Forest Management Plan

Prepared for:

SimpSon's Farm, LLC

Monroe County AR

Prepared by:

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AR Registered Forester #414

November 2019

Table of Contents

Attachments

A – Timber Stand Improvement

B – Basal Area

C – Glossary

Appendix

1- Timber Valuation

Landowner Objectives

The most important step in any land management planning process is to determine the goals and objectives of the landowner. These objectives will serve as a guide in making management decisions in the future and what practices are carried out in the present. In conversation with the owner, we have determined that the primary objective for this property is to enhance the wildlife resources by active management on the property. The secondary objective is to manage the timber resources to provide a marketable commodity and a healthy forest condition. Both of these objectives complement each other and some of the practices that are recommended will accomplish both objectives. In general, good timber management is good wildlife management and vice versa.

The primary species of focus are white-tailed deer and waterfowl. Of course, other game and non-game species will benefit as a result of the practices and activities carried out from this plan. This plan is written to accomplish the primary and secondary goals using proven and sound forestry and wildlife management techniques.

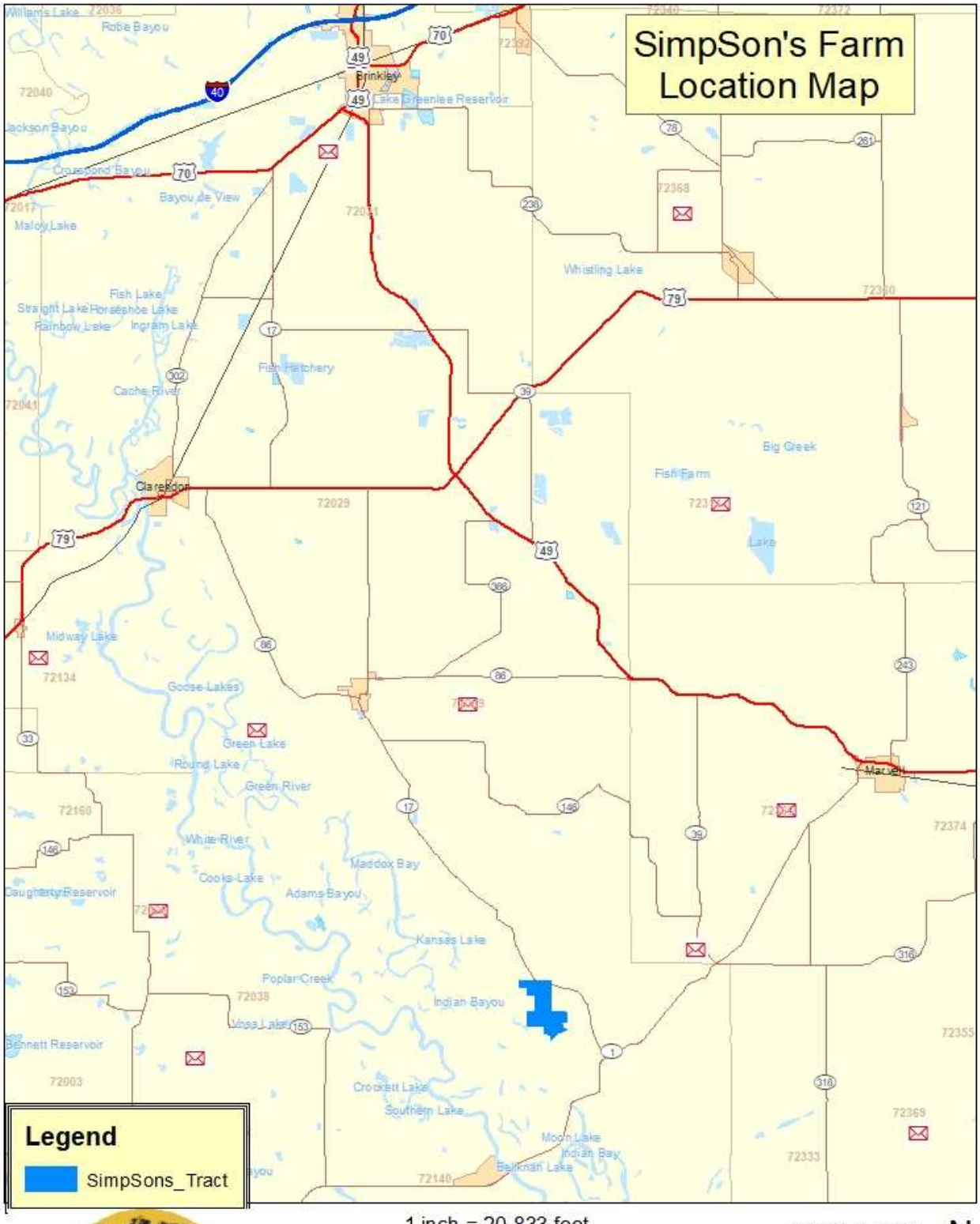
Tract Description

This ownership consists of approximately 952 acres located in Monroe County Arkansas, south of the town of Holly Grove off of State Highway 17. Approximately 422 acres is in forest and the balance is actively being farmed in a variety of crops. The legal descriptions are as follows:

Township 3 South Range 1 West
- Section 4 – E ½ SE ¼, NW ¼ SE 1/4
- Section 3 – SW ¼
- Section 9 – E ½ SE ¼
- Section 10 – W ½, SE ¼, less 10 ac. in the SE corner
- Section 15 – NE ¼ NW ¼, pt. NW ¼ NE ¼

The tract is adjacent to the White River bottomlands and the White River National Wildlife refuge. Topography of the tract is generally flat with low ridges typical of river bottom terraces. Logging conditions would be limited to dry summer/fall periods.

Access is overall very good with access via county roads and a system of internal farm roads. Boundaries are not consistently marked, but there appears to have been a survey and most of the corners are in place. The property line adjacent to the 80-acre private tract should be identified prior to any management activities taking place. All the boundary lines should be established in accordance with Arkansas posting law statute.


SimpSon's Farm
Location Map
Legend
SimpSons_Tract
1 inch = 20,833 feet
Date: 11/22/2019
Author: THWhite
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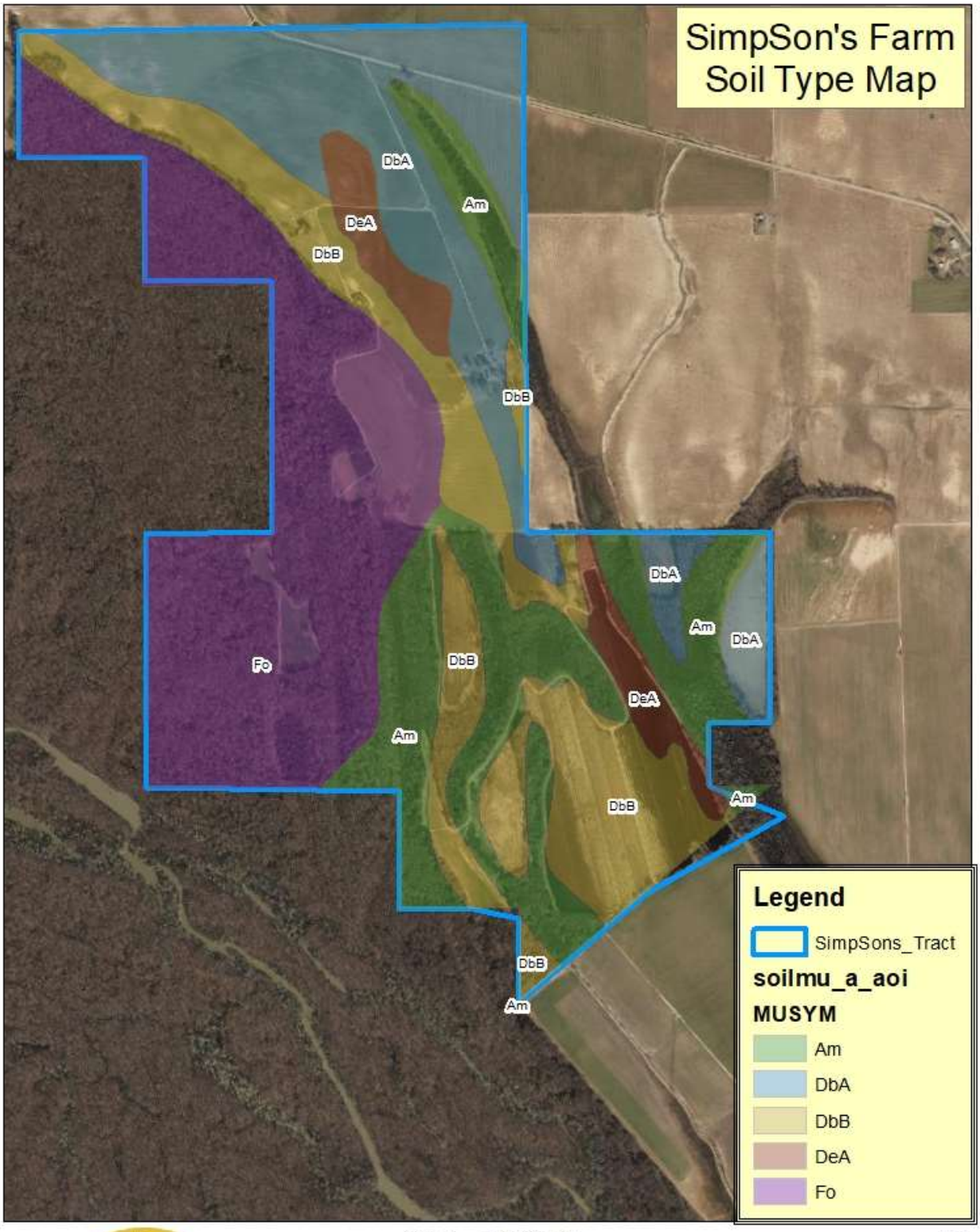
GOLDEN OAK FORESTRY

Major Soil Types

Soil type and composition is the key to the overall productivity of any property. Any tract of land cannot produce any more than the productivity of the soil will allow. Trees, shrubs and herbaceous cover can be an indication of the soil type and productivity. Any management activities should take into consideration the predominant soil type and soil characteristics. For forested lands, soil productivity is typically expressed in terms of "site index." The definition of site index is the height, in feet, of the dominant and co-dominant trees at a base age, usually 50 years. For example, a site index of 80 would mean that trees would reach a height of 80 feet tall in 50 years. Therefore, the higher the site index the more productive the site usually will be. In addition to soil type, the duration and frequency of flooding and any previous agricultural practices can affect the productivity of a site.

Management decisions about what types of plant species should be planted or favored must take into consideration the soil type and characteristics. The soil types and the site index for nuttall, cherrybark, willow and water oak is listed in the table below. This information is from the USDA Soil Survey for Monroe County.

Soil map Key	Soil Type	Nuttall oak Site Index (base age 50) in ft.	Cherrybark oak, in ft.	Willow oak, in ft.	Water Oak, in ft.
Am	Amagon silt loam, 0 to 1 percent slope	100	90	100	100
DbA	Dubbs silt loam, 0 to 1 percent slope	95	100	95	90
DbB	Dubbs silt loam, 0 to 3 percent slope	95	100	95	90
DeA	Dundee silt loam, 0 to 1 percent slope	n/a	105	n/a	95
Fo	Foley-Calhoun-Bonn complex	80	n/a	n/a	80



1 inch = 1,320 feet

Date: 11/21/2019
Author: THWhite

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GOLDEN OAK FORESTRY

Endangered or Threatened Species or Species of State Concern

The Endangered Species Act of 1973 was enacted to provide a means to conserve the ecosystems upon which threatened and endangered (T&E) species depend and provides a program for the conservation and recovery of those species. The Act directs all federal agencies to employ their authorities in furthering the purposes of the Act and to ensure that their actions do not jeopardize any listed species or adversely modify their habitat.

Threatened and endangered species are those U.S. plants and animal species that are reduced in numbers, making extinction a high probability. The disappearance of these species would be a biological, cultural and in some cases, and economic loss to the nation.

If the installation of one or more conservation practices will have a probable effect on any listed species or their habitat, NRCS will advise the landowner of the requirements of the Endangered Species Act and recommend an alternative conservation treatment that avoids the adverse effects.

NRCS can only provide governmental assistance if no listed species or their habitat will be negatively affected. If the landowner is seeking no assistance from NRCS and chooses to proceed with the implementation of this plan on their own, the NRCS is not liable for any affect to T&E species.

Proper management decisions can only be made after the landowner is aware of the probability of the presence of any T&E species on their property.

Archaeological, Cultural and Historical Sites

Cultural resources are important to protect. They include any prehistoric or historic district, site, building, structure or object listed in or eligible for listing in the National Register of Historic Places (maintained by the Secretary of the Interior). The National Historic Preservation Act of 1966 (NHPA) requires the federal government to assess, prior to the start of a project, potential impacts to cultural resources and consults with the State Historic Preservation Office and Tribal governments to mitigate any affects that these practices might have.

Forest management operations that disturb the soil have the potential to adversely impact significant cultural resources. NRCS can only provide government assistance if no cultural resources will be affected. To determine whether any affect is likely to occur, NRCS will conduct a Cultural Resource Review to assess your property for the potential to adversely affect cultural resources. In the event the Review indicates cultural resources are likely to be present on your property, recommendations made in the management plan must be amended to ensure no cultural resources will be adversely affected.

The NHPA only applies to projects which are funded or administered by the federal government. Therefore, if the practices called for in this plan will be cost-shared or specifically designed by the NRCS, a Cultural Resources Review must be completed prior to NRCS funding

any assistance on this property. If the landowner is seeking no assistance from NRCS and chooses to proceed with the implementation of this plan on their own, NRCS is not liable for any affect to the cultural resources. The landowner is encouraged to protect such things as cemeteries and old farmstead structures regardless of NRCS involvement, but there is no legal requirement to do so.

There is an old cemetery located on the south boundary of the property, but it is surrounded by agricultural land and is not a part of the forested areas.

Water Resource and Quality

Water is an important renewable resource. It is also one of the most important resources that a landowner can affect. Two of the most important items you can do to maintain high water quality is to maintain adequate forested buffers along streams and/or drainages, and properly plan and maintain road and trail used for vehicles, logging equipment or ATV's.

The topography of this tract is generally flat and subject to frequent inundation. This tract is located close to Indian Bayou, which is an old river slough, formed from the White River. The majority of the wooded area will be considered wetlands, based on soil type and vegetation type. Special considerations and regulations may apply when working within a wetland, and these will be adhered to throughout the management of this property. In addition, any practices or operations shall follow the recommended Best Management Practice for Water Quality. A copy of this can be found at: http://www.forestry.state.ar.us/bmp/bmp_review.html or can be obtained at the local Arkansas Division of Forestry county office.

Wildlife Resources

Since one of the primary goals of this landowner is to enhance the wildlife habitat, specifically for white-tailed deer and waterfowl, the habitat requirements for these species are given below. (Adapted from "Master Wildlifer, 2003, and NRCS leaflet #11, Nov. 1999). Development of good deer and waterfowl habitat will also be beneficial to other game and non-game species.

White-tailed deer – Habitat requirements – White-tailed deer are extremely adaptable animals. Their essential requirements include food, cover and water. Abundant forest land provides suitable cover, except where large acreages are in agricultural production and cover for deer may be limiting. An interspersion of brushland, woodland, and non-forested land creates more diversity in the types and amounts of food and cover present. Ideal habitat resembles a "patchwork quilt" with a variety of cover types interspersed randomly across a property. The transition zone between two cover types is often referred to as an "edge." Deer as well as other wildlife species utilize such areas heavily. Many timber harvesting operations today create an "edge effect" and add diversity to a habitat. Deer have a large and varied diet and eat practically all plant species at one time or another. They were once thought to be exclusively browsers, selecting twigs primarily. However, leaves, bark and herbaceous material such as grasses, weeds, and soft stemmed plants have been found to be important in their diets. Acorns and other nuts, fruits, mushrooms, algae and mosses are also heavily utilized when available.

Deer seem to be able to determine which foods or plants are most nourishing. Foods eaten readily in one area may not be taken in another due to differences in soil types, succulence, deer numbers and other factors. Utilization of specific food items is heavier on burned than on non-burned areas, and also heavier on fertilized than on non-fertilized areas.

Land management practices exert a direct influence upon the value of an area for deer habitat. Habitat manipulation trough timber harvest, controlled burning, and wildlife plantings have been shown to be important in providing a proper combination of food and cover necessary to maintain healthy deer populations. In agricultural areas, food is in abundance for around 6 months during the year. The critical time for deer is late winter through early spring, when the mast crop is gone, no agricultural crops are available and their food reserves are strained due to the rut for males and fawn development for females. Fall food plots are important for filling in during this critical time period. Spring plantings are less important, due to the abundance of agricultural crops. Good deer habitat is nearly always a by-product of forest management or some other land use.

Supplemental minerals can also be of benefit for antler production and lactating females. The QDMA recommends applying the following mixture of loose minerals to old stumps or logs and allowing them to saturate, so that they are used over a longer period of time. The mineral mixture of 50 lbs. stock salt, 50 lbs. trace minerals and 25 lbs. dicalcium phosphate can be purchased from local feed stores in bulk.

Deer readily utilize plants growing in natural or developed forest openings. These opening can compensate for yearly and seasonal fluctuations in food supplies, especially mast. They are less important, however, if the habitat is enhanced through coordinated and sustained timber cutting for deer. An excellent resource for food plot establishment is "Quality Food Plots" by K. Kammermeyer, K. Miller and L Thomas, Jr. and published by the Quality Deer Management Associations (QDMA).

Retain natural openings and create openings in timber stands. Forest openings of 1 to 3 acres per 100 acres, should be developed. These openings should be irregularly shaped, preferably linear, and strategically located throughout an area to provide maximum diversity and edge. Openings should not be adjacent to major roads or other access routes. Unused logging roads, skid trails, and other trails can be "opened up" and seeded to provide additional supplemental food.

A diversity in the management of wildlife openings is desirable. Rotation of the following alternative should be practiced:

1. Allow some openings to grow up in native vegetation and maintain these in an early stage of plant succession by annual disking, or prescribed burning on a 2-3-year rotation.
2. Plant some openings in annual crops such as corn, soybeans, cowpeas or one of the grain sorghums.
3. Plant some openings in wheat, oats or rye for winter grazing.
4. Plant some openings in perennials such as red or white clover and maintain these by late summer mowing and periodic fertilization.

Waterfowl – Habitat Requirements – Since the breeding season occurs outside of the wintering grounds, we will focus on the fall and winter habitat requirements of primarily the mallard, which is the most prized and sought after of waterfowl in the South. The fall migration of mallards usually occurs later than other dabbling duck species. The birds appear to be reluctant to migrate as long a adequate food and open water is available to them. In most years, the last big migration flights leaving the Canadian prairies may not occur until mid-November. This parcel is located within the Mississippi flyway which holds the largest concentration of migrating waterfowl. Up to 37% of the entire mallard population have been recorded in the fertile lower Mississippi River Delta region.

Adaptability is the key for a species like the mallard that uses a broad range of habitats. Mallards eat both native and cultivated (agricultural) foods. Each of these food groups is important during some period of the annual cycle. Native foods are usually nutrient complete, while cultivated foods may lack some essential requirements. Cultivated foods can supplement but cannot totally replace native foods, but research has shown more duck-unit-days (DUD) occur in unharvested rice fields than any other food source.

Fall and winter foods consist primarily of high energy seed from aquatic or emergent wetland plants and cultivated sources. Native foods include seeds from sedges, millet, smartweed, coontail, duck potato, duckweed, along with some mast producing trees. Cultivated grains include corn, rice, sorghum, wheat, barley and oats. Mallards also feed on tubers and rhizomes of chufa, flatsedge and bulrush.

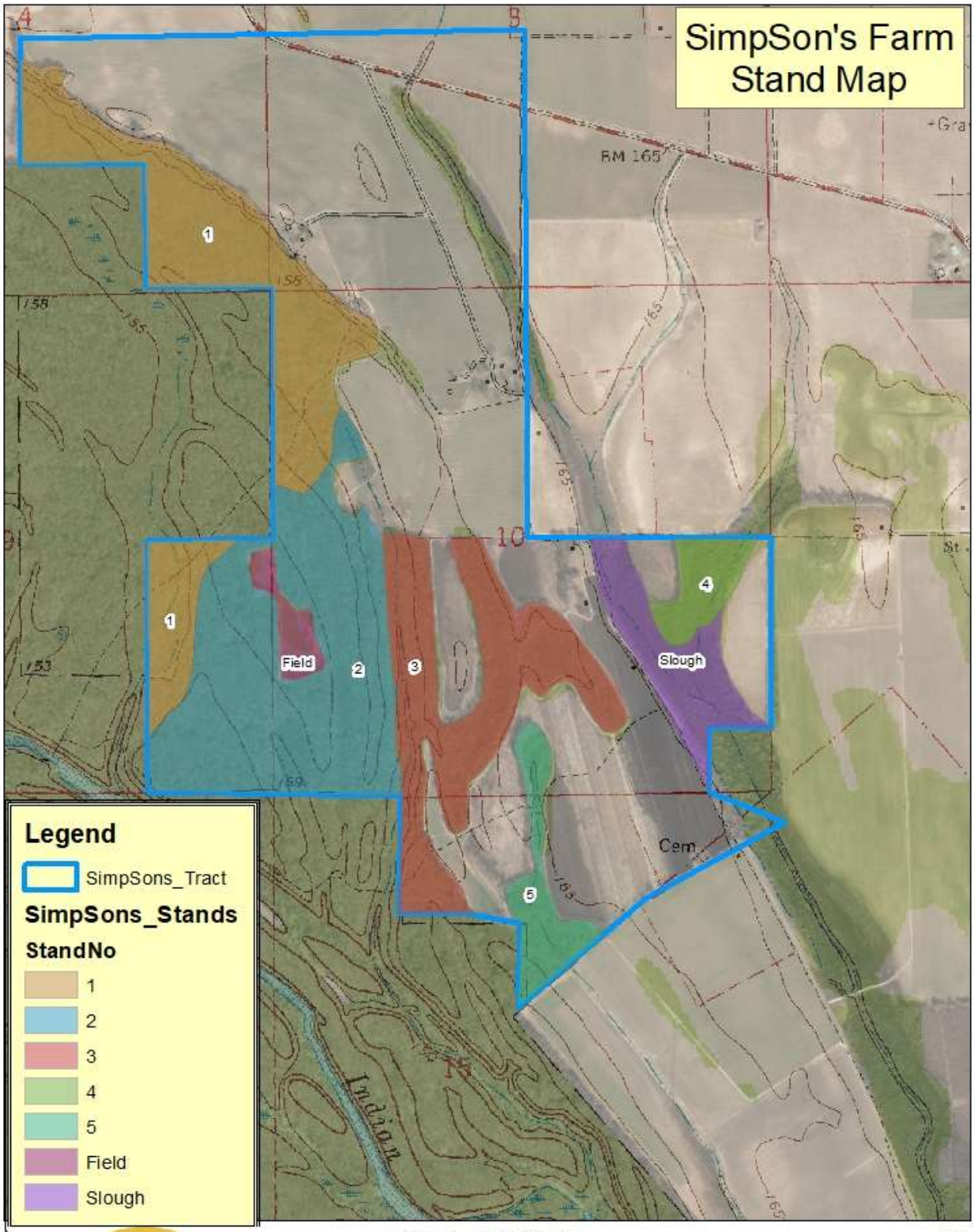
Moist Soil Units, or seasonally flooded impoundments are areas where flooding is controlled to encourage native vegetation and discourage undesirable vegetation. Green tree reservoirs are typically bottomland hardwood stands that have the ability to be artificially flooded to allow dabbling ducks to feed on the mast crop. Both of these areas are beneficial to waterfowl, but require careful planning and management to maximize the benefit to waterfowl.

A very beneficial resource for waterfowl management is "Wetland Management for Waterfowl, A Handbook" published by Mississippi River Trust, NRCS, and U.S. Fish and Wildlife Service.

Stand Descriptions & Recommendations

Management of larger tracts is best accomplished by dividing the tract into smaller units or stands. A stand is simply an area that has similar characteristics and could be managed in a similar fashion. Each stand might contain different compartments (open fields, food plots, inoperable acres), but is generally similar in stand structure, topography, or species composition.

A timber cruise was performed on this area and the data was calculated for each stand and the following are specific management recommendations for the various stands, along with the cruise data.



1 inch = 1,320 feet

Date: 11/21/2019
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GOLDEN OAK FORESTRY

Stand 1

Description - This stand is approximately 120 acres in size and consists of mixed hardwood, with predominantly willow and nuttall oak, sweetgum and green ash. There is evidence that this stand has been harvested in the past. Its position is the lowest terrace and is subject to frequent inundation and drainage appears to be poor. The primary soil type is the Foley-Calhoun-Bonn complex and it suited for growing oak. This is a natural stand and has a total basal area of 111 sq. ft., which is considered over-stocked. The topography is flat, with some ponding areas present. The site index for water oak is 80'.

Current Condition – The stand is considered over- stocked, with a total basal area of 111 sq. ft. but with only 34 sq. ft. (30% of the stocking) in oak. This means the predominance of the stand is non-oak. There is a notable absence of any smaller reproduction in oak. This would be seedlings from 4' tall to 4" in diameter. This is likely due to the absence of disturbance and the wet conditions.

The understory is open, with some smaller non-oak's present, primarily elm and gum. The following table gives specific data for the stand condition.

Species	Basal area/acre	Trees/acre	Average DBH
Cypress	4	7.5	18.8"
American Elm	11.8	15	11.0"
Bitter Pecan	4.4	3	14.8"
Willow	0.3	0	32"
Cedar Elm	1.9	4	8.2"
Green Ash	20.3	24	10.3"
Nuttall Oak	10.3	4	21.6"
Overcup Oak	2.8	2	17.5"
Persimmon	4.7	16	6.3"
Red Maple	1.5	13	3.6"
Shumard Oak	0.9	0	20.1"
Sugarberry	6.5	12	8.8"
Swamp Chestnut Oak	1.3	1	13.4"
Sweetgum	10.7	12	11.1"
Water Oak	7.8	4	18.1"
Willow Oak	13.1	7	17.8"

Recommendations - This stand is a good candidate for a mid-story removal harvest. This would remove most of the merchantable non-oak species and allow openings to be created in which to establish oak regeneration for the future propagation of the stand. This should be done by selectively marking those trees to be removed. Some oak may be removed if it lies in denser patches. The goal of the harvest operation would be to adjust the species composition to favor oak and create openings where regeneration can occur. The overall basal area after the harvest should be around 45 to 50 sq. feet. Research has shown that this is the optimal condition for providing enough sunlight to the young oak seedlings for their growth and development, but not too much to be allow a dense understory condition to occur. The harvest should be timed in years of heavy acorn crop to take every opportunity to establish oak seedlings. The openings created will also encourage shade intolerant herbaceous and tree species. Once the reproduction becomes advanced, typically 2-4" d.b.h. then the remaining overstory can be removed in a final harvest. Of the oak trees that are marked for harvest, the older/larger trees should be selected if it can be determined that they will not likely live until the next cutting cycle (10 years).

Stand 2

Description - This stand is approximately 140 acres in size and consists of low quality, mixed hardwoods. The stand is a little higher in elevation than stand one, and the soil type is the same Stand 1, which is the Foley-Calhoun-Bonn. The site index for cherrybark oak in this stand is 80 feet. This stand has been harvested in the past, leaving mostly poorer quality oaks, and non-oaks to remain. There is a denser understory of smaller, low value tree species and vines. Most of this stand appears to be situated outside of the flood prone area and could support cherrybark oak.

Current Condition – The stand is 90% stocked, with a total basal area of 90.8 sq. ft. and 257 trees per acre for all species. However, the oak basal area is 47 sq. ft. (52%). Many of the oaks are poor in quality, with 9 cull trees per acre. These were likely hollow, crooked or damaged when the last harvest took place and were left. There are two lower areas that are subject to artificial flooding via water control structures and these areas will not support cherrybark oak. The oak trees in these lower areas are showing signs of water stress in the form of splitting bark, epichormic branching, some crown death, and bark splitting. Care should be taken to remove the water from these areas as soon as possible prior to the growing season, or perhaps not flooding the areas every year. The table below shows specific data for the stand.

Species	Basal area/acre	Trees/acre	Average DBH
Cypress	0.3	0	28.0″
American Elm	1.1	1	17.0″
Bitter Pecan	1.9	1	19.0″
Black Locust	0.3	5	4.1″
Cedar Elm	8.9	77	3.5″
Cherrybark Oak	3.3	6	7.9″
Green Ash	1.4	3	7.6″
Amer. Hornbeam	3.8	81	2.6″
Nuttall Oak	2.4	4	8.2″
Overcup Oak	11.1	15	10.0″
Persimmon	1.9	3	10.2″
Red Mulberry	0.3	1	8.0″
Silver Maple	0.5	2	7.2″
Sugarberry	3.8	10	7.2″
Swamp Chestnut Oak	0.5	2	8.0″
Sweetgum	15.1	23	9.4″
Sycamore	1.4	2	12.2″
Water Oak	18.4	12	14.2″
Willow Oak	11.4	7	15.8″

There are approximately 170 stems per acre that are under 6″ d.b.h. and most are not oak, and they should be removed.

Recommendations - This stand is also a good candidate for a mid-story removal harvest. But is also in need of a TSI (timber stand improvement) treatment. This will remove all those non-oak stems that are not merchantable. The TSI would not remove those species that are mast bearing, such as mulberry, cherry, persimmon or dogwood. The combination of the TSI and mid-story removal should result in a residual basal area around 45 sq. ft. Some of these trees will be poor formed, but will produce seed, which is their only benefit. The TSI operation should be done prior to the mid-story removal harvest. As in Stand 1, the timing of the harvest should be after a heavy seed (acorn) crop year to allow the best opportunity for seedling establishment. Preferred oak species in descending order of importance would be: cherrybark oak, water oak, willow oak and overcup oak.

Stand 3

Description - This stand is approximately 112 acres in size and consists of a mixture of primarily non-oak species. The main component is elm, ash, hickory and sweetgum. There are some small areas of willow and water oak. The primary soil type is Amagon silt loam, which has a site index for water oak of 100' and cherrybark oak of 90', which are very good. The area appears to be wet from drainage of adjacent agricultural fields and there is some evidence of beaver activity in the past. The area was apparently logged very heavily in the past and the remaining forest is what was left that could not be cut. That explains the high percentage of hickory and sweetgum, which have limited or no value, depending on local markets. The overall condition is quite degraded over the past year's practices. The stand is long and narrow and mostly surrounds agricultural fields.

Current Condition - The overall basal area of the stand is 62 sq. ft., but with only 15.5 sq. ft. (25%) in oak, leaving this stand as understocked at about 60% stocking. The overall diameter is smaller when compared with Stands 1 and 2. There are 119 trees per acre of reproduction in miscellaneous hardwood, and only 6 trees/acre of oak reproduction. The presence of water is from the small drainages that run through the stand is likely runoff from adjacent rice fields. This water could be a limiting factor in developing future stands of oak.

Species	Basal area/acre	Trees/acre	Average DBH
Black Willow	1.3	1	20.2″
Cedar Elm	8.0	94	2.9″
Green Ash	9.8	30	7.2″
Amer. Hornbeam	0.5	25	2.0″
Nuttall Oak	2.5	4	10.8″
Overcup Oak	1.9	2	12.3″
Shagbark Hickory	7.5	4	18.1″
Silver Maple	0.9	16	2.8″
Sugarberry	2.5	2	14.1″
Sweetgum	14.4	34	8.4″
Water Oak	8.1	11	9.8″
Willow Oak	3.0	8	6.6″

Recommendations – Since this stand is very understocked in desirable oak species, and since its location is adjacent to and surrounding agricultural fields, it would make sense to dedicate their use to providing cover for wildlife instead of timber production. This stand possesses a large amount of "edge" relative to the size of the stand and this edge is important and highly used by wildlife. As a side note, there was a noticeably high presence of white-tailed deer and deer sign through this stand when the field work was done. The cost to

establish an oak stand would likely be prohibitive, relative to the return. Since the stand has been subject to agricultural runoff and drainage, the cover type is now reflecting that practice and changing it would require drastic changes in the water patterns. Should the investment decision be made to establish oak it would require complete removal of the overstory and replanting with water, willow and cherrybark oak. This operation could cost in excess of $300 per acre. In lieu of that, we recommend keeping the stand as is for the next 10 years and allowing the forest to mature.

Stand 4

Description - This stand is approximately 16 acres in size and is adjacent to a 34-acre slough, locally known as "the slash". The slough is typically wet most of the year and is part of a drainage to Indian Bayou. Most of the tree cover in the slough has died and the primary cover type is button bush. It appears as though there are, or have been some impediments to drainage causing the standing water. The 16-acre wooded portion is a poor-quality hardwood stand, but it's position between an old vacant field of about 6 acres, and agricultural fields is important as cover for wildlife. The primary soil types are Amagon silt loam and Dubbs silt loam, which have high site indices for oak.

Current Condition – The 16-acre wooded portion has a basal area of 65 sq. ft., but only 20 sq. ft. (30%) is in oak, being overcup, willow and water oak. The oak that remain are of poor quality and most would not be merchantable. There are 460 trees per acre that are sub-merchantable (under 6" d.b.h.) and most of that is elm. The abandoned field would be ideal for a fall food plot. It is currently in broomsedge, but it looks to have been recently planted in winter wheat. There are also some sweetgum sprouts that are beginning to take it over.

Species	Basal area/acre	Trees/acre	Average DBH
Overcup Oak	4.0	11	7.2"
Water Oak	6.0	4	16.3"
Willow Oak	10.0	11	12.1"
Cedar Elm	18.3	12	2.4"
Green Ash	8.9	57	4.1"
Shagbark Hickory	4.0	11	8.0"
Sugarberry	2.0	4	10.0"
Sweetgum	10	38	6.9"

Recommendations – This stand would be a good candidate for WSI (wildlife stand improvement) where the goal would be to remove the smaller elm, sugarberry and ash and create openings for herbaceous vegetation could occupy. This would supply browse and other early successional native vegetation. The abandoned field would be a good place to establish a fall food plot. Such fall food plot plants as ladino clover, turnips, daikon radishes, oats or Austrian winter peas would be ideal for this area. We recommend that the old field be bush-hogged or burnt to eliminate the sweetgum sprouts and then planted in the early fall. The slough area will need to have the water removed for a period of time if trees are to be established. It would be a good site for cypress and would provide resting cover for waterfowl during the winter, when the area is flooded again.

Table 1

Summary of Recommended Activities

Area	Activity	Unit/amount	Timing
Stand 1	Mark and selectively harvest mid-story removal	120 acre	Summer 2020
Stand 2, 4	TSI/WSI	156	Summer 2021
Stand 2	Mark and selectively harvest mid-story removal	140 acres	Summer 2022
Stand 4 - Field	Bush hog or burn	6 acres	Summer 2020
Stand 4 – Field	Plant food plots	6 acres	Fall 2020

Summary

This ownership appears to have many of the ingredients necessary to produce quality wildlife habitat and timber resources, while also preserving soil and water quality. With a planned, methodical approach the value of this property can be enhanced and those values can be realized by the owner in the form of income from timber sales, good water quality, and improved wildlife habitat. The practices and recommendations contained within are given with the understanding that available time, equipment and finances may influence the degree to which they are implemented. It is important to remember that timber is managed with a calendar, not a clock; meaning it takes time to alter timber stands and much of the work is weather dependent. This plan is written to cover the next 10 years in the life of this property.

We would recommend investigating the various assistance and cost share programs to aid in some of the expense activities mentioned in this plan.

Prepared for the use and benefit of Simpson's Farm LLC and their designees.

Prepared by:

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Tim White, RF 414
Golden Oak Forestry

Date: November 23, 2019

Attachment A

Timber Stand Improvement

Timber stand improvement (TSI) or Forest Stand Improvement (FSI) or Wildlife Stand Improvement (WSI) is the removal or deadening of undesirable vines, shrubs and trees in a forest stand. It is a major forest management tool to help woodland owners achieve their management objectives. The less desirable trees can be removed to favor the growth of those that better satisfy the owner's objectives (e.g., quality timber, wildlife habitat, etc.). At the same time, woody plants that pose a threat to human health or safety, such as poison ivy, can be eliminated. Several timber stand improvement techniques can also be used to develop standing dead trees to provide various types of wildlife habitat such as perches, dens and foraging trees for animals and birds.

Timber stand improvement can be accomplished by cutting the less desirable woody vegetation or by killing it in place. Undesirable trees with commercial value can be sold, making the timber stand improvement operation an income-generating forest management activity. In most timber stand improvement operations, however, the undesirable vegetation is of little economic value or use. Although it can be cut and left in the woods, the safest and most efficient way to remove undesirable vegetation is often to kill the trees, shrubs or vines and leave them standing.

The most effective method for killing standing trees, shrubs and vines will usually involve the use of a herbicide. For those who prefer not to use pesticides, cutting, frilling or girdling can be used without herbicides. However, physical methods of deadening standing trees that do not use herbicides are generally less dependable (particularly with hard-to-kill species such as red maple, hickories and dogwoods) and require longer to be effective than those that incorporate herbicides into the treatment.

Selected Timber Stand Improvement Techniques

Following is a discussion of when and how to use two commonly applied timber stand improvement techniques: frilling or girdling and spaced cuts or injection. Tables 1-2 present herbicides commonly used with each method, along with brief recommendations for their use. These recommendations are not complete instructions; they are provided to help you select among the herbicides. It is essential that you read the entire label before using any herbicide. The label contains complete instructions for use, along with other valuable information such as personal and environmental safety considerations and procedures. Many of the labels also list information about the effectiveness of the herbicide in controlling different species of trees, shrubs and vines. All herbicides are not equally effective in controlling different species.

Herbicides, like all pesticides, are approved (labeled) for specific uses by the Environmental Protection Agency. These approved uses are listed and described on the pesticide's label. The herbicides listed in Tables 1 were appropriately labeled at the time of publication. Because pesticide labeling may change at any time, you should verify that a particular herbicide is still labeled for your intended use.

Frilling or Girdling

Girdling and frilling are methods of killing standing trees that may be done with or without an herbicide. Girdling involves cutting a groove or notch into the trunk of a tree to

interrupt the flow of sap between the roots and crown of the tree (Figure 1). The groove must completely encircle the trunk and should penetrate into the wood to a depth of at least 1/2 inch, preferably 1 to 11/2 inches on larger trees. Girdling can be done with an ax, hatchet or chainsaw. When done with an ax or hatchet, the girdle is made by striking from above and below along a line around the trunk so that a notch of wood and bark is removed. The width of the notch varies with the size of the tree. Effective girdles may be as narrow as 1 or 2 inches on small-diameter trees, and as wide as 6 or 8 inches on very large-diameter trees. When a chain saw is used to girdle, usually two horizontal cuts between 2 and 4 vertical inches apart are made completely around the tree (Figure 2).

Frilling is a variation of girdling in which a series of downward angled cuts are made completely around the tree, leaving the partially severed bark and wood anchored at the bottom (Figure 3). Frilling is done with an ax or hatchet.

By themselves, girdling and frilling are physical methods to deaden trees that require very little equipment and may be done without herbicides. Both techniques require considerable time to carry out, particularly with an ax or hatchet. Girdling with a chain saw is much faster. The effectiveness of girdling and frilling depends on the tree species and on the size and completeness of the girdle or frill. To be effective, girdles and frills must completely encircle the tree. Because frills can heal-over more easily, girdling is usually more effective.

The effectiveness of both girdling and frilling can be increased by using herbicides (Table 1). With frilling and girdling, water soluble forms of herbicides are most commonly used to get maximum movement of herbicide within the plant. When using water-soluble herbicides, the herbicide/water mixture is commonly applied by squirting it on the girdle or frill until the cut surface is wet. Hand-held, pint or quart spray bottles, such as those available at local garden stores, are ideal for applying herbicide to the girdle (Figure 4). Exceptions to the above recommendations are the commonly-used forestry herbicides that contain the ester formulation of 2,4-D + 2,4-DP, such as Weedone 170 and Acme Super Brush Killer. They are labeled for use with frilling in an oil carrier, and the recommendation is to fill the frill with the mixture. They are commonly applied with a backpack or hand-held, hand-pumped sprayer.

Spaced Cuts - Tree Injection

Tree injection involves introducing an herbicide into the undesirable tree through spaced cuts made around the trunk of the tree with an ax, hatchet, and machete or tree injector (Figure 5). The procedure can be visualized as a discontinuous frill with a small amount of herbicide placed in each cut. With an ax or hatchet, non-overlapping horizontal cuts penetrating into the sapwood (the outer area of lighter-colored wood in the stem cross section) are made completely around the tree. Cuts are approximately 2 inches long and are spaced 1 to 3 inches apart, depending on tree species and specific herbicide being used. A small amount of herbicide is then placed in each cut (Table 2). This can be done conveniently with a pint or quart spray bottle (such as those available at garden stores). The amount of herbicide to be placed in the cut is specified on the herbicide label but is generally 1 to 2 milliliters. There are also various tree injectors available including the "hypo-hatchet," which is a hatchet constructed to inject herbicide when it is struck into the tree.

Tree injection is generally more effective than mechanical girdling or frilling without herbicide because of the use of the herbicide. However, on difficult-to-control species, such as red maple, hickories and dogwoods, a continuous frill or girdle with herbicide may be necessary to obtain acceptable control. For this reason, many commercial TSI (timber stand improvement) contractors routinely use a single chainsaw girdle with herbicide on all species to maximize effectiveness.

As with most of the herbicides suggested for use with girdling and frilling, the herbicides for tree injection are mostly water-soluble materials that move vertically and horizontally within the tree to complete a chemical girdle.

Figure 1. **Figure 2.** **Figure 3.** **Figure 4.** **Figure 5.**

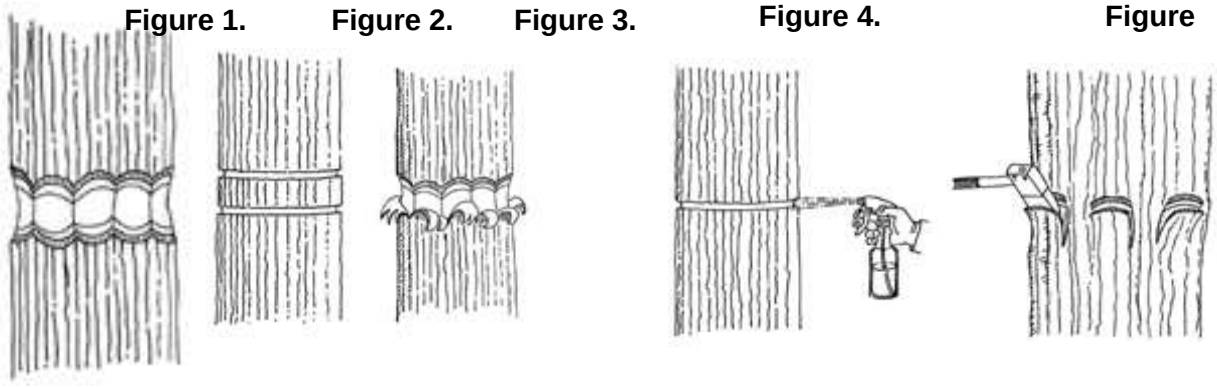


Table 1. Herbicides commonly used when girdling or frilling undesirable trees in a timber stand improvement operation. Column one contains the common names of frequently used herbicides; column two contains one or more examples of commonly used brands along with their manufacturers or distributors; and column three contains a brief summary of use recommendations.

COMMON NAMES	BRAND NAMES (MANUFACTURER OR DISTRIBUTOR)	RECOMMENDATIONS**
Dicamba	Banvel CST (Sandoz or Riverdale)	Spray or paint cut surface of girdle with undiluted Banvel CST.
Glyphosate	Accord (Monsanto)	Spray or paint Accord on the cut surface of girdle or frill at a rate of 1 ml for each 2 inches of trunk diameter, either undiluted or mixed with water at a concentration of no less than 25 percent. For best results, application should be made during periods of active growth and full leaf
	Roundup (Monsanto)	Spray or paint Roundup on the cut surface of girdle or frill at a rate of 1 ml for each 2 to 3 inches of trunk diameter, either undiluted or mixed with water at a concentration of no less than 50 percent. For best results, application should be made during periods of active growth and
Imazapyr	Chopper, Arsenal AC, (American Cyanamid)	Mix 8-12 oz. of Chopper in one gallon of water, diesel oil, or penetrating oil (such as Cide-Kick, Cide-Kick II, or ArborChem Basal Oil) and spray or paint mixture on cut surface of girdle or frill. Apply enough of the spray mixture to completely wet the cut surface. Can be done anytime except active growing season
Picloram + 2,4- D	Pathway, Tordon RTU (DowElanco)	Spray or paint the girdle or frill with undiluted Pathway or Tordon RTU. Apply enough herbicide to wet the cut surface completely.
	Tordon 101*, Forestry Tordon 101*	Spray or paint the cut surface of the girdle with Tordon 101 or Forestry Tordon 101 diluted 1:1 with water. Apply enough of the spray mixture to completely wet the cut surface
Triclopyr	Garlon 3A (DowElanco)	Wet the cut surface of a single girdle that completely encircles the tree with Garlon 3A, undiluted or diluted 1:1 with water.
2,4-D + 2,4-DP	Weedone 170 (Rhone-Poulenc)	Fill frill with mixture of Weedone 170 or Brush Killer 2D + 2DP and oil mixed at a rate of 3.8 to 5.1 ounces of herbicide in 1 gallon of oil.
	Brush Killer 2D + 2DP (Riverdale)	
2,4-D + 2,4-DP	Riverdale 2D +2DP Amine (Riverdale)	Fill fresh frill with mixture equivalent to 3.8-5.1 oz. of Riverdale 2D + 2DP Amine in 1 gallon of water.
2,4-D + 2,4-DP Ester +	Acme Super Brush Killer, BK 800 (pbi/Gordon)	Fill fresh frill full with mixture equivalent to 3.8-5.1 oz. of Acme Super Brush Killer or BK 800 in 1 gallon of diesel oil or mineral oil.

* Restricted Use Pesticide, must be certified applicator to purchase and use.

** Be sure to read and follow all label directions when applying any herbicide.

Attachment B

Example of Basal Area measurement

This figure illustrates graphically how many 6-, 10-, 14-, and 18-inch trees you would have on a 1/5-acre circular plot to make 60 square feet of basal area per acre:

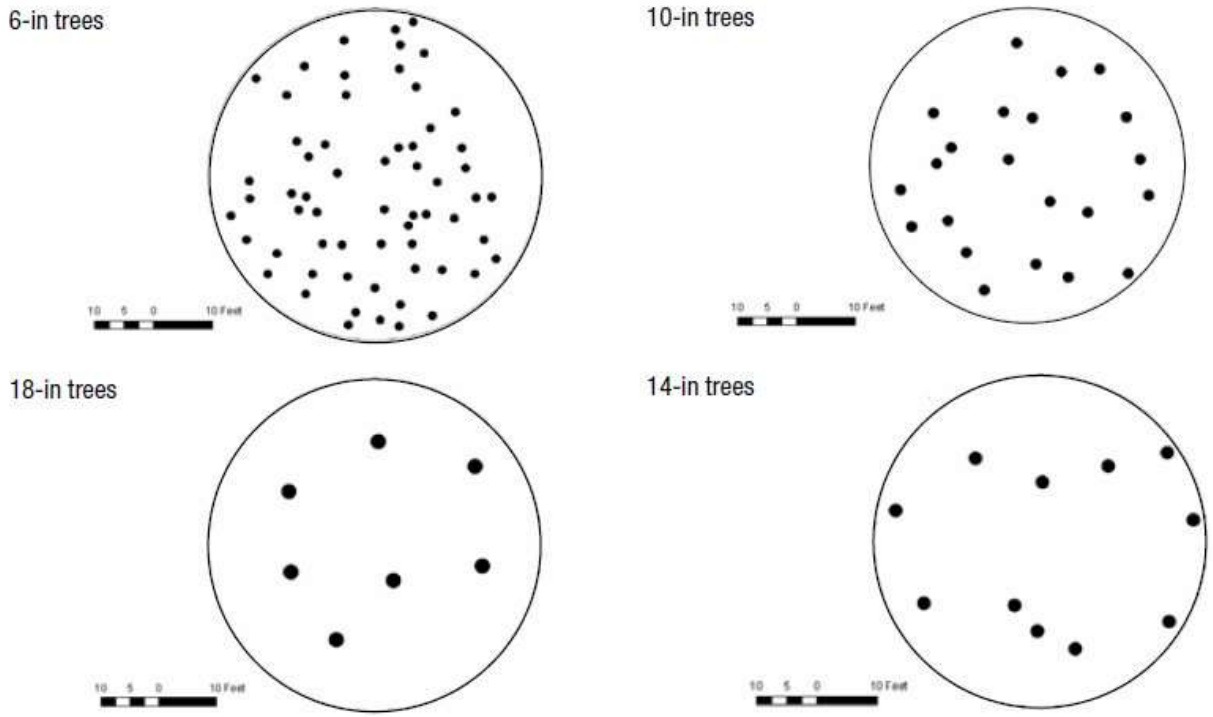
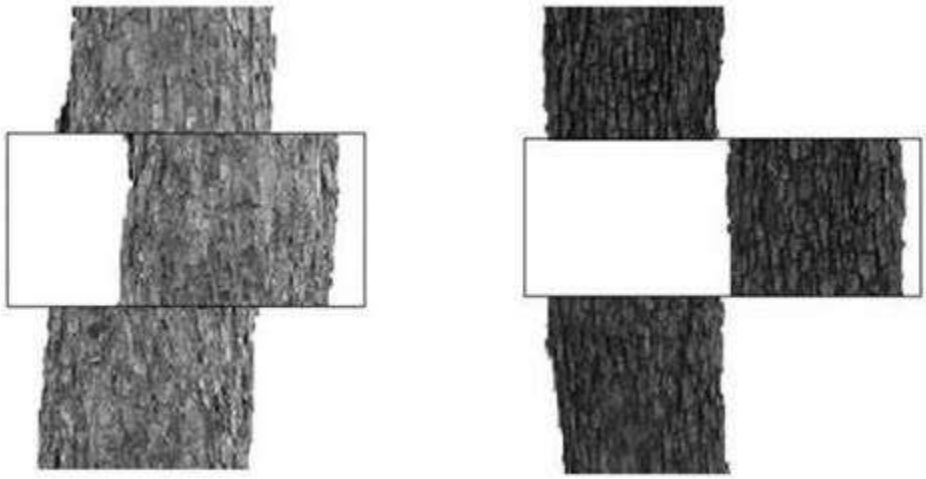


Figure 2. Representation of a 1/5-acre plot and the number of trees at 6, 10, 14, and 18 inches DBH that are needed to make 60 square feet of basal area per acre. (Graphic courtesy John Gilbert, Longleaf Pine Stand Dynamics Lab, School of Forestry and Wildlife Sciences, Auburn University)

Examples of Basal Area prism

Using a wedge prism relascope



In (count it)

Out (do not count it)

Attachment C

Glossary

Acre (Ac.): An area of land containing 43,560 square feet.

Advanced Regeneration: Seedling and/or saplings that are present under a canopy of trees.

Aesthetics: Pleasurable sensations, both mental and physical, which people may experience because of certain environmental resources.

Afforest: To establish trees on a previously un-forested area.

Arkansas Forestry Association (AFA): A nonprofit organization that represents and promotes the special interests of its membership, which includes private non-industrial forest landowners. The mission of the AFA is to advance the cause of forestry, develop a public appreciation for the environment and economic value of Arkansas' forests, encourage the wise use and management of the forest resources, and serve a watchful guardian of private property rights. The AFA administers the Tree Farm program.

Arkansas Forestry Commission (AFC): The mission of the AFC is "to protect and develop forestry resources of the state." The AFC offer a variety of technical assistance and technical service programs to promote sound forest management on private non-industrial forestlands. The AFC administers the SPBPRP cost-share program.

Arkansas Game and Fish Commission (AGFC): The AGFC is responsible for managing the state's fish and wildlife resources to provide sustainable public hunting and fishing opportunities. Their mission is "to preserve, protect, and enhance Arkansas wildlife populations and their habitat for public benefit."

Arkansas Natural Heritage Commission (ANHC): The ANHC is responsible for conducting inventories and protecting habitat of rare species and identifying and protecting the most natural biological communities in the state.

Artificial regeneration: Establishing a new forest by planting or direct seeding.

Aspect: The direction a slope faces.

Basal Area: The cross-sectional area of a tree, in square feet, at 4.5 feet above ground, typically expressed in square feet per acre.

Board foot: A unit for measuring wood volume. It is commonly used to express the volume of wood in a tree, log or piece of lumber. It measures 1 foot long, 1 foot wide and 1 inch thick (144 cubic inches.)

Browse: Leaves, buds, twigs, of shrubs, vines and trees that are consumed by wildlife, typically deer.

Buffer: A designated zone or strip of land of varying size and shape along a road, trail, stream or body of water. Buffer strips of standing trees may be used to shield an area from view or protect a body of water from sedimentation.

Canopy: The cover of branches and foliage formed collectively by the tops or crowns, of adjacent trees.

Chip-n-saw: Standing or harvested trees of an appropriate size (for example 9-10 inches DBH) and species to be processed by a chipping head-rig, which simultaneously produces small sizes of dimension lumber and pulp chips. Typically only used with pine or other softwoods.

Clearcut: A harvest operation that removes all the merchantable trees from an area at the same time. Typically, the first step in establishing an even-aged stand of trees.

Co-dominant: One of four tree crown classes. Trees with medium sized crowns forming the general level of the crown cover. They receive full light from above but are crowded on the sides and thus receive little light from the sides.

Competition: The struggle among adjacent trees and vegetation for growth requirements such as sunlight, nutrients, water and growing space. Competition exists at the above (crowns) and below (roots) ground level.

Conservation Reserve Program (CRP): A program to encourage farmers to enroll highly erodible cropland and/or other land contributing to a serious water quality problem into a reserve for 10-15 years. It aids farmers with converting cost-share dollars in highly erodible land to vegetative cover such as grasses, wildlife plantings, bottomland hardwood trees, pine trees, or riparian buffers. Farmers receive an annual rental payment for the term of the contract. The CRP program is administered by the FSA.

Consulting Forester: A professional forester available for hire on a contract basis. Landowners usually receive a higher net return by using a Consulting Forester that those that do not.

Coppice Forest: A forest originating from primarily stump and/or root sprouts.

Cord: A unit of measurement for stacked round wood or pulpwood, containing 128 cubic feet. A standard cord measures 4 feet tall by 4 feet wide by 8 feet long, containing about 85 feet of solid wood.

Cost Basis: The cost element of basis in a capital asset that naturally increases in volume or size over time.

Cost-Share Program: Government programs that provide financial assistance to landowners to do conservation practices. See CRP, EQIP, SPBPRP, WHIP, WRP.

Crop Tree: A tree identified to be grown to maturity for the final harvest cut, usually on the basis of quality, species and location relative to other trees.

Crown: The branches and foliage of a tree.

Cubic Foot: A wood volume measurement containing 1,728 cubic inches, such as a block of wood measuring 1 foot by 1 foot by 1 foot. A cubic foot of wood contains 6-10 usable board feet of lumber, due to sawdust, planer loss, and shrinkage.

Cull: A tree of merchantable size that is made un-merchantable because of shape, disease insect infestation or injury.

Cutting Cycle: The planned timber harvest interval in the same stand. Cutting cycles occur in both even and uneven aged stands.

DBH: See Diameter Breast Height.

Deciduous Tree: A tree that loses all its leaves annually. Typically hardwoods such as oak, hickory, ash, sweet gum.

Defect: The portion of a tree or log unusable for the intended product and therefore not measured. Defects include decay, limbs, crooks, or cavities.

Delivered Price: The price paid at the first point of concentration, or mill, for forest products. Delivered price includes stumpage costs, harvest and hauling of the trees.

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

Diameter Limit Cutting: A selective method of harvesting whereby all merchantable trees above a specified minimum diameter are harvested, without regard to quality or species. Not recommended in most cases, for hardwood management.

Dibble bar: Also called planting bar. A tool used for hand planting tree seedlings, typically about 4.5 feet long and with a ten inch blade.

Diversion Ditch: A shallow channel that has been cut across the top of a slope, or the side of a hill for the purpose of diverting surface runoff.

Dominant Tree: One of four tree crown classes. Having a crown in the uppermost layers of the canopy and recovering full light from above and partly from the side. Dominant trees are generally larger than the average trees in the stand and have well-developed crowns but could be somewhat crowded from the side.

Environmental Quality Incentives Program (EQIP): A USDA conservation program for landowners to treat identified soil, water, forest and related natural resource concerns on eligible land. Provides cost share assistance to eligible landowners and is administered by the NRCS.

Ephemeral Stream: Streams having a defined channel but no banks so water flows only during or immediately after rain; SMZ's are typically not used around most ephemeral streams.

Establishment Cost: the cost required to afforest or reforest an area with trees of desired species and capable of surviving. Could include such costs as site preparation, seedlings or tree seeds, and labor to plant. The IRS takes the position that establishment cost also includes the cost of brush and weed control essential to the survival of a natural stand. Establishment cost is capital cost and cannot be expensed or deducted.

Even-Aged Management: Forest management with periodic harvest of all trees on a part of the forest at one time or over a short period to produce stands containing trees all the same age and/or size.

Farm Service Agency (FSA): A part of the USDA tasked with enhancing the environment through development and implementation of programs to ensure adequate protection of agricultural producers and landowners' natural resources. The FSA administers the CRP program.

Firebreak: A natural or man-made barrier, between 15' and 30' wide, created by removing trees, brush, leaves and litter, used to control the spread of a fire, either prescribed or wild fire.

Forest Stand Improvement: See timber stand improvement (TSI)

Forest Type: A category of forest cover based on its species composition. Examples in Arkansas are: loblolly-shortleaf pine, oak-pine, oak-hickory, oak-gum-cypress, and elm-ash-cottonwood.

Girdling: Completely encircling the trunk of a tree with a cut that sever the bark and cambium layers in order to kill the tree. Specific herbicide is sometimes introduced into the cut to ensure death and inhibit sprouting.

Growing Stock: All live trees in a forest stand, including sawtimber, pole timber, pulpwood, saplings and seedlings that are commercially valuable as timber products.
Habitat: The natural environment of a specific plant or animal. An area containing all the necessary resources for the plant or animal to live, grow and reproduce.

Hardwood: (A) A broad-leaved tree belonging to the botanical group Angiosperm. Examples are oaks, hickories, maples, elms and ash. Usually losing their leaves annually, with some exceptions, (holly, live oak, and magnolia). (B) The wood of such trees, regardless of hardness. Major uses are for pallets, furniture, flooring and decorative paneling.

Herbicide: Chemical formulations that are designed to kill specific species of plants.

High-grading: The practice of removing only the biggest and best trees from stand during a harvest operation and leaving the poorest, lowest quality trees. Diameter limit cutting can be a form of high grading. Not typically recommended.

Hydric Soil: Those soils that are saturated, flooded and ponded long enough during the growing season for the development of anaerobic conditions in the topsoil.

Improvement Cut: A type of intermediate harvest operation with the primary objective of eliminating lower value trees in favor of more valuable ones.

Increment Borer: A hollow, auger-like tool that is used to bore into a tree and extract a core that shows the trees growth rings.

Intermediate Cut: Rem0ving immature trees from a forest stand sometime between establishment and final harvest to improve the quality of the remaining stand.

Intermediate Tree: One of four tree crown classes. Tress shorter than dominant and co-dominant trees but with the crowns extending into the canopy formed by the dominant and co-dominant trees. The trees receive little light from above and none from the sides and have small crowns.

Landing: A location in a harvest operation where logs are taken (skidded) to be loaded on trucks for transport to the mill.

Log Rule: A method that calculates the amount of lumber that can be sawn from logs of given lengths and diameters. Usually expressed in tabular formant. Examples are: Doyle, International ¼ inch, Scribner.

Lump Sum Sale: Selling timber for a single cash price, usually paid before harvest and includes all or a portion of trees within a stand. Contras to pay as cut.

Marking: the process of designating trees within an area to be cut and sold. Commonly done with specific paint applied in two spots, one at d.b.h. and one at ground level, which allows the buyer to identify trees to be cut and the seller to determine that only those trees marked were cut.

Mast: Fruits and nuts of certain trees or shrubs. Can be hard mast – acorns, or soft mast – berries, fruits.

Mature Tree: A tree that has reached the desired age or size for its intended use and can vary depending on the species involved.

MBF: Thousand board feet, a typical measure of logs or lumber.

Merchandising: the practice of selling and using timber for the highest value product possible.

Merchantable: That part of a tree or stand of trees that can be sold for specific forest products.

Merchantable Height: The height (length) of the usable portion of a tree trunk. It is measured to a point where the diameter becomes too small to obtain the desired product.

Merchantable Timber: A stand in which trees are of sufficient size, quality and volume to provide a commercial timber harvest.

Mortality: The number or volume of growing stock trees that die during a certain period.

Multiple use: A concept of forest management that recognizes more than one use or purpose, such as wood production, water quality, wildlife habitat, recreation, animal forage, aesthetics or air quality.

Natural Resources Conservation Service (NRCS): A division of the USDA that helps individuals, groups, organizations, cities and towns, state and local governments reduce the waste of land and waters resources and put these natural assets to good use. NRCS administers the EQIP and WHIP cost share programs.

Natural Regeneration: Reforestation accomplished by seeding from adjacent trees or sprouts from the stumps or roots of harvested trees. The process may include site preparation to provide a suitable seedbed.

Natural Stand: A stand of trees resulting from natural seeding or sprouting.

Non-Ephemeral Stream: Can be perennial or intermittent. Has a defined channel or banks. Water flows immediately after a rain event. SMZ's are typically recommended for these types of streams to prevent excessive soil movement.

Non-Point Source Pollution: Pollution which is (1) materials such as chemicals, nutrients, and soil that is carried into water bodies by precipitation; (2) not traceable to a specific, identifiable point of origin; and (3) controlled through implementation of BMP's.

Overstocked: Forest stand conditions where too many trees are present and inhibit stand growth.

Overstory: That portion of the trees in a stand forming the upper crown cover.

Overtopped Trees: One of four tree crown classes. These trees have crowns entirely below the general level of the canopy and receive no direct sunlight either from above or the sides, also called suppressed.

Partners for Fish and Wildlife Program: Offer financial and technical assistance to landowners for habitat restoration, especially prior-converted or farmed wetlands. The U.S. Fish and Wildlife Service administers this program.

Pesticides: A collective term meaning chemicals including herbicides, insecticides, and fungicides which are used to kill pests such as weeds, insects or other unwanted vegetation.

Plantation: Forested areas that are established artificially by planting or direct seeding. Usually made up of a single species.

Pole Timber: trees from 6" to 12" d.b.h.

Prescribed Burn: Deliberately burning under specific weather conditions, which allows the fire to be confined to a predetermined area and produces a fire intensity to meet predetermined

objectives. Prescribed fire can be used to reduce hazardous conditions, control unwanted vegetation, improve wildlife habitat, improve grazing and improve visibility.

Pruning: Removing live or dead branches from standing trees to improve the quality of the wood produced.

Pulpwood: Wood grown and cut primarily for the manufacture of paper, fiberboard or other wood fiber products.

Regeneration: Seedlings or saplings existing in a stand. The process by which a forest is renewed, either artificially or naturally.

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.

Reproduction: Young trees which will grow to be a mature forest.

Riparian Zone: That area adjacent to or on the bank of rivers or streams. Identified by vegetation, wildlife, or other characteristics unique to these locations.

Rotation: The number of years required to establish and grow trees to a specified size, product, or condition of maturity.

Sale Area: the area that will be affected by the harvesting operations. Sale areas are normally marked with flagging or paint.

Salvage Cut: Harvesting dead or damaged trees, or those in danger of being killed by insect, fire, flooding or wind, before the timber becomes worthless.

Sapling: Trees from 2" to 6" at DBH.

Sawlog: Also called saw timber, trees large enough to saw into lumber; for pine usually larger than 9" and for hardwood larger than 14" in diameter.

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 the new forest. Usually results in an even-aged stand.

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.

Seedling: (A) A tree usually 2" or less in DBH, which has grown from a seed. (B) A nursery grown tree which is lifted and replanted.

Selection Method: An uneven-aged system in which individual trees or small groups of trees are selected for harvesting. Trees selected for harvested are usually marked.

Shade Tolerance: A tree's ability to develop and grow in the shade of, and in competition with, other trees or vegetation.

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

Shrub: A woody, low growing, perennial plant, usually less than 3" in diameter that ordinarily lacks a well-defined main stem.

Silviculture: The art and science of producing a forest to meet the objectives of the owner.

Site: The area in which a plant or stand of trees grows, considered in terms of its biological, climatic and soil factors.

Site Index: An expression of forest site quality based on the height of a free-growing dominant or co-dominant trees at a base age of 50 years, or 25 years in some cases.

Site Preparation: Preparing an area of land for planting, direct seeding or natural regeneration by clearing, chemical vegetation control, burning, disking, ripping, bedding or windrowing, or a combination of these.

Skid Trail: A road or trail over which logs are dragged from the stump to the landing area.

Skidding: Pulling logs from where they are cut to a landing area.

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

Snag: A standing dead tree.

Southern Pine Beetle Prevention and Restoration Program (SPBPRP): A cost-share assistance program for landowners in south Arkansas to help reduce the outbreak and/or spread of southern pine beetle; administered by the Arkansas Forestry Commission.

Stand: A group of trees with similar characteristics, such as species, age, or condition that can be distinguished from adjacent groups. Typically a unit of management in forestry.

Stand Prescription: A document prescribing present and future treatments to a forest stand to create a desired result.

Stewardship Program: The Forest Stewardship Program is a means by which a landowner has access to resource professionals to assist them in obtaining a written forest management plan

addressing multiple use management. It is administered by the Arkansas Forestry Commission.

Stocking: An indication of the number of trees in a stand in relation to the desirable number of trees for optimum growth and management. See understocked and overstocked.

Stumpage Value: The economic value to the landowner of standing trees.

Streamside Management Zone (SMZ): A strip of land immediately adjacent to water bodies where timber management activities are particularly designed to preserver water quality.

Thinning: Generally, 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 Cruise: The process by which the volume, type and quality of timber within a designated are is estimated.

Timber Sale: Activities associated with the exchange of timber for money. Typically done by collecting multiple bids and a written contract is highly recommended.

Timber Stand Improvement (TSI): A thinning made in immature stands to improve the composition, structure, condition, health and vigor of the remaining stand.

Tree: A woody perennial plant with a single, well-defined stem, more or less definitely formed crown and usually reaching a height of at least 13 feet.

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

Understocked: Insufficiently stocked with trees, less than adequate for stand optimization.

Understory: All forest vegetation growing under an overstory.

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

Veneer Log: Logs of specific size, species, and quality to be peeled, sawn or sliced into veneer.

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

Water Bar: A cross drainage diversion structure for active or inactive roads, fire lanes or trails. Acts to divert surface water runoff into side vegetation, ditch or dispersion area to reduce water volume and velocity.

Wetlands: The U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency jointly define this as "Those areas that are inundated or saturated with surface or ground water

at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas."

Wetlands Resource Program (WRP): A voluntary program offering landowners a chance to receive payments for restoring and protecting wetlands on their property. WRP is administered by the NRCS.

Wildlife Habitat Incentive Program (WHIP): Provides both technical assistance and cost-share payments to help establish and improve fish and wildlife habitat. WHIP is administered by the NRCS.

Windrow: Slash, logging residue and debris raked together into piles or rows normally by use of heavy equipment.

Wing Ditch: A water turnout or diversion ditch constructed to move and dispense water away from the road and side ditches into adjacent undisturbed areas.

Wolf Tree: A very large, over-mature trees that is, or was grown in the open.

Appendix – 1

Timber Valuation

A systematic forest inventory was conducted November 2019 by Golden Oak Forestry to determine the volume and value of the standing timber on this property. This inventory gathered data on tree species, size (diameter at breast height), merchantable length, and condition. The results are shown below, in addition to the current market value. This value was gathered from personal knowledge of timber sales, timber market publications, discussions with local sawmill owners and timber buyers. The information is presented for the total forested acres of approximately 422. A map showing the measurement points is included.

The volumes listed are not guaranteed, but are very accurate based on my experience and abilities as an Arkansas Registered Forester and the most up to date equipment available. The values listed could be used to establish a timber tax basis, if required by a tax professional. The values represent stumpage value, or the price the landowner receives when selling timber.

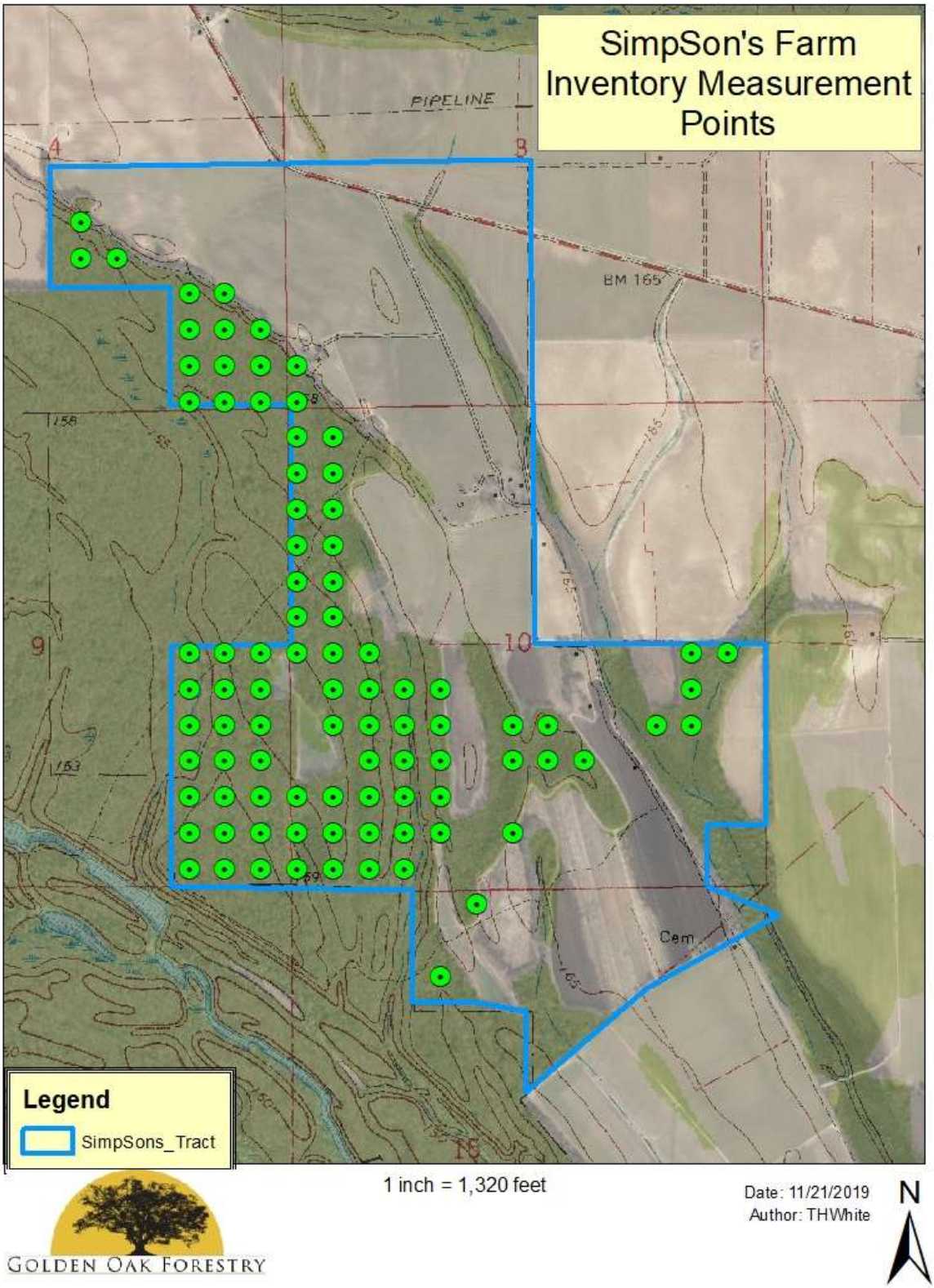
The specifications used for the inventory are as follows: All pulpwood category trees are a minimum of 15′ in length to a 3″ top diameter. Diameter at breast height (D.B.H.) for pulpwood trees is 6″ to 12″ or any larger diameter tree that would not make a sawtimber tree due to crook or sweep or other deformity. The sawtimber category trees are a minimum of 16′ length and D.B.H. of 14″ and larger, to a 12″ minimum top diameter. If a tree would not make either product category, usually due to a hollow trunk, it was recorded as cull or a den tree.

All diameter measurements are made at 4.5′ above ground level (DBH) using 2″ diameter classes. Height measurements were made with a Tru-Pulse laser clinometer. A 10-factor basal area prism was used to determine measurement trees at each inventory point. Volumes were calculated utilizing T-cruise software.

Total Tract

Product	Tons	Value
Red Oak pulpwood	**855**	**$8550.00**
Red Oak sawtimber	**7206**	**$324,070.00**
White Oak pulpwood	**460**	**$4600.00**
White Oak sawtimber	**1110**	**$45,950.00**
Gum pulpwood	**1718**	**$17,180.00**
Gum sawtimber	**2249**	**$56,225.00**
Misc. hardwood pulpwood*	**2905**	**$29,050.00**
Misc. hardwood sawtimber*	**3323**	**$83,075.00**
Cypress pulpwood	**134**	**$1,340.00**
Cypress sawtimber	**666**	**$16,642.00**
Total		**$586,682.00**

***Miscellaneous hardwood species include: ash, elm, hickory, maple and sugarberry.**


SimpSon's Farm
Inventory Measurement
Points
PIPELINE
BM 165
Cem
Legend
SimpSons_Tract
1 inch = 1,320 feet
Date: 11/21/2019
Author: THWhite
N
GOLDEN OAK FORESTRY