# *FOREST WILDLIFE STEWARDSHIP MANAGEMENT PLAN*

## Bloody Run Wildlife Management Area
## Clayton County

**Developed by**
**Bruce Blair, District Forester, Iowa DNR**
**Doug Chafa, Wildlife Biologist, Iowa DNR**

## HOW THIS PLAN WAS DEVELOPED

Each Wildlife Management Area owned by the Iowa Department of Natural Resources (DNR) is assigned a Wildlife Biologist. This person is responsible for managing and determining objectives for each Wildlife Management Area (WMA). Objectives address the habitat needs of "Species of Greatest Concern" and the woodland condition of each area.

About 75% of the total land managed by the Wildlife Bureau consists of woodlands. Managing these areas is a cooperative effort of the DNR, Wildlife and Forestry Bureaus. Management activities are essential for maintaining and/or improving woodlands for wildlife and recreation.

The first step of the planning process is for the assigned Wildlife Biologist and Forester to walk the property and take field notes. Information collected for each stand includes: list of tree species, tree sizes, topography, aspect, disease issues, etc. The Wildlife Biologist and Forester then discuss the options for each stand and determine the desired management system. Treatment options are discussed with attention to how they will fit into the overall management for the area. Recommendations are designed to achieve the goals and objectives.

One of four management systems are specified for each stand. This identifies the overall management system for that stand and designates the "road map" for what work will take place in the future. What follows is a brief description of each management system:

- ***Early Successional*** - Areas are clearcut every 15 to 20 years to maintain young, high stem density habitat.

- ***Even-Age*** - Shade intolerant species such as oak, walnut and aspen require full sunlight to grow. Even-age management involves a clearcut at some point to create the full sunlight condition. Even-age stands are scheduled to be clearcut every 125 years; this is called the "rotation age." Clearcutting also creates early successional habitat for the first 15 years, or so.

- ***Uneven-Age*** – This management system works well for maintaining stands that are have lots of species that are tolerant of shade such as hard maple, ash and basswood. Every 20 years, these stands can be selectively harvested to remove the mature and defective trees. Through proper selection, we can maintain a stand with good structure, with plenty of trees in the understory, mid-story and over-story canopy layers.

- ***Viewshed*** - These are steep slopes and buffers along the trout streams where little, or no, management activities will take place.

- ***Other*** - This is a catch-all category that includes areas like retired crop fields and life estate lands.

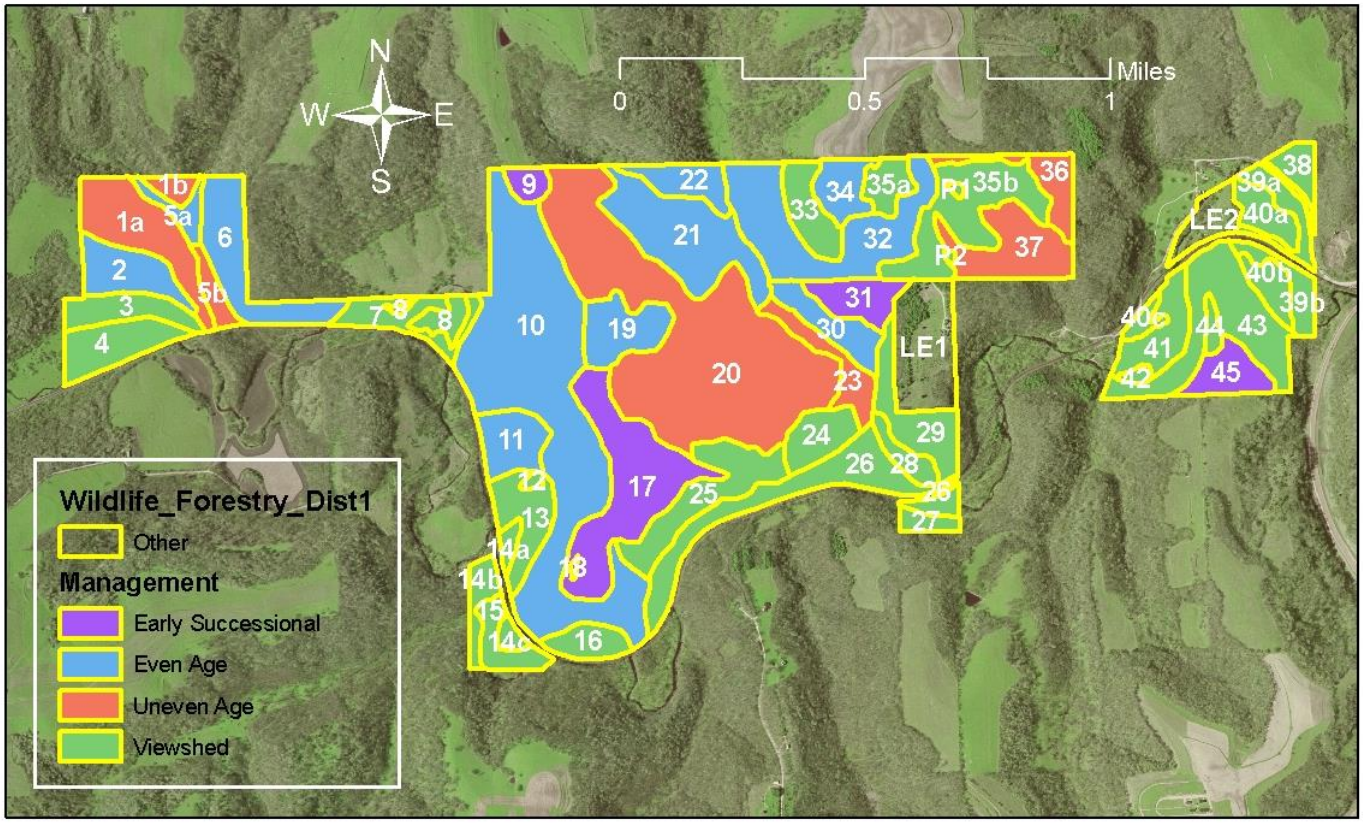


***Figure 1: Management Systems Selected for each Stand.***

# INTRODUCTION

**Area Manager for Bloody Run WMA:**

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**Location of Bloody Run WMA:** Basal Giard Claim No.1, Spain Land Grant, Clayton County

**Current Size:** 732 total acres

In Iowa, the DNR is the government agency responsible for the stewardship of indigenous and migratory wildlife species found in the state. Many of these species live near, and in, WMA forests. Forests are a relatively slow-changing landscape with some stands reaching maturity after a period of 125 years. This time span may extend through the careers of several wildlife managers. The longevity factor emphasizes the need for a Forest Wildlife Stewardship Plans (FWSP) in order to wisely manage our WMA forests.

There are 3 primary factors emphasizing the need for FWSP's:

1. The continued succession of forest stands past the oak-hickory stage into the shade tolerant maple-basswood stage.
2. The loss of early successional forest stands and associated wildlife species.
3. The lack of proper management to secure mature forest stands with proper overstory and understory tree species for associated forest-interior wildlife species.

Some wildlife species use all of the different forest age classes while others are dependant on a specific age class. Although the overall change in forest succession is relatively slow, changes in the early stages of forest succession occur relatively fast. For example, some populations of indigenous and migratory bird species, dependent on these short-lived forest age classes, are experiencing dramatic declines. In Iowa, they include the indigenous game bird, the ruffed grouse and the migratory game bird the American woodcock. Nation-wide declines of both species have been detected.

Many migratory non-game birds including the gold-winged warbler, blue-winged warbler, black-billed cuckoo, yellow-billed cuckoo and eastern towhee are also dependent on this early stage of forest growth. Each of these species is showing populations declines.

Conversely, some species of neotropical migratory birds are dependent upon mature, undisturbed woodlands. The Acadian flycatcher, Cerulean warbler, and the veery are some examples of birds needing mature forests. Management objectives will attempt to either protect these types of sites or include needed management to secure these necessary habitats for the future.

The DNR Wildlife Bureau's State Comprehensive Wildlife Conservation Plan identifies all of the above species, and others, as species of "greatest conservation needs". (Appendix – Tables 1-6).

Generally, the Wildlife Bureau manages state-owned forestland for the greatest diversity of forest wildlife and esthetic value. The DNR Wildlife Bureau's FWSP will prioritize the "species of greatest conservation needs," and the habitat needs of these wildlife species will be guiding factors to forest

management decisions. Evaluations will be conducted to monitor the success of these management decisions. Forest and wildlife inventories will be conducted on each WMA and the information will be entered into a database. This database along with the "FWSP Definitions and Guiding Factors" (Appendix) will be used to make forest management decisions on the WMA's. The primary goal will be to maintain or increase populations of wildlife species of greatest conservation needs.

## MANAGEMENT OBJECTIVES

The primary objectives for all State WMA's are to improve wildlife habitat for a variety of wildlife species, to provide recreational opportunities, to provide clean water, and to protect endangered species. This Forest Wildlife Stewardship Plan strives to develop a forest ecosystem that has a diversity of tree sizes and species. Developing a diverse forest will benefit the widest variety of wildlife species. Wildlife species have diverse habitat requirements. Even on a Wildlife Management Area, what is productive habitat for one species may be unproductive for another.

Bloody Run WMA is unique in that it provides a large block of woodland suitable for forest interior migratory birds. Some retired interior fields will be converted to woodland through tree planting to enhance this large-block woodland. Every effort will be made to protect and enhance the watershed of the Bloody Run trout stream. Ruffed grouse, woodcock, and Eastern Towhee populations in northeast Iowa are declining due to a lack of early successional growth. Neotropical migratory birds dependent on early successional growth are also declining. Therefore, a substantial portion of Bloody Run WMA will be managed to provide early successional habitat for this group of species.

This WMA is blessed with stands abundant with red, white, bur, black and chinkapin oaks. Oak forests are very important to a long list of wildlife species. Oak trees provide cover, roosts for birds and hollow cavities that many creature call home. More importantly, oaks provide acorns, also called "hard mast", which are a staple food source for many wildlife species. In general, the oaks stands are healthy throughout Bloody Run WMA.

USFS surveys indicate the oak resource is slowly dwindling throughout the state. As oak stands die-out from old age, or timber harvests, they are usually replaced by tree species more tolerant of shade, like elm, ash, bitternut hickory, basswood and hard maple. This process of a species less tolerant of shade being replaced by species more tolerant of shade is called *succession*. We can see this process taking place throughout Bloody Run WMA.

Natural resource managers cannot depend on oak stands replacing themselves. Therefore, the forest resource has to be actively managed to maintain oak for the future. Management activities that can aid in maintaining and regenerating oak include prescribed fire, tree planting, clearcut harvesting, and target tree release.

## GENERAL DESCRIPTION OF THE AREA

**Stand Map –** The property consists of two disconnected parcels. The property has been divided into stands. Each stand has a unique description and set of management recommendations. The stands were numbered from 1 to 45 as depicted below.

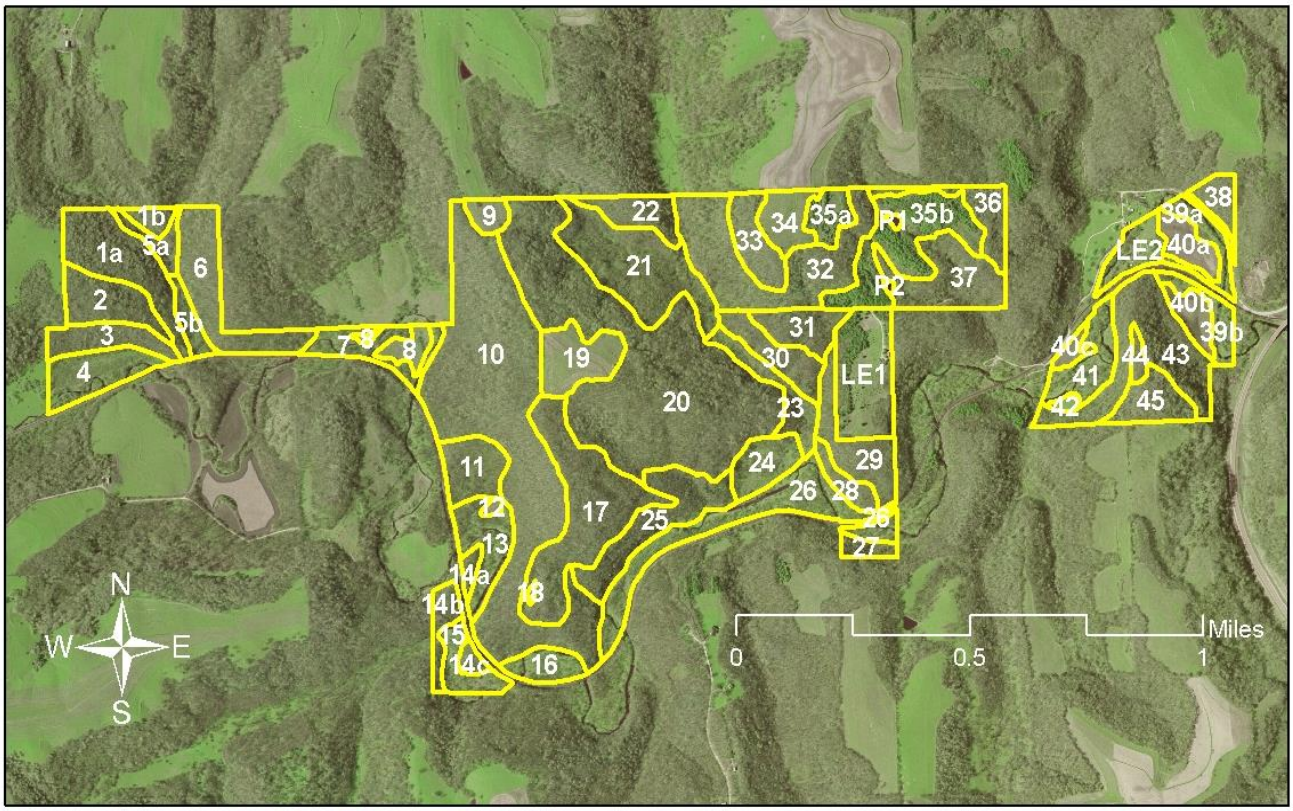



***Figure 2: Stand Map of Bloody Run WMA***

The entire property resides inside of Basal Giard Claim No 1. This area was deeded to Basal Giard back when this area was still owned by Spain.

There is a busy railroad that cuts through the property and parallels the stream. The builders made a number of "cuts" through the bedrock to round-over sharp curves.

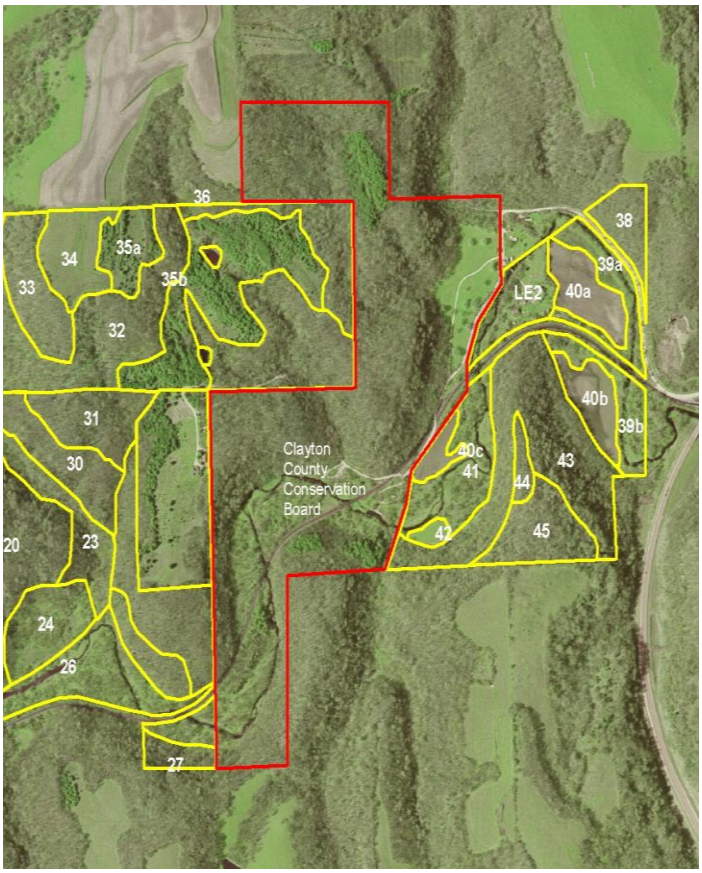



***Figure 3: This aerial photo depicts the land between the two DNR parcels that is owned and management by the Clayton County Conservation Board.***

The land between these two parcels is owned by the Clayton County Conservation Board as depicted in the aerial photo to the left. The CCCB lands is primarily managed for recreation including camping and fishing. The DNR maintains Bloody Run as a put-and-take trout stream. The fishing access is good on the CCCB owned land and sees a lot of fishing traffic. Hunting is not permitted on the CCCB property.

**Geology –** Blood Run stream cuts through three major geologic formations: they include the Ordovician-aged Galena formation in the highest elevations followed by the Prairie du Chien group in mid-slope. The valley floor consists of the Cambrian-aged Jordon Sandstone formation.

**Soils –** All of the soils throughout this WMA have a silt loam texture. The soil's parent material is primarily wind deposited *loess*. All of the soil types were created under woodland and savanna-like cover. In general, the soil types are predictable based on the slope. The more level areas near the ridge tops contain lots of Fayette silt loam. Further down slope, the soil transitions to Dubuque silt loam. As the slope gets steeper, the soils transitions to Nordness and Nordness – rocky complex. Fayette soils may be 20 feet or deeper over bedrock compared to Nordness soils which may be less than 1 or 2 feet to bedrock.

The productivity of the soils depends primarily on the slope and aspect. Fayette, Dubuque and Nordness soils can all be very productive for producing quality timber. In general, East and North facing slopes are more moist and more productive, whereas South and West aspects are dryer and less productive.

The valley floor contains a combination of Dorchester and Dorchester – Volney complex. The parent material for these soils is derived from alluvial sediments washed down from the hills. That is why they have the same silt loam texture. These two soil types are potentially very productive. There major limitations involve annual flash flooding and unpredictable water tables.

## PROPOSED MANAGEMENT SYSTEMS

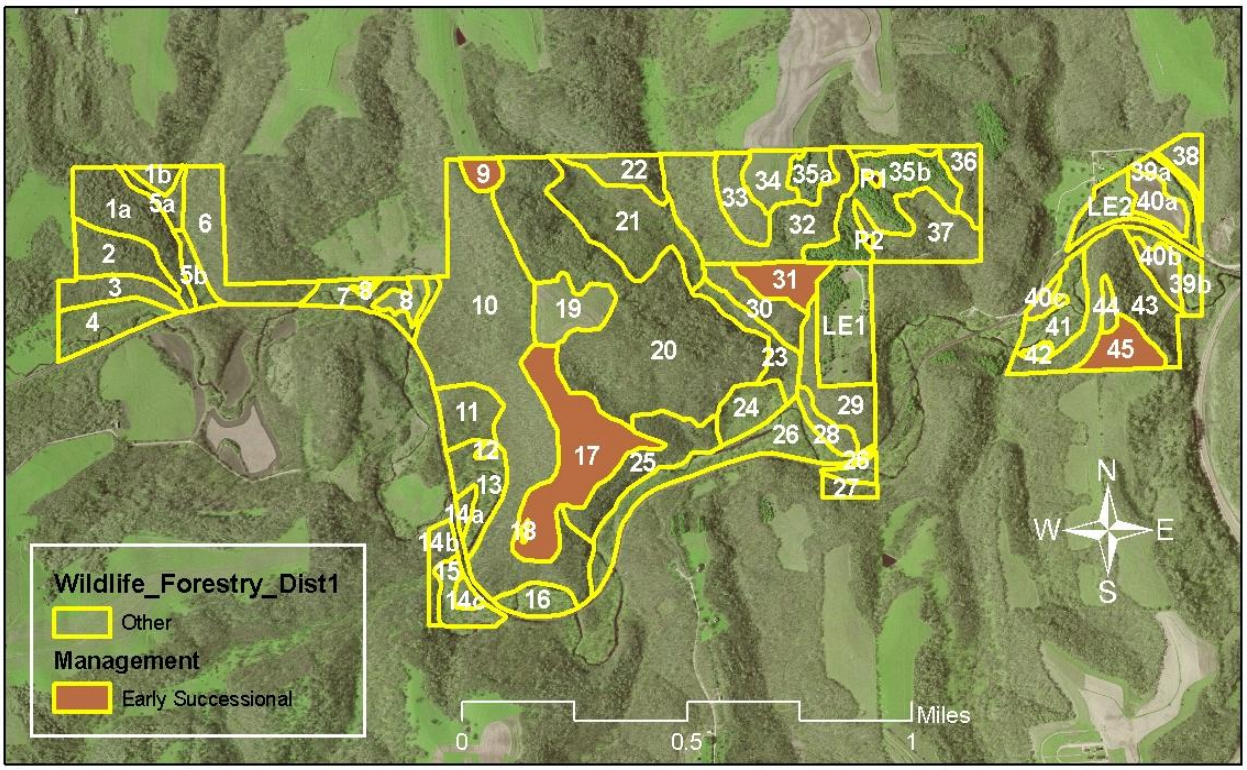
The decision on what management system would to be used was based on the objectives for the area. The objective were determined based on weather to maintain an oak component, or to develop a diverse woodland landscape, protect fragile sites, improve water quality in the trout stream, and increase the acres of early successional growth. The acres under each management system are as follows:

**Early Successional Management** – Species of birds such as ruffed grouse, American woodcock, gold winged warbler, blue winged warbler, black billed cuckoo, yellow billed cuckoo, and eastern towhee are dependent on the young, dense woody growth. High stem densities of trees and shrubs provides suitable nesting habitat and protection from predators.

Aspen is an excellent species to create the dense growth needed by these species because it sprouts prolifically from the roots when the parent tree is cut. Therefore, the majority of early successional management within Bloody Run WMA will be in Stands that already contain aspen. Aspen is a relatively short lived species; it's ability to root sucker diminishes with age. The best method to maintain or expand an aspen clone is to clearcut it while the trees are still in vigorous condition. Ideally, a stand of aspen would have 1/3 of the stem sapling sized (1-4" DBH), 1/3 pole-sized (5-10" DBH) and 1/3 medium sized (11-16" DBH).

Areas managed for early successional habitat will be managed on 15-20 year rotations. In other words, every 15-20 years, the aspen clones will be rejuvenated through cutting to create high stem densities. In the Bloody Run WMA, early successional areas will be managed on **20 year** rotations. There are approximately **53 acres** within Bloody Run that are designated for early successional habitat. The allowable cut every 5 years would be 53 acres / 20 yrs X 5 yrs = **13.25 acres cut every 5 years**.

***Figure 4: Proposed Stands to by Managed as Early Successional Habitat***



**Even-Age Management -** Even-aged stands can be characterized as having an overstory canopy whose trees are all nearly the same age. In other word, all the trees started growing at one point in time. Clearcut harvesting is employed to create these conditions in forested stand. Even-aged management permits shade intolerant species like oak, aspen, and walnut to regenerate under ample sunlight. Trees of the new forest will develop at the same rate. These trees will grow tall, straight and well pruned. The brushy stage created by the clearcut provides excellent browse and cover for wildlife. Clearcuts can be as small as 1/2 to 2 acres in size.
Even age management is essential for creating and maintaining forest cover required by many wildlife species. Even age management involves growing a stand of trees which are close to the same age. At some point in the stand's development, the entire area is clearcut which creates the even age structure. Even age management creates excellent habitat for deer, turkey, and grouse and is essential for regeneration of oak which require full sunlight. The only way that oak can be maintained as a component of the forest is by practicing some form of even age management.

Even though large blocks of forest are needed on some Wildlife Management Areas for some wildlife species, each stage of an even age stand provides habitat for wildlife. For example, regenerating stands (1-10 years old) benefit the same species of birds as does early successional stands, golden-winged warbler, blue-winged warbler, black-billed cuckoo, yellow-billed cuckoo, Eastern towhee, along with ruffed grouse and American woodcock.

Sapling to small pole sized stands between 10 and 20 years old, may be used by black and white, Kentucky, and worm eating warblers. From age 20-60 years, pole to medium size trees tend to be used by canopy nesters such as scarlet tanagers, wood thrushes, and ground nesters such as ovenbirds and black and white warblers.

Mature stands of 60 to 125 years of age are used by birds such as the wood thrush, Acadian flycatcher, ovenbird, worm eating warbler, and scarlet tanagers.

Even age management involves clearcuttting and planting, clearcutting with regeneration already established, or a shelterwood system to develop desirable seedlings on the ground.

Shelterwood is a form of even-age management. The final cut is a clearcut, but several thinnings are done prior to the final cut. The large, healthy trees are left to provide seed for naturally reseeding the stand, and to create partial shade to inhibit the growth of weeds and brush until the desirable seedlings are well established. The final cut or clearcut is normally done when there are a sufficient number of desirable trees that are 3-5 ft. tall. The shelterwood system can take many years to develop a good stocking of desirable young trees. You may have to kill the undesirable species several times to favor the species you want. The final clearcut should not be made until you are satisfied with the stocking of desirable young trees.

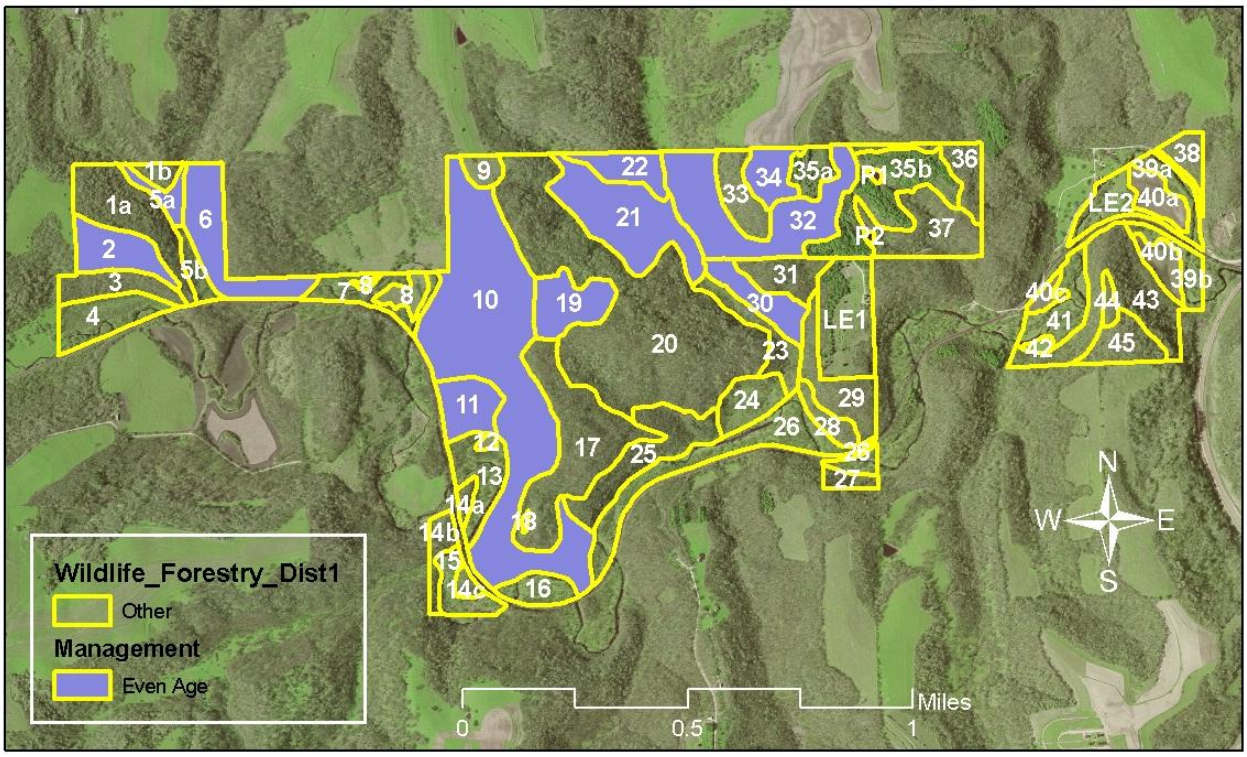
Clearcutting to create full sunlight is essential at some point in the stands life to successfully regenerate oak. If stands are not clearcut, the oak component of the forest will be lost to shade tolerant species. Clearcuts also provide additional early successional habitat in the early stages. The area is in the brushy stage for a very short period, normally 10-15 years. After that time, the trees will totally shade the ground, and the area becomes a pole sized (5-10" dia.) stand of trees.

Fire is a tool in managing oak stands that is currently being studied. Frequent burning of the leaf layer in the woods will kill thin barked species such as hard maple, cherry, elm, bitternut hickory, and ironwood. Fire will expose mineral soil and open up the ground to sunlight. These conditions favor the natural regeneration of oak. Oak seedlings will tolerate light fires. The top will be killed by the fire, but the deep

root systems survive and sprout. Fire will be utilized on a limited scale to encourage oak regeneration in oak stands. Once a good number of oak seedlings are present, these stands will have to be clearcut or the young oak will die from lack of sunlight.

There are **231 acres** that will be managed as even-aged woodlands. The allowable cut, every 5 years, using a 125 year rotation age would be **9.2 acres every 5 years**.

***Figure 5: Stands Proposed for Even-aged Management.***



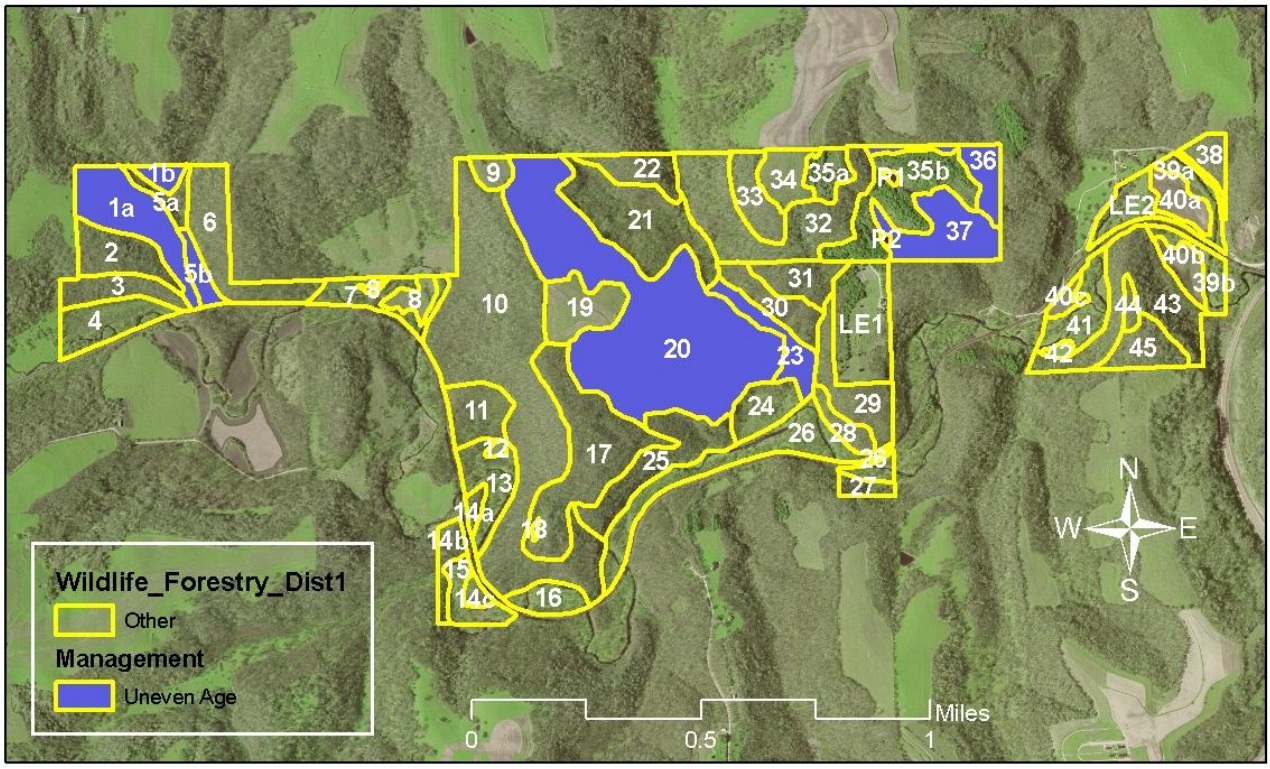
**Uneven-Age Management** - Uneven age management develops a stand of trees with all tree sizes represented. The stand structure is developed by selectively harvesting mature and defective trees, and removing unwanted small trees that are damaged or defective. Because uneven age stands always have large trees present, this system favors species that will grow in shade such as hard maple and basswood.

Uneven age management will maintain blocks of woodland that will always have larger trees. Uneven age management is desirable where the understory is mainly hard maple, on steep slopes, and on areas where always having large trees is important.

Uneven age management areas will provide continuous tracts of woodland with minimal disturbance. Large tracts of uneven age management will provide necessary habitat for neotropical migratory bird species such as cerulean, hooded, Canada, and Kentucky warblers. Selective harvesting will create small openings in the canopy, which will increase ground cover, and enhance stand structure. Den trees will be left to provide cavities for wildlife such as woodpeckers, bats, and squirrels, including the Northern myotis and red squirrel, species of greatest conservation need. Timber stand improvement and selective harvesting will create woody debris on the forest floor for reptiles and amphibians.

There are **158 acres** that will be managed as uneven-aged woodlands. All the acres could be selectively harvested every 20 years. In this case, **7.9 acres** could be cut annually using a 20 year re-entry cutting cycle.

***Figure 6: Stands Proposed for Uneven-aged Management***

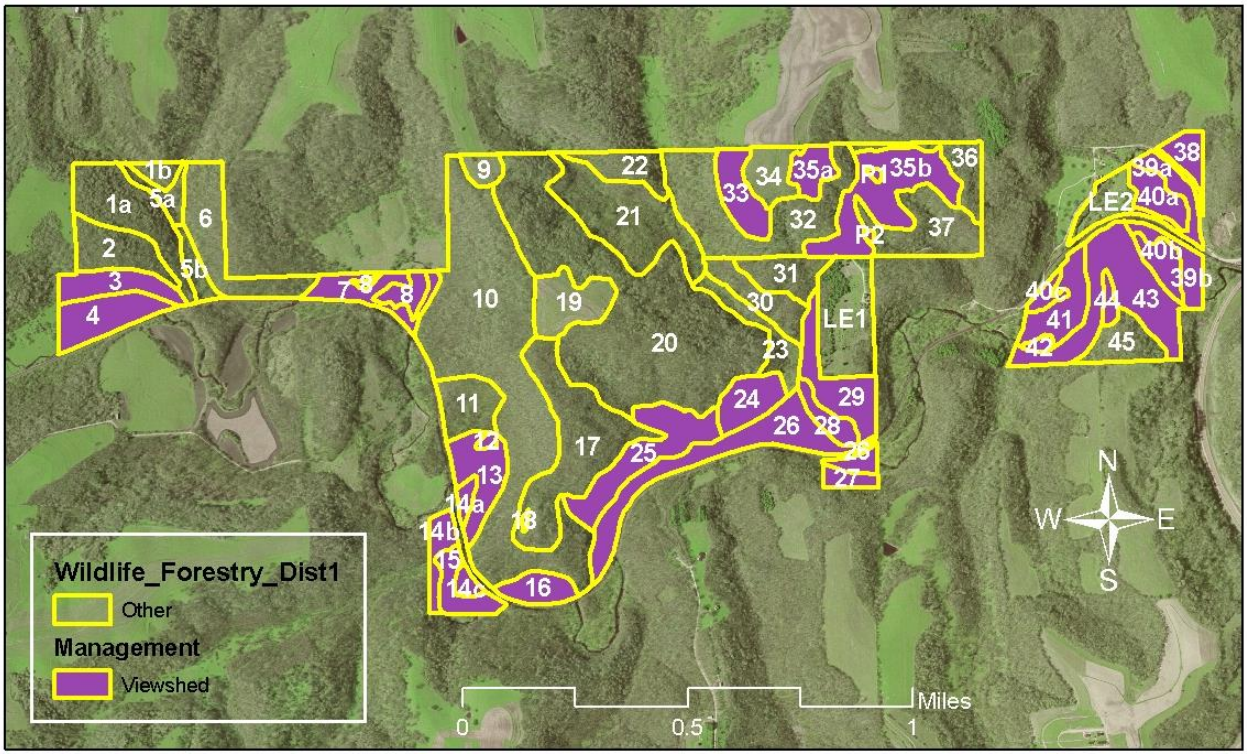


**Viewshed Management -**Viewshed areas are typically steep slopes and areas along streams which are fragile and are best left to naturally progress through succession. Areas where endangered plant or animal species exist will also be under viewshed management. Management can take place on these areas where desirable, but the major objective is to have very minor disturbance if any.

Many neotropical birds will benefit greatly from the areas designated as viewshed. Algific slopes and maderate slopes will be under viewshed management which will protect 8 species of land snails listed as species of greatest conservation need.

There are **<u>263 acres</u>** designated for viewshed management which equals approximately 36% of the total forest resource.

***Figure 7: Stands Proposed for Viewshed Management***




**Income from Timber Harvests -** Harvesting is conducted to regenerate stands to desirable species and to achieve a diversity of tree sizes and species. Income from timber harvesting operations will be reinvested into the area to plant trees, thin young stands, and convert areas to more desirable species, and cut the early successional cuts. Harvesting is a very minimal portion of this plan. The majority of work recommended is to thin young stands so that the oak is not shaded out by other trees, remove undesirable species to encourage natural regeneration of desirable trees, complete the early successional work, and tree planting.

# DESCRIPTIONS AND RECOMMENDATION FOR INDIVIDUAL STANDS

## Stand 1a: 19.6 acres

**Site Description:** The soil is mostly Nordness and Dubuque silt loams on a Northeast facing aspect.

**Woodland Description:** The forest classification is Northern Hardwoods forest type. More that 50% of the overstory trees are hard maple. Other common overstory species include red oak, white elm, hackberry and basswood. The overstory trees range from 10 to 24 inches, Diameter at Breast Height (DBH). The understory layer is composed entirely of shade tolerant species such as hard maple, elm, hackberry, ironwood and musclewood. This is an uneven-aged stand with stems in every size.

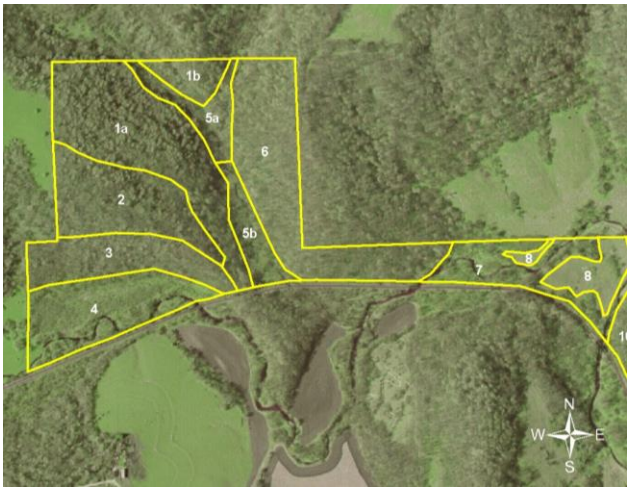
**Management System and Recommendations: (Uneven-aged)**
The uneven-aged structure can be maintained indefinitely because of the tree species present. The best way to maintain the uneven-aged structure is to conduct periodic selective harvests where 1/3 of the overstory stems would be harvested on 20 year cutting cycles.

## Stand 1b: 2.9 acres

**Site Description:** The soil is mostly Nordness rocky silt loam on a South facing aspect.

**Woodland Description:** This stand is very similar to Stand 1a. The forest classification is Northern Hardwoods forest type. More that 50% of the overstory trees are hard maple. Other common overstory species include red oak, white elm, hackberry and basswood. The overstory trees range from 8 to 20 inches DBH. The understory layer is composed entirely of shade tolerant species such as hard maple, elm, hackberry, ironwood and musclewood. This is an uneven-aged stand with stems in every size.

**Management System and Recommendations: (Uneven-aged)**
Manage this stand the same as Stand 1a. The uneven-aged structure can be maintained indefinitely because of the tree species present. The best way to maintain the uneven-aged structure is to conduct periodic selective harvests where 1/3 of the overstory stems would be harvested on 20 year cutting cycles.




Satellite photo taken 2003


Black & white aerial photo taken 1930's

**Stand 2: 12.1 acres**

**Site Description:** The soil is primarily Fayette and Dubuque silt loams with an East aspect.

**Woodland Description:** The forest classification is Central Hardwoods forest type. The overstory consists of 16 to 26 inch DBH red oak, white oak, hard maple, elm, and hickory. The understory layer is mostly hard maple, bitternut hickory, ironwood, elm, basswood and hackberry.

**Management System and Recommendations: (Even-aged)**
To benefit wildlife, it would be good to maintain this area with desirable mast producing hardwoods such as oak and hickory. Treatments will be needed to establish oak/hickory regeneration in the understory for the future stand. The shelterwood system could be employed to achieve this objective. The first step would be to harvest all merchantable trees of undesirable species (elm, bitternut, basswood, hackberry and hard maple). Additional trees will be harvested to produce a canopy that will allow plenty of sunlight to penetrate to the forest floor. Next, the shade tolerant understory species would also be felled and have the stump treated with an herbicide to prevent re-sprouting. We will then monitor the stand until sufficient natural oak regeneration develops. At that time the overstory will be harvested to liberate the oak regeneration. Prescribed fire may be applied periodically to help improve conditions for establishment of oak regeneration.

**Stand 3: 9.3 acres**

**Site Description:** The soil is primarily rocky Nordness silt loam on a strong South facing slope. This is a very droughty site.

**Woodland Description:** Scrub oak is the forest classification. The overstory consists of 8 to 20 inch DBH black oak, bur oak, white oak, chinkapin oak, walnut, elm and hackberry. The understory layer is mostly prickly ash, ironwood, elm and hard maple.

**Management System and Recommendations: (Viewshed)**
The intent is to maintain this oak community. Treatments will be needed to accomplish this objective. The first step will be to select important target trees; such as oak, shagbark hickory, walnut and cherry, and release them from canopy competition. This will improve vigor, health and survival of the target trees. The next treatment will be to periodically burn the stand. The burning will encourage oak trees over less desirable species.

**Stand 4: 12.2 acres**

**Site Description:** The soil is primarily Dorchester silt loam in a bottomland. Bloody Run trout stream runs through this stand. The south boundary is the railroad tracks. This stand is prone to annual flash flooding.

**Woodland Description:** The forest classification is bottomland hardwoods. Greater than 75% of the overstory consists of 4 to 12 boxelder. Other species are more scattered and include elm, cottonwood, willow and black walnut. The understory layer is nearly absent of tree regeneration because of flooding, heavy herbaceous competition and deer herbivory.

**Management System and Recommendations: (Viewshed)**
There is little incentive to perform forest management activities here because of the uncertain impact of flooding. It would be beneficial, however, to release the scattered walnuts and other desirable species (approximately 1 to 10 trees per acre) from canopy competition to improve their growth and survival.

**Stand 5a: 4.3 acres**

**Site Description:** The soil is Dorchester silt loam on fairly level terrain. This is a bottomland with some flooding.

**Woodland Description:** Central Hardwoods is the forest type. The overstory consists of 2 to 8 inch DBH hard maple, hackberry, elm and ironwood. There are also some scattered walnut, oak, cherry and hickory. The understory layer is mostly shade tolerant hard maple, hackberry and ironwood.

**Management System and Recommendations: (Even-aged)**
Diversity, growth and vigor can be improved by releasing from canopy competition important target trees. Select the scattered desirable oak, walnut, cherry and hickory and release by felling trees that crowd them.

**Stand 5b: 4 acres**

**Site Description:** The soil is Dorchester silt loam on fairly level terrain. Some flooding and high water tables my be a problem.

**Woodland Description:** The forest classification is Bottomland Hardwoods. Most of the overstory consists of 4 to 10 boxelder and elm. The understory layer is mostly small boxelders.

**Management System and Recommendations: (Viewshed)**
There is little incentive to perform forest management activities here because of the uncertain impact of flooding.

**Stand 6: 19.4 acres**

**Site Description:** The soil is primarily rocky Nordness silt loam on a steep West to South facing aspect. This is a droughty site.

**Woodland Description:** The forest classification is Central Hardwoods forest type. The overstory consists of 10 to 26 inch DBH red oak, white oak, bur oak, black oak, elm, hickory and hard maple. The understory layer is mostly ironwood, hard maple, musclewood and elm.

**Management System and Recommendations: (even-aged)**
To benefit wildlife, it would be good to maintain the oak-hickory community. Treatments will be needed to establish advanced regeneration of desirable species for the future stand. The shelterwood system could be employed to achieve this objective. The first step would be to harvest all merchantable trees of undesirable species (elm, bitternut, basswood, hackberry and hard maple). Additional trees will be harvested to reduce the canopy allowing plenty of sunlight to penetrate to the forest floor. Next, the shade tolerant understory species would also be felled. The stumps will be treated with an herbicide to prevent re-sprouting. We will then monitor the stand until sufficient natural oak regeneration develops. When that occurs, the overstory will be harvested to liberate the oak regeneration.

**Stand 7: 9.4 acres**

**Site Description:** The soil is Dorchester silt loam on fairly level terrain. Flash flooding and high water tables my be a problem here. The railroad tracks mark the South property line.

**Woodland Description:** The overstory consists of 4 to 10 inch DBH boxelder, white elm and cottonwood. The understory layer is mostly sapling sized boxelder.

**Management System and Recommendations: (Viewshed)**
It would be difficult to perform forest management activities here because of the uncertain impact of the frequent flash floods.

**Stand 8: 4.3 acres**

**Site Description:** This stand consists of two small retired crop fields. The soil is mapped as Dorchester silt loam on fairly level terrain. This area sees infrequent flash flooding.

**Woodland Description:** The ground cover is mostly cool season grasses like brome and blue grass.

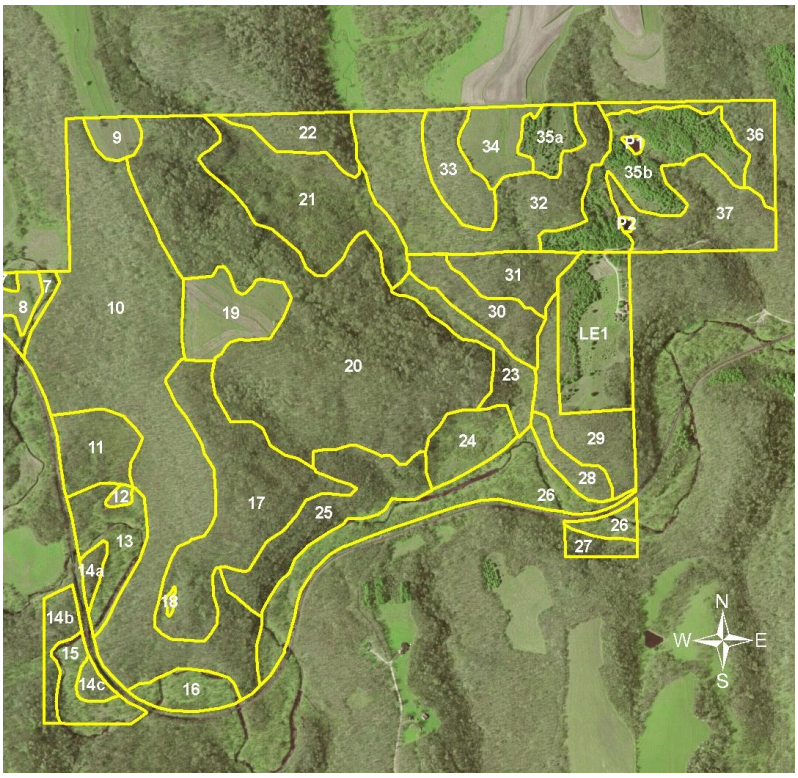
**Management System and Recommendations: (Viewshed)**
It would be beneficial for wildlife, especially forest interior birds, to convert this grassy opening to a cover of forest. Plant about 50 to 100 swamp white oak and bur oak per acre. Place a 5 foot tall tree shelter over each tree to protect from deer browsing. Control weeds for the first three growing seasons.

**Stand 9: 3.5 acres**

**Site Description:** This is a retired crop field. The soil is primarily Fayette and Dubuque silt loams on a ridge.

**Woodland Description:** The ground cover is mostly cool season grasses like brome and blue grass.

**Management System and Recommendations: (Early Successional)**
It would be beneficial for wildlife, especially forest interior birds and rough grouse, to convert this grassy opening to a forest cover. This can be accomplished by planting bareroot seedlings using a tree planting machine. This would take about 700 seedlings per acre. Species to plant would include lots of aspen with some oak and mixed native shrubs. Weeds would need to be controlled for the first 3 years.



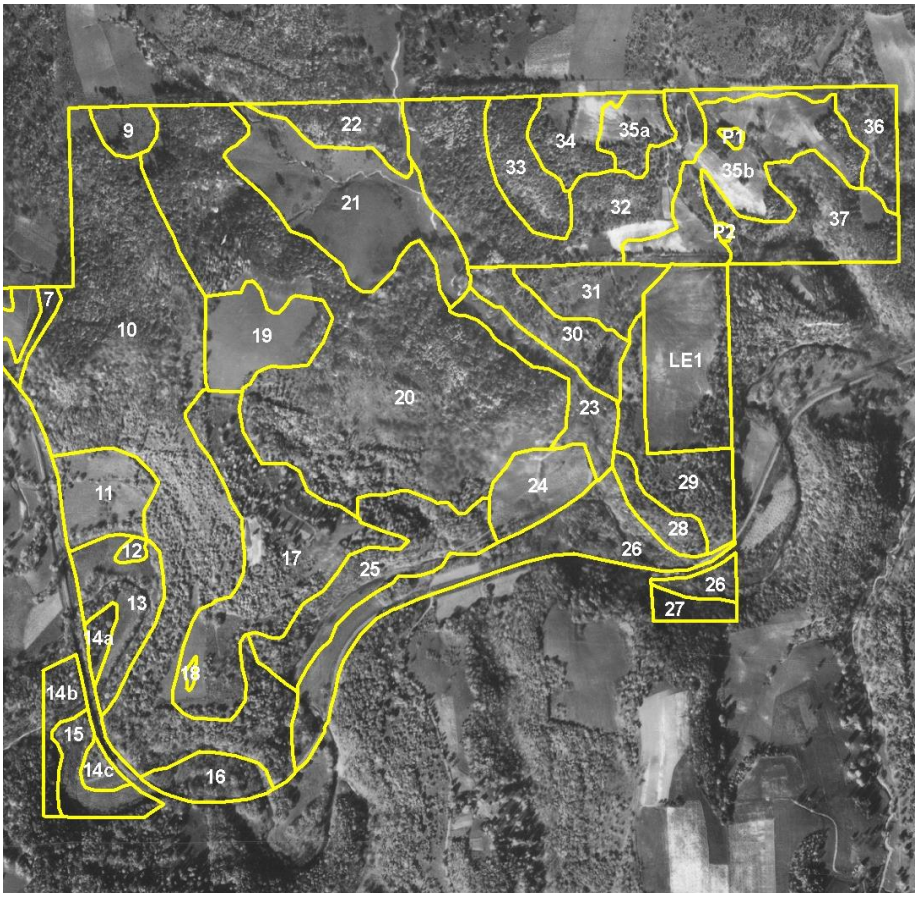
Satellite photo taken 2003

**Stand 10: 91.7 acres**

**Site Description:** This larger stand contains a mix of Nordness, Dubuque, and Fayette silt loams. The soils tend to transition from Fayette on flatter ground to Nordness on the steeper slopes. The stand is mostly west facing.

**Woodland Description:** The forest classification is Central Hardwoods. The overstory consists of 16 to 24 inch DBH red oak, white oak, hard maple, elm and ash. The understory layer is mostly ironwood, musclewood, hard maple, elm and bitternut hickory.

**Management System and Recommendations: (Even-aged)**
This stand has been dominated by oak for a very long time. It would be desirable to maintain this oak dominance for two reasons: 1) oak forests are dwindling in abundance throughout the region. 2) oak forests are very important to many wildlife species. The oaks in this stand are being gradually replaced by shade tolerant hard maple, basswood and ash. Management activities are intended to maintain the oak forest. This will be accomplished through a combination of treatments that will eliminate the less desirable species which, in turn, will favor the more desirable. This can be done through a combination of weed tree removal, prescribed fire, timber harvests and tree planting.




Aerial photo taken in the 1930's

**Stand 11: 10.2 acres**

**Site Description:** The soil is mapped as Dubuque silt loam on a gentle South facing aspect. This is an old field that was retired many years ago and has grown back to timber.

**Woodland Description:** The forest classification is Central Hardwoods forest type. The overstory consists of 4 to 14 inch DBH elm, walnut, bitternut hickory, aspen and scattered red, white and bur oak. The stand is even-aged with a sparse understory layer.

**Management System and Recommendations: (Even-aged)**
There are many desirable trees throughout this stand that are struggling from natural crowding. It would be desirable to identify the most desirable target trees and release them from canopy competition. This will improve diversity and vigor for the target trees. Select about 50 target trees per acre and release them so they are free to grow on all four sides. The priority of species to release includes: bur oak, white oak, red oak, walnut, black cherry and shagbark hickory.

**Stand 12: 0.7 acres**

**Site Description:** This is a small grassy opening. The soil is Dubuque silt loam.

**Woodland Description:** The cover is mixed cool season grasses and weedy perennials such as golden rods and mare's tall.

**Management System and Recommendations: (Viewshed)**
This small opening will be allowed to naturally convert to a forest cover. No treatment are necessary.

**Stand 13: 11.3 acres**
**Stand 15: 6.3 acres**
**Stand 16: 6.1 acres**

**Site Description:** These 3 stands are all very similar. The soil is primarily Dorchester silt loam on level terrain. These 3 stands are all in the flood plane and are prone to annual flash flooding events. Bloody Run trout stream runs through these stands. Access to these stand is difficult to reach with heavy equipment.

**Woodland Description:** The forest classification is Bottomland Hardwoods. The overstory consists of 8 to 16 inch DBH boxelder, cottonwood, white elm and willow. The understory layer is sparse.

**Management System and Recommendations: (Viewshed)**
It would be difficult to perform forest management activities here because of the uncertain impact of the frequent flash floods. No management treatments are current under consideration.

**Stand 14a: 1.8 acres**
**Stand 14b: 4.9 acres**
**Stand 14c: 1.9 acres**

**Site Description:** The soil is mostly rocky Nordness silt loam on narrow ridges. These 3 stands are very similar. Getting to these stands is difficult because the stream or railroad or private property bars good access.

**Woodland Description:** The forest classification is Central Hardwood forest type. The overstory consists of 10 to 18 in DBH mixed oak, hard maple, basswood and hickory.

**Management System and Recommendations: (Viewshed)**
Access will make it difficult to perform treatments on these 3 small stands. No management treatments are current under consideration.

**Stand 17: 34.7 acres**

**Site Description:** This stand contains a mix of Nordness, Dubuque, and Fayette silt loams. The soils tend to transition from Fayette on flatter ground to Nordness on the steeper slopes. This stand is a ridge that run to the South.

**Woodland Description:** The overstory consists of 14 to 22 inch aspen, red oak, white oak, ash, shagbark hickory and elm. The understory layer is mostly hard maple, ironwood, bitternut hickory and ash.

**Management System and Recommendations: (Early Successional)**
Thirty years ago, this stand consisted of dense sapling to pole-sized mixed hardwoods. Many of the trees were big-tooth aspen. At that time, the stand provided excellent habitat for game species like roughed grouse and American woodcock. This type of habitat is becoming scare throughout the area. Therefore, the objective for this stand is to create young woody habitat that was here 30 years ago. Patches of this stand will be clearcut harvested. This will stimulate lots of aspen root suckering and lots of mixed hardwood regeneration. Undesirable species will we kill at the same time including exotic species like honeysuckle.

**Stand 18: 0.3 acres**

**Site Description:** This small opening has Fayette silt loam soil on gentle west facing slope. This opening was much bigger years ago, but has been invaded by trees over time.

**Woodland Description:** This stand contains lots of brush. The species are mostly young aspen, wild plum, hawthorn and other shrubs.

**Management System and Recommendations: (Early Successional)**
This stand will be managed similar to Stand 17. This stand currently providing good early successional habitat. No treatments are needed at this time.

**Stand 19: 12.4 acres**

**Site Description:** This is another retired crop field right in the middle of a large block of forest. The soil is primarily Fayette silt loam on a gentle Southeast facing aspect.

**Woodland Description:** The ground cover is mostly cool season grasses like brome and blue grass.

**Management System and Recommendations: (Even-aged)**
It would benefit wildlife species, especially forest interior birds, to convert this opening to forest cover. This can be accomplished by planting bareroot seedlings using a tree planting machine. This would take about 700 seedlings per acre. Species to plant would include aspen, oak, hickory and some mixed native shrubs. Weeds would be controlled for the first 3 years to get the seedlings off to a good start.

**Stand 20: 96.3 acres**

**Site Description:** The soil is primarily Nordness silt loam on a generally East facing aspect.

**Woodland Description:** This stand has halfway transitioned from Central Hardwoods to Northern Hardwoods forest types. The overstory consists of 12 to 20 inch red oak, white oak, hard maple, white ash, elm and some aspen. The understory layer is mostly ironwood, hard maple, elm, and bitternut hickory.

**Management System and Recommendations: (Uneven-aged)**
The uneven-aged structure can be maintained indefinitely because of the tree species present. The best way to maintain the uneven-aged structure is to conduct periodic selective harvests where 1/3 of the overstory stems would be harvested on 20 year cutting cycles.

**Stand 21: 28.5 acres**

**Site Description:** The soil is mostly Dubuque silt loam on a Northeast facing slope. This was open pasture land about 30 years ago.

**Woodland Description:** The forest classification is Central Hardwoods forest type. The overstory consists of 6 to 10 inch elm, walnut, boxelder, black cherry, aspen, cottonwood and a few scattered oak. The understory layer is mostly boxelder, elm, ironwood, honeysuckle and wild plum.

**Management System and Recommendations: (Even-aged)**
Identify the most desirable target trees and release them from canopy competition. This will improve diversity and vigor for the target trees. Select about 50 target trees per acre and release them so they are free to grow on all four sides. The priority of species to release includes: bur oak, white oak, red oak, walnut, black cherry and shagbark hickory.

**Stand 22: 8.1 acres**

**Site Description:** The soil is primarily Nordness silt loam on a Southwest facing slope.

**Woodland Description:** The forest classification is Central Hardwoods. The overstory consists of 16 to 26 inch red oak, white oak, bur oak, hard maple, basswood, shagbark hickory and black walnut. The understory layer is mostly hard maple, ironwood and bitternut hickory.

**Management System and Recommendations: (Even-aged)**
To benefit wildlife, it would be good to maintain this area with desirable mast producing hardwoods such as oak and hickory. Treatments will be needed to establish oak/hickory regeneration in the understory for the future stand. The shelterwood system could be employed to achieve this objective. The first step would be to harvest all merchantable trees of undesirable species (elm, bitternut, basswood, hackberry and hard maple). Additional trees will be harvested to produce a canopy that will allow plenty of sunlight to penetrate to the forest floor. Next, the shade tolerant understory species would also be felled and have the stump treated with an herbicide to prevent re-sprouting. We will then monitor the stand until sufficient natural oak regeneration develops. At that time the overstory will be harvested to liberate the oak regeneration. Prescribed fire may be applied periodically to help improve conditions for establishment of oak regeneration.

**Stand 23: 9.1 acres**

**Site Description:** The soil is called Dorchester-Volney Complex silt loam at the base of a narrow drainage.

**Woodland Description:** The forest has transitioned into Northern Hardwoods forest. The overstory consists of 12 to 18 inch basswood, hard maple, hackberry, walnut, red oak, elm, black ash and white ash. The understory layer is mostly hard maple, basswood, ash and hackberry.

**Management System and Recommendations: (Uneven-aged)**
The uneven-aged structure can be maintained indefinitely because of the tree species present. The best way to maintain the uneven-aged structure is to conduct periodic selective harvests where 1/3 of the overstory stems would be harvested on 20 year cutting cycles.

**Stand 24: 8.7 acres**

**Site Description:** The soil is a mix of Fayette and Dorchester silt loams of gentle Southeast aspect. This was open pasture about 30 years ago that has largely succeeded to trees and shrubs.

**Woodland Description:** The trees are 1 to 10 diameter elm, aspen, boxelder and scattered mixed. There are plenty of shrubs including prickly ash, honeysuckle and wild plum. The scattered small opening are being gradually encroached by trees and brush.

**Management System and Recommendations: (Viewshed)**
This stand is filling-in with forest cover naturally. It could be helped along by planting some of the openings with early successional species, especially aspen.

**Stand 25: 18.8 acres**

**Site Description:** This is a rocky and steep South facing hillside.

**Woodland Description:** Scrub oak is the forest classification. The overstory consists of 8 to 20 inch bur, red, black, white and chinkapin oaks. Shagbark hickory, bitternut hickory, hard maple, basswood, elm and ash are more scattered. The understory layer is mostly ironwood, elm, bitternut hickory and hard maple.

**Management System and Recommendations: (Viewshed)**
Most of this stand is too difficult to walk on because of it's steepness. Periodic prescribed fire would help to maintain the oak dominance in this stand.

**Stand 26: 25.9 acres**

**Site Description:** The soil is primarily Dorchester silt loam in a bottomland. Bloody Run trout stream runs through this stand. The south boundary is the railroad tracks. This stand is prone to annual flash flooding.

**Woodland Description:** The forest classification is bottomland hardwoods. Most of the overstory consists of 4 to 12 inch boxelder. Other species are more scattered and include elm, cottonwood, willow and black walnut. The understory layer is nearly absent of tree regeneration because of flooding, heavy herbaceous competition and deer herbivory.

**Management System and Recommendations: (Viewshed)**
There is little incentive to perform forest management activities here because of the uncertain impact of flooding. It would be beneficial, however, to release the scattered walnuts and other desirable species (approximately 1 to 10 trees per acre) from canopy competition to improve their growth and survival.

**Stand 27: 2.8 acres**

**Site Description:** This is a rocky steep slope with very thin soil. It is located across the stream and track from the main part of the property.

**Woodland Description:** The forest classification is Central Hardwoods midway succeeding to Northern Hardwoods. The overstory consists of 8 to 16 inch hard maple, mixed oak, basswood, bitternut hickory and other mixed hardwoods.

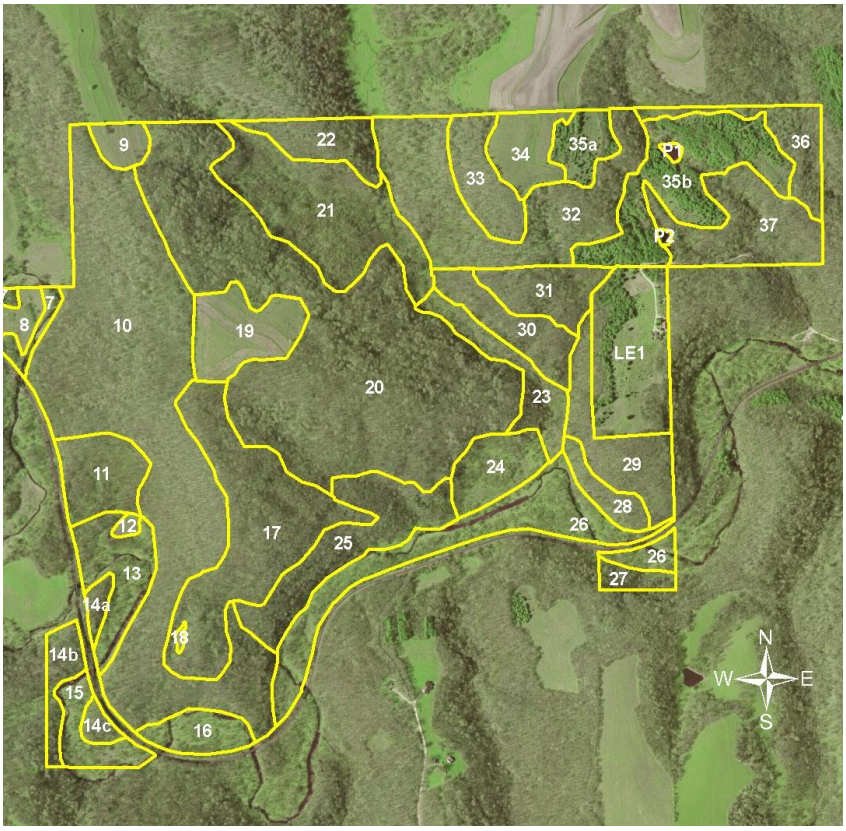
**Management System and Recommendations: (Viewshed)**
This small stand is landlocked with poor access. No treatments are suggested.

**Stand 28: 4.2 acres**

**Site Description:** This site is very steep with prominent rock outcroppings. The thin soil and steep Southwest aspect makes this stand very droughty. There is a rock outcropping providing a beautiful overlook of the valley near the top of the slope.

**Woodland Description:** The forest classification is scrub oak. The overstory consists of 6 to 16 inch black oak, bur oak and white oak. The understory layer is diverse with lots of shrubs, scrubby trees and native prairie species.

**Management System and Recommendations: (Viewshed)**
Most of the slope is too steep to walk over. Prescribed fire can be applied periodically to maintain the this interesting savanna-like community.



**Stand 29: 13 acres**

**Site Description:** The soil is a mix of Dubuque and rocky Nordness silt loams. The aspect is south to west facing. There are some small pockets of oak wilt disease in this stand.

**Woodland Description:** The forest classification is Central Hardwoods. Most of the overstory is 12 to 16 inch black oak. Other species includes walnut, elm and hickory. The understory layer is mostly ironwood, ash, elm, basswood, bitternut hickory and aspen. There is also a lot of prickly ash.

**Management System and Recommendations: (Viewshed)**
Oak wilt disease can spread and cause a lot of mortality of healthy trees. This disease can be controlled with cultural practices. Prescribed fire will also be used to control understory vegetation and will favor oak regeneration.

**Stand 30: 9.6 acres**

**Site Description:** The soil is rocky Nordness silt loam on a dry Southwest facing slope. There are some prominent rock outcroppings throughout.

**Woodland Description:** The forest classification is Central Hardwoods forest type. The overstory consists of 12 to 18 inch red oak, black oak, white oak, hard maple and basswood. The understory layer is elm, ironwood, bitternut hickory and hard maple.

**Management System and Recommendations: (Even-aged)**
This stand will be managed to maintain the abundance of oak. Prescribed fire will used to manipulate the understory to favor desirable species such as oak and hickory. Some trees will need to be harvested and undesirable weed trees felled to increase sunlight penetration to the ground. Oak will not regenerate without these treatments.

**Stand 31: 9 acres**

**Site Description:** The soil is primarily Dubuque silt loam on gentle south facing slope. There is some limited oak wilt in this stand.

**Woodland Description:** The forest classification is Central Hardwoods. The overstory consists of 16 to 26 inch red oak, black oak, white oak and aspen. The understory layer is shade tolerant species like hard maple, ironwood, elm, bitternut hickory and basswood.

**Management System and Recommendations: (Early Successional)**
The abundance of aspen and the many trees approaching maturity makes this a good stand to develop as early successional forest. This area would be clearcut in stages to stimulate dense young forest.

**Stand 32: 33.3 acres**

**Site Description:** The soil is a mix of Dubuque and Nordness silt loams on West, South and East facing slopes. This stand was recently purchased. Trees were selectively harvested around 1992 to salvage storm damage. A few scattered trees were also harvested a couple of years ago.

**Woodland Description:** Central Hardwoods is the forest classification. The overstory consists of 12 to 18 inch red oak, white oak, shagbark hickory, hard maple and basswood. The understory layer is mostly ironwood, elm, bitternut hickory, hard maple and basswood.

**Management System and Recommendations: (Even-aged)**
To benefit wildlife, activities will be directed to maintain desirable mast producing hardwoods especially oak and hickory. Prescribed fire may be applied periodically to help improve conditions for the establishment of oak regeneration. Sections will be clearcut harvested followed up with planting oak seedlings and protecting them with tree shelters.

**Stand 33: 9.4 acres**

**Site Description:** The soil is rocky Nordness silt loam on a west facing aspect. The soil is thin and droughty. The tree appear to be growing quite slowly.

**Woodland Description:** Scrub Oak is the forest classification. The dense overstory consists of 10 to 16 inch red oak, bur oak, black oak and shagbark hickory. The trees appear slow growing. The understory layer is shade tolerant ironwood, elm, bitternut hickory and hard maple.

**Management System and Recommendations: (Viewshed)**
This stand should be maintained as an oak forest. An occasional prescribed fire will help to maintain this oak stand.

**Stand 34: 7.9 acres**

**Site Description:** The two main soil types here are Fayette and Dubuque silt loams on gently sloping terrain. This was an working Christmas tree farm that has been abandoned. A portion of the stand is open ground.

**Woodland Description:** Most of the trees are 2 to 6 inch diameter scotch pine.

**Management System and Recommendations: (Even-aged)**
These trees are providing good thermal cover for many species of wildlife.

**Stand 35a: 5.8 acres**
**Stand 35b: 23.9 acres**

**Site Description:** The soil is primarily Dubuque and Fayette silt loams on gentle East facing slopes. These two stands are older pine plantations.

**Woodland Description:** The overstory consists of 8 to 16 inch Scotch Pine, white pine, red pine and Norway spruce. The understory layer is mixed hardwoods and shrubs. The shrubs include many exotics including buckthorn, honeysuckle and Autumn olive. There are health issues with some of the species. The red pine have stagnated. This makes they susceptible to insect and disease attacks. The Scotch pine are prone to infestation by ips beetle. This beetle is the vector for pine wilt nematodes with can rapidly kill the trees.

**Management System and Recommendations: (Viewshed)**
The pines provide some diversity. Pine provide good thermal cover and roost sites wildlife. The red pine should be thinned to improve their health. Additionally, hardwood encroachment from less desirable species like elm and ash should be controlled. Some harvest thinning and crop tree release work could be conducted to achieve forest health objectives.

**Stand 36: 8.5 acres**

**Site Description:** The soil is a mix of Dubuque and Fayette silt loams on a steep East aspect.

**Woodland Description:** Central Hardwoods is the forest classification. The overstory consists of 16 to 22 inch red oak, white oak, basswood, bitternut hickory and hard maple. The understory layer is mostly hard maple, ironwood, elm, ash and bitternut hickory.

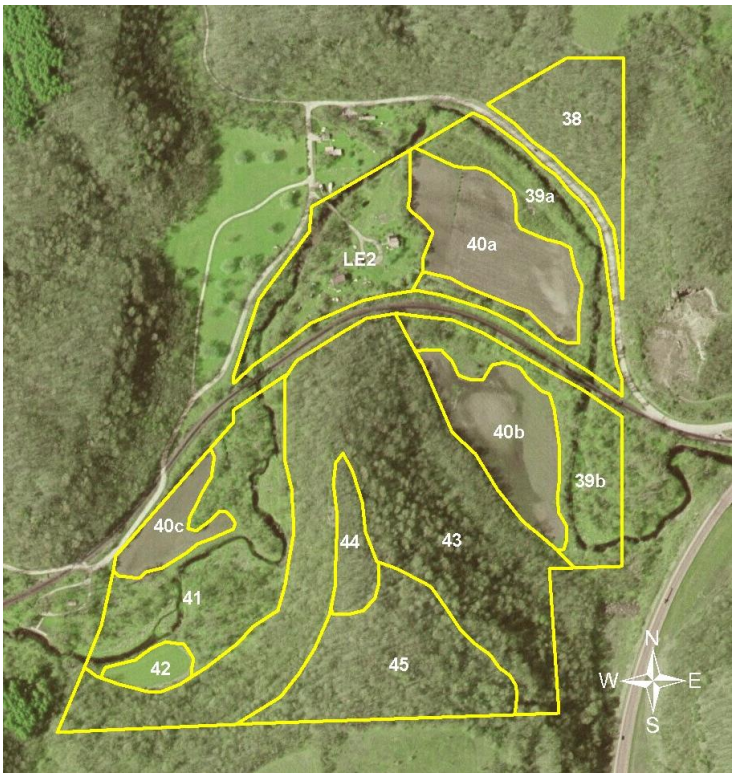
**Management System and Recommendations: (Uneven-aged)**
This stand will be allowed to slowly convert Northern Hardwoods forest type. Trees will be harvested on 20 year cutting cycles. Timber stand improvement work will be done following the harvests to improve timber quality.

**Stand 37: 17.6 acres**

**Site Description:** This is a highly diverse stand due to it's unique disturbance history. The soils are mostly Dubuque and Nordness silt loams on a generally south facing aspect.

**Woodland Description:** The overstory is highly diverse with 10 to 20 inch bur oak, black oak, red oak, white oak, aspen, elm and hard maple. The understory layer is mostly hard maple, ironwood, bitternut hickory and ash.

**Management System and Recommendations: (Uneven-aged)**
This stand will be allowed to slowly convert Northern Hardwoods forest type. Trees will be harvested on 20 year cutting cycles. Timber stand improvement work will be done following the harvests to improve timber quality. Additionally, prescribed fire may be implemented to modify the understory to benefit the stand.




Aerial photo taken in the 1930's

**Stand 38: 4.8 acres**

**Site Description:** The soil is mostly rocky Nordness silt loam on a steep and dry Southwest aspect.

**Woodland Description:** The forest classification is Scrub Oak forest type. The overstory consists of mixed oaks and hickory. Shade tolerant hardwoods are encroaching. The understory is shrubby.

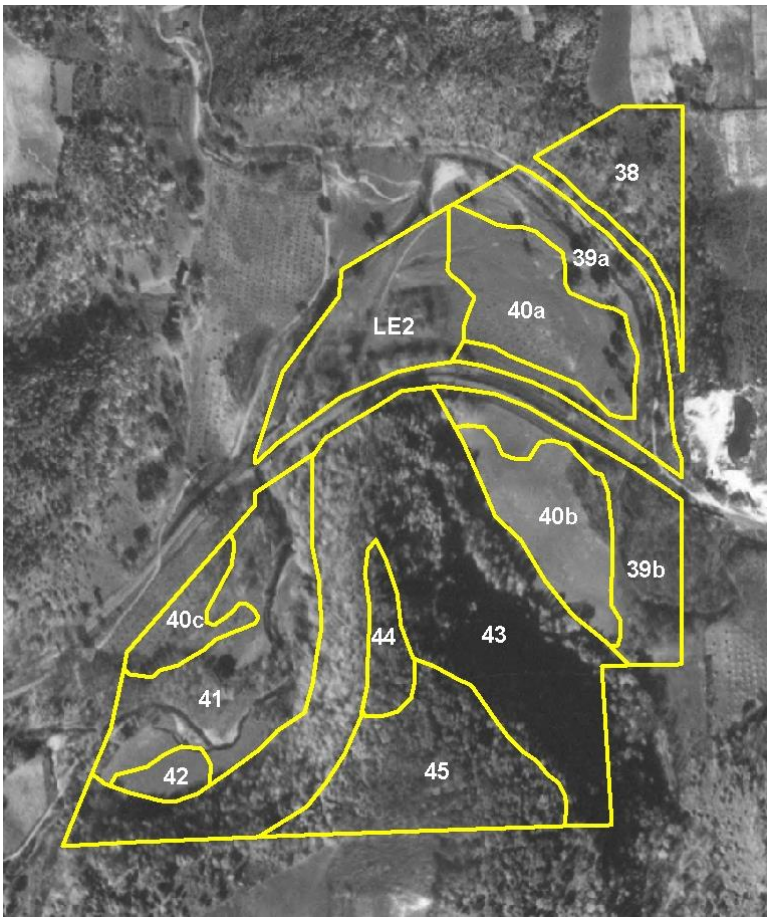
**Management System and Recommendations: (Viewshed)**
Management activities will be geared toward maintaining the current oak community. This can be done with periodic prescribed fire. No other activities are planned for now.

**Stand 39a: 6.2 acres**
**Stand 39b: 5.9 acres**
**Stand 41: 10.6 acres**

**Site Description:** These 3 similar stands are in the flood plain of Bloody Run trout stream. The soil is primarily Dorchester silt loam on level terrain. Flash flooding is a serious problem.

**Woodland Description:** The forest classification is Bottomland Hardwoods. The overstory consists of 6 to 36 inch boxelder, willow, cottonwood and white elm. Oak, walnut and other species are widely scattered. The understory layer is nearly absent due to flood scouring, heavy herbaceous competition and deer browsing.

**Management System and Recommendations: (Viewshed)**
There is little incentive to perform forest management activities here because of the uncertain impact of flooding. It would be beneficial, however, to release the scattered walnuts and other desirable species approximately 1 to 10 trees per acre from canopy competition to improve their growth and survival.



Aerial photo taken in the 1930's

**Stand 40a: 6.6 acres**
**Stand 40b: 5.4 acres**
**Stand 40c: 2.2 acres**

**Site Description:** These 3 stands were in crop production until a few years ago. Damage from repeated floods has limited the ability continue farming these fields. They have been retired as a result. The soil is mapped as rich Dorchester silt loam.

**Woodland Description:** Sapling sized cottonwood, willow and boxelder have naturally seeded-in to varying degrees on all of these fields. The small openings have seeded in to weeds.

**Management System and Recommendations: (Viewshed)**
The cottonwood and willow have a strong foothold in these fields. It would probably be best to just let these trees continue developing as they are highly suited to the flooding. The small opening could be planted with mast producing hardwoods such as bur oak and swamp white oak.

**Stand 42: 1.1 acres**

**Site Description:** This is another small crop field that was retired a number of years ago. Seedling oak were planted throughout. Many of these tree have not survived due to flooding and deer browsing. The remaining survivors have been cover with wire cages to protect them from deer. The soil is all Dorchester silt loam.

**Management System and Recommendations: (Viewshed)**
The wire tree shelters are definitely helping the trees to develop. An additional 100 bur oak and swamp white oak seedlings will be added and protected with 5 foot tall tree shelters. Weeds will be controlled for three growing seasons to get them off to a good start.

**Stand 43: 26.6 acres**

**Site Description:** This is a very interesting stand. It contains a prominent vertical limestone outcropping approximately 1000 feet in length. This vertical wall contains a unique plant community. The soil is primarily rocky Nordness silt loam.

**Woodland Description:** The overstory consists of 10 to 20 inch hard maple, basswood, ash, bur oak, chinkapin oak, red oak, elm and hackberry. This is a rather uncommon group of species. The understory layer is mostly hard maple, ash, ironwood, bitternut hickory, hackberry and shrubs like gray dogwood and bladdernut.

Photo of the prominent rock outcropping. The top edge of the outcropping is the boundary between Stands 43 & 44.

**Management System and Recommendations: (Viewshed)**
The rock outcropping is very picturesque. Management treatments will be limited to releasing the important trees such as the chinkapin and bur oaks.

**Stand 44: 1.9 acres**

**Site Description:** This is a small stand of scrub oak at the top of the prominent outcropping that was described in Stand 43. The soils quite thin. There is a small native prairie remnant with an excellent view of the valley at the top of the cliff.

**Woodland Description:** The overstory consists of 8 to 16 inch chinkapin, bur, black, white and red oaks. There are also some scattered shagbark hickory. The understory contains mostly ironwood and elm.

**Management System and Recommendations: (Viewshed)**
The thin soil helps to maintain this as an oak stand. Only an occasional prescribed fire is all that is needs to maintain this stand.

**Stand 45: 8.8 acres**

**Site Description:** The soil is primarily Dubuque silt loam on a gradual North facing aspect. This stand is fairly even-aged.

**Woodland Description:** The forest classification is Central Hardwoods forest type. The overstory consists of 14 to 20 inch aspen, red oak, hard maple and other mixed hardwoods (cherry, shagbark, ash, hackberry, basswood, elm and bitternut). The understory consists of anything shade tolerant such as white ash, black ash, hackberry, ironwood, musclewood, hard maple, basswood, white elm, red elm and bitternut hickory).

**Management System and Recommendations: (Early Successional)**
The abundance of aspen and the many trees approaching maturity makes this a good stand to develop as early successional forest. This area would be clearcut in stages to stimulate dense young forest.

**Stand P1: 0.4 acres**
**Stand P2: 0.3 acres**

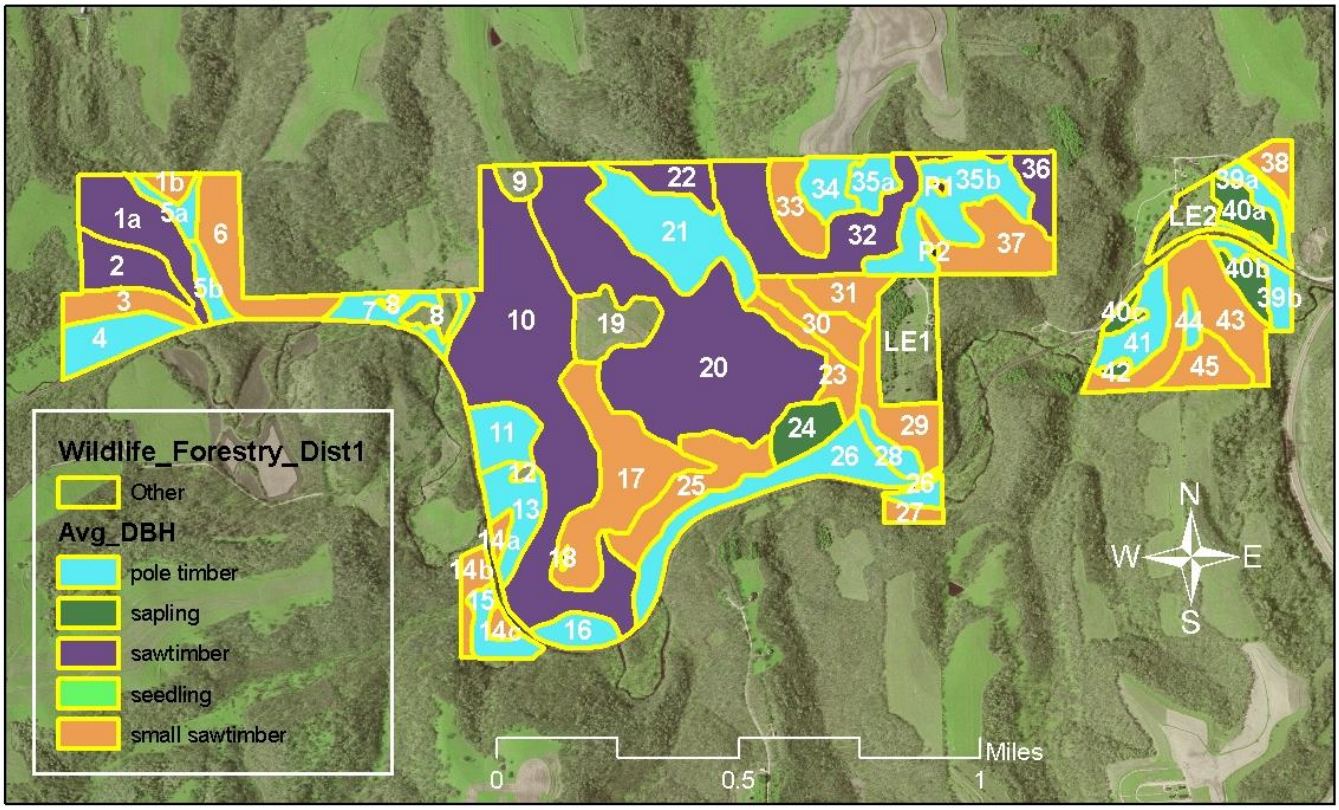
**Site Description:** These two stands are small ponds. They will be maintained to provide water and habitat for aquatic wildlife.

**Stand LE1: 20.4 acres**
**Stand LE2: 7 acres**

**Site Description:** These two areas are lands owned by the DNR under a life estate agreement.

APPENDIX

## Size Class of the Average Overstory Tree



## Table 1: SUMMARY OF WOODLAND STANDS

| Stand | Acres | Timber Type | Size Class | Management System | Prescription | Prescription Implementation Year | Comments |
|---|---|---|---|---|---|---|---|
| 1a | 19.6 | northern hardwoods | sawtimber | uneven aged | selective harvest | 2013 | hard maple dominated |
| 1b | 2.9 | northern hardwoods | sawtimber | uneven aged | selective harvest | 2018 | hard maple dominated |
| 2 | 12.1 | central hardwoods | sawtimber | even aged | clearcut | 2008 | mature oak |
| 2 | 12.1 | central hardwoods | sawtimber | even aged | weed tree removal | 2009 | post harvest work |
| 2 | 12.1 | central hardwoods | seedling | even aged | seedling planting w/ shelters | 2010 | |
| 3 | 9.3 | scrub oak | small sawtimber | viewshed | weed tree removal | 2010 | pre-burn treatment |
| 3 | 9.3 | scrub oak | small sawtimber | viewshed | prescribed fire | 2011 | |
| 4 | 12.2 | bottomland hardwoods | pole timber | viewshed | crop tree release | 2010 | release scattered walnuts |
| 5a | 4.3 | central hardwoods | pole timber | even aged | crop tree release | 2010 | |
| 5b | 4 | bottomland hardwoods | pole timber | viewshed | | | |
| 6 | 19.4 | central hardwoods | small sawtimber | even aged | shelterwood harvest | 2018 | first selective cut for oak regeneration |
| 6 | 19.4 | central hardwoods | small sawtimber | even aged | weed tree removal | 2010 | |
| 6 | 19.4 | central hardwoods | small sawtimber | even aged | prescribed fire | 2011 | |
| 7 | 9.4 | bottomland hardwoods | pole timber | viewshed | | | flood prone |
| 8 | 4.3 | retired field | open | viewshed | seedling planting w/ shelters | 2010 | open ground |
| 8 | 4.3 | retired field | seedling | viewshed | weed control | 2011 | |
| 8 | 4.3 | retired field | seedling | viewshed | weed control | 2012 | |
| 9 | 3.5 | retired field | open | early successional | seedling planting w/ shelters | 2011 | plant aspen, oak and shrubs |
| 9 | 3.5 | retired field | seedling | early successional | weed control | 2011 | |
| 9 | 3.5 | retired field | seedling | early successional | weed control | 2011 | |
| 9 | 3.5 | retired field | open | early successional | edge feathering | 2010 | |
| 10 | 91.7 | central hardwoods | sawtimber | even aged | partial harvest | 2008 | |
| 10 | 91.7 | central hardwoods | pole timber | even aged | weed tree removal | 2009 | |
| 10 | 91.7 | central hardwoods | seedling | even aged | seedling planting w/ shelters | 2010 | |
| 11 | 10.2 | central hardwoods | pole timber | even aged | crop tree release | 2008 | |
| 12 | 0.7 | retired field | open | viewshed | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 13 | 11.3 | bottomland hardwoods | pole timber | viewshed | | | flood prone |
| 14a | 1.8 | central hardwoods | small sawtimber | viewshed | | | |
| 14b | 4.9 | central hardwoods | small sawtimber | viewshed | | | |
| 14c | 1.9 | central hardwoods | small sawtimber | viewshed | | | |
| 15 | 6.3 | bottomland hardwoods | pole timber | viewshed | | | flood prone |
| 16 | 6.1 | bottomland hardwoods | pole timber | viewshed | | | flood prone |
| 17 | 34.7 | central hardwoods | small sawtimber | early successional | clearcut | 2008 | lots of aspen |
| 17 | 34.7 | central hardwoods | small sawtimber | early successional | site prep for natural regen. | 2009 | lots of aspen |
| 18 | 0.3 | central hardwoods | sapling | early successional | | | |
| 19 | 12.4 | retired field | open | even aged | seedling planting | 2009 | |
| 19 | 12.4 | retired field | seedling | even aged | weed control | 2010 | |
| 19 | 12.4 | retired field | seedling | even aged | weed control | 2010 | |
| 19 | 12.4 | retired field | open | even aged | edge feathering | 2009 | |
| 20 | 96.3 | central hardwoods | sawtimber | uneven aged | selective harvest | 2013 | |
| 20 | 96.3 | central hardwoods | sawtimber | uneven aged | site prep for natural regen. | 2014 | |
| 21 | 28.5 | central hardwoods | pole timber | even aged | crop tree release | 2011 | |
| 22 | 8.1 | central hardwoods | sawtimber | even aged | weed tree | 2010 | |
| 22 | 8.1 | central hardwoods | sawtimber | even aged | prescribed fire | 2011 | |
| 23 | 9.1 | northern hardwoods | small sawtimber | uneven aged | | | |
| 24 | 8.7 | central hardwoods | sapling | viewshed | vine removal | 2014 | |
| 25 | 18.8 | scrub oak | small sawtimber | viewshed | | | |
| 26 | 25.9 | bottomland hardwoods | pole timber | viewshed | crop tree release | 2015 | flood prone |
| 27 | 2.8 | central hardwoods | small sawtimber | viewshed | | | |
| 28 | 4.5 | scrub oak | pole timber | viewshed | weed tree | 2010 | |
| 28 | 4.5 | scrub oak | pole timber | viewshed | prescribed fire | 2011 | |
| 29 | 13 | mixed oak | small sawtimber | viewshed | weed tree | 2010 | |
| 29 | 13 | mixed oak | small sawtimber | viewshed | prescribed fire | 2011 | |
| 30 | 9.6 | central hardwoods | small sawtimber | even aged | prescribed fire | 2011 | |
| 31 | 9 | central hardwoods | small sawtimber | early successional | clearcut | 2010 | |
| 31 | 9 | central hardwoods | small sawtimber | early successional | site prep for natural regen. | 2011 | |
| 32 | 33.3 | central hardwoods | sawtimber | even aged | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 33 | 9.4 | mixed oak | small sawtimber | viewshed | | | |
| 34 | 13.7 | conifers | pole timber | even aged | crop tree release | 2012 | |
| 35 | 23.9 | conifers | pole timber | viewshed | tree shelters | 2009 | |
| 36 | 8.5 | central hardwoods | sawtimber | viewshed | selective harvest | 2012 | |
| 36 | 8.5 | central hardwoods | sawtimber | viewshed | site prep for natural regen. | 2012 | |
| 37 | 17.6 | central hardwoods | small sawtimber | uneven aged | | | |
| 38 | 4.8 | scrub oak | small sawtimber | viewshed | prescribed fire | 2010 | |
| 39a | 6.2 | bottomland hardwoods | pole timber | viewshed | | | flood prone |
| 39b | 5.9 | bottomland hardwoods | pole timber | viewshed | | | flood prone |
| 40a | 6.6 | retired field | sapling | viewshed | seedling planting w/ shelters | 2009 | flood prone |
| 40b | 5.4 | retired field | sapling | viewshed | seedling planting w/ shelters | 2009 | flood prone |
| 40c | 2.2 | retired field | sapling | viewshed | seedling planting w/ shelters | 2009 | flood prone |
| 40a | 6.6 | retired field | sapling | viewshed | weed control | 2009 | flood prone |
| 40b | 5.4 | retired field | sapling | viewshed | weed control | 2009 | flood prone |
| 40c | 2.2 | retired field | sapling | viewshed | weed control | 2009 | flood prone |
| 41 | 10.6 | bottomland hardwoods | pole timber | viewshed | crop tree release | 2012 | flood prone |
| 42 | 1.1 | retired field | sapling | viewshed | seedling planting w/ shelters | 2009 | flood prone |
| 42 | 1.1 | retired field | sapling | viewshed | weed control | 2010 | flood prone |
| 43 | 26.6 | central hardwoods | small sawtimber | viewshed | crop tree release | 2014 | |
| 44 | 1.9 | scrub oak | pole timber | viewshed | prescribed fire | 2009 | |
| 45 | 8.8 | central hardwoods | small sawtimber | early successional | clearcut | 2009 | |
| 45 | 8.8 | central hardwoods | small sawtimber | early successional | site prep for natural regen. | 2010 | |

**Table 2. Forest Breeding Birds of Greatest Conservation Need in NE Iowa**

| Common Name | Scientific Name |
|---|---|
| Bald eagle | *Haliaeetus leucocephalus* |
| Red-shouldered hawk | *Buteo lineatus* |
| Broad-winged hawk | *Buteo platypterus* |
| Peregrine falcon | *Falco peregrinus* |
| Ruffed grouse | *Bonasa umbellus* |
| American woodcock | *Scolopax minor* |
| Black-billed cuckoo | *Coccyzus erythropthalmus* |
| Yellow-billed cuckoo | *Coccyzus americanus* |
| Long-eared owl | *Asio otus* |
| Whip-poor-will | *Caprimulgus vociferus* |
| Red-headed woodpecker | *Melanerpes erythrocephalus* |
| Acadian flycatcher | *Empidonax virescens* |
| Willow flycatcher | *Empidonax traillii* |
| Least flycatcher | *Empidonax minimus* |
| Brown creeper | *Certhia americana* |
| Veery | *Catharus fuscescens* |
| Wood thrush | *Hylocichla mustelina* |
| Blue-winged warbler | *Vermivora pinus* |
| Cerulean warbler | *Dendroica cerulea* |
| Black-and-white warbler | *Mniotilta varia* |
| Prothonotary warbler | *Protonotaria citrea* |
| Worm-eating warbler | *Helmitheros vermivorus* |
| Louisiana waterthrush | *Seiurus motacilla* |
| Kentucky warbler | *Oporornis formosus* |
| Hooded warbler | *Wilsonia citrina* |
| Eastern towhee | *Pipilo erythrophthalmus* |

**Table 3. Forest Migratory Birds of Greatest Conservation Need in NE Iowa**

| Common Name | Scientific Name |
|---|---|
| Golden-winged warbler | *Vermivora chrysoptera* |
| Canada warbler | *Wilsonia canadensis* |

## Table 4. Forest Mammals of Greatest Conservation Need in NE Iowa

| Common Name | Scientific Name |
|---|---|
| Northern myotis | *Myotis septentrionalis* |
| Red squirrel | *Tamiasciurus hudsonicus* |
| Woodland vole | *Microtus pinetorum* |
| Spotted skunk | *Spilogale putorius* |
| Southern Flying Squirrel | *Glaucomys volans* |

## Table 5. Forest Reptiles and Amphibians of Greatest Conservation Need in NE Iowa

| Common Name | Scientific Name |
|---|---|
| Cricket Frog | *Acris crepitans* |
| Northern Prairie Skink | *Eumeces septentrionalis* |
| Bullsnake | *Pituophis catenifer sayi* |
| Timber Rattlesnake | *Crotalus horridus* |

## Table 6. Forest Land Snails of Greatest Conservation Need in NE Iowa (Restricted to Algific Talus Slopes and Maderate Slopes)

| Common Name | Scientific Name |
|---|---|
| Iowa Pleistocene Snail | *Discus macclintocki* |
| Frigid Ambersnail | *Catinella gelida* |
| Minnesota Pleistocene Succinea | *Novasuccinea n. Sp. Minnesota a* |
| Iowa Pleistocene Succinea | *Novasuccinea n. Sp. Minnesota b* |
| Briarton Pleistocene Snail | *Vertigo brierensis* |
| Hubricht's Vertigo | *Vertigo hubrichti* |
| Iowa Pleistocene Vertigo | *Vertigo iowaensis* |
| Bluff Vertigo | *Vertigo occulta* |

## Table 7. Forest Butterflies of Greatest Conservation Need in NE Iowa

| Common Name | Scientific Name |
|---|---|
| Pepper and Salt Skipper | *Amblyscirtes hegon* |
| Sleepy Duskywing | *Erynnis brizo* |
| Dreamy Duskywing | *Erynnis icelus* |
| Columbine Duskywing | *Erynnis lucilius* |
| Silvery Blue | *Glaucopsyche lygdamus* |
| Hickory Hairstreak | *Satyrium caryaevorum* |
| Edward's Hairstreak | *Satyrium edwardsii* |
| Striped Hairstreak | *Satyrium liparops* |

## FWSP DEFINITIONS AND GUIDING FACTORS

***Upland Forest Wildlife –*** Representative tree species include oak, hickory, hard maple, cherry, elm, walnut, ash, and red cedar. This habitat factor will provide habitat for wildlife such as ruffed grouse, woodcock, songbirds and woodpeckers, deer, turkey, raptors, owls, squirrels, and associated furbearing predators.

***Floodplain Forest Wildlife*** –Characterized by species such as silver maple, cottonwood, walnut, green ash, elm, hackberry and willows. This habitat factor will benefit wildlife such as songbirds and woodpeckers, furbearers, raptors, reptiles and amphibians on relatively level areas inundated by water from time to time.

***Woodland Edge*** – An area of habitat transition that consists of vegetation (herbaceous and woody) of different heights and densities. This habitat factor will favor early successional vegetation for wildlife benefiting from edge cover.

***Conifer/Wildlife Plantation*** – A conifer or tree/shrub planting designed for wildlife habitat. This habitat factor will provide nesting sites, food and cover for wildlife. Conifers are also important to wildlife during the winter providing thermal benefits and areas of decreased snow depths.

***Restoration*** – A new planting of seedlings, direct seeding, or regeneration of roots. This habitat factor will create new forest habitat that will be of higher quality for wildlife.

***Conversion*** – An existing shade tolerant forest stand converted to nut and fruit bearing species of trees and shrubs to provide more food and cover. This habitat factor is a timber stand improvement increasing the forest quality. It will begin forest succession from early stages to old growth.

***Riparian Buffer*** – Woodland next to streams, lakes, and wetlands that is managed to enhance and protect aquatic resources from adjacent fields. This habitat factor will provide a woody cover buffer to enhance soil and water conservation while providing wildlife habitat.

***Old Growth*** – Natural forests that have developed over a long period of time, generally at least 120 years, without experiencing severe, stand-replacing disturbance---a fire, windstorm, or logging. This habitat factor will provide necessary wildlife habitat for species requiring mature woodlands.

***Viewshed*** – A physiographic area composed of land, water, biotic, and cultural elements which may be viewed from one or more viewpoints and which has inherent scenic qualities and/or aesthetic values as determined by those who view it. Viewshed's are a habitat factor that will be primarily a "hands-off" area for aesthetics, proper soil and water conservation, along with providing special wildlife habitats.

***Unique Natural Sites*** – Sites that contain unusual or rare natural components that should be preserved for their unique characteristics, such as algific slopes. This habitat factor will identify these uncommon sites for management considerations.

***Preserve Status*** – An area of land or water formally dedicated for maintenance as nearly as possible in its natural condition though it need not be completely primeval in character at the time of dedication or an area which has floral, fauna, geological, archeological, scenic, or historic features of scientific or educational value. This habitat factor will recognize the quality of preserve sites and apply proper maintenance to protect its integrity.

***Recreation*** –Leisure activities involving the enjoyment and use of natural resources. This habitat factor will favor hunting activities while taking into consideration secondary activities such as wildlife watching, mushroom picking, photography, and hiking.

***Special Restrictions*** – Certain limitations or conditions on the use or enjoyment of a natural resource area. This habitat factor will take into consideration these limitations or conditions to select proper management.

# EXPLANATION OF TIMBER MANAGEMENT PRACTICES

***Timber stand improvement (TSI) –*** This is the removal of undesirable or low value trees. Removing these unwanted trees will provide more space and sunlight for desirable trees to grow. Timber stand improvement is a "weeding" to increase the growth of your forest.

***Weed Tree Removal -*** In older timber, the undesirable species can be killed to encourage the natural reseeding of desirable species. The removal of the "weed" trees allows sunlight to reach the ground so that seedlings can become established. The undesirable species can be killed standing by cutting flaps in the trunk and applying Tordon RTU or Pathway into the cuts. The cuts must be in a circle around the trunk and overlapping. The trees can also be cut off and the stumps treated with Tordon RTU or Pathway to prevent resprouting. Wet the outer rim of freshly cut stumps. The work can be done anytime except spring during heavy sap flow.

Desirable trees that are poor formed or damaged should also be removed. These trees should not be treated with herbicide. The stumps will resprout and produce another tree. Cut the stumps close to the ground so that the sprout will originate near the ground.

***Crop-Tree Release -*** In pole-sized stands (4-10" dia.), potential crop trees can be selected and released. At maturity, there is room for 35-50 trees per acre. Now you can select the trees you want to comprise your future stand of mature trees and thin around them to give them more growing space. Select a crop tree every 30-35 ft. apart. Remove trees with crowns that are touching or overtopping the crowns of your crop trees. Crop trees can be selected based on criteria that meets your objectives. Normally, the crop trees will be a desirable species, show good form without large side limbs, and be free of major defects. Species normally favored are black walnut, red oak, white oak, white ash, basswood, cherry, and hard maple.

***Walnut Pruning -*** Walnut trees that are 2-12" in diameter can be pruned to promote veneer quality trees. You should prune during the dormant season. Limbs less than 1 inch in diameter are providing foliage which produces food for the tree and should be left. When the limbs approach 1 1/2 to 2" in diameter, they should be removed. Do not remove over 1/3 of the live crown in any one year. At least 50% of the total height of the tree should be maintained in live crown.

***Uneven-Age Management -*** Uneven-age management can be implemented to manage shade tolerant species. The timber is selectively harvested to remove mature, damaged, and defective trees. Because large trees are always present in the timber, only species that can grow in the shade can reproduce. Hard maple and basswood can be managed on an uneven-age system of management. Uneven-age management involves maintaining a good distribution of all tree sizes in your timber. It is critical that following a selective harvest, the smaller trees are thinned to remove the trees damaged by logging, poor formed trees, and low value species. The thinning following the harvest insures that you have high quality trees ready to replace the older trees as they are harvested.

***Even-Age Management -*** Even-age management involves a clearcut at some point in the stands rotation. Clearcutting creates full sunlight to the ground. All trees 2" and larger in diameter are felled. Oak, ash, hickory, and walnut require full sunlight to grow. Even-age management must be applied to successively manage these species. Clearcutting creates stands of trees all the same age. The trees compete equally for sunlight and are forced to grow straight and tall, resulting in high quality timber. Clearcutting also provides excellent browse and cover for wildlife.

***Shelterwood -*** Shelterwood is a form of even-age management. The final cut is a clearcut, but several thinnings are done prior to the final cut. The large, healthy trees are left to provide seed for naturally reseeding the stand, and to create partial shade to inhibit the growth of weeds and brush until the desirable seedlings are well established. The final cut or clearcut is normally done when there are a sufficient number of desirable trees that are 3-5 ft. tall.

The first thinning can be a killing of the undesirable species such as ironwood, elm, bitternut hickory, and boxelder. This removes the seed source for the undesirable species and opens up the ground to sunlight.

The mature and defective trees can be harvested if additional sunlight is needed for the development of desirable seedlings. The harvest should be light, removing the trees that are deteriorating and leaving the high quality trees for seed.

The shelterwood system can take many years to develop a good stocking of desirable young trees. You may have to kill the undesirable species several times to favor the species you want. The final clearcut should not be made until you are satisfied with the stocking of desirable young trees.

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