good TSI opportunity. Focus on removing approximately 25 ft<sup>2</sup>/acre of basal area in order to reduce stocking to around the B-line. Trees to remove should come primarily from UGS pole timber. Reducing stand stocking will not only improve timber growth, but also maintain individual tree health and reduce the susceptibility to disease and decline.

**Stand:** 25**Acres:** 25

<b>Dominant Aspect:</b>	Northeast	<b>Total Basal Area:</b>	75.0
<b>Average Slope:</b>	20% - 30%	<b>AGS Basal Area:</b>	38.3
<b>Soil Type(s):</b>	73220, 73584, 73227	<b>B-level Basal Area:</b>	53.8
<b>Predominant Stand Age:</b>	Stand age not taken	<b>C-level Basal Area:</b>	41.8
<b>Site Index &amp; Species:</b>	Black oak: 53	<b>Average DBH:</b>	5.6
<b>Stocking Level (%):</b>	80.8	<b>Trees/Acre:</b>	435
<b>Merch Volume/Acre and Scale:</b>	1100 International 1/4	<b>Snags/Acre:</b>	3
		<b>Den Trees/Acre:</b>	1
<b>Common Overstory Trees:</b>	Black oak, white oak, red oak, post oak		
<b>Common Midstory Trees:</b>	Hickory, black oak, white oak		
<b>Common Tree Regeneration:</b>	Hickory, black oak, white oak		
<b>Common Understory Plants:</b>	Dogwood		
<b>Ecological Site(s) (# and name):</b>	F116AY012MO: Low-base Chert Upland Woodland F116AY013MO: Low-base Chert Protected Backslope Woodland F116AY002MO: Chert Protected Backslope Forest		

**Description of Stand Condition:**

Stand 25 encompasses a small ridgetop with north, east, and west-facing backslopes. This stand is similar to many we have described thus far, dominated by pole-sized black oak, white oak, red oak, and post oak. The east-facing slope is somewhat steeper, with lower timber quality and more of a woodland character. The midstory/understory is dominated by hickories, oaks, and dogwood. Overall, this stand has a high density of smaller stems.

**Stand Management Objectives:**

Reduce high proportion of UGS pole timber.

**Desired Future Condition:**

A healthy, even-aged upland oak forest, managed for future timber production and forest health.

**Stand Management Recommendations:**

TSI: This is another good TSI opportunity. Removing trees with small crowns and poor growth form will concentrate growing space on the best quality trees in the stand. Remove up to 20 ft<sup>2</sup>/acre of basal area from UGS pole timber, small trees, and culls.

**Stand:** Field**Acres:** 9.2

<b>Dominant Aspect:</b>	None
<b>Average Slope:</b>	<5%
<b>Soil Type(s):</b>	73220

**Description of Stand Condition:**

This field is currently used for grazing cattle. It is dominated by cool season grasses.

**Stand Management Objectives:**

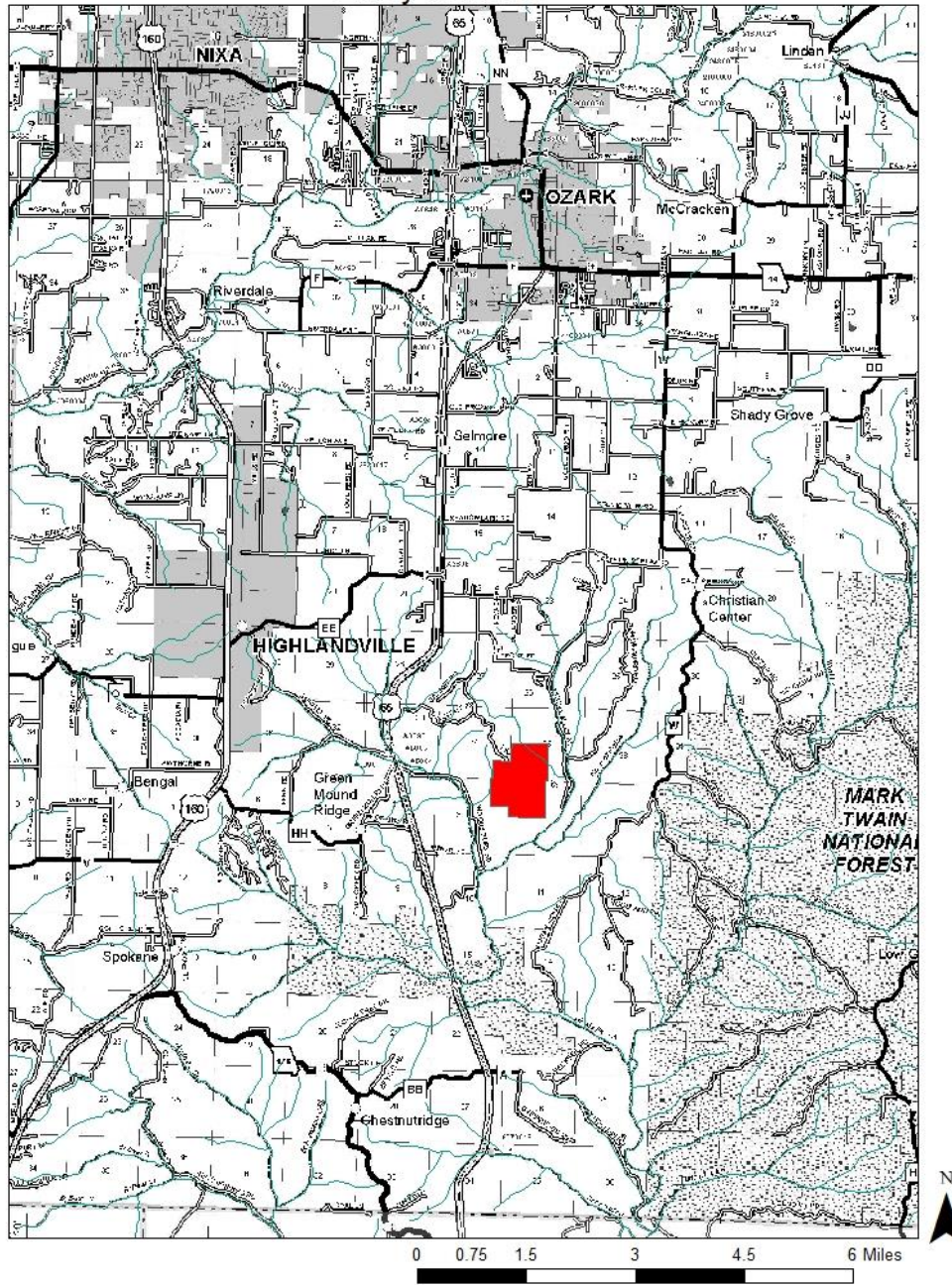
Fence cattle out of forested stands.

**Stand Management Recommendations:**

Fencing: Cattle grazing is detrimental to natural areas for several reasons. Grazing directly affects vegetation by eating and trampling seedlings and herbaceous plants. Furthermore, excessive grazing leads to soil compaction and erosion that can have lasting effects on a site. We recommend fencing these forested acres be a top priority moving forward. We can put you in touch with either a Private Lands Conservationist (MDC) or NRCS representative to provide technical advice on fencing.

# APPENDIX I – Location Information/Plat Map

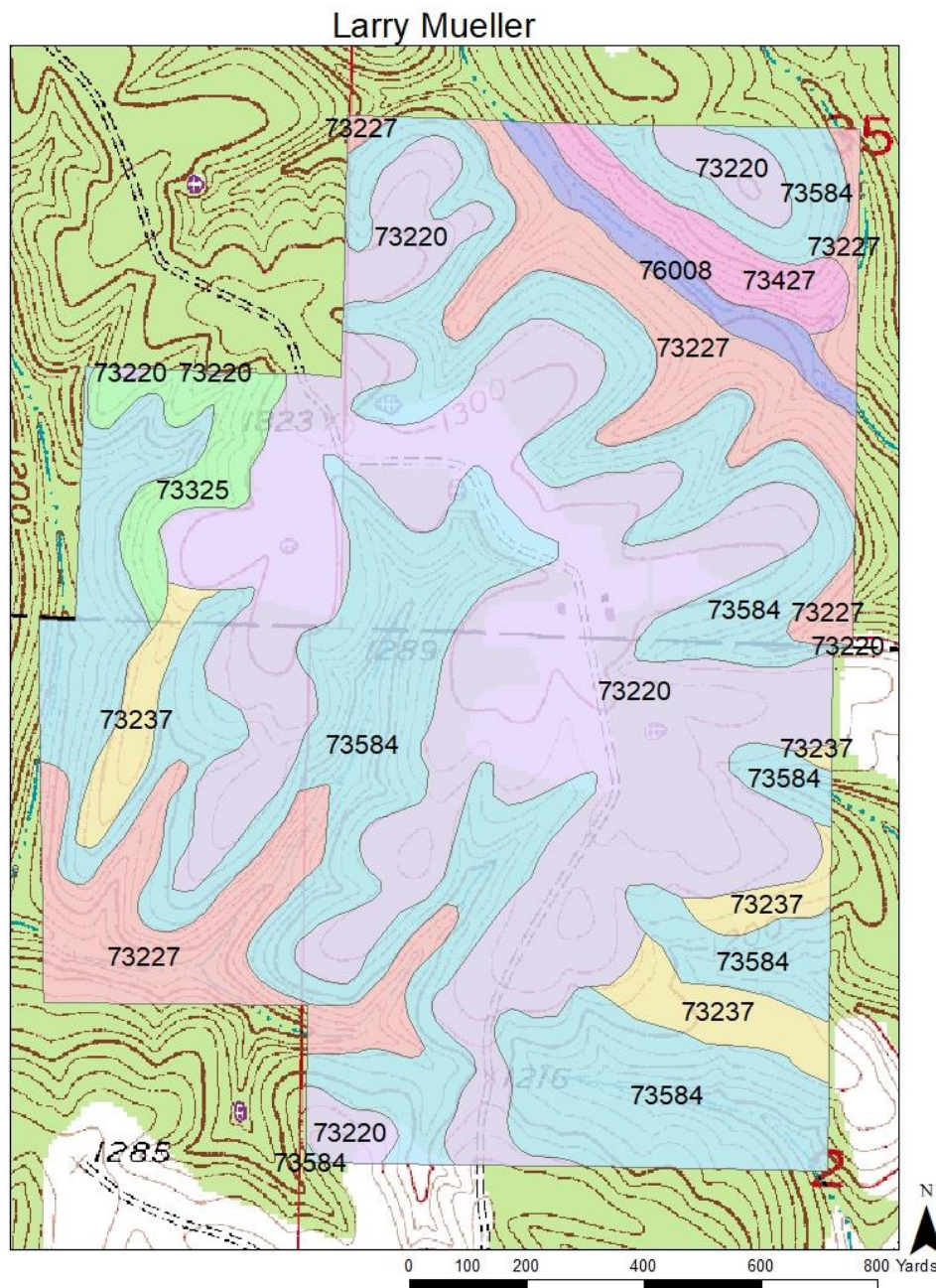
Larry Mueller



## APPENDIX II – Soil Information

Soils are the foundation on which trees grow. Not all soils have the same ability to grow trees. Bottomland soils and north and east facing slope soils are usually more productive. They retain soil moisture and have the capability of producing good tree growth. On south and west facing slopes, soils are usually shallower in depth, lose soil moisture quicker, and are not as productive for tree growth. Having a knowledge and understanding of soils provides the forest owner and manager with a better idea of forest land potential.

### Soil or Ecological Site Map:



## Description of Your Soils

A brief description of your soil types is discussed below. These condensed descriptions are included for quick reference.

Map Unit Symbol	Map Unit Name
73220	Poynor extremely gravelly silt loam, 8 to 15 percent slopes
73227	Ocie-Gatewood complex, 15 to 35 percent slopes, very stony
73237	Clarksville very gravelly silt loam, 3 to 15 percent slopes
73325	Clarksville extremely gravelly silt loam, 15 to 50 percent slopes
73427	Gasconade-Gatewood-Rock outcrop complex, 15 to 50 percent slopes
73584	Clarksville very gravelly silt loam, 35 to 60 percent slopes
76008	Cedargap gravelly silt loam, 1 to 3 percent slopes, frequently flooded

Map Unit: 73220—Poynor extremely gravelly silt loam, 8 to 15 percent slopes

The Poynor component makes up 80 percent of the map unit. Slopes are 8 to 15 percent. This component is on hills and hillslopes. The parent material consists of slope alluvium over residuum weathered from dolomite. Depth to a root restrictive layer, strongly contrasting textural stratification, is 10 to 39 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the F116AY056MO *Pinus echinata*-*Quercus stellata*/*Schizachyrium scoparium*, *Quercus stellata*-*Quercus marilandica*/*Schizachyrium scoparium* ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map Unit: 73227—Ocie-Gatewood complex, 15 to 35 percent slopes, very stony

The Ocie component makes up 45 percent of the map unit. Slopes are 15 to 35 percent. This component is on hills and hillslopes. The parent material consists of slope alluvium over residuum weathered from dolomite over dolomite. Depth to a root restrictive layer, strongly contrasting textural stratification, is 15 to 36 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 2 percent. This component is in the F116AY048MO *Quercus alba*-*Quercus rubra*/*Cercis canadensis*, *Quercus stellata*-*Quercus marilandica*/*Schizachyrium scoparium* ecological site. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

The Gatewood component makes up 35 percent of the map unit. Slopes are 15 to 35 percent. This component is on hillslopes and hills. The parent material consists of slope alluvium over residuum weathered from dolomite over dolomite. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 27 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 2 percent. This component is in the F116AY016MO *Quercus alba*-*Quercus rubra*/*Cercis canadensis*, *Quercus stellata*-*Quercus marilandica*/*Schizachyrium scoparium* ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map Unit: 73237—Clarksville very gravelly silt loam, 3 to 15 percent slopes

The Clarksville component makes up 85 percent of the map unit. Slopes are 3 to 15 percent. This component is on hillslopes and hills. The parent material consists of slope alluvium over residuum weathered from dolomite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the F116AY012MO *Pinus echinata*-*Quercus stellata*/*Schizachyrium scoparium*, *Quercus stellata*-*Quercus marilandica*/*Schizachyrium scoparium* ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map Unit: 73325—Clarksville extremely gravelly silt loam, 15 to 50 percent slopes

The Clarksville component makes up 85 percent of the map unit. Slopes are 15 to 50 percent. This component is on hillslopes and hills. The parent material consists of slope alluvium over residuum weathered from limestone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 50 percent. This component is in the F116AY049MO *Quercus alba*-*Quercus stellata*/*Schizachyrium scoparium*, *Quercus stellata*-*Quercus marilandica*/*Schizachyrium scoparium* ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map Unit: 73427—Gasconade-Gatewood-Rock outcrop complex, 15 to 50 percent slopes

The Gasconade component makes up 60 percent of the map unit. Slopes are 15 to 50 percent. This component is on hillslopes and hills. The parent material consists of residuum weathered from dolomite over dolomite. Depth to a root restrictive layer, bedrock, lithic, is 13 to 21 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R116AY052MO Limestone/Dolomite Exposed Backslope Glade/Woodland Complex, Limestone/Dolomite Protected Backslope Glade/Woodland Complex ecological site. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

The Gatewood component makes up 20 percent of the map unit. Slopes are 15 to 50 percent. This component is on hillslopes and hills. The parent material consists of slope alluvium over residuum weathered from dolomite over dolomite. Depth to a root restrictive layer, bedrock, lithic, is 28 to 36 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 26 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 2 percent. This component is in the F116AY016MO *Quercus alba*-*Quercus rubra*/*Cercis canadensis*, *Quercus stellata*-*Quercus marilandica*/*Schizachyrium scoparium* ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map Unit: 73584—Clarksville very gravelly silt loam, 35 to 60 percent slopes

The Clarksville component makes up 85 percent of the map unit. Slopes are 35 to 60 percent. This component is on hills and hillslopes. The parent material consists of slope alluvium over residuum weathered from limestone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is moderately high.



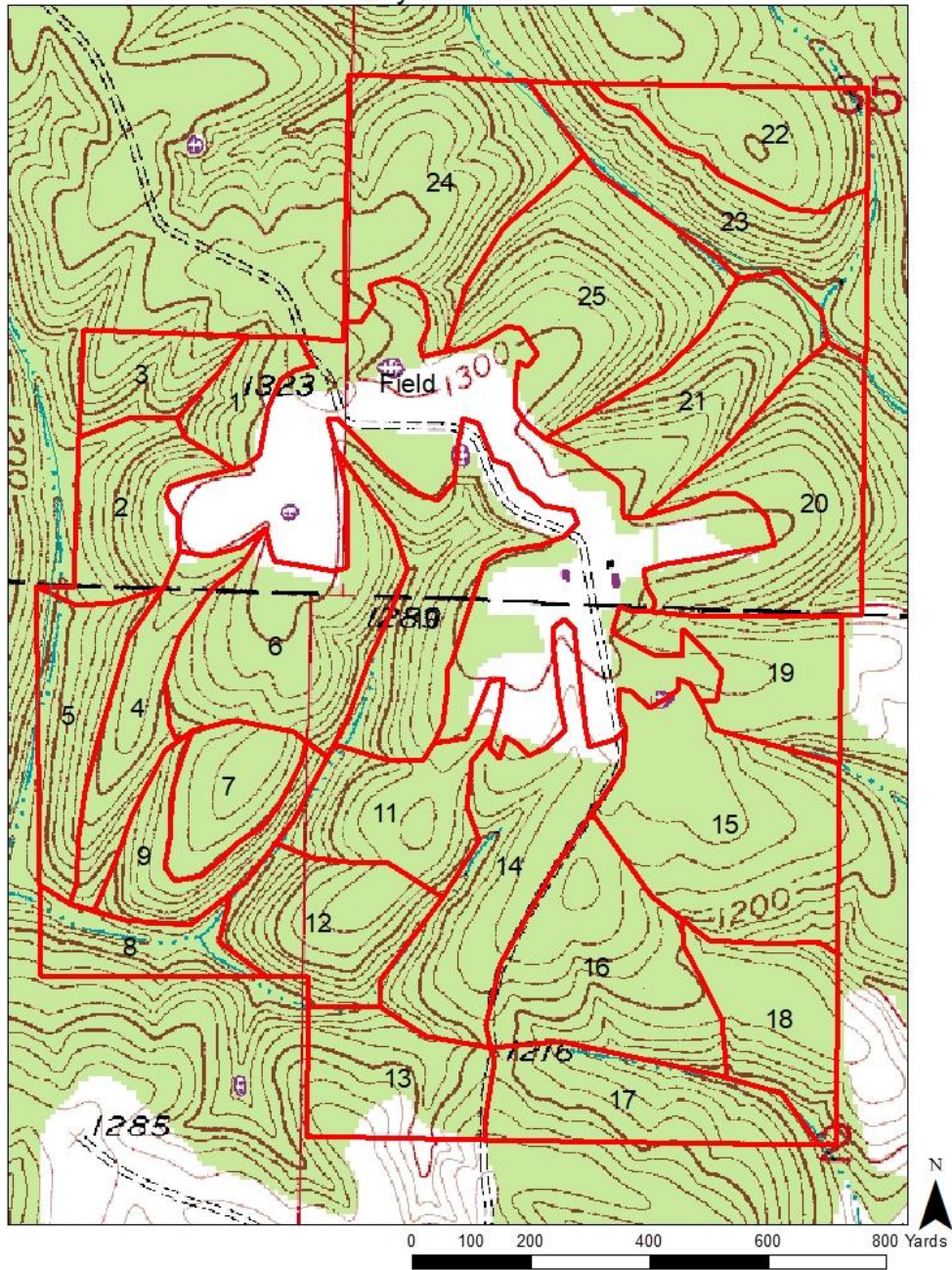
Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 50 percent. This component is in the F116AY058MO Pinus echinata-Quercus alba/Vaccinium arboreum/Schizachyrium scoparium, Pinus echinata-Quercus stellata/Schizachyrium scoparium, Quercus alba-Quercus stellata/Schizachyrium scoparium, Quercus stellata-Quercus marilandica/Schizachyrium scoparium ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map Unit: 76008—Cedargap gravelly silt loam, 1 to 3 percent slopes, frequently flooded  
The Cedargap component makes up 90 percent of the map unit. Slopes are 1 to 3 percent. This component is on hills and drainageways. The parent material consists of loamy alluvium over clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 48 inches during January, February, March, April, November, December. Organic matter content in the surface horizon is about 4 percent. This component is in the F116AY037MO Quercus alba-Quercus rubra/Corylus americana/Elymus virginicus-Carex ecological site. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

*For more detailed information about the soils found on your property contact your local USDA, NRCS (Natural Resource Conservation Service) office at \_\_\_\_\_, located in \_\_\_\_\_, Missouri.*

### APPENDIX III – Topographic Map

Larry Mueller



## APPENDIX IV – Environmental Evaluations and Management Information

### FOREST MANAGEMENT

The stocking level of a forest stand is an indication of the number and size of trees in a stand in relation to the desired number of trees. When trying to maximize the tree growth potential of a forest stand, a stocking level less than 60% is considered “*understocked*.” Stocking levels from 60% to 80% are considered “*optimally stocked*,” with space available for additional growth. Stocking levels from 80% to 100% are “*fully stocked*,” but may be thinned to allow trees room to grow and for improved stand health. Stands greater than 100% stocked are “*overstocked*,” have limited growth potential, and are likely in need of some level of thinning or harvest.

Since many of our forests are overstocked, thinning or forest stand improvement is a commonly recommended practice. The goal is to choose the most desirable trees and kill or remove the competing, less desirable ones or to remove unwanted trees across the stand in order to improve overall forest stand composition. This allows more growth to occur on the best trees.

Timber harvests are a good forest management tool when the trees are large enough to attract the interest of a logger. An overstocked stand could be thinned by harvesting selected trees. In many cases, low quality trees of various sizes and trees considered mature are selected for harvest. A forest stand improvement thinning is often needed after the harvest to remove additional undesirable and damaged trees. The end result should be a properly stocked stand of better quality trees. This increases the vigor and health of the stand and adds more value to future sales. Avoid diameter limit cuts where all trees over a certain size will be harvested. This almost always leads to high-grading, a practice where only the best trees are harvested leaving poor quality trees with little future potential.

### ARCHAEOLOGICAL, CULTURAL, & HISTORICAL SITES

Cultural resources are important to protect. They include any prehistoric or historic district, site, building, structure or object listed or eligible to be listed in the National Register of Historic Places. Cultural resources that are also protected under other authorities (such as the American Indian Religious Freedom Act) include tangible traces such as; districts, sites, buildings, structures and objects, and less tangible traces such as; dance forms, aspects of folk life, landscapes, vistas, cultural or religious practices; historical documents; and some landscapes, vistas, cemeteries (if they have historic or cultural value). If a planned conservation practice is ground disturbing or potentially ground disturbing, contact the local NRCS field office for additional planning considerations.

The following sites have been noted on your property:

### FOREST HEALTH AND PROTECTION

Your property is a valuable asset and should be protected from destructive grazing, wildfire, insects and diseases, invasive species, or any other disruptive force. Practices that will improve forest health include fencing, fire breaks/lanes, and monitoring for insect and disease activities and invasive species.

**Destructive grazing:** Cattle, hogs, horses, or other livestock compact the soil in a woodland, trample young seedlings and sprouts, damage roots, rub bark from stems, and eat or defoliate small trees. Once woodlands have been grazed, they are more prone to disease and insect problems. If excessive grazing is allowed, soil compaction and erosion problems may also occur. If present, fencing livestock out of

woodlands is necessary to meet the objectives you have for your forested land.

**Fire management:** Fire is a natural force and may be either beneficial or harmful. The difference is a matter of timing, intensity, and management objectives. Uncontrolled fire that occurs in a place or time that is not desired is considered a wildfire. Wildfire can cause damage to woodlands. It may weaken or kill trees, cause wounds where insects and diseases can enter, and reduce timber quality and value. Alternatively, prescribed fires are conducted under carefully controlled and managed conditions to accomplish land management objectives as outlined in a site specific prescribed burn plan. Prescribed fire is a tool that can be used to improve oak regeneration, increase herbaceous vegetation and diversity, restore natural communities and improve wildlife habitat.

**Insect and disease:** There are a lot of common misconceptions about tree and forest health. Frequently, people believe that if a tree is green, it is healthy. Many times trees impacted by insects or disease are beyond the point of treatment before any symptoms are noticed. Active management that removes these declining trees and provides sufficient growing space to the remaining, more vigorous, healthy trees is important for optimal forest health. However, it is also important to remember that an occasional dead tree is natural in a healthy forest due to competition for sunlight and nutrients. These dead trees, commonly known as snags, also provide habitat for many types of woodland wildlife. If applying pesticides to treat insects or diseases **always read and follow the label directions**.

**Invasive species:** An “invasive species” is defined as a species that is non-native (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. Invasive species can be plants, animals, and other organisms (e.g., microbes). Human actions are the primary means of invasive species introductions. You can help prevent and control the spread of exotic invasive species by maintaining or developing well-established, diverse communities of native plants to resist these invaders. When applying herbicides to treat invasive species **always read and follow the label directions**.

## **SOIL & WATER RESOURCE & QUALITY**

Water is an important renewable resource. It is also one of the most important resources that a landowner can affect. Three of the most important items you can do to maintain water quality is to retain adequate forested buffers along streams and drainages, avoid soil erosion by properly planning and/or maintaining roads/trails used for vehicles, and/or logging equipment, and exclude livestock from your woods. More specific information on best management practices for water quality and resource protection can be found in the MDC “*Missouri Watershed Protection Guide*” and “*Missouri Woody Biomass Harvesting Manual*.”

## **RECREATION & AESTHETIC RESOURCES**

Many management practices affect the appearance and recreation resource of your property. Your forest stewardship/forest management plan recommends management activities with your aesthetic and recreational considerations in mind.

## **FISH, WILDLIFE, AND WETLAND RESOURCES**

Numerous fish and wildlife species rely on forests to provide needed habitat. Wildlife species need food, shelter and water within their home range. Forest management can improve wildlife habitat for game and

non-game species. The increased growth of trees in managed wooded lands can result in an increase in the mast (nuts, berries, acorns, seeds) production of these trees. Increased sunlight reaching the forest floor increases plant growth and provides additional food and cover for wildlife. Down tree tops and logs will provide escape cover and habitat for ground-dwelling birds, chipmunks, salamanders and frogs. Standing dead trees, or snags, and living trees with cavities provide diverse habitat for a variety of wildlife. Creating a transition zone or edge where stands meet open land or fields or developing forest openings can provide wildlife food, cover, and nesting areas. Construction of wildlife watering facilities, or small fishless ponds, can provide needed water where it is currently lacking in larger blocks of forest. Healthy forests also serve as filters for runoff water, thus protecting water quality in streams and wetlands. Natural community restoration of glades, woodlands, savannas, and bottomland forests restore declining habitats and the wildlife species associated with those habitats.

## **FOREST OF RECOGNIZED IMPORTANCE**

Forests of Recognized Importance (FORI) are considered critically important because of their unique combination of social, cultural, biodiversity and environmental values. Social or cultural values include aspects of a forest that are important to the surrounding community's identity, like historical features or sacred sites or forest products that local residents depend on. Biodiversity values are critical to protecting rare ecosystems or habitats, or unusual plant or animal species. Environmental values include aspects of the forest that benefit the whole community, like protecting local watersheds or preventing erosion. These forests are evaluated at the landscape level, rather than the stand level and are recognized for the combination of unique values, rather than a single attribute. Examples of FORI's in Missouri include priority areas identified in the State Forest and Wildlife Action Plans, and priority watersheds identified by various agencies and organizations. GIS files of these areas have been developed, which will make identifying their locations easier on the ground.

- Your land does not contribute to, or fall within, an area identified as a FORI.
- Your land does contribute to, or fall within, the area identified as the \_\_\_\_\_ FORI. You should take the following steps to help conserve this area:

## **BIOLOGICAL DIVERSITY**

Biodiversity is extremely important to the health of both a unique forest tract and the larger overall landscape. A diversity of plants, animals, and management makes an ecosystem more resilient to stressors such as wildfire, flooding, drought, or pest outbreaks. Biological diversity also contributes to the functionality and societal benefits, whether ecological or economical, that a property can provide.

## **AGROFORESTRY**

Agroforestry is the intentional integration of trees and shrubs into crop and animal farming systems to create environmental, economic, and social benefits. It has been practiced in the United States and around the world for centuries. For a management practice to be called agroforestry, it typically must satisfy the four "I"s: intentional, intensive, integrated, and interactive. The five agroforestry practices include alley cropping, forest farming, riparian forest buffers, silvopasture, and windbreaks.

## **CONSERVATION BASED ESTATE PLANNING & LEGACY PLANNING INFORMATION**

Estate planning is the act of preparing for the transfer of a person's wealth and assets after his or her death. Forestland is a real property asset which is included with estates, and forest owners are encouraged to consider what will happen to their land after death. The decisions that aging landowners make about the future use and ownership of their land are important. Ensuring that enough wooded land, in large enough property sizes, continues to be available in the future will not only help ensure working forests, but also the continuation of the many critical public benefits that these forests provide. Important estate planning and other information is available at the National Timber Tax Website: [www.timbertax.org](http://www.timbertax.org)

## **CARBON SEQUESTRATION & CLIMATE RESILIENCE**

Carbon dioxide and its impact on the climate is a concern of many. In the United States, forests make up 90% of the US carbon sink and sequester approximately 10% of the U.S. CO<sub>2</sub> emissions. Additionally, a healthy, managed forest can sequester greater amounts of carbon while still providing for wildlife habitat, recreation opportunities, wood products, and other uses. A healthy forest is much more resilient to extreme climate events, such as drought or flooding, than an unmanaged forest.

## APPENDIX V – Glossary/Helpful Internet Sites

### Glossary

- Acceptable Growing Stock (AGS):** Trees that are of good form, species and quality and would be satisfactory as crop trees.
- Aspect:** The direction that a slope faces (north, south, etc.)
- Basal Area:** The cross-sectional area of a tree, in square feet, at 4.5 feet from the ground (at breast height). When the basal area of all the trees in a stand are added together, the result is expressed as square feet of basal area per acre, which is a measure of a stand's density.
- Best management practices (BMP):** applied forestry practices that protect or enhance a forest stand.
- Biomass:** A renewable energy source of biological materials derived from living, or recently living organisms, such as wood, waste, and crop residues.
- Board Foot:** A unit for measuring wood volumes. It is commonly used to express the amount of wood in a tree, saw log, or individual piece of lumber. A piece of wood 1 foot long, 1 foot wide, and 1 inch thick (144 cubic inches).
- Canopy:** The more or less continuous cover of branches and foliage formed collectively by the tops, or crowns of adjacent trees.
- Clearcut:** A harvest and regeneration technique that removes all trees from an area at the same time, resulting in an even-aged stand.
- Crop Tree:** A tree identified to be grown to maturity for the final harvest cut, usually on the basis of its location with respect to other trees and its timber quality.
- Crown:** The part of the tree made up of leaves and branches growing outward from the trunk.
- Cull:** A tree or log of merchantable size that because of a defect is useless for its intended purpose.
- Den Tree:** A living tree with a cavity large enough to shelter wildlife.
- Diameter Breast Height (DBH):** The diameter of a tree at 4.5 feet above the ground.
- Even-Aged Management:** Forest management with periodic harvest of all trees on part of the forest at one time or over a short period to produce stands containing trees all the same or nearly the same age or size.
- Forest Stand Improvement:** See timber stand improvement.
- Girdling:** Completely encircling the trunk of a tree with a cut that severs the bark and cambium of the tree. Herbicide is sometimes injected into the cut to ensure death of the tree.
- Hack-n-squirt:** A tree treatment method where an axe or hatchet is used to make "hacks" (injections) into the tree's cambium layer. A plastic "squirt" bottle is used to spray a specific amount of herbicide into the cuts placed around the tree.
- High-grading:** Cutting only the high-value trees from a forest property, leaving a stand of poor quality with decreased future timber productivity.
- Intermediate Cut:** Removing immature trees from the forest sometime between establishment and final stand harvest to improve the quality and spacing of the remaining forest stand. Contrast this technique with a harvest cut.
- Landing:** A place where logs are taken to be loaded on trucks for transport to the mill.
- Log Rules:** A table showing estimated amount of lumber that can be sawed from logs of given lengths and diameters. Two log rules are commonly used in Missouri:  
**Doyle Rule** is a simple formula rule used in the eastern United States. It underestimates the amount of lumber in small logs and overestimates large logs.  
**International 1/4-inch Rule** is a formula rule allowing 1/2 -inch taper for each 4 feet of length and 1/16 -inch shrinkage for each 1-inch board. This measure approximates the actual sawmill lumber tally.
- Mast:** Fruit of trees such that serve as food for many species of wildlife.
- Mature Tree:** A tree that has reached the desired size or age for its intended use.
- MBF:** Abbreviation for 1,000 board feet using the Roman numeral M.
- Midstory:** The trees growing beneath the overstory layer and above the understory.
- Overstocked:** A forest stand condition where too many trees are present for optimum tree growth.
- Overstory:** The portion of trees in a stand forming the upper crown cover.
- Pole Timber:** Trees from 6 inches to 12 inches in diameter at breast height.
- Prescribed Burn:** To deliberately burn natural fuels under specific weather conditions, which allows the fire to be confined to a predetermined area and produces the fire intensity to meet predetermined objectives.
- Pruning:** Removing live or dead branches from standing trees to improve wood quality.
- Pulpwood:** Wood cut primarily for manufacture of paper, fiberboard, or other wood fiber products.
- Regeneration:** The number of seedlings or saplings existing in a stand. The process by which a forest is renewed by direct seeding, planting, or naturally by self-sown seeds and sprouts.
- Regeneration Cut:** Any removal of trees intended to assist regeneration already present or to make regeneration possible.
- Release:** To free trees from competition by cutting, removing, or killing nearby vegetation.
- Riparian Zone:** The area adjacent to or on the bank of rivers and streams.
- Sapling:** Trees from 2 inches to 6 inches in diameter at breast height.

**Sawtimber:** Trees at least 12 inches in diameter at breast height from which a sawed product can be produced.

**Seed-tree Harvest:** A harvest and regeneration method where nearly all trees are removed at one time except for scattered trees to provide seed for a new forest.

**Selection Harvest:** Harvesting trees to regenerate and maintain a multi-aged structure by removing some trees in all size classes either singly or in small groups.

**Shelterwood Harvest:** A harvesting and regeneration method that entails a series of partial cuttings over a period of years in the mature stand. Early cuttings improve the vigor and seed production of the remaining trees. The trees that are retained produce seed and also shelter the young seedlings. Subsequent cuttings harvest shelterwood trees and allow the regeneration to develop as an even-aged stand.

**Site Index:** An expression of forest site quality based on the height of a free-growing dominant or co-dominant tree at age 50 (or age 100 in the western United States).

**Skid Trail:** A road or trail over which equipment or horses drag logs from the stump to a landing.

**Skidding:** Pulling logs from where they are cut to a landing or mill.

**Slash:** The treetops and branches left on the ground after logging or as a result of a storm, fire, or pruning.

**Snag:** A standing dead tree from which leaves and most of the branches have fallen. Used by wildlife.

**Stand:** A group of trees with similar characteristics, such as species, age, or condition that can be distinguished from adjacent groups. A stand is usually treated as a single unit in a management plan.

**Stand density:** A measure of the stocking of a stand of trees based on the number of trees per area and diameter at breast height of the tree of average basal area.

**Stocking:** An indication of the number of trees in a stand in relation to the desirable number of trees for best growth and management. There are three categories or levels of stocking:

- **A-level** – 100% stocking; stands at or above this level are considered overstocked and unable to support any more trees.
- **B-level** – approximately 60% stocking; stands at or above this level are considered adequately stocked and all growing space is utilized by existing trees.
- **C-level** – 40-50% stocking; stands at or above this level are considered understocked, but have the amount of trees necessary to reach B-level within 10 years on average sites. Any stand with a stocking level below B-level is considered understocked, but cutting below this level can be done to promote regeneration.

**Streamside Management Zone (SMZ):** An area adjacent to the banks of streams and bodies of open water where extra precaution is necessary in carrying out forest practices to protect the stream bank and water quality.

**Thinning:** A cutting or killing of trees in an immature forest stand to reduce the tree density and concentrate the growth potential on fewer, higher quality trees,

**Timber Stand Improvement (TSI):** A thinning made in immature stands to improve the composition, structure, condition, health, and growth of the remaining trees, while also increasing sunlight to the forest floor to promote regeneration and herbaceous vegetation

**Undesirable Growing Stock (UGS):** Trees of low quality or less valuable species that should be removed in a thinning.

**Understocked:** Insufficiently stocked with trees.

**Understory:** All forest vegetation growing under the overstory and midstory trees.

**Uneven-Aged Management or Stand:** A stand of trees containing at least three age classes intermingled on the same area.

**Volume:** The amount of wood in a tree, stand of trees, or log according to some unit of measurement, such as board foot, cubic foot, etc.

**Wolf Tree:** A very large, often overmature tree that is or was open grown.

## Helpful Internet Sites

- USDA NRCS Web Soil Survey: <https://websoilsurvey.nrcs.usda.gov/>.
- USDA NRCS Field Office Technical Guide (FOTG): <http://www.nrcs.usda.gov/technical/efotg/>.
- USDA NRCS Program Information: <https://www.nrcs.usda.gov/wps/portal/nrcs/main/mo/programs/>.
- Missouri Department of Conservation: <http://mdc.mo.gov/>.
- Missouri Managed Woods Program: <https://mdc.mo.gov/property/property-assistance/missouri-managed-woods>
- Missouri Tree Farm System: <http://www.forestandwoodland.org/missouri-tree-farm-system.html>.
- American Tree Farm System: <http://www.treefarmssystem.org/>.
- Forest Stewardship Program Plan Elements: <https://www.fs.fed.us/cooperativeforestry/library/elementsguide.pdf>.
- Missouri Consulting Foresters Association: <http://www.missouriforesters.com/>.
- University of Missouri Natural Resource Extension publications: <http://extension.missouri.edu/main/DisplayCategory.aspx?C=3>



- US Forest Service publications: <http://www.fs.fed.us/publications/>.
- Forest health updates for the central states including Missouri: <http://na.fs.fed.us/fhp/fhw/csflw/>.
- Missouri timber price trends: <https://mdc.mo.gov/trees-plants/timber-sales/timber-price-trends>.
- Missouri Forest Products Association : <http://www.moforest.org/resources/landowners.php>
- USDA National Agroforestry Center: <http://www.unl.edu/nac/index.htm>.
- University of Missouri Center for Agroforestry: <http://www.centerforagroforestry.org/>.
- Forest and Woodland Association of Missouri: <http://www.forestandwoodland.org/>
- Missouri Walnut (and other fine hardwoods) Council: <http://www.walnutcouncil.org/state-chapters/missouri.html>

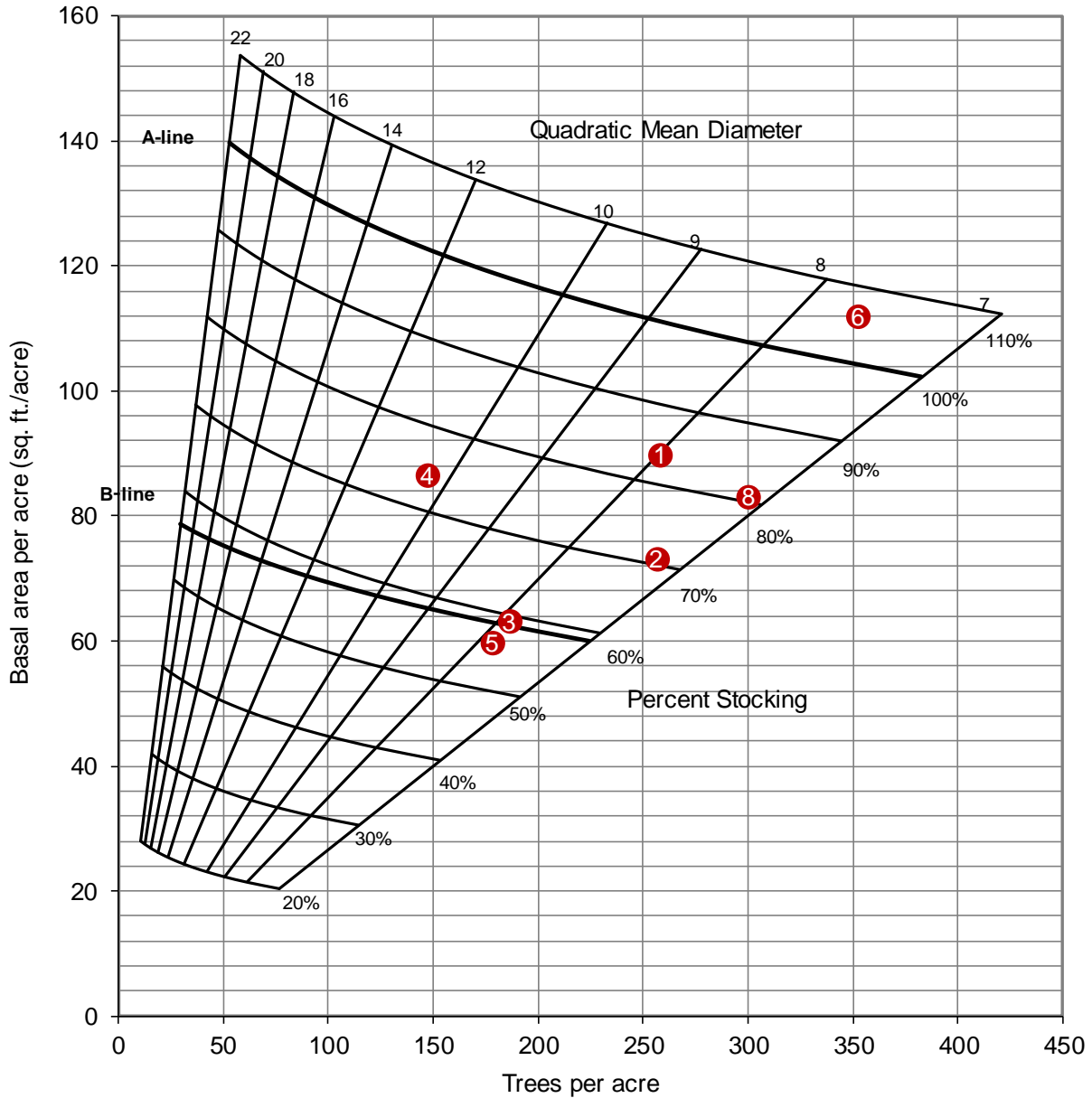
**APPENDIX VI– Supporting Documents/Stand Information**

This section contains base-line data or supplemental information and documentation that supports or guides the management of your forest and forest related resources. This information may also be required for federal or state cost share programs.

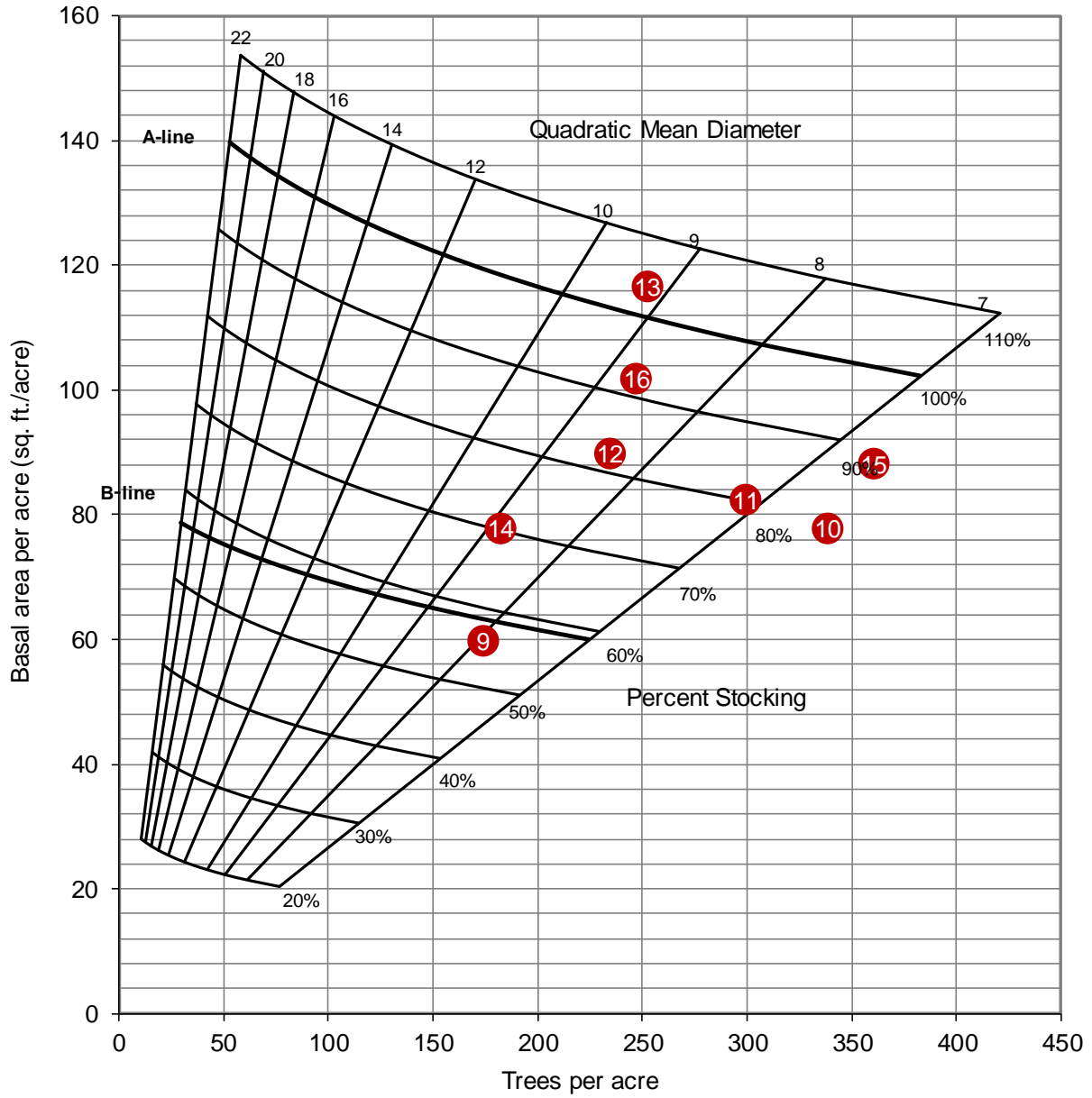
<i>Stand #</i>	<i># Plots Taken</i>	<i>Total BA/ Ac</i>	<i>Mature BA/AC</i>	<i>Sawtimber AGS BA/AC</i>	<i>Sawtimber UGS BA/AC</i>	<i>Pole Size AGS BA/AC</i>	<i>Pole Size UGS BA/AC</i>	<i>Small Tree AGS BA/AC</i>	<i>Small Tree UGS BA/AC</i>	<i>Cull BA/AC</i>	<i>Total Trees/AC</i>	<i>B-Level BA/AC</i>	<i>C-Level BA/AC</i>	<i>Stocking %</i>	<i>Volume/ acre (scale)</i>	<i>Average Diameter</i>
<b>1</b>	<b>3</b>	<b>90.0</b>	<b>0</b>	<b>23</b>	<b>3</b>	<b>17</b>	<b>27</b>	<b>0</b>	<b>10</b>	<b>10</b>	<b>258</b>	<b>61.2</b>	<b>47.5</b>	<b>85.3</b>	<b>2.0 Int</b>	<b>8.0</b>
<b>2</b>	<b>3</b>	<b>73.3</b>	<b>3</b>	<b>17</b>	<b>0</b>	<b>23</b>	<b>7</b>	<b>0</b>	<b>10</b>	<b>13</b>	<b>256</b>	<b>59.1</b>	<b>45.8</b>	<b>72.0</b>	<b>1.2 Int</b>	<b>7.2</b>
<b>3</b>	<b>3</b>	<b>63.3</b>	<b>0</b>	<b>7</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>0</b>	<b>7</b>	<b>20</b>	<b>186</b>	<b>60.9</b>	<b>47.3</b>	<b>60.3</b>	<b>0.1 Int</b>	<b>7.9</b>
<b>4</b>	<b>3</b>	<b>86.7</b>	<b>3</b>	<b>23</b>	<b>7</b>	<b>23</b>	<b>23</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>147</b>	<b>66.9</b>	<b>51.9</b>	<b>75.1</b>	<b>2.3 Int</b>	<b>10.4</b>
<b>5</b>	<b>3</b>	<b>60.0</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>33</b>	<b>7</b>	<b>0</b>	<b>3</b>	<b>7</b>	<b>178</b>	<b>60.8</b>	<b>47.2</b>	<b>57.2</b>	<b>0.3 Int</b>	<b>7.9</b>
<b>6</b>	<b>5</b>	<b>112.0</b>	<b>4</b>	<b>24</b>	<b>8</b>	<b>28</b>	<b>28</b>	<b>0</b>	<b>4</b>	<b>16</b>	<b>352</b>	<b>60.2</b>	<b>46.7</b>	<b>107.9</b>	<b>2.2 Int</b>	<b>7.6</b>
<b>7</b>	<b>2</b>	<b>95.0</b>	<b>5</b>	<b>10</b>	<b>10</b>	<b>20</b>	<b>35</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>497</b>	<b>54.9</b>	<b>42.6</b>	<b>100.4</b>	<b>1.0 Int</b>	<b>5.9</b>
<b>8</b>	<b>3</b>	<b>83.3</b>	<b>13</b>	<b>33</b>	<b>7</b>	<b>3</b>	<b>20</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>300</b>	<b>58.8</b>	<b>45.6</b>	<b>82.2</b>	<b>4.1 Int</b>	<b>7.1</b>
<b>9</b>	<b>2</b>	<b>60.0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>15</b>	<b>45</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>174</b>	<b>61.1</b>	<b>47.4</b>	<b>57.0</b>	<b>0.0 Int</b>	<b>8.0</b>
<b>10</b>	<b>5</b>	<b>78.0</b>	<b>4</b>	<b>12</b>	<b>4</b>	<b>22</b>	<b>18</b>	<b>4</b>	<b>6</b>	<b>8</b>	<b>338</b>	<b>56.8</b>	<b>44.1</b>	<b>79.6</b>	<b>0.9 Int</b>	<b>6.5</b>

<i>Stand #</i>	<i># Plots Taken</i>	<i>Total BA/Ac</i>	<i>Mature BA/AC</i>	<i>Sawtimber AGS BA/AC</i>	<i>Sawtimber UGS BA/AC</i>	<i>Pole Size AGS BA/AC</i>	<i>Pole Size UGS BA/AC</i>	<i>Small Tree AGS BA/AC</i>	<i>Small Tree UGS BA/AC</i>	<i>Cull BA/AC</i>	<i>Total Trees/AC</i>	<i>B-Level BA/AC</i>	<i>C-Level BA/AC</i>	<i>Stocking %</i>	<i>Volume/acre (scale)</i>	<i>Average Diameter</i>
11	4	82.5	3	15	10	15	20	0	13	8	299	58.7	45.5	81.5	1.1 Int	7.1
12	4	90.0	3	13	5	30	30	0	0	10	234	62.2	48.3	83.9	0.7 Int	8.4
13	4	116.7	13	27	17	20	30	0	3	7	252	64.2	49.8	105.3	3.9 Int	9.2
14	5	78.0	0	14	8	20	22	0	2	12	182	63.4	49.2	71.4	0.8 Int	8.9
15	6	88.3	0	18	5	27	30	0	5	3	360	57.5	44.6	89.1	1.2 Int	6.7
16	5	102.0	0	38	10	14	28	4	2	6	247	63.0	48.8	93.9	2.3 Int	8.7
17	4	70.0	10	33	15	5	5	3	0	0	118	66.9	51.9	60.6	3.7 Int	10.4
18	4	82.5	13	18	18	8	20	0	0	8	134	67.3	52.2	71.0	2.0 Int	10.6
19	4	90.0	8	30	8	18	5	3	5	15	246	61.7	47.9	84.6	2.4 Int	8.2
20	5	80.0	12	12	10	12	4	2	4	24	203	62.5	48.5	74.2	1.8 Int	8.5
21	4	90.0	10	10	13	18	23	0	5	13	300	59.6	46.2	87.6	1.6 Int	7.4
22	4	90.0	0	25	10	13	25	5	0	13	223	62.7	48.7	83.2	2.5 Int	8.6

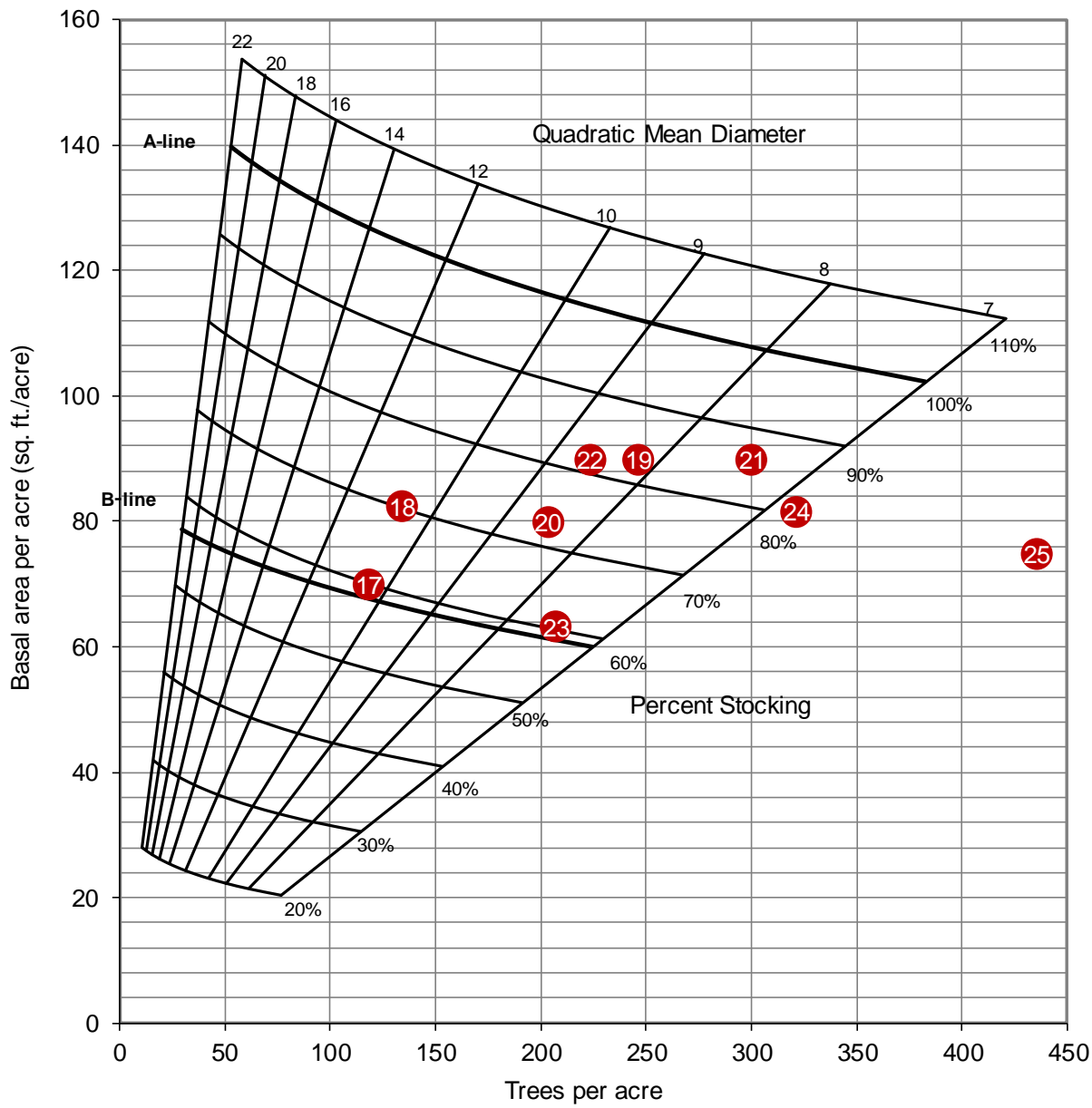
<i>Stand #</i>	<i># Plots Taken</i>	<i>Total BA/Ac</i>	<i>Mature BA/AC</i>	<i>Sawtimber AGS BA/AC</i>	<i>Sawtimber UGS BA/AC</i>	<i>Pole Size AGS BA/AC</i>	<i>Pole Size UGS BA/AC</i>	<i>Small Tree AGS BA/AC</i>	<i>Small Tree UGS BA/AC</i>	<i>Cull BA/AC</i>	<i>Total Trees/AC</i>	<i>B-Level BA/AC</i>	<i>C-Level BA/AC</i>	<i>Stocking %</i>	<i>Volume/acre (scale)</i>	<i>Average Diameter</i>
<b>23</b>	<b>3</b>	<b>63.3</b>	<b>0</b>	<b>10</b>	<b>3</b>	<b>3</b>	<b>13</b>	<b>3</b>	<b>3</b>	<b>27</b>	<b>207</b>	<b>59.8</b>	<b>46.4</b>	<b>61.4</b>	<b>0.7 Int</b>	<b>7.5</b>
<b>24</b>	<b>6</b>	<b>81.7</b>	<b>2</b>	<b>8</b>	<b>2</b>	<b>30</b>	<b>25</b>	<b>2</b>	<b>8</b>	<b>5</b>	<b>321</b>	<b>57.9</b>	<b>44.9</b>	<b>81.8</b>	<b>0.7 Int</b>	<b>6.8</b>
<b>25</b>	<b>6</b>	<b>75.0</b>	<b>2</b>	<b>17</b>	<b>5</b>	<b>18</b>	<b>13</b>	<b>3</b>	<b>10</b>	<b>7</b>	<b>435</b>	<b>53.8</b>	<b>41.8</b>	<b>80.8</b>	<b>1.1 Int</b>	<b>5.6</b>



Stocking chart for stands 1-8 on the Mueller property. Percent stocking is an indication of the amount of growing space being used in a stand. It is a function of both basal area and density (trees per acre). With this information, we can determine both the stocking value and average diameter of the stand. Red dots indicate the stocking of each stand: stands range from understocked to overstocked. Refer to the glossary for more information on stocking.



Stocking chart for stands 9-16 on the Mueller property.



Stocking chart for stands 17-25 on the Mueller property.