

FOREST WILDLIFE STEWARDSHIP PLAN

FOR BIG MARSH AND SHELL ROCK BEND WILDLIFE AREAS

A plan that will increase the diversity of forest wildlife and prioritize species of greatest conservation need



Developed by

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INTRODUCTION

In Iowa, the Department of Natural Resources (IDNR) 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 IDNR Wildlife Management Area (WMA) forests. Forests are a relatively slow-changing landscape with some stands reaching maturity after a period of 100 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.

The forest can be managed to improve the forest ecosystem for wildlife species. The method in which the forest is managed effects what wildlife species will use a particular area at any point in time as the forest changes. Forests on state land are also renewable resources that are owned by the public. Properly managed, these forests can provide multiple benefits such as wildlife habitat, water quality, recreation, and are a good investment for the people of Iowa.

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

- 1) The continued succession of many oak forest communities toward an over-dominance of mature shade-tolerant forest communities.
- 2) The loss of early successional forest stands and associated wildlife species.
- 3) The lack of proper management to secure mature forest stands with diverse overstory and understory tree species for associated forest-interior wildlife 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. However, wildlife species have diverse habitat requirements. Even on a Wildlife Management Area, what is productive habitat for one species may be unproductive for another species.

Some wildlife species use all of the forest age classes but others have very specific needs where only one or two of the particular forest age classes are needed to survive. 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.

How the Forest Stewardship Plan Was Developed

The Wildlife Biologist is the manager of the area and determines the objectives for each wildlife area. Objectives address the habitat needs of Species of Greatest Conservation Need determined by the wildlife action plan and the woodland condition of each area. Seventy five percent of the total land managed by the Wildlife Bureau in northeast Iowa is woodland. Managing woodland is essential to improve the areas for wildlife and recreation.

Management of wildlife areas is a cooperative effort by the wildlife and forestry bureaus to enhance state owned areas for a diversity of wildlife species. The property is walked by the biologist and forester. Stands are identified by tree species, tree size, topography, and management system. The biologist and forester discuss the options for each stand and how management of that stand will fit into the overall management for the area. Forester recommendations are designed to manage the stand to reach the goals and objectives of the biologist.

One of five 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 on the site in the future.

Each management system is described in detail in this plan. A brief description of each management system is as follows –

Savanna –

Areas are burned or mowed every 5 years to maintain a healthy prairie grass/forb mix and to eliminate shrub encroachment and shrub/tree dominance.

Early Successional -

The goal on these areas is to clearcut every 15 years to maintain young, high stem density habitat. These areas are generally on the woodland edges to feather the edge.

Even Age -

Shade intolerant species such as oak, shagbark hickory, and walnut require full sunlight to grow. Even age management involves a clearcut at some point to create the full sunlight condition. The goal is to clearcut even age stands every 100 years. Clearcutting also creates early successional habitat for the first 15 years.

Uneven Age -

Uneven age management can be used to manage species that will grow in shade such as hard maple and basswood. On an approximate 20 year cycle, the stand can be selectively harvested to remove the mature and defective trees. The openings are filled with young maple and basswood, creating an all age or uneven age forest.

Viewshed -

These can be steep slopes, high recreational use areas, and buffers along the streams, rivers, and roads where management will be minimal.

General Description of the Plan Area

MANAGER:

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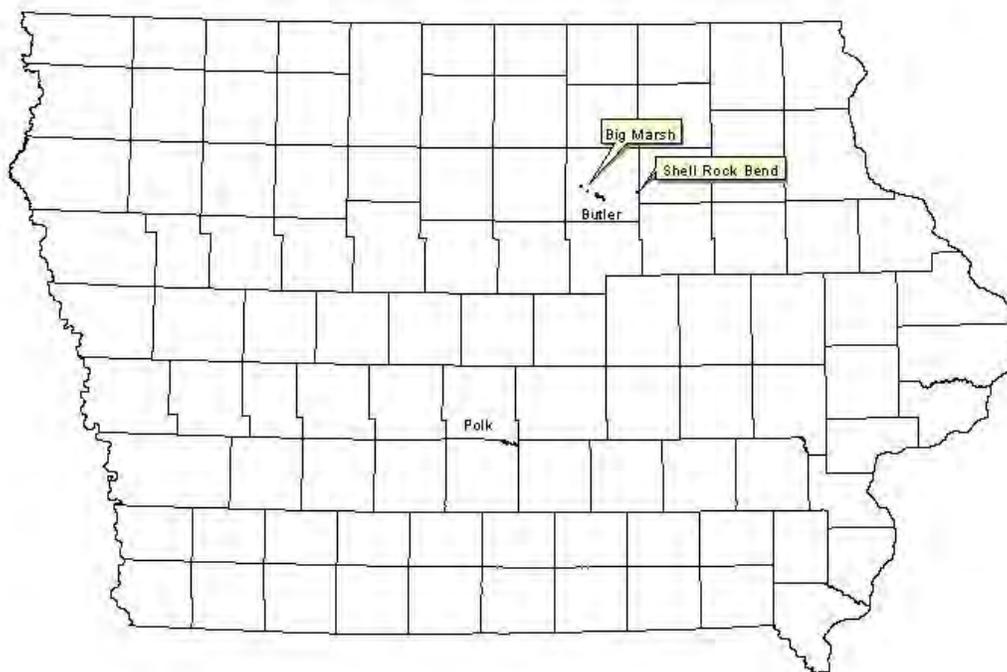
LOCATION:

Meyer Property-	Sec. 1 & 2, Madison Twp., Butler Co.
Trapp Property-	Sec. 8 & 17, Ripley Twp., Butler Co.
Big Marsh Map 1-	Sec. 15, 16 & 22, Ripley Twp., Butler Co.
Big Marsh Map 2-	Sec. 15, 23 & 24, Ripley Twp., Butler Co.
Big Marsh Map 3-	Sec. 24, Ripley, Sec. 30, Jefferson Twp. Butler Co.
Shellrock Bend Area-	Sec. 13, Shellrock Twp., Butler Co.

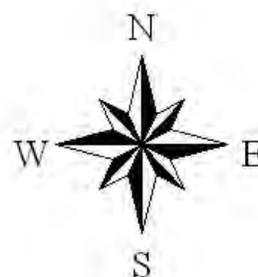
TOTAL ACRES: 1096 acres

The two maps below indicate the general location of the plan area.

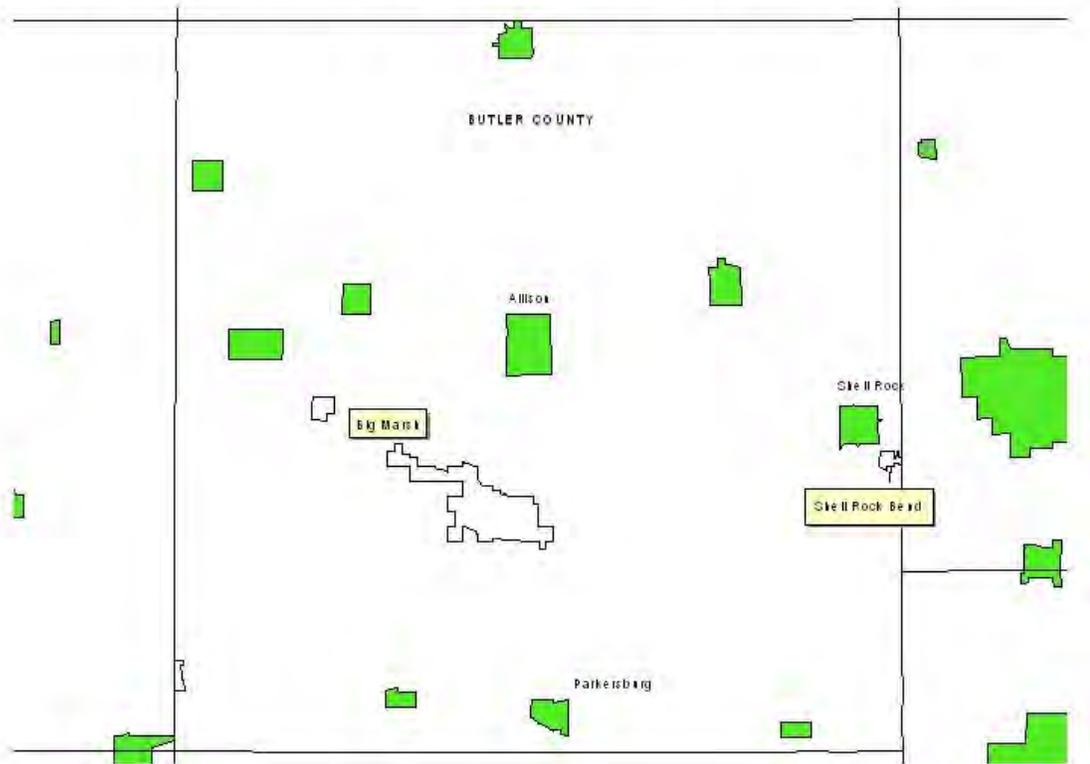
Stewardship Plan Locations



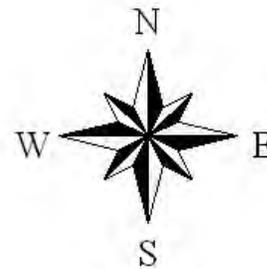
 Management Areas
 Counties



Locations in Butler County



-  **Counties**
-  **Incorporated_cities**
- Wildlife Areas**
-  **AGREEMENT**
-  **WMA**
-  **WPA**



DESCRIPTION OF THE AREA

The 1096 acres of forested public land addressed in this plan are outlined on the attached aerial photos that immediately follow this section. Most of the timber on these areas can be found on the Big Marsh WMA bottomland along the West Cedar River in central Butler County. The Shellrock Bend WMA is on the Shellrock River just downstream from Shell Rock in Butler County.

There are six maps covering these areas. The first is labeled the Meyer Property, the second is the Trapp Property, the third is Big Marsh Map 1, fourth Big Marsh Map 2, fifth Big Marsh Map 3 and the last map is Shell Rock Bend WMA. These six maps plus two overview maps which show how these map areas are interconnected are included at the end of this section.

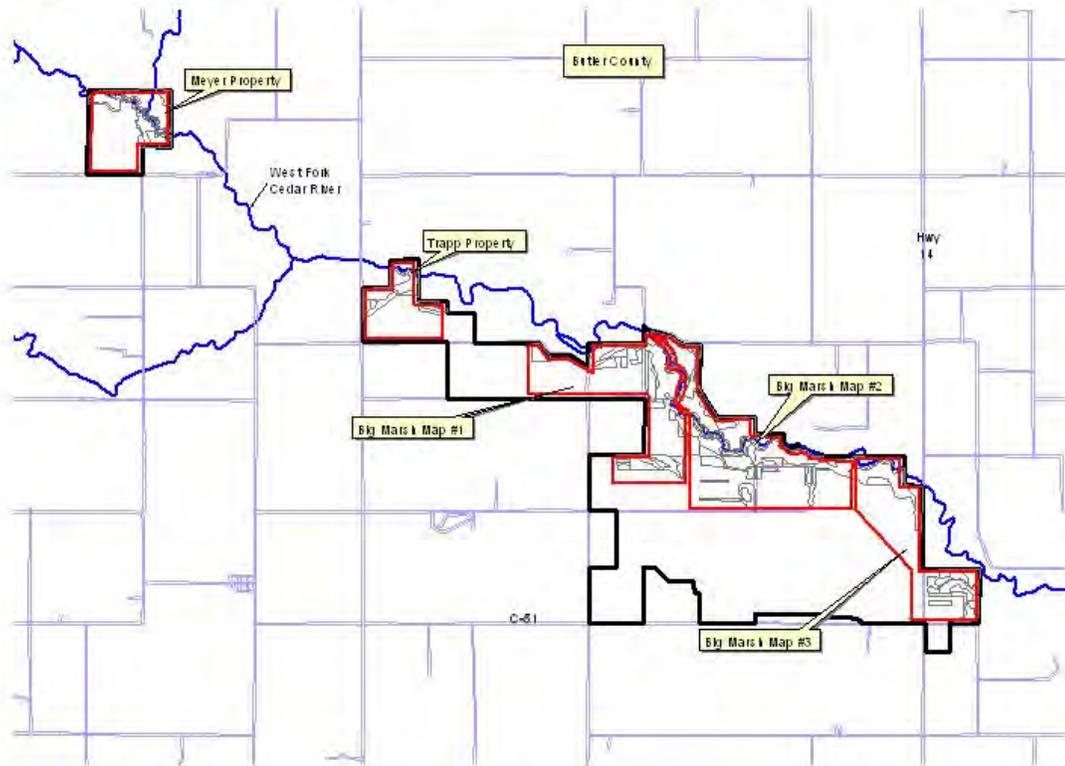
Through an on-the-ground inventory 99 different areas or stands were identified. These stands are labeled on the maps. Each stand is described in this plan; and, the plan provides woodland management recommendations for each stand.

Development of the WMAs began in the 1950s when land acquisition in the floodplain was first initiated. The size of the area has grown sporadically since that time with the most recent addition within the last 10 years.

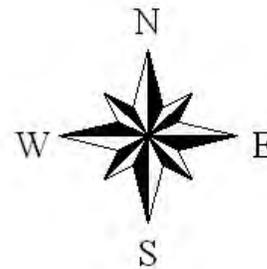
Much of the WMAs beyond the main body of forested land were pasture and cropland. Initial habitat development centered on creating wetland impoundments. Today the acreage of these WMAs is roughly divided into thirds as forest, wetland, and upland grass including some crop.

Over the past 60 years, successional changes in the natural vegetation on the area have altered the appearance of the areas' forested acres. This FWSP has been written to address this issue.

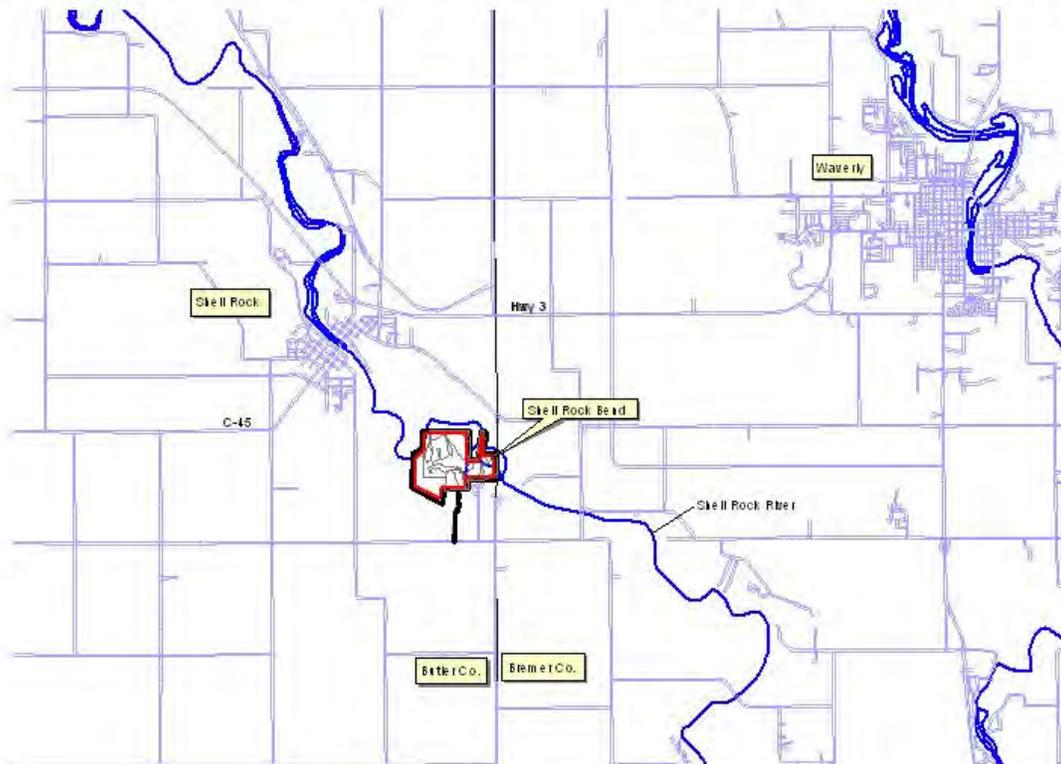
Big Marsh Stand Map Overview



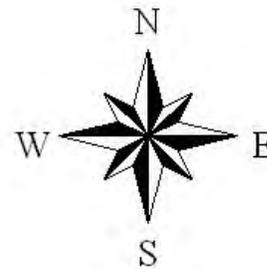
- Stand map locations
- Timber Stands
- Wildlife Areas**
- AGREEMENT
- WMA
- WPA
- Iowa_roads
- ~ Designated_rivers
- Counties



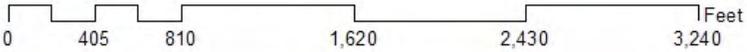
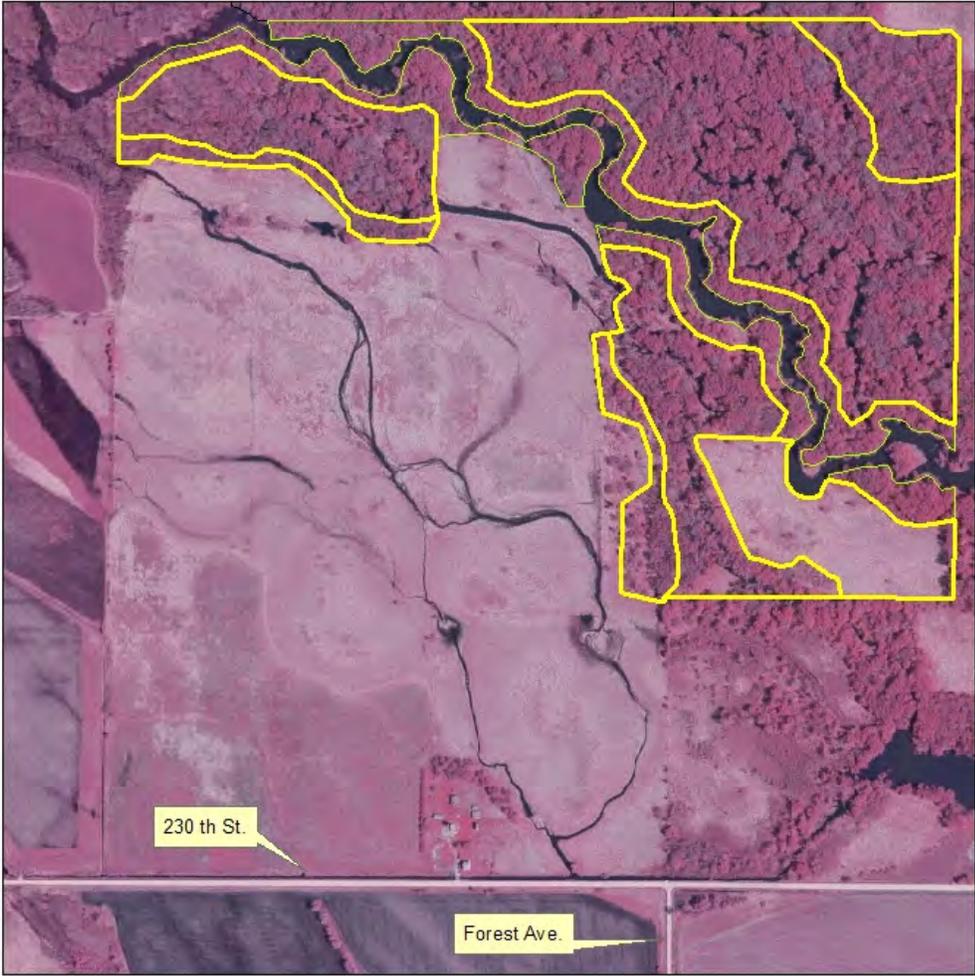
S-R Bend Stand Map Overview



-  Stand map locations
-  Timber Stands
- Wildlife Areas**
-  AGREEMENT
-  WMA
-  WPA
-  Iowa_roads
-  Designated_rivers
-  Counties

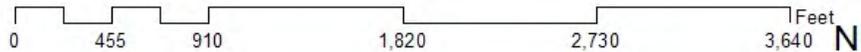
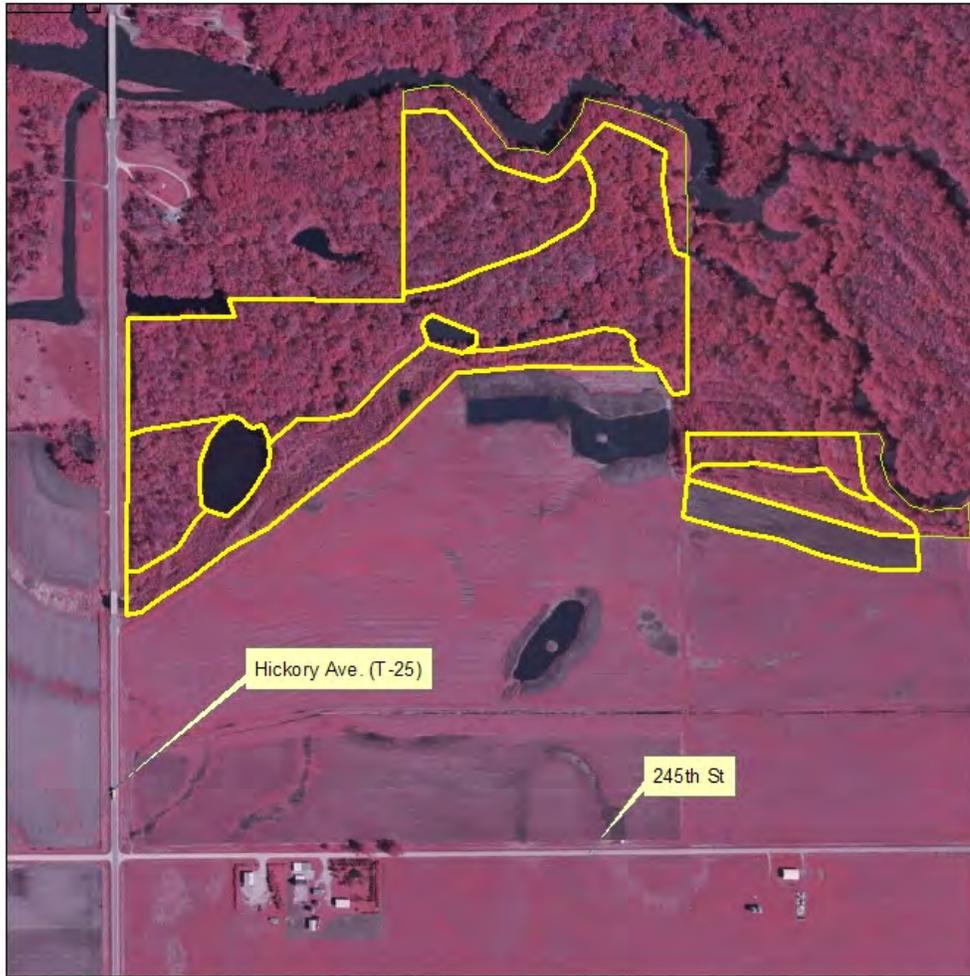


Big Marsh
Forest Stewardship Plan
Meyer Property
12-18-2008



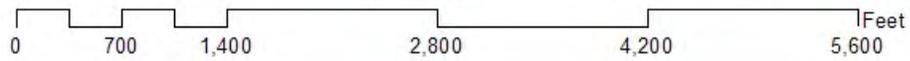
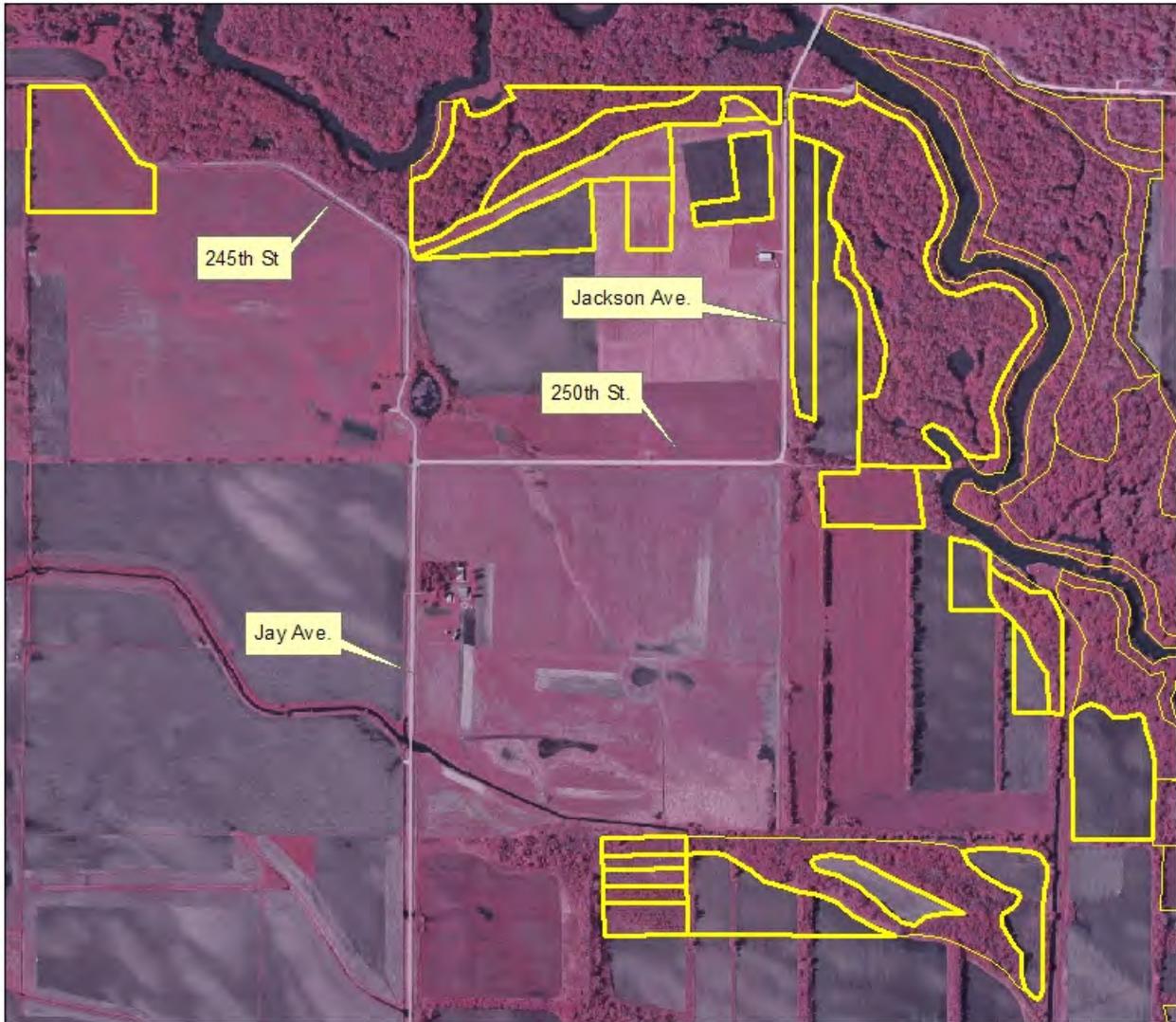
Sec. 1 and 2, Madison Twsp.
Butler Co.
T91N-R18W

Big Marsh
Forest Stewardship Plan
Trapp Property
12-18-2008



Sec. 8 & 17, Ripley Twp.
Butler Co.
T91N-R17W

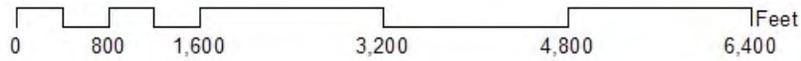
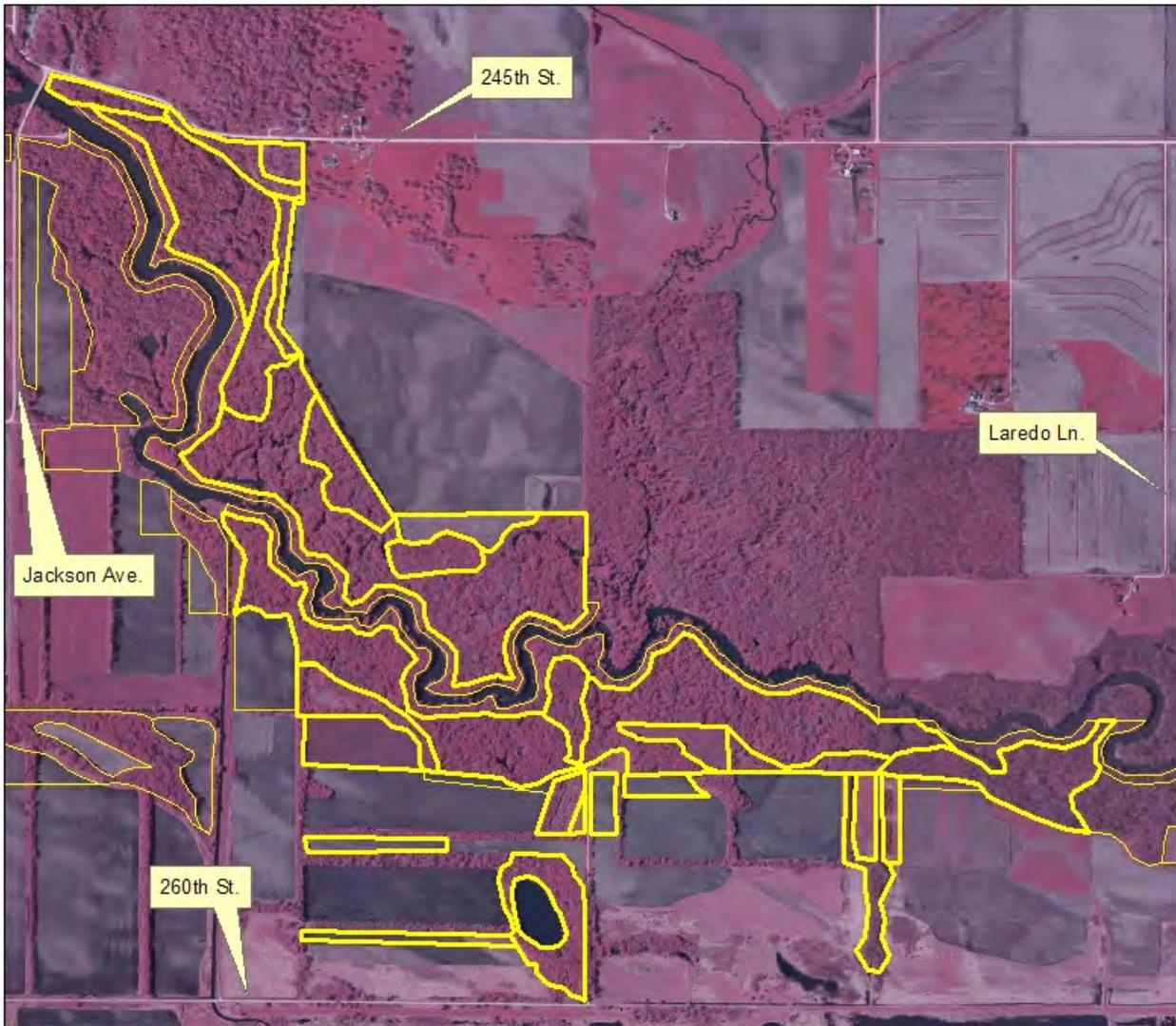
Big Marsh
Forest Stewardship Plan
Big Marsh Map 1
12-18-2008



Sec. 15, 16 and 22, Ripley Twp.
Butler Co.
T91N-R17W

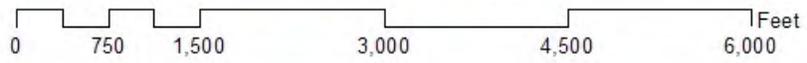
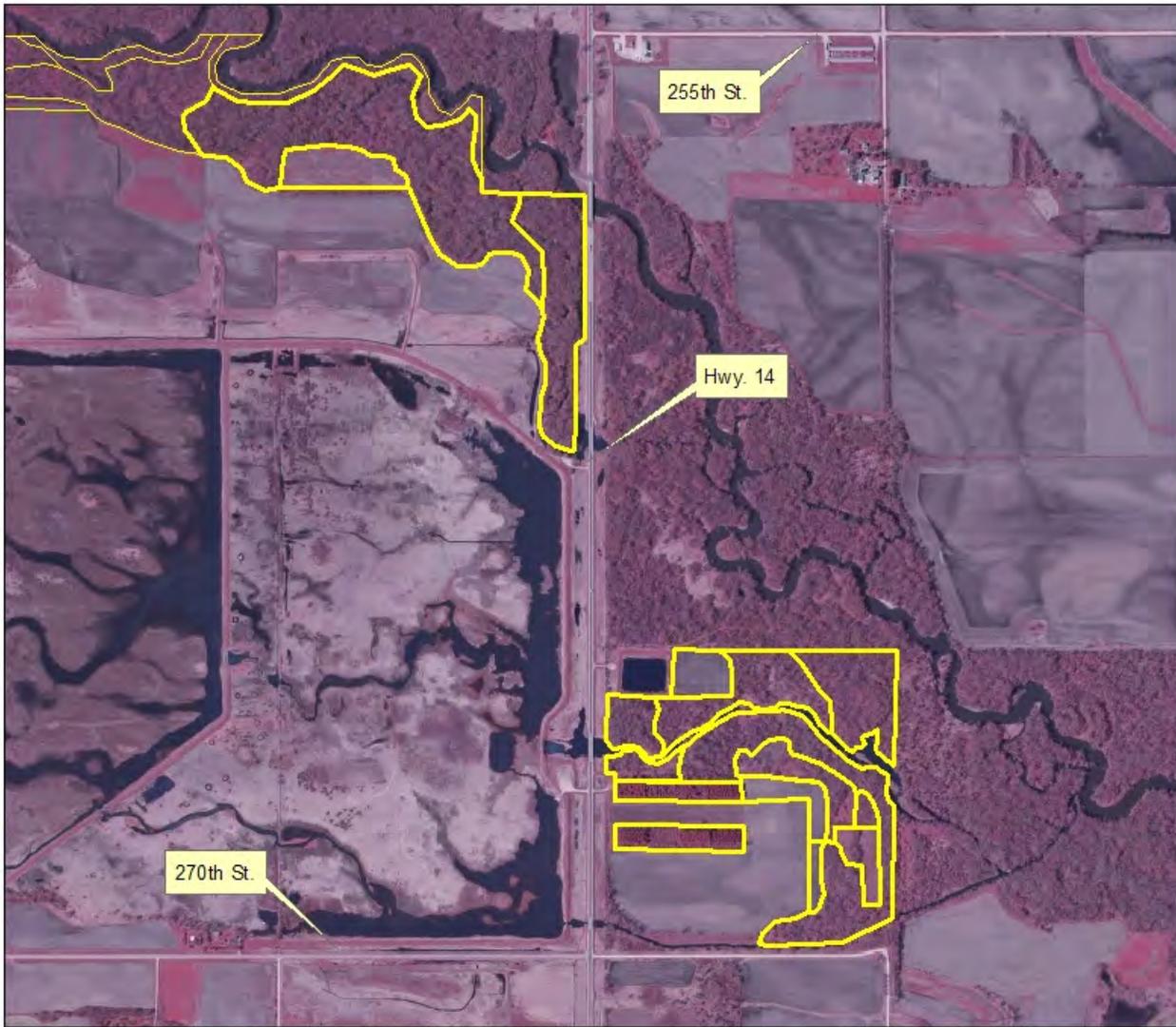


Big Marsh
Forest Stewardship Plan
Big Marsh Map 2
12-18-2008



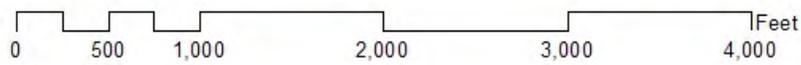
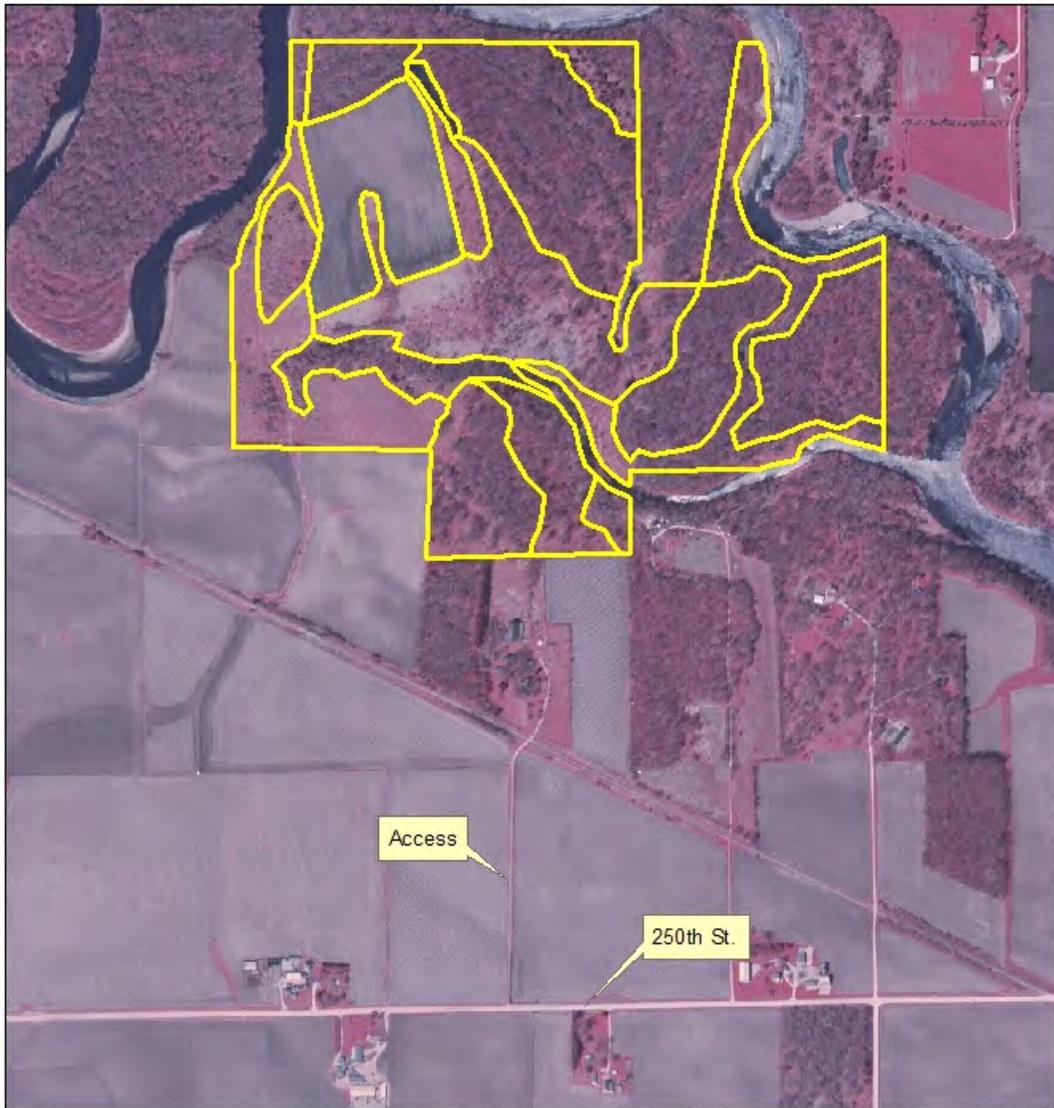
Sec. 15, 23 and 24, Ripley Twp.
Butler Co.
T91N-R17W

Big Marsh
Forest Stewardship Plan
Big Marsh Map 3
12-18-2008



Sec. 24, Ripley Twp.
Sec. 30, Jefferson Twp.
Butler Co.
T91N-R17W
T91NR16W

Big Marsh
Forest Stewardship Plan
Shellrock Bend
12-18-08



Sec. 13, Shell Rock Twsp.
Butler Co.
T91N-R15W

Soils

Most of the areas covered by this plan are bottomland soils. These soils include Coland, Spillville and Marshan. There are very few upland areas on these properties, but where the upland soils are found, they tend to be sandy and dry soils like Burkhart, Sparta and Saude

Most of the bottomland soils will support species like silver maple, cottonwood and ash. On areas where you have a slight rise (second benches), bur oak, black oak, swamp white oak and possibly walnut will do well. The upland areas on the sandy soils should support species like bur oak, white oak, red oak, black oak, shagbark hickory and other upland species.

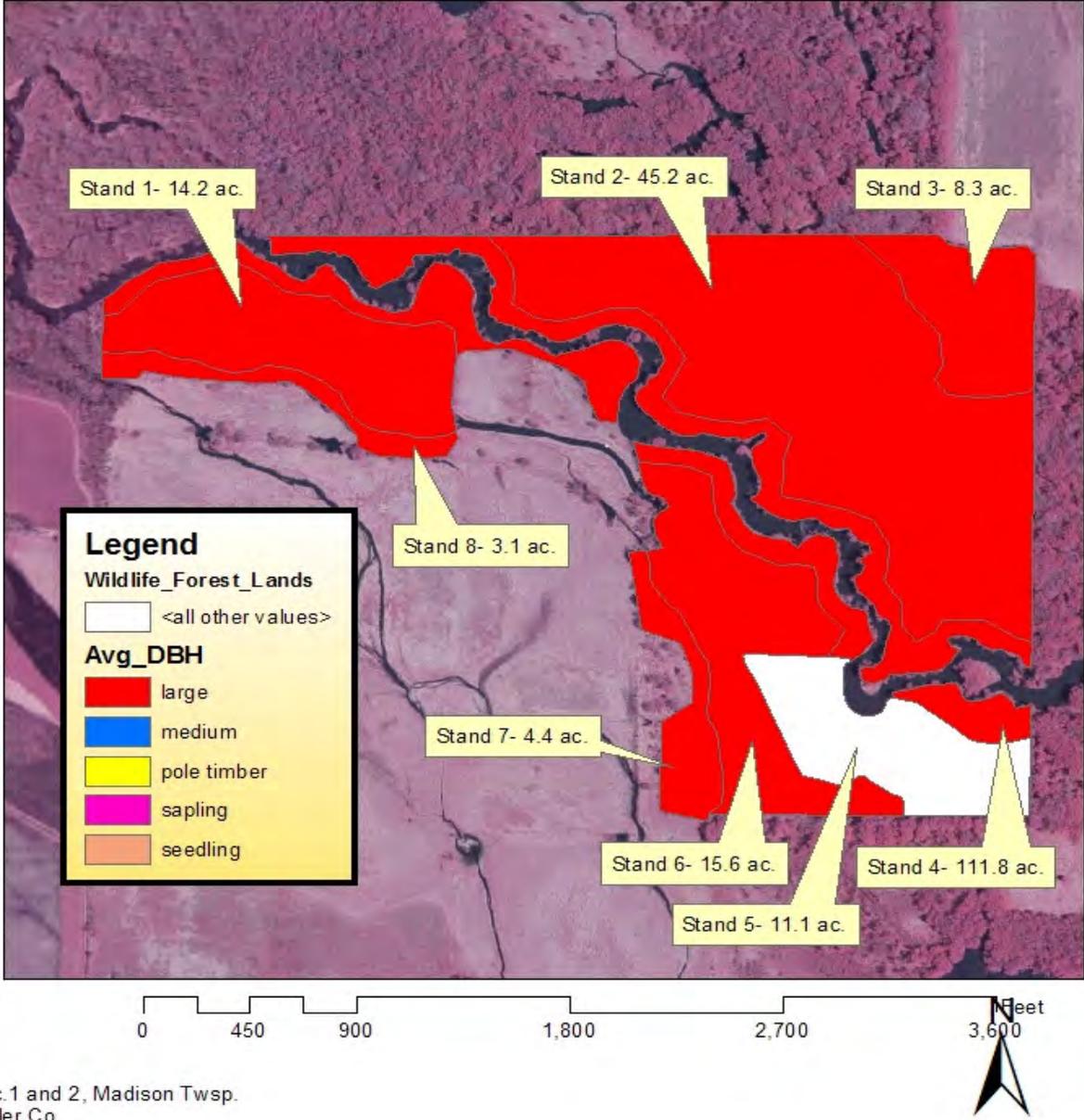
Current Distribution of Tree Size on the Area

The woodland was stand mapped according to the average tree size as follows:

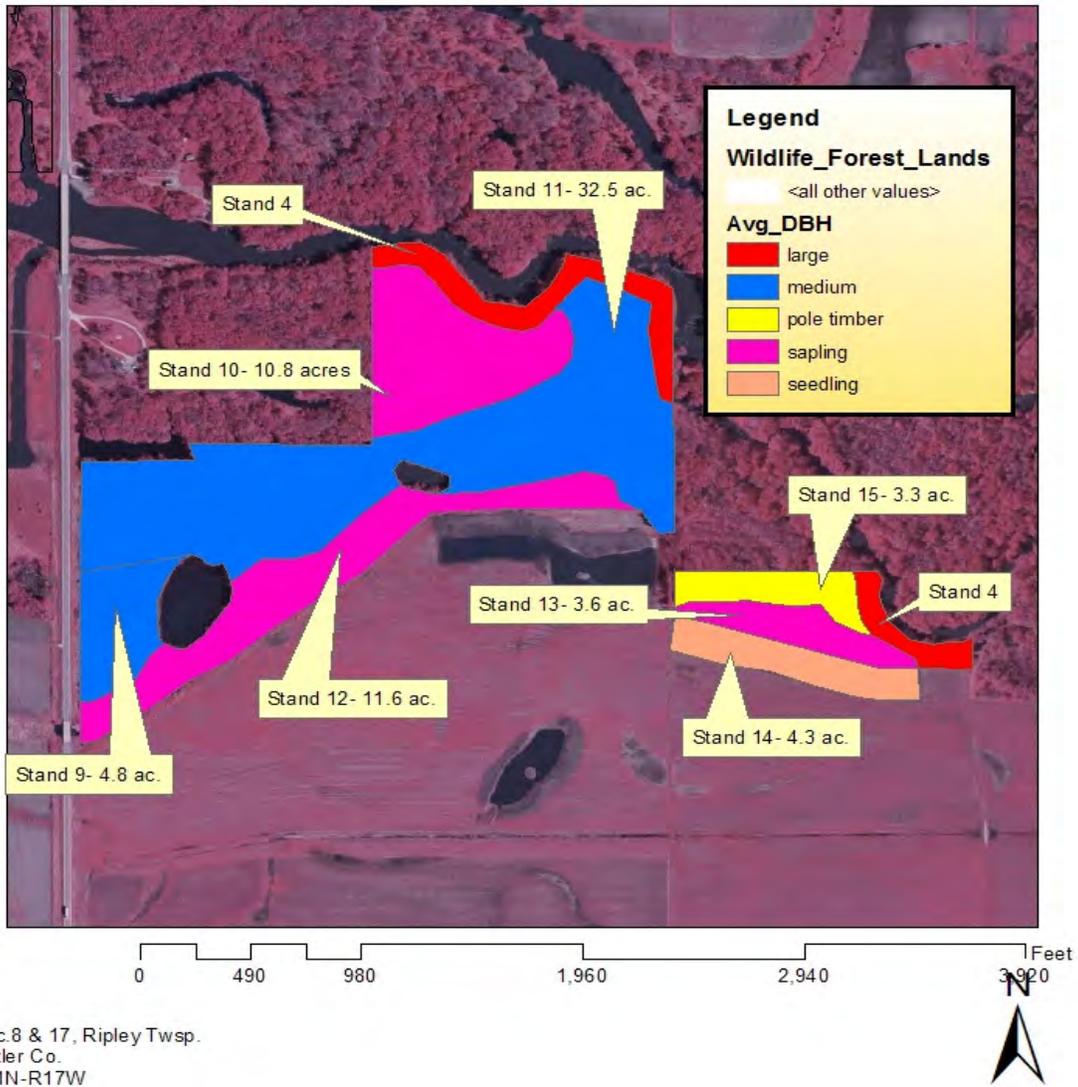
<u>Tree Size</u>	<u>Acres</u>	<u>% of Total Area</u>
Seedlings (new plantings)	87.2	8
Sapling (<4" dbh)	78.3	8
Pole size (5-12" dbh)	117.6	11
Med. Size (14-18" dbh)	523.5	51
Large (>20" dbh)	221.3	22
Totals	1027.9	100

The following six maps show the distribution of the current tree sizes. While future acres of cropland – to – woodland conversion that will be part of this plan are not included in the table above, they are identified on these six maps as “all other values”.

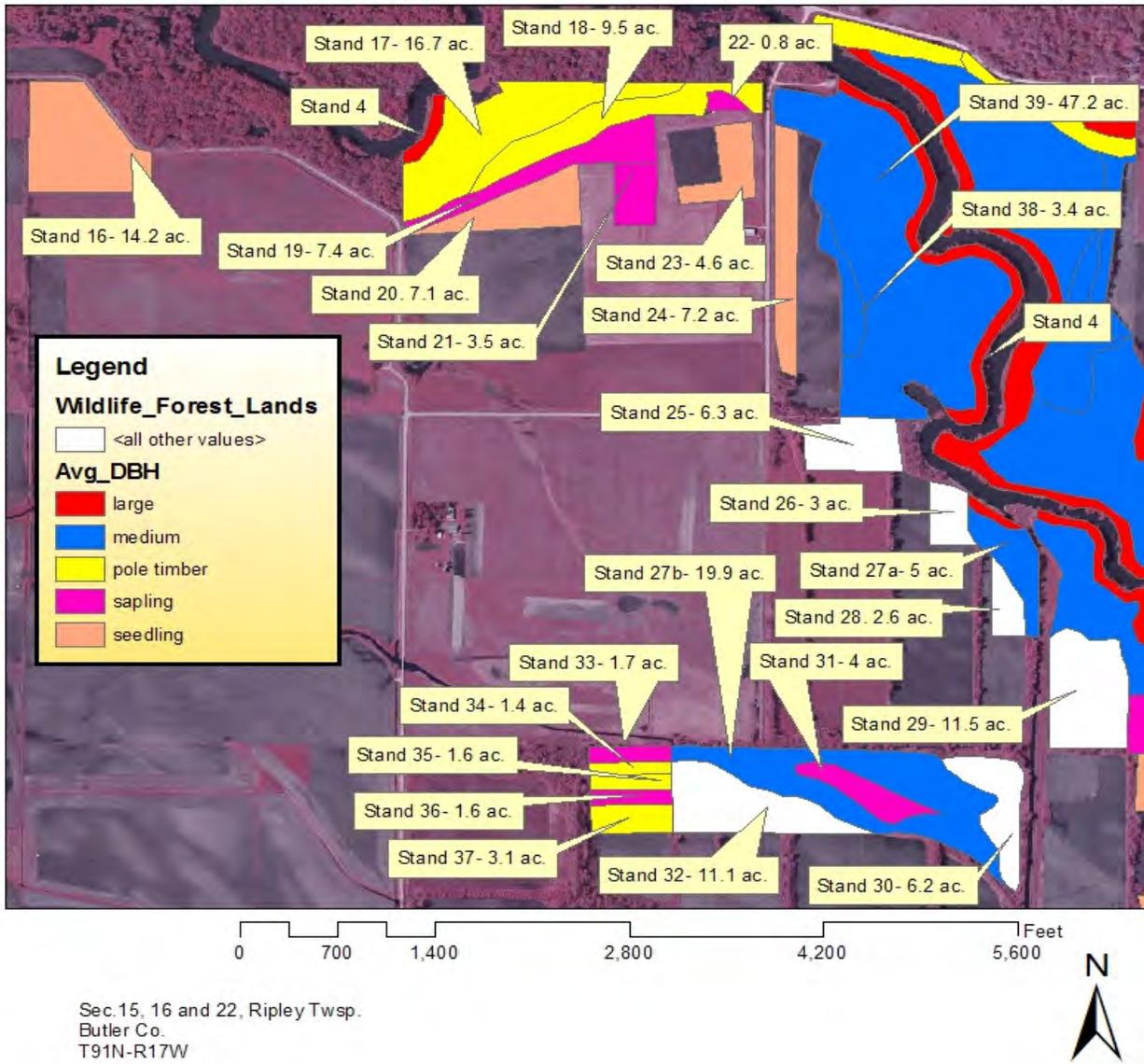
Big Marsh
 Forest Stewardship Plan
 Meyer Property
 Tree Size Map
 12-18-2008



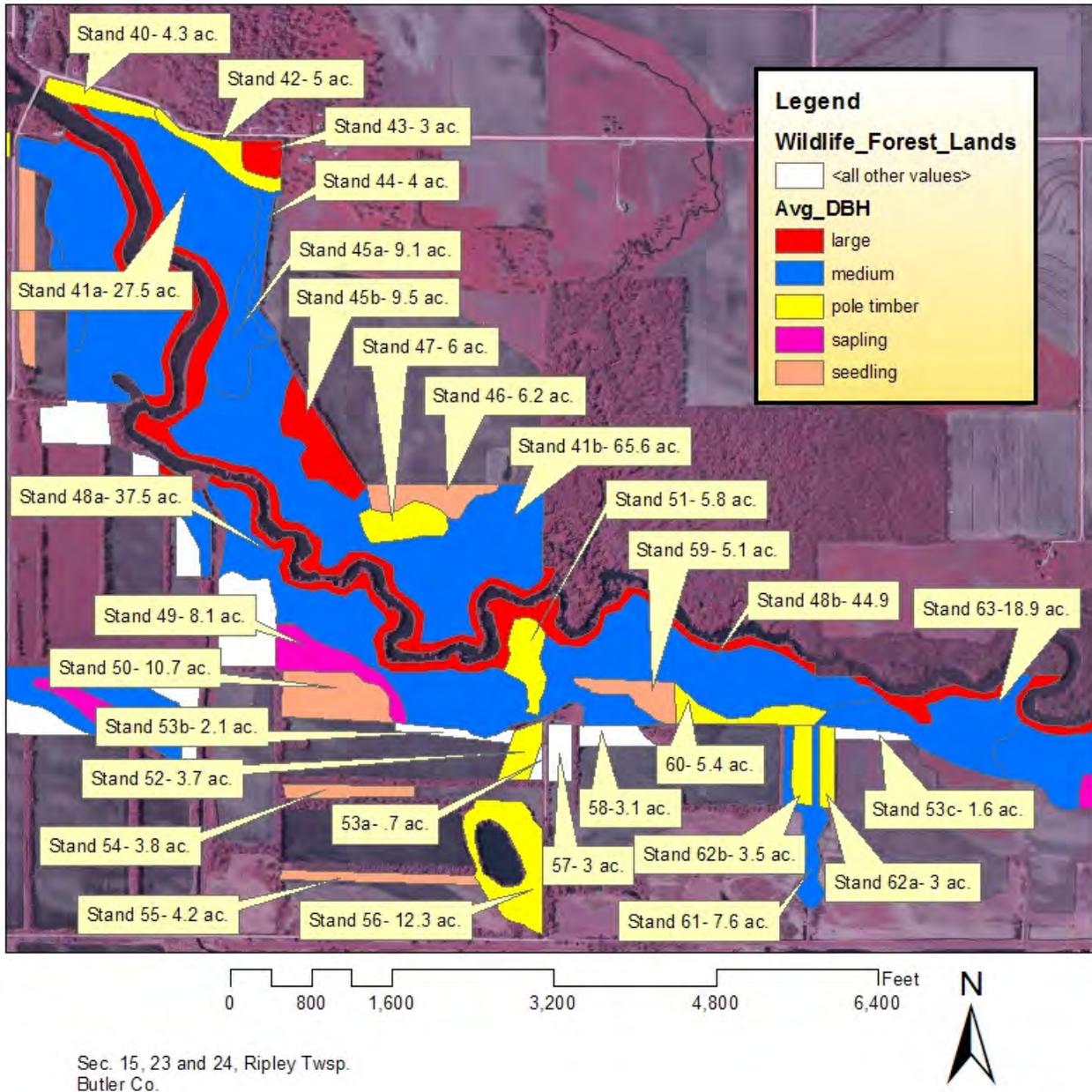
Big Marsh
 Forest Stewardship Plan
 Trapp Property
 Tree Size Map
 12-18-2008



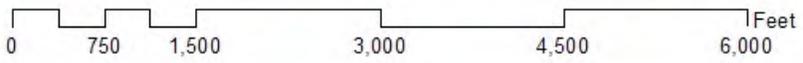
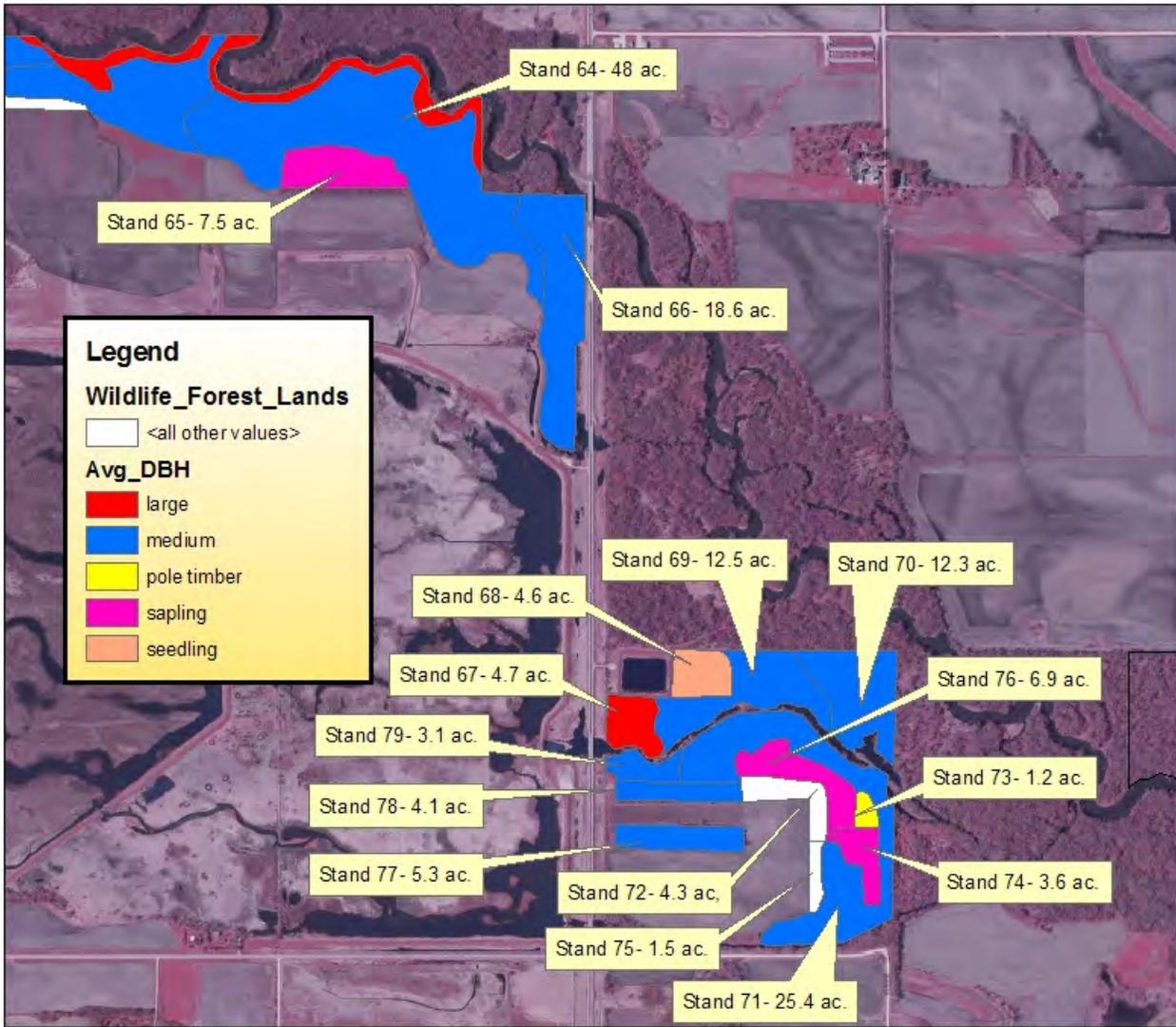
Big Marsh
 Forest Stewardship Plan
 Big Marsh Map 1
 Tree Size Map
 12-18-2008



Big Marsh
 Forest Stewardship Plan
 Big Marsh Map 2
 Tree Size Map
 12-18-2008



Big Marsh
 Forest Stewardship Plan
 Big Marsh Map 3
 Tree Size Map
 12-18-2008



Sec. 24, Ripley Twsp.
 Sec. 30, Jefferson Twsp.
 Butler Co.
 T91N-R17W
 T91NR16W

OBJECTIVES

Generally, the Wildlife Bureau manages state-owned forest for the greatest diversity of forest wildlife and esthetic value. The IDNR Wildlife Bureau's FWSP will emphasize the species of greatest conservation need, and the habitat needs of these wildlife species will be guiding factors to forest management decisions.

For example, many migratory non-game birds including the gold-winged warbler, blue-winged warbler, black-billed cuckoo, yellow-billed cuckoo and eastern towhee are dependent on early stages of forest growth. Each of these species are showing population declines. So to address this issue savannas will be restored and early growth woodland stands will be maintained and developed.

Conversely, some species of birds are dependent upon mature, undisturbed woodlands. The Red-shouldered Hawk, Acadian flycatcher, Cerulean warbler, and the veery are some examples of bird species needing mature forests. Since this plan area encompasses one of the few woodlands in north central Iowa large enough to accommodate bird species that require solid blocks of mature timber several hundred acres in size, these species will be given priority consideration in management decisions, as well. The plan area contains over 740 acres of mature timber; and the plan will maintain that component of large trees for nesting and perching with attention given to maintaining these acres in 1-2 core areas at all times.

Our goal will be to monitor and evaluate the success of these management decisions. 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 WMAs now and in the future. The Forest Wildlife Stewardship Plan is dynamic and will change. Updating as new information and techniques become available.

Associated with the impact of the three primary factors (introduced on page 5) on species of greatest conservation needs is the lack of recreational opportunities due to poor habitat diversity. Greater habitat diversity should provide greater wildlife diversity which can result in greater recreational diversity. Hunted game species such as deer, turkey, woodcock, and wood ducks will also benefit. Therefore, recreation will be improved for hikers as well as for the birding and sporting publics alike.

Additionally, we are experiencing soil erosion in floodplains which impacts water quality. This is due to cropping in flood prone areas and due to a lack of soil-holding vegetation on the floor of the very mature forest stands. This loss could be reduced by converting cropland to forest stands that support grasses, forbs, and shrubs and by clearing small areas (generally each less than five acres) of mature forest to encourage undergrowth. This plan calls for maintaining about 158 acres of recently converted cropland and converting another 68 acres to trees and shrubs. This work plus other woodland management components in this plan will help reduce nutrient loading and run-off into our waterways.

Therefore this plan has three primary objectives.

- (1) Creating and maintaining various forest types as habitat for a variety of wildlife species including species of greatest conservation needs,
- (2) Increasing recreational opportunities, and
- (3) Improving water quality.

Details are laid out in the *Proposed Management Systems for the Areas* section and the *Description and Recommendations for Individual Stands* section.

OTHER MANAGEMENT CONSIDERATIONS

Some of the species of greatest conservation need that are using or hopefully will be using the woodlands have habitat requirements not directly related to tree size, trees per acre, size of timber stands, or tree and shrub species diversity. These species include the wood turtle, Blandings turtle, blue-spotted salamander, and river otter. These animals are all associated with the aquatic habitats within and adjacent to the woodlands. These sites, including river sandbars, river banks, flow-through side channels, isolated oxbows, and ponds, all must be protected and maintained as desirable habitats.

More specifically, some guidelines should be added to woodland timber management to address these needs.

- 1- When cutting by a pond or oxbow, drop a few smaller trees into the water to create sunning and loafing sites for turtles.
- 2- When cutting by a pond or oxbow that has adjacent terrain high enough to support grass rather than willows, open the overstory canopy enough to allow full sunlight to reach a portion of the shoreline.
- 3- Restrict logging activity to dates when the ground is frozen.
- 4- Perpetuate grassy areas where possible as these sites are frequented by wood and Blandings turtles.
- 5- Any swale or channel crossings created to facilitate logging must be removed after the logging operation to accommodate normal seasonal flows.

Additionally, 1 to 7 trees in clearcuts may be selected and left as dead snags to provide feeding, nesting, resting sites for birds, bats, squirrels, and raccoons.

Many of the species of greatest conservation need are “interior species” (those that require large blocks of undisturbed woodland). Others also require mature trees (8-25 inches in diameter). Therefore, cutting will be done progressively across the woodland to maintain a large block of mature forest without interior disturbance. This will ensure that a large block of mature forest suitable for interior bird species will be maintained.

Reeds Canary grass could inhibit adequate tree regeneration after clearcutting. If adequate regeneration isn't appearing approximately 5-7 years after clearcutting due to a reeds canary grass infestation, the area should undergo site prep treatment such as spraying, dozing, scarification, or other methods deemed necessary to accelerate natural reseeding of bottomland species and increase tree density.

Income from Forest Harvests

Harvesting is conducted to regenerate stands to desirable species and to achieve a diversity of tree sizes and species. Income from forest harvesting operations will be reinvested into the area to plant trees, thin young stands, convert areas to more desirable species, and create early successional habitat. Harvesting of trees is needed to ensure success of this plan. The majority of work recommended is focused on shade intolerant species 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, reestablish oak savannas, and tree planting.

Proposed Management Systems and Habitat Types

Recommendations for each stand were based on whether the area will be managed to create savanna, early successional growth, an even age system, an uneven age system, or viewshed. These management systems are described in the following section.

Decisions on what systems would be used were based on the objectives for the area to create and improve the woodland with diverse forest types, increase recreation, and improve water quality.

The acres proposed for each management system are as follows –

<u>Management System</u>	<u>Acres</u>	<u>% of Total Area</u>
Savanna	93.1	9
Early Successional	107.3	10
Even Age	718.1	65
Uneven Age	10.4	<1
Viewshed	167.1	15
Total	1096	100

The application of these management systems is to create and conserve various wildlife habitat types or tree age classes to achieve the objectives listed earlier in this plan. This means manipulating the amount and quantity of these habitat types or age classes. (The maps in the Management Systems section will delineate the management systems by stand.)

Some of the habitat types / age classes are present in more than one forest management system. This is explained below.

Savanna habitat includes acres in the savanna system.

Early successional habitat includes the acres specifically listed as early successional management systems PLUS even age management systems acres in seedling and sapling stages.

Pole tree stands are even age and uneven age management system acres that are transitional between early successional stands and mature stands.

Mature, interior habitat includes those even and uneven management system stand acres in medium and mature stands PLUS viewshed management system acres.

The following table further clarifies this by showing the different habitats that are present within each management systems depending on the age class of the trees.

		Mgmt.	Systems			
H		Savanna	Early Successional	Even- Age	Uneven Age	Viewshed
A	Sapling/seedling		X	X		
B	Poles			X		
I	5-“ – 12” diameter					
T	Mature	X		X	X	X
A	12+” diameter					
T	Grass/Brush	X				

The table below shows percent make-up of the stands based on habitat type or age class both at present and when plan implementation has run a 100 year cycle. The result is increased forest quality and diversity. Total forested acres will increase through cropland conversion.

Habitat Type / Age Classes	Present	Long-term Goal w/ Management
Savanna	0%	9%
Early Successional - (≤ 4” dbh)	16%	20%
Pole - (5 to 12” dbh)	11%	13%
Mature - (12+” dbh)	73%	60%

Description of Management Systems

Savanna Management-

Savannas in Iowa are remnants of what was once a common transitional zone between prairies and woodlands. Typically it consists of widely scattered oak trees with expansive limbs and an understory of prairie plants and scattered shrubs like wild plum and hawthorne. Oaks are randomly scattered. They can be as few as one tree per acre or numerous enough to create a 50% oak canopy.

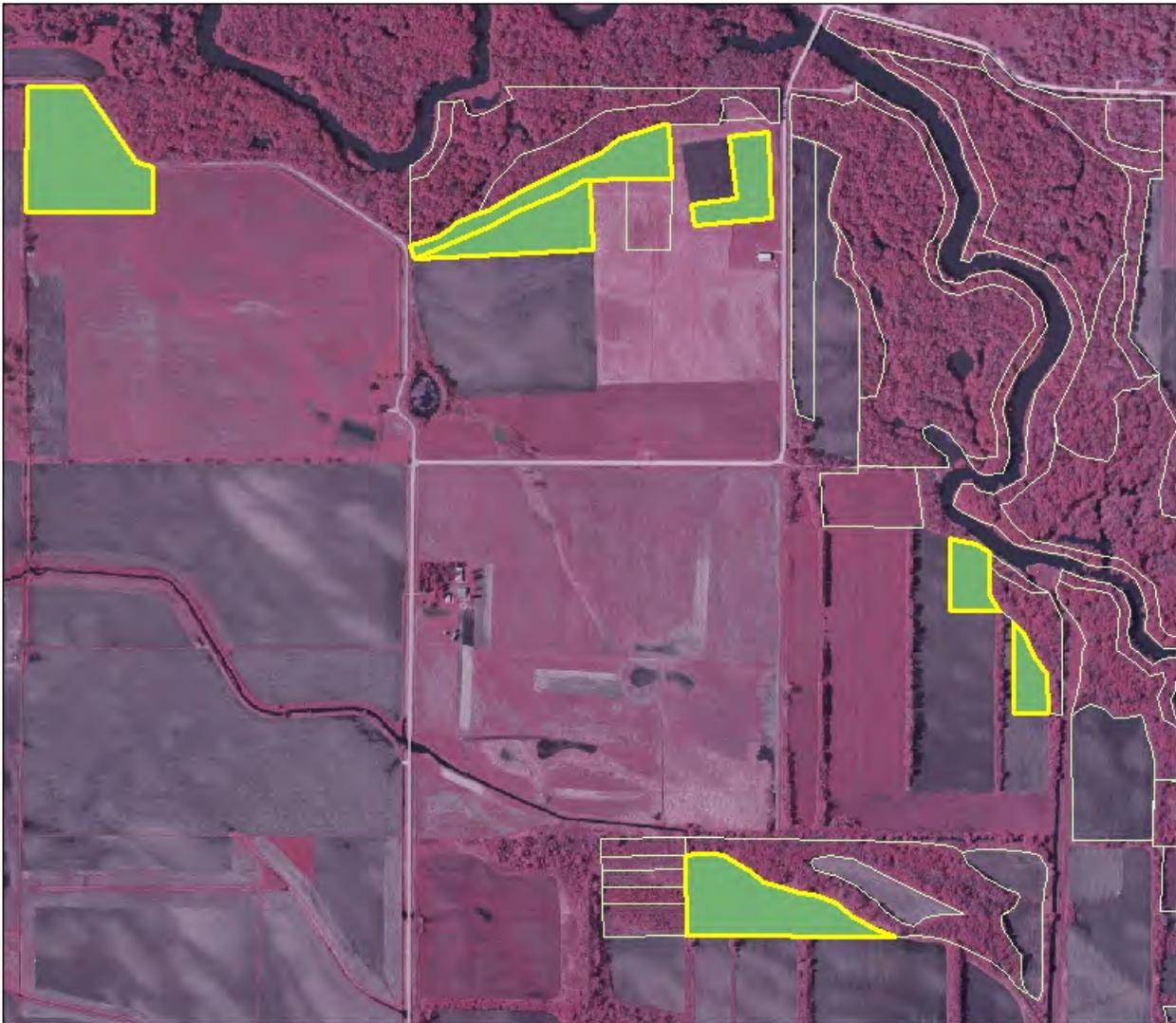
This zone typically supported Swainson's hawks, long-eared owls, red-headed woodpeckers, loggerhead shrikes, and Bells vireos to name a few.

Savanna will be created by converting cropland along the woodland edge. Oak trees and a few shrubs will be planted; and, prairie plants will be established around these trees.

Management after establishment will likely involve burning to control encroachment of too much brush and other tree species, to encourage natural oak regeneration, and to rejuvenate the prairie understory. Oak seedlings will tolerate light fires.

There are 93.1 acres of savanna in this plan. These areas will be managed to perpetuate a mixture of scattered oaks and shrubs with an understory of grasses and forbs. Fire, mowing, selective planting, and selective cutting will be used over the years.

Big Marsh
Forest Stewardship Plan
Big Marsh Map 1
Savanna Management
12-18-2008

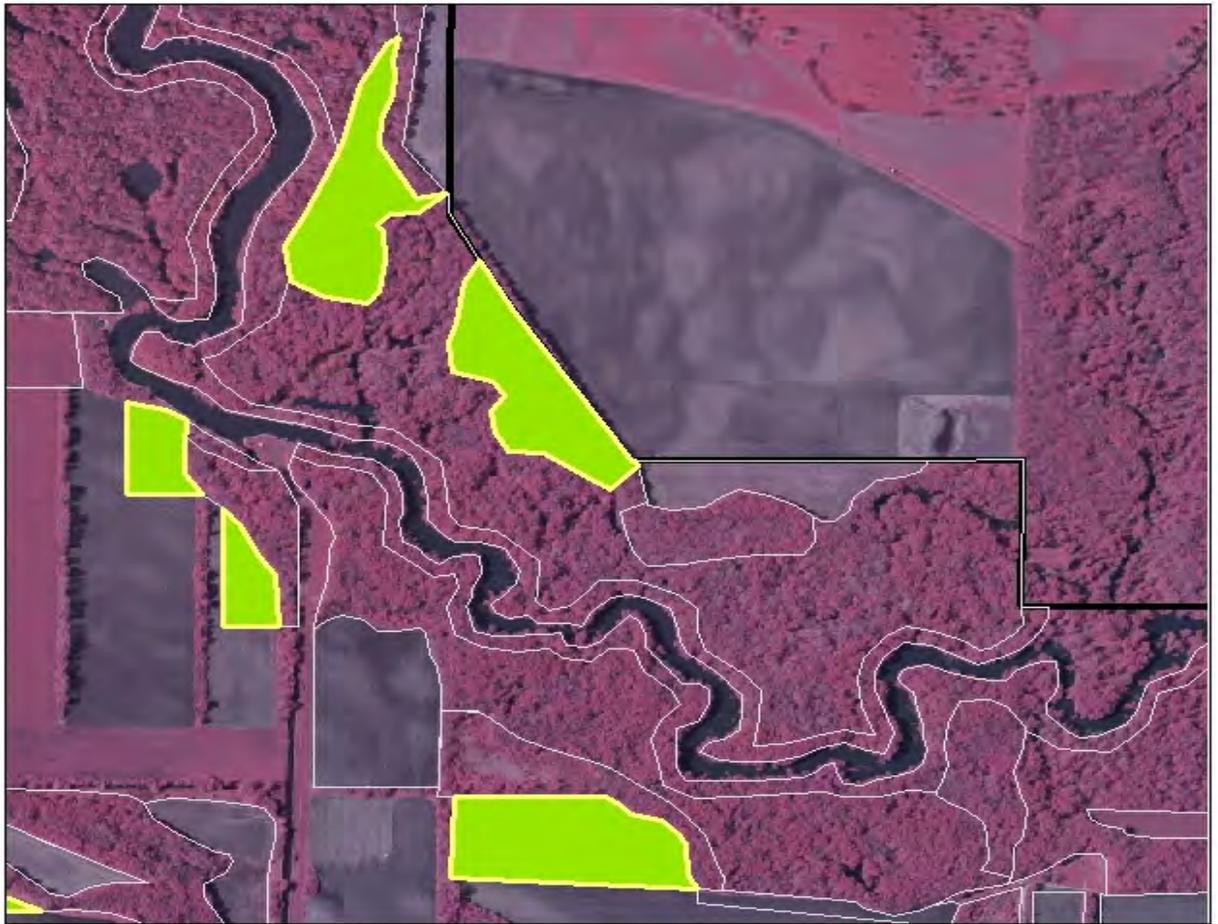


0 700 1,400 2,800 4,200 5,600 Feet

Sec. 15, 16 and 22, Ripley Twp.
Butler Co.
T91N-R17W



Big Marsh
Forest Stewardship Plan
Big Marsh Map 2
Savanna Management
Edit 2-26-13

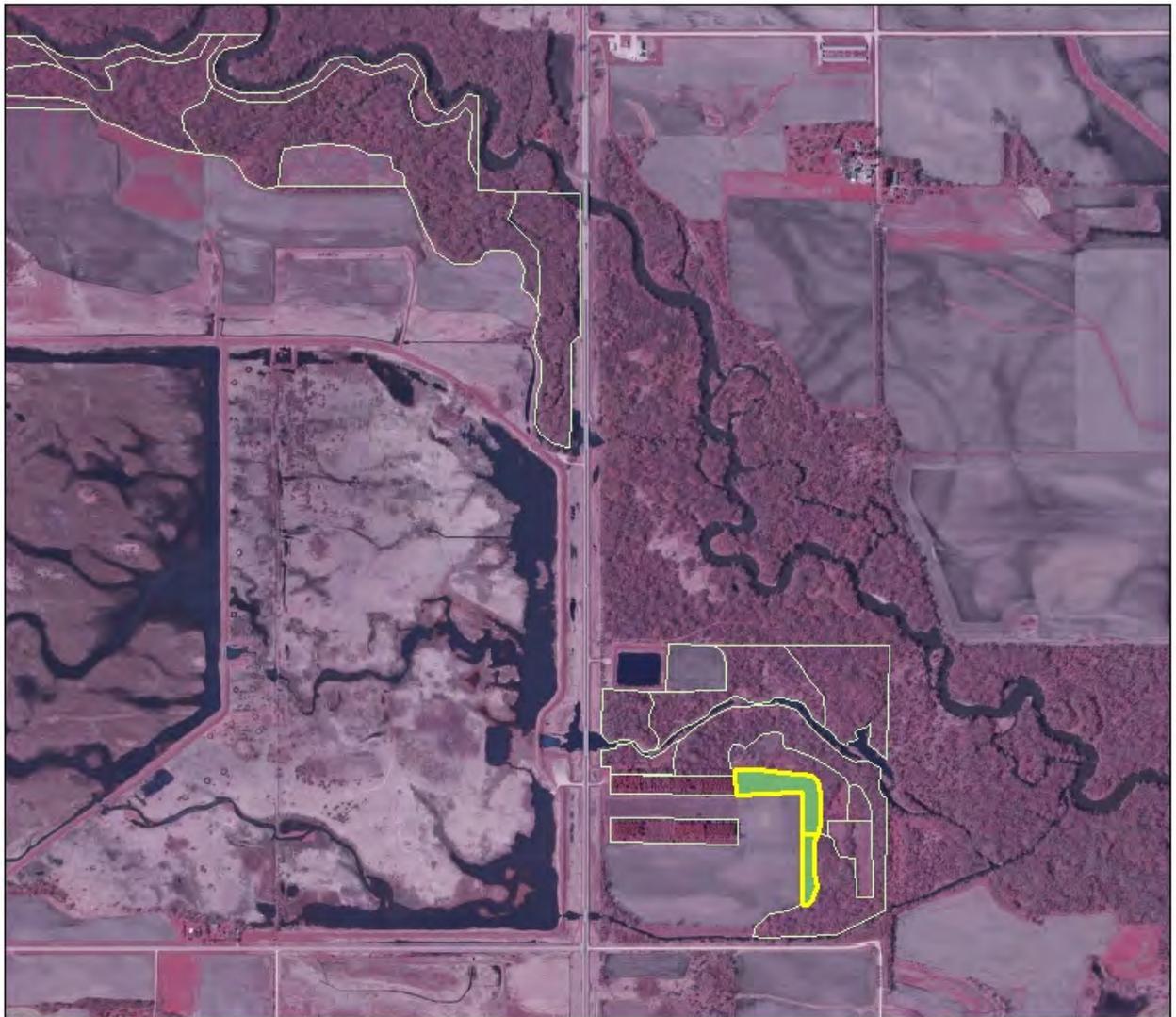


0 650 1,300 2,600 3,900 5,200 Feet

Sec. 15, 23 and 24, Ripley Twsp.
Butler Co.
T91N-R17W



Big Marsh
Forest Stewardship Plan
Big Marsh Map 3
Savanna Management
12-18-2008

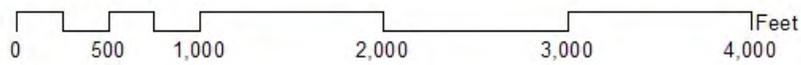
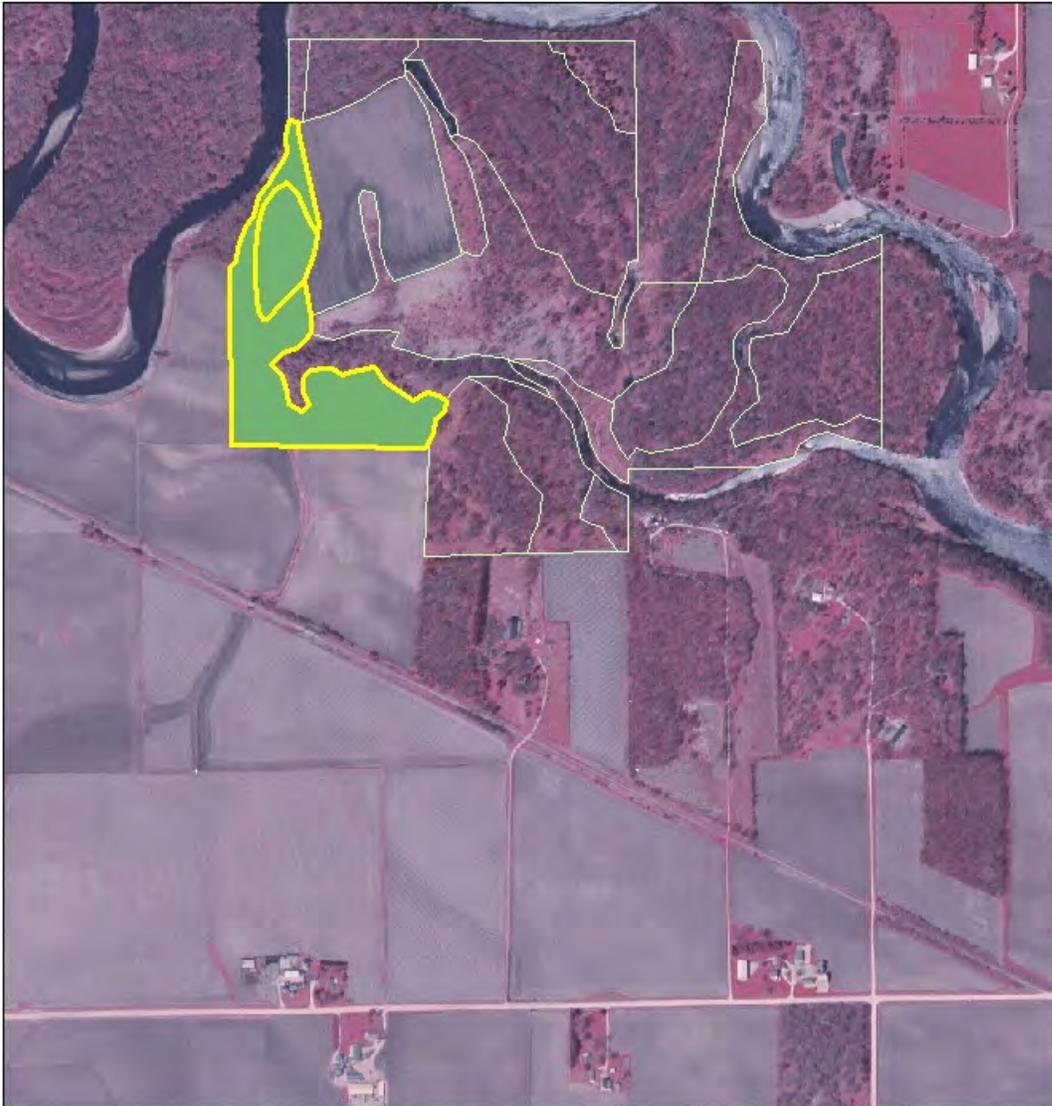


0 750 1,500 3,000 4,500 6,000 Feet



Sec. 24, Ripley Twp.
Sec. 30, Jefferson Twp.
Butler Co.
T91N-R17W
T91NR16W

Big Marsh
Forest Stewardship Plan
Shellrock Bend
Savanna Management
12-18-08



Sec. 13, Shell Rock Twsp.
Butler Co.
T91N-R15W

Early Successional Management -

These sites (stands) typically are areas that are shrubs with small trees interspersed. They will have a little bit of grass, shrubs like elderberry and dogwood, and young trees such as green ash, elm, boxelder, soft maple, honey locust, walnut, and bur oaks. High stem densities for trees and shrubs provide suitable nesting habitat and protection from predators.

Many species of birds such as American woodcock, gold winged warbler, black billed cuckoo, veery, Kentucky warbler are dependent on the early stages of woody growth.

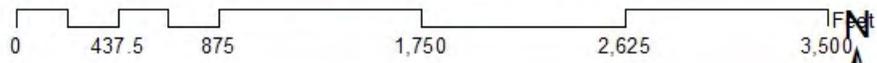
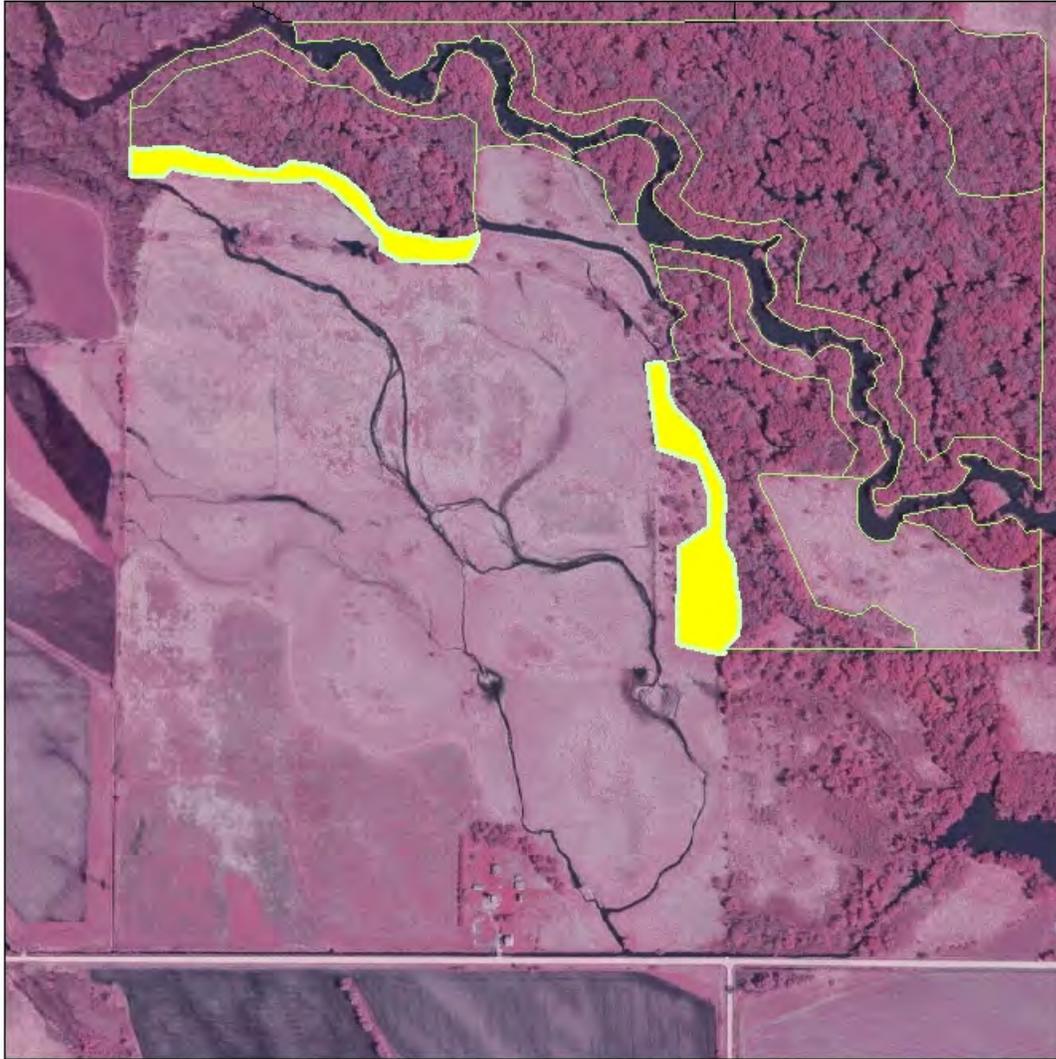
The majority of early successional sites are perpetuated on the woodland edges since a good deal of sunlight is required for many of these species to survive. This work will “feather” the edges and make a gradual transition from the field edges to the larger trees. Feathering or softening the edges results in less nest parasitism of interior forest bird species by brown-headed cowbirds.

Early successional management at Big Marsh and Shell Rock Bend will involve killing larger trees along the woodland edge to provide full sunlight to the forest floor. This will encourage higher stem densities of woody cover along with pockets of grass, flowers, and shrubs. The woodland edge management will be enhanced at many sites (stands) by planting brushy species just outside the forest edge for a distance of 100 feet more-or-less.

The early successional management areas will be managed on a 15 year rotation meaning that each site will be disturbed or “opened up” every 15 years. However, not all sites will be managed in the same year; so, various aged sites will always be present across the plan area.

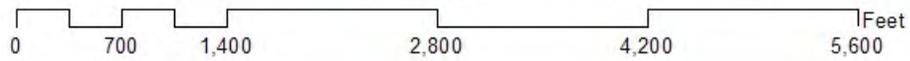
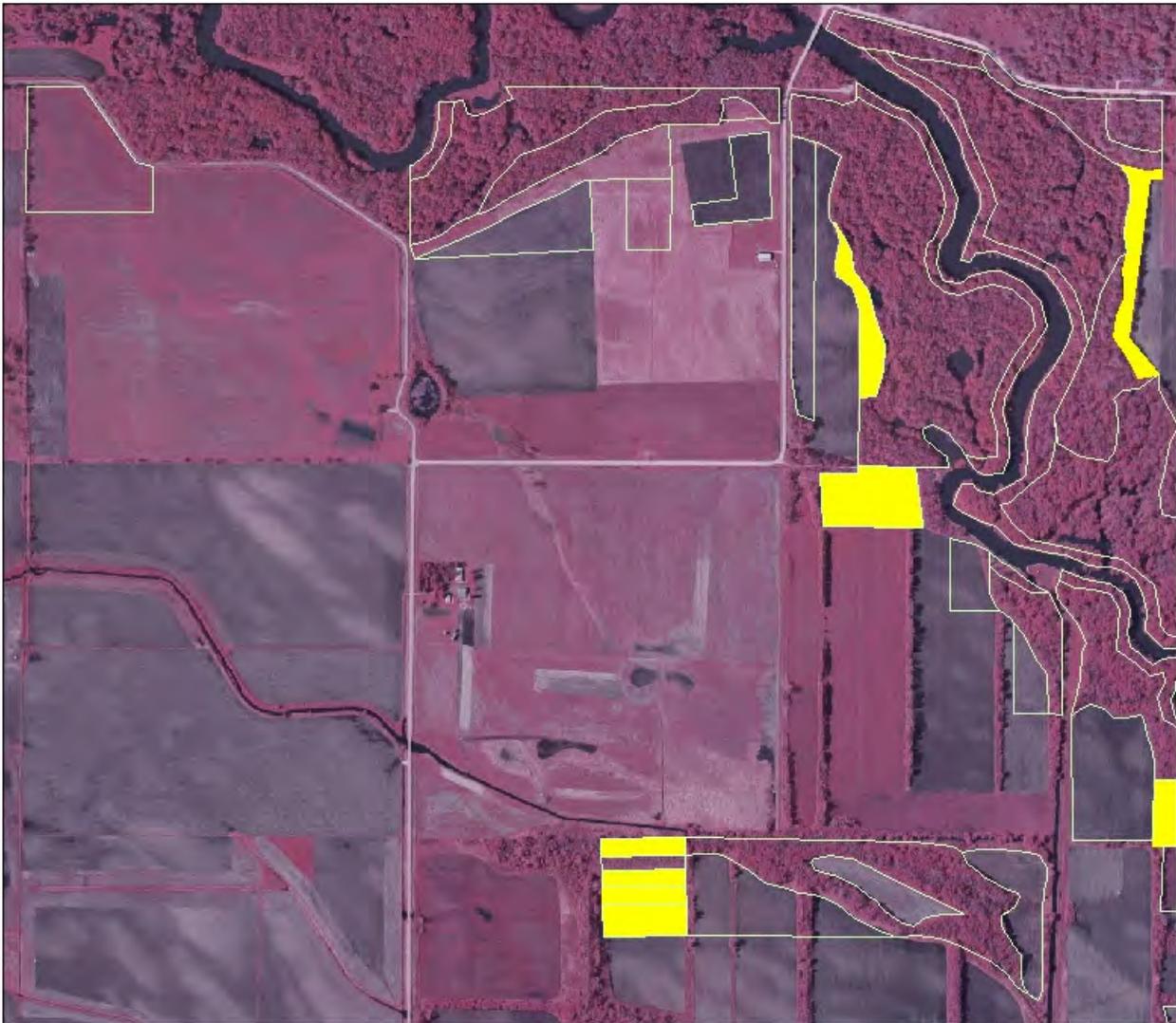
Big Marsh has 107.3 acres scheduled for early successional management. Applying sustainable forestry guidelines, 35 acres could be cut every 5 years to maximize the diversity of tree sizes. Keep in mind that the first 15 years of a clear cut will also add early successional habitat.

Big Marsh
Forest Stewardship Plan
Meyer Property
Early Successional Management
12-18-2008



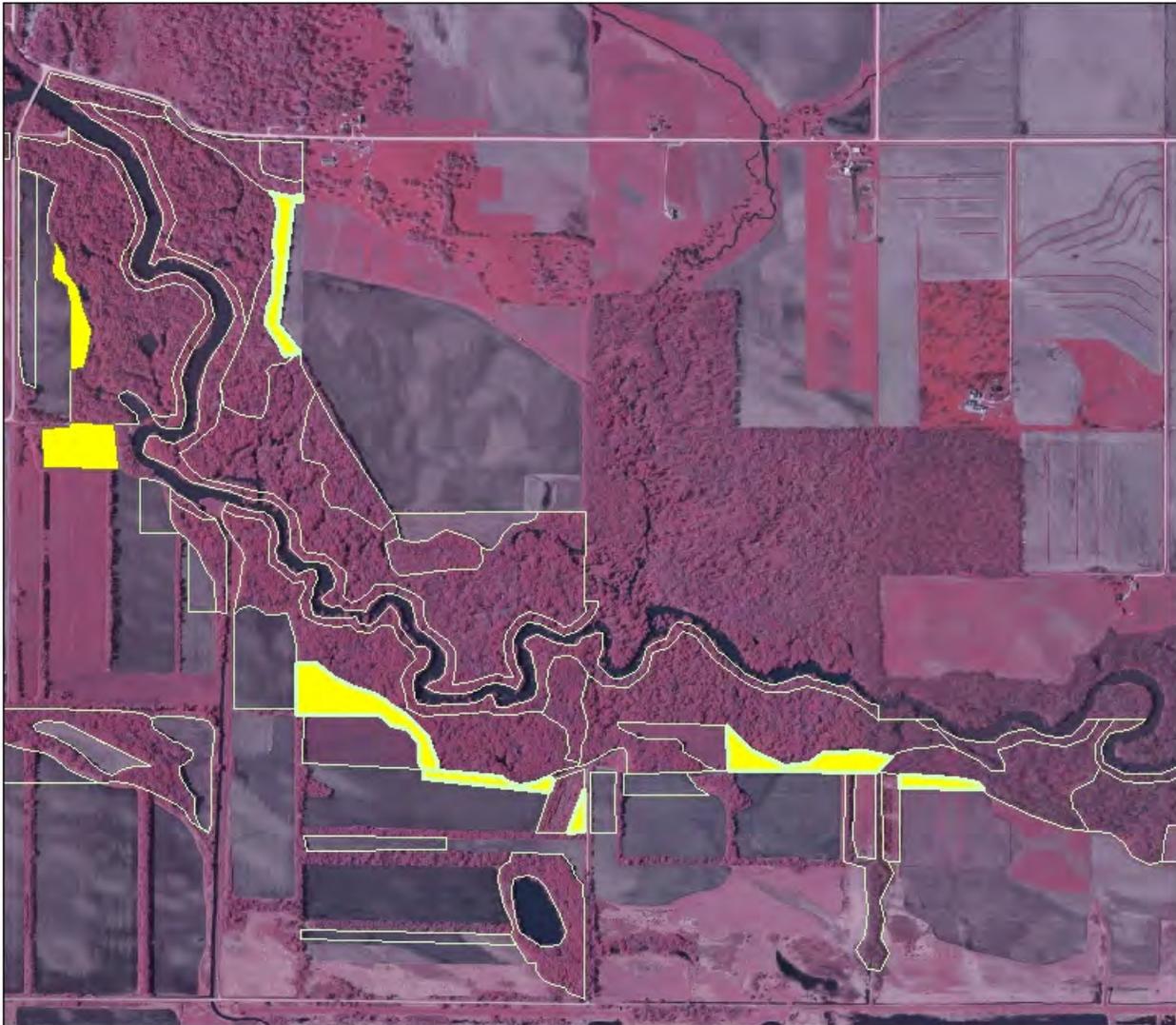
Sec. 1 and 2, Madison Twsp.
Butler Co.
T91N-R18W

Big Marsh
Forest Stewardship Plan
Big Marsh Map 1
Early Successional Management
12-18-2008



Sec. 15, 16 and 22, Ripley Twp.
Butler Co.
T91N-R17W

Big Marsh
Forest Stewardship Plan
Big Marsh Map 2
Early Successional Management
12-16-2008

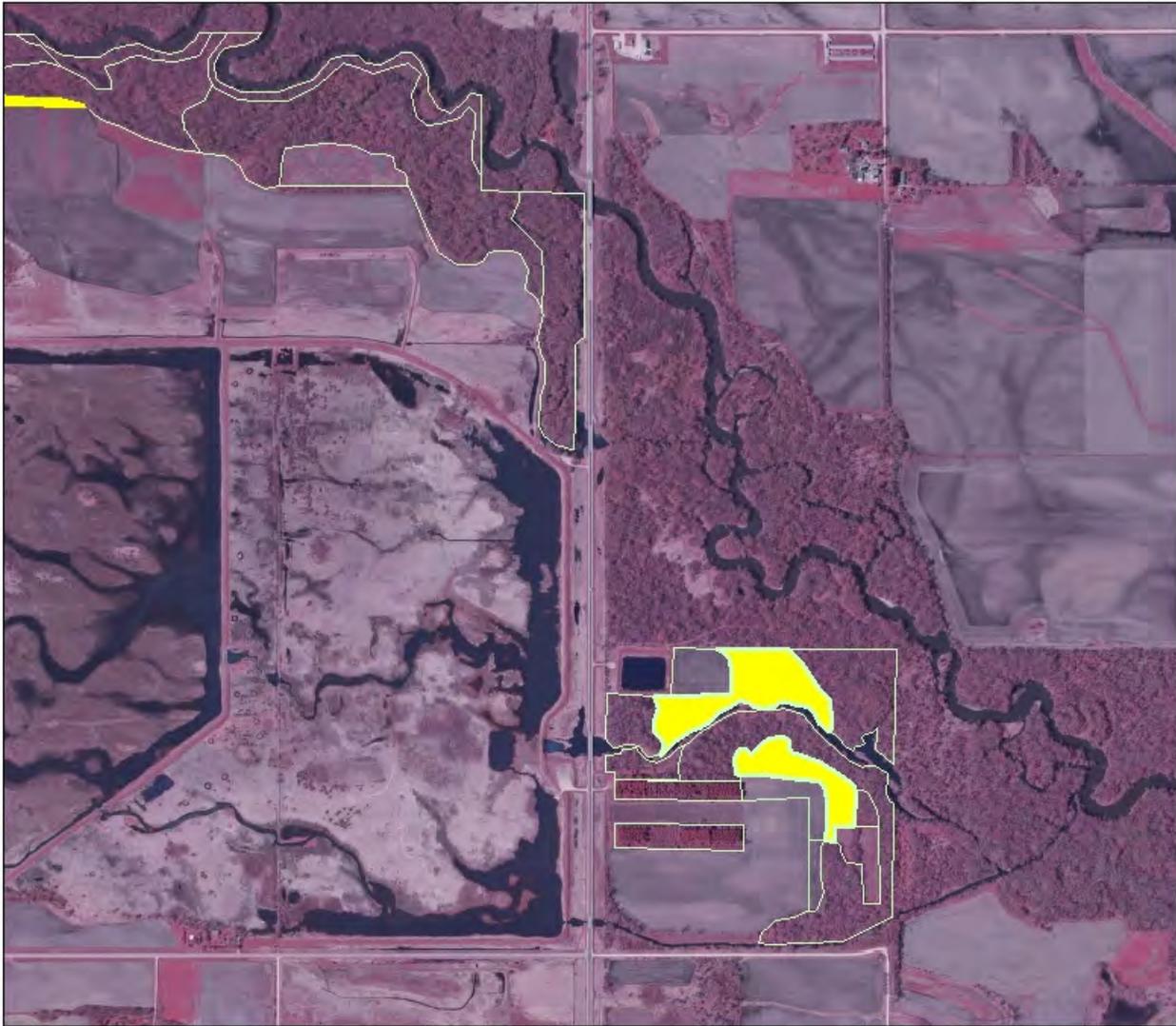


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Sec. 15, 23 and 24, Ripley Twp.
Butler Co.
T91N-R17W

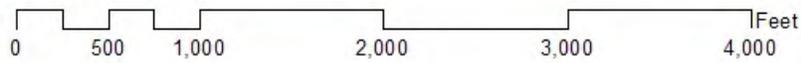
Big Marsh
Forest Stewardship Plan
Big Marsh Map 3
Early Successional Management
12-18-2008



Sec. 24, Ripley Twp.
Sec. 30, Jefferson Twp.
Butler Co.
T91N-R17W
T91NR16W



Big Marsh
Forest Stewardship Plan
Shellrock Bend
Early Successional Management
12-18-08



Sec.13, Shell Rock Twsp.
Butler Co.
T91N-R15W

Even Age Management –

Even age management is essential for wildlife species depending on oak/hickory forests. Oak acorns (mast) are at the top of the food list for many species of wildlife. In the absence of even age management techniques, the oak component in Iowa's floodplain will eventually be lost to shade tolerant species such as hackberry, ash, elm, bitternut hickory and boxelder.

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 (1-15 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, veery, 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 red-shouldered hawk, broad-winged hawk, pileated woodpecker, wood thrush, Acadian flycatcher, ovenbird, worm eating warbler, and scarlet tanagers.

Even age management involves growing a stand of trees which are close to the same age. At some point in the stands life, the area is clearcut which creates the even age structure. Even age management in the floodplain creates excellent habitat for deer, turkey,



and wood ducks and woody debris on the forest floor provides habitat for amphibians and reptiles. Clearcutting 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 age management involves clearcutting and planting, clearcutting with regeneration already established, or a shelterwood system to develop desirable seedlings on the ground. . By making small 3-5 acre clearcuts within stands, various aged sites suitable to a variety of wildlife species are created.

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. Prescribed burning is an optional management tool that can be



used to kill the undesirable species and create open spaces for oak regeneration. The final clearcut should not be made until you are satisfied with the stocking of desirable young trees.

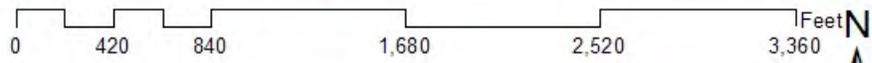
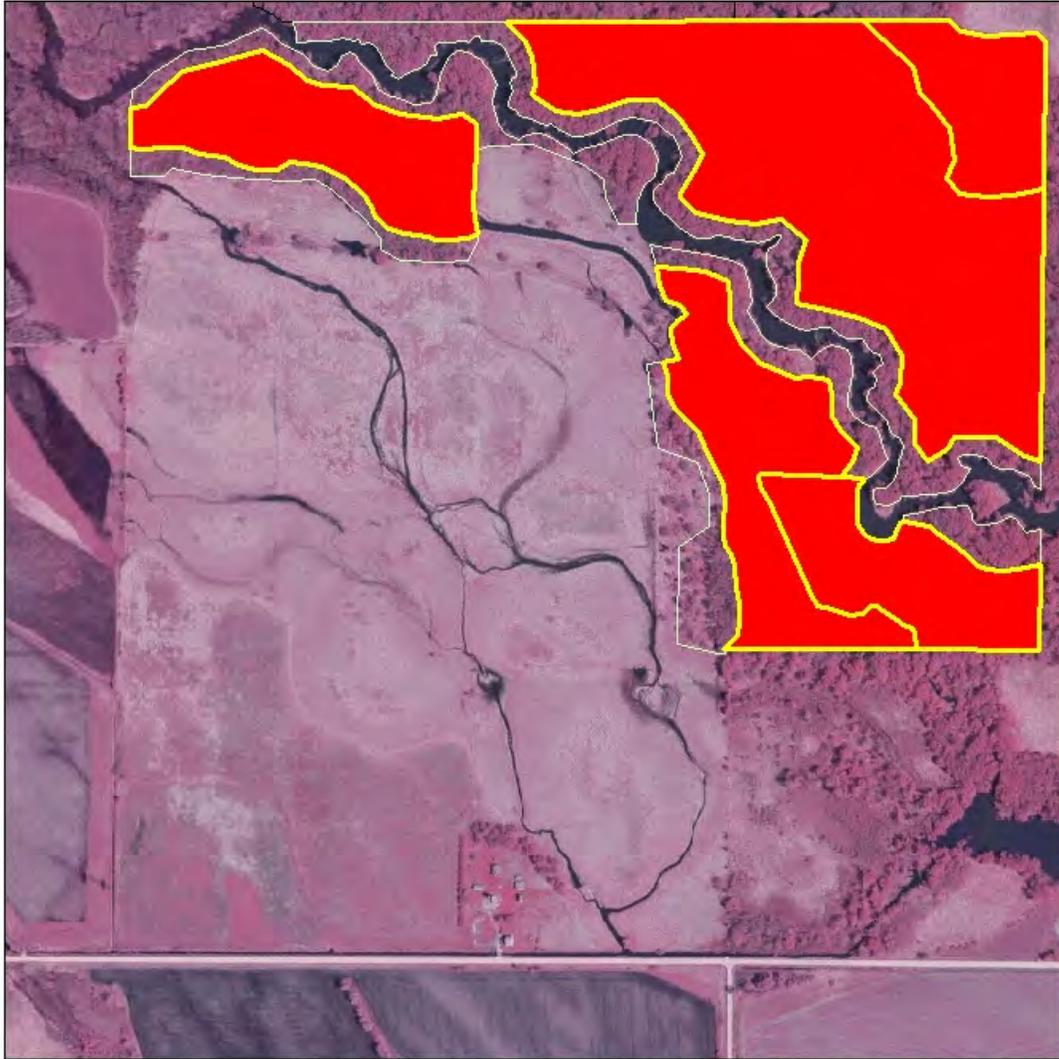
Clearcutting to create full sunlight is essential at some point in the stands life to successfully regenerate oak. If stands are not clearcut, the oak component of the forest will be lost to shade tolerant species. Clearcuts also provide additional early successional habitat in the early stages. The 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 (5-12" dia.) stand of trees.

Regarding oak management in general in even aged stands at Big Marsh and at Shell Rock Bend, the stands are too wet to allow oak regeneration except for small knobs and ridges that may be as little as 1-2 feet higher than the surrounding floodplain. Oak replanting on clearcuts and oak enhancement by shelterwood cutting on these small areas will be utilized to maintain and increase the oak component in the floodplain forest.

Other sun-loving tree species such as walnut, soft maple, and cottonwood benefit from even age management, as well. Left in an unmanaged state, much of the floodplain woodland will evolve into less desirable species such as ash, elm, bitternut hickory and boxelder.

There are 736.7 acres under even age management. Dividing the 736 acres by 100 years, yields an allowable cut of 7.3 acres per year, or 73 acres every 10 years.

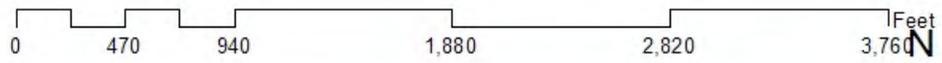
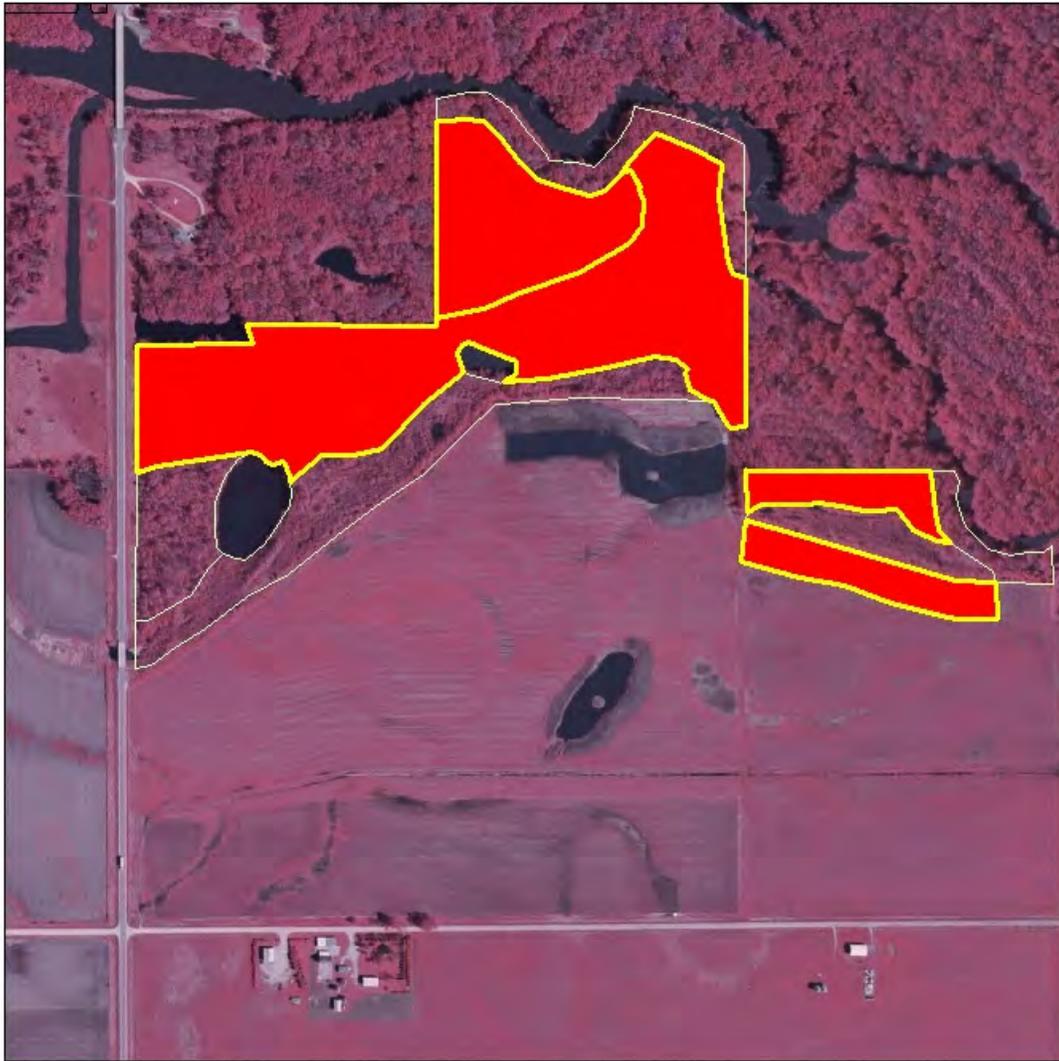
Big Marsh
Forest Stewardship Plan
Meyer Property
Even Age Management
12-16-2008



Sec. 1 and 2, Madison Twsp.
Butler Co.
T91N-R18W



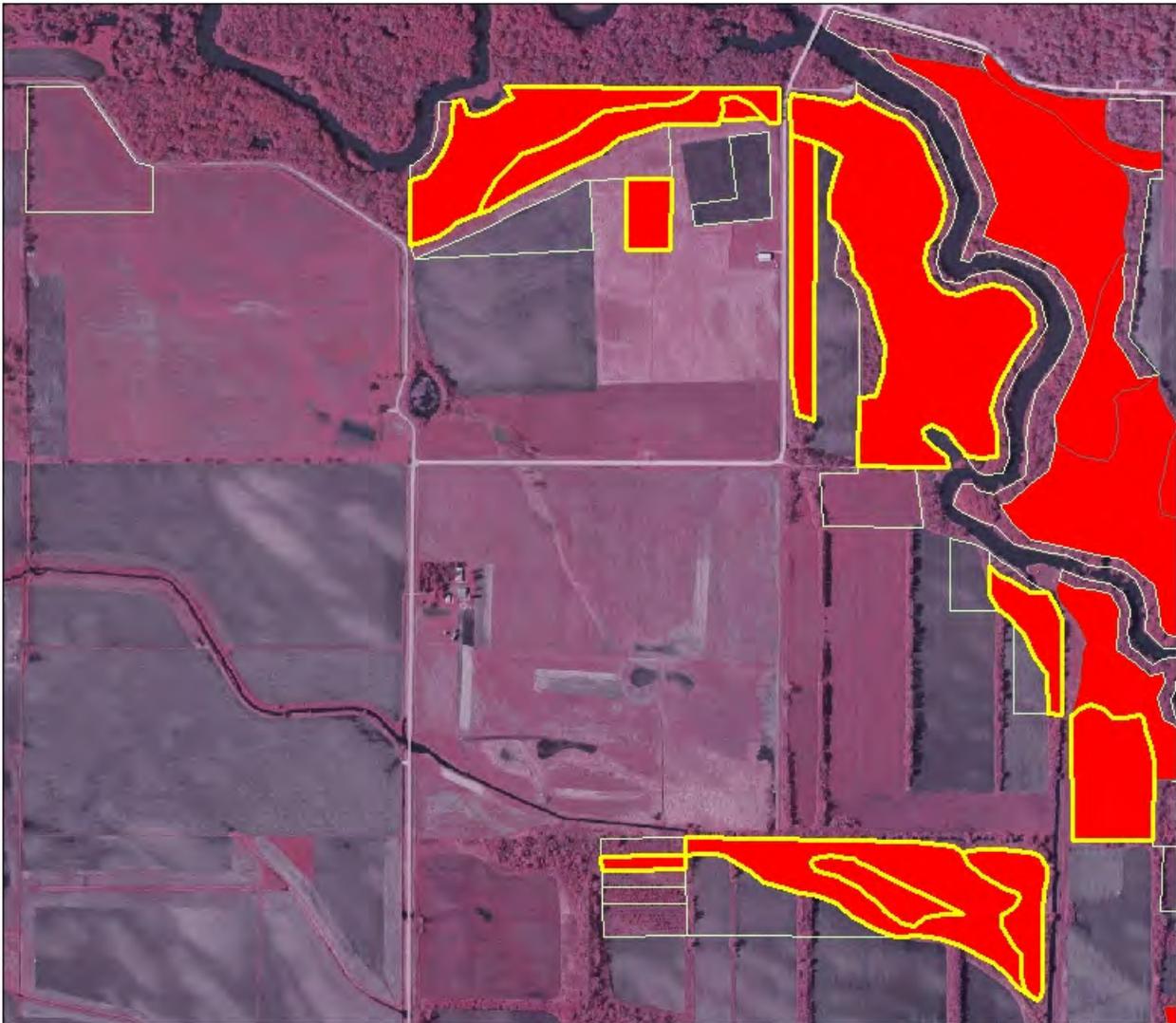
Big Marsh
Forest Stewardship Plan
Trapp Property
Even Age Management
12-18-2008



Sec.8 & 17, Ripley Twsp.
Butler Co.
T91N-R17W



Big Marsh
Forest Stewardship Plan
Big Marsh Map 1
Even Age Management
12-18-2008

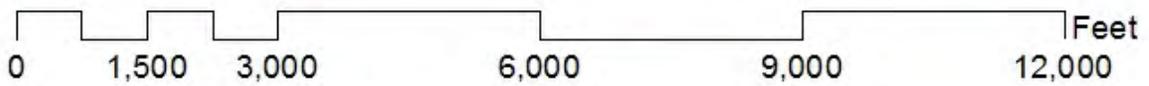
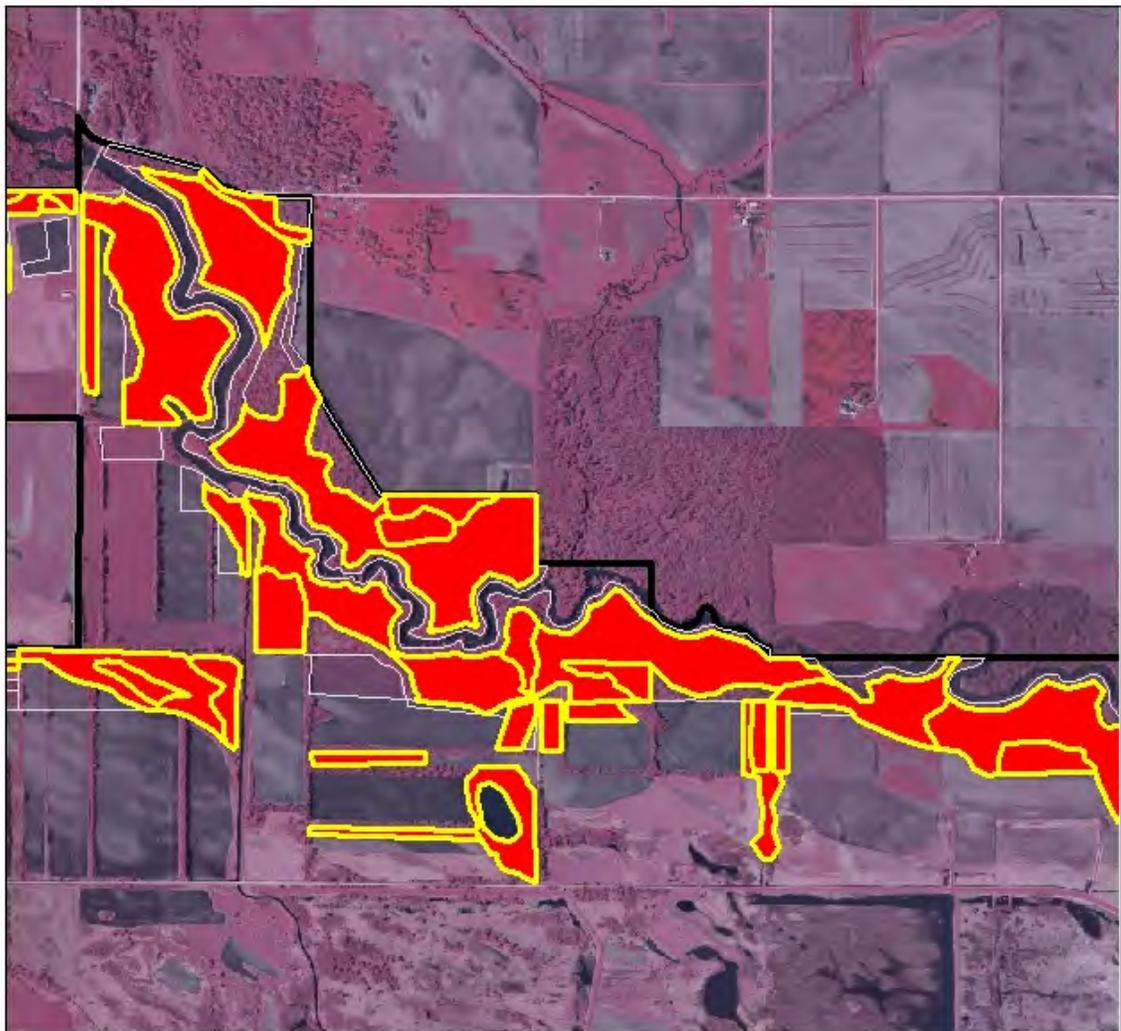


0 700 1,400 2,800 4,200 5,600 Feet



Sec. 15, 16 and 22, Ripley Twp.
Butler Co.
T91N-R17W

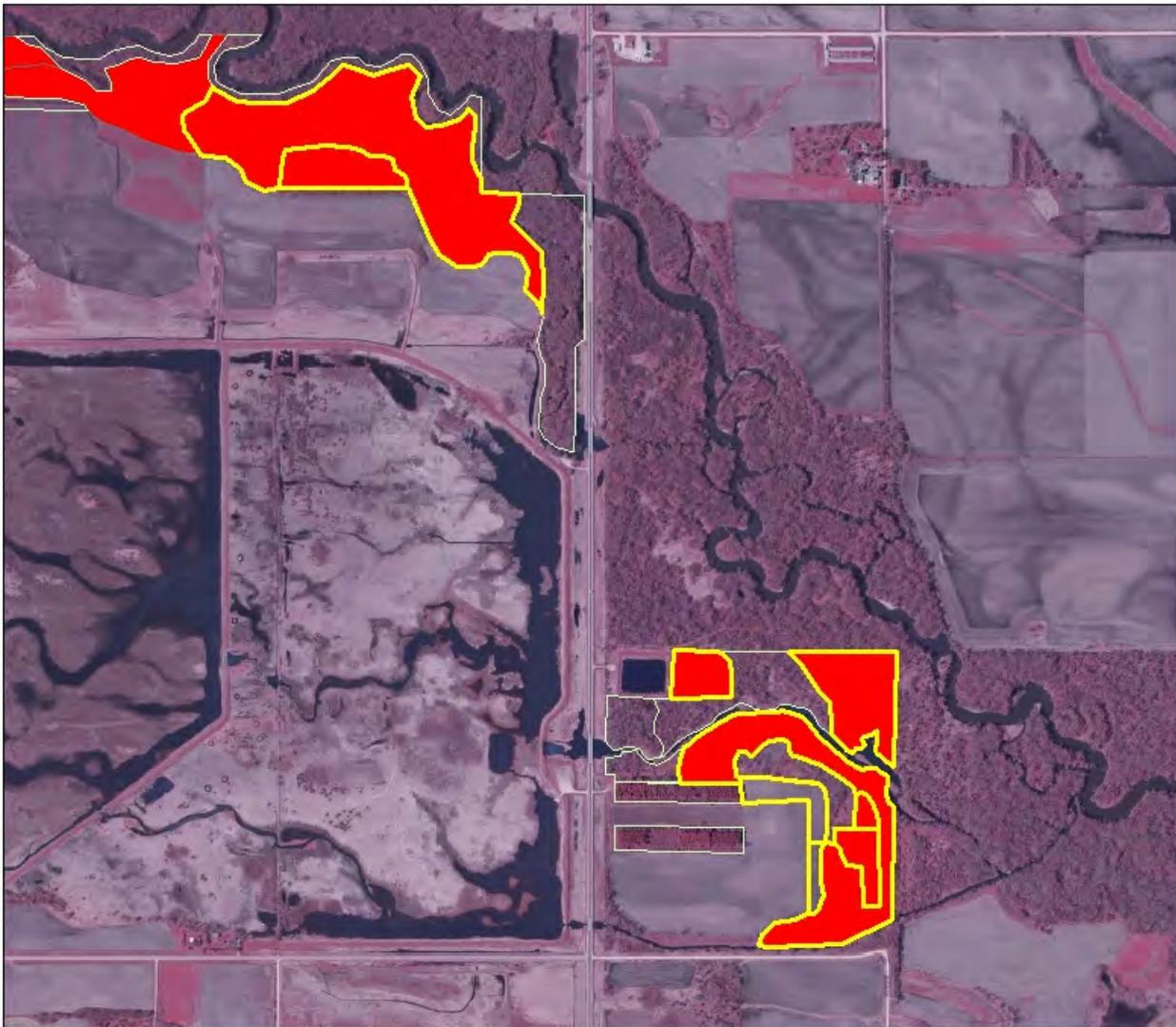
Big Marsh
Forest Stewardship Plan
Big Marsh Map 2
Savanna Management
Edit 2-26-13



Sec. 15, 23 and 24, Ripley Twp.
Butler Co.
T91N-R17W



Big Marsh
Forest Stewardship Plan
Big Marsh Map 3
Even Age Management
12-18-2008

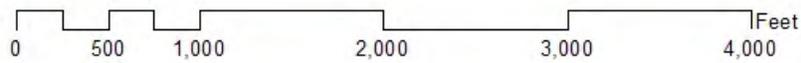
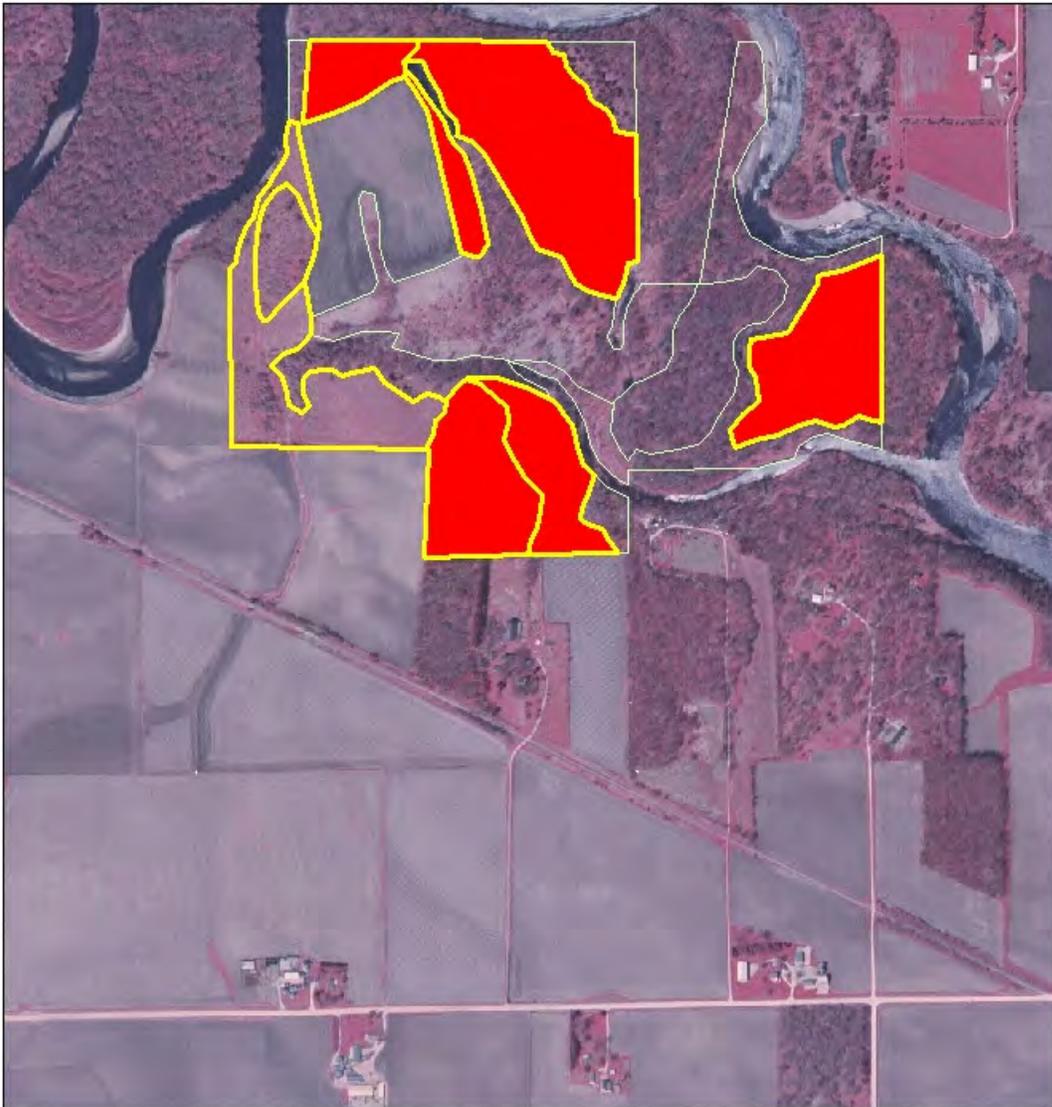


0 750 1,500 3,000 4,500 6,000 Feet



Sec. 24, Ripley Twp.
Sec. 30, Jefferson Twp.
Butler Co.
T91N-R17W
T91NR16W

Big Marsh
Forest Stewardship Plan
Shellrock Bend
Even Age Management
12-18-08



Sec. 13, Shell Rock Twp.
Butler Co.
T91N-R15W

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.

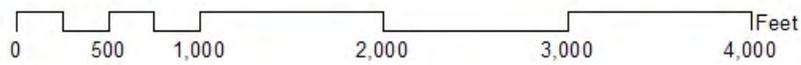
Uneven age management areas will provide continuous tracts of woodland with infrequent disturbance. Large tracts of uneven age management will provide necessary habitat for neotropical migratory bird species such as cerulean, hooded, Canada, and Kentucky warblers. Selective harvesting will create small 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. Large oaks that are healthy will be left to provide acorns for many wildlife species. Timber stand improvement and selective harvesting will create woody debris on the forest floor for reptiles and amphibians.



There is very little uneven age management prescribed for Big Marsh and Shell Rock Bend. Uneven age management will reduce plant species diversity and wildlife species diversity in the floodplain because of the long-term trend toward hackberry, ash, elm, bitternut hickory and boxelder. Blocks of woodland will still have larger, mature trees because few acres under the even age management are cut (74 acres every 10 years over the entire property) on the 100 year rotation.

Stands can be selectively harvested every 20 years to remove mature and defective trees. There are 10.4 acres under uneven age management. The allowable harvest will be 5.2 acres every 10 years.

Big Marsh
Forest Stewardship Plan
Shellrock Bend
Uneven Age Management
12-18-08



Sec. 13, Shell Rock Twsp.
Butler Co.
T91N-R15W

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. Areas adjacent to well travelled roads can also be included.

Management can take place on these areas where desirable to improve the health and species composition of the forest, and to

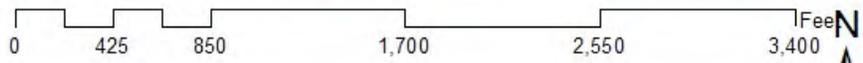
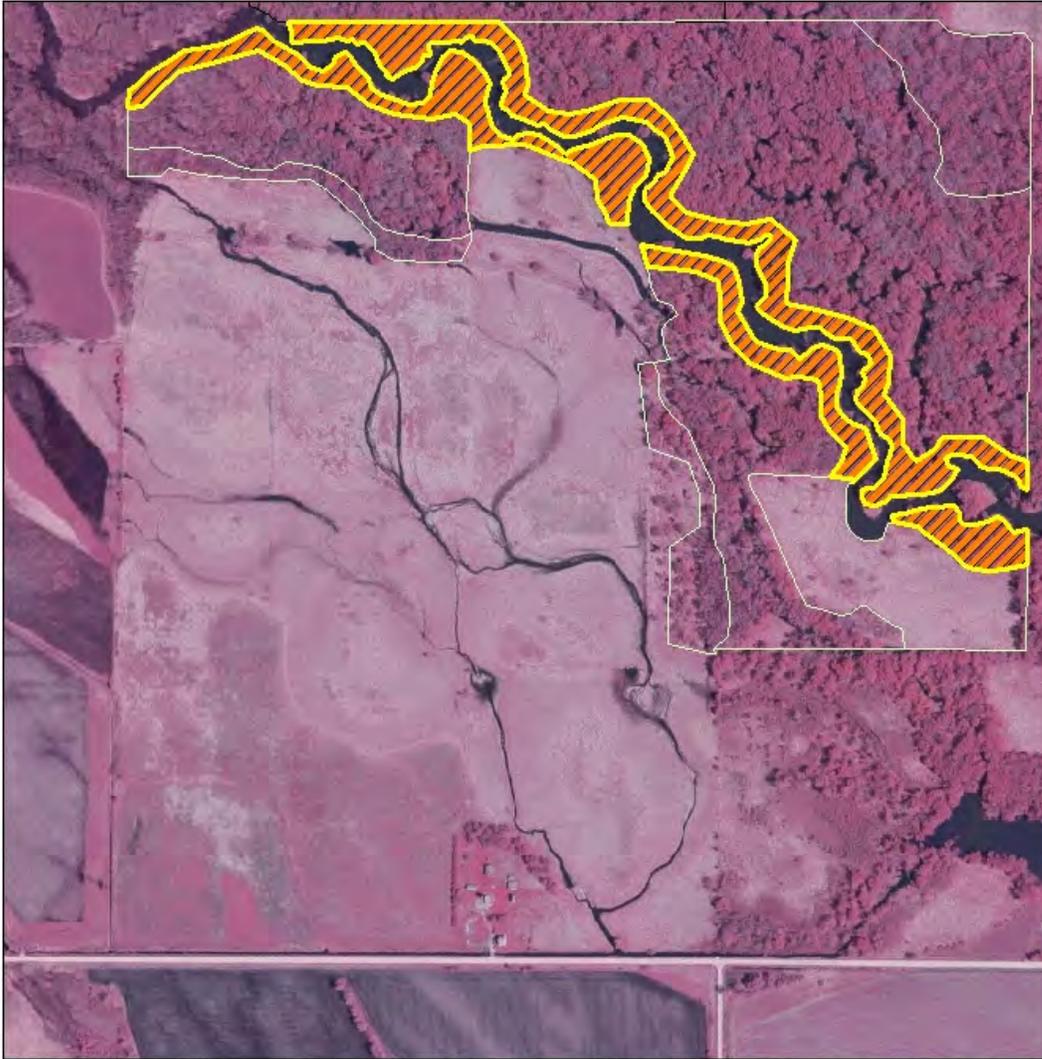
enhance the area for endangered species, but the major objective is to have minor disturbance.



Many neotropical birds will benefit greatly from the areas designated as viewshed. Habitat for a threatened state plant species is included in the viewshed at Big Marsh.

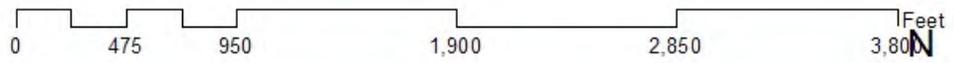
There are 170.7 acres of viewshed management on the area. These areas are generally supporting medium to large sized trees along the river and the main roads. These will be maintained with incidental removal of selected trees only when needed.

Big Marsh
Forest Stewardship Plan
Meyer Property
Viewshed map
12-16-2008



Sec.1 and 2, Madison Twsp.
Butler Co.
T91N-R18W

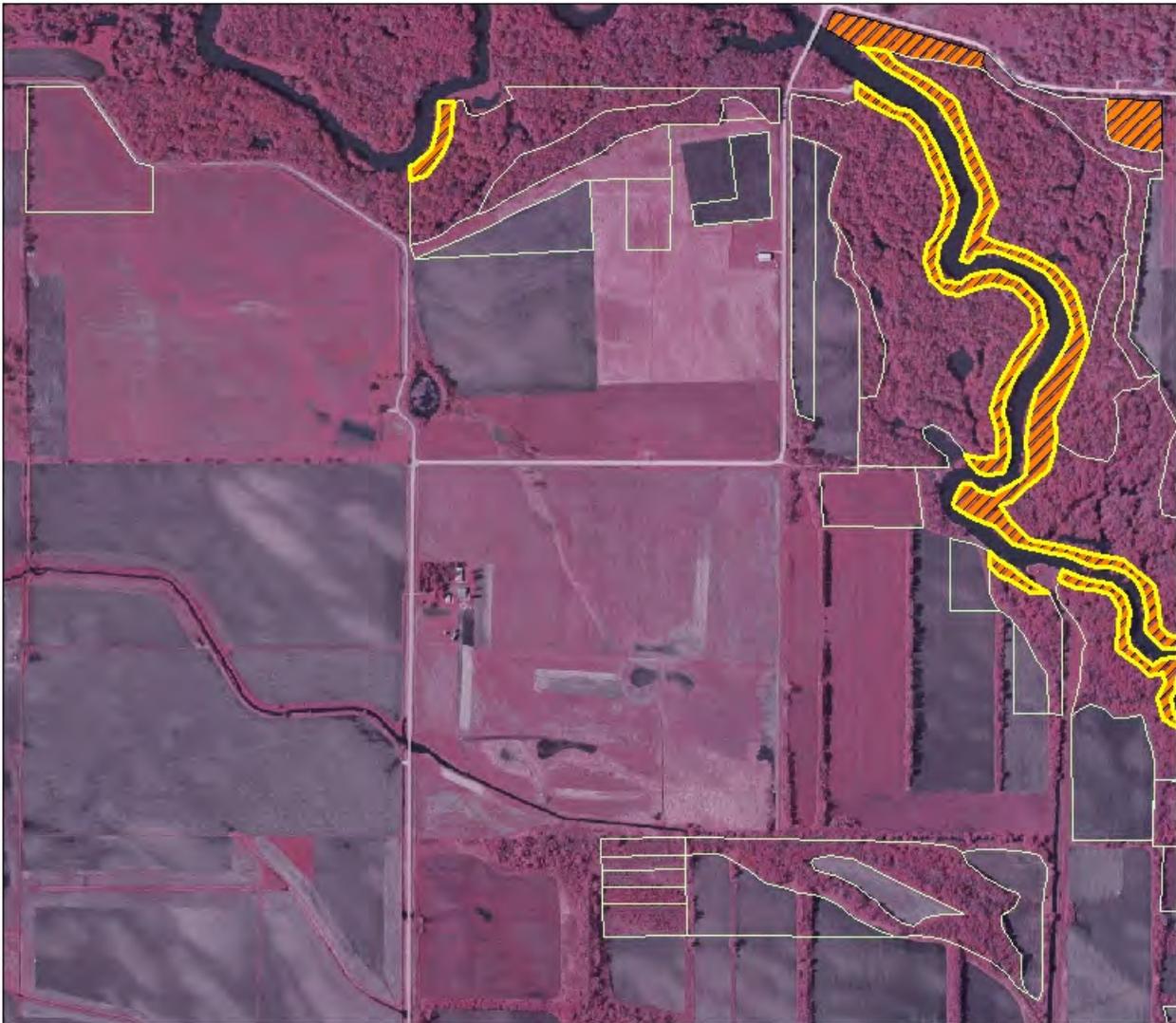
Big Marsh
Forest Stewardship Plan
Trapp Property
Viewshed map
12-18-2008



Sec.8 & 17, Ripley Twsp.
Butler Co.
T91N-R17W



Big Marsh
Forest Stewardship Plan
Big Marsh Map 1
Viewshed map
12-18-2008

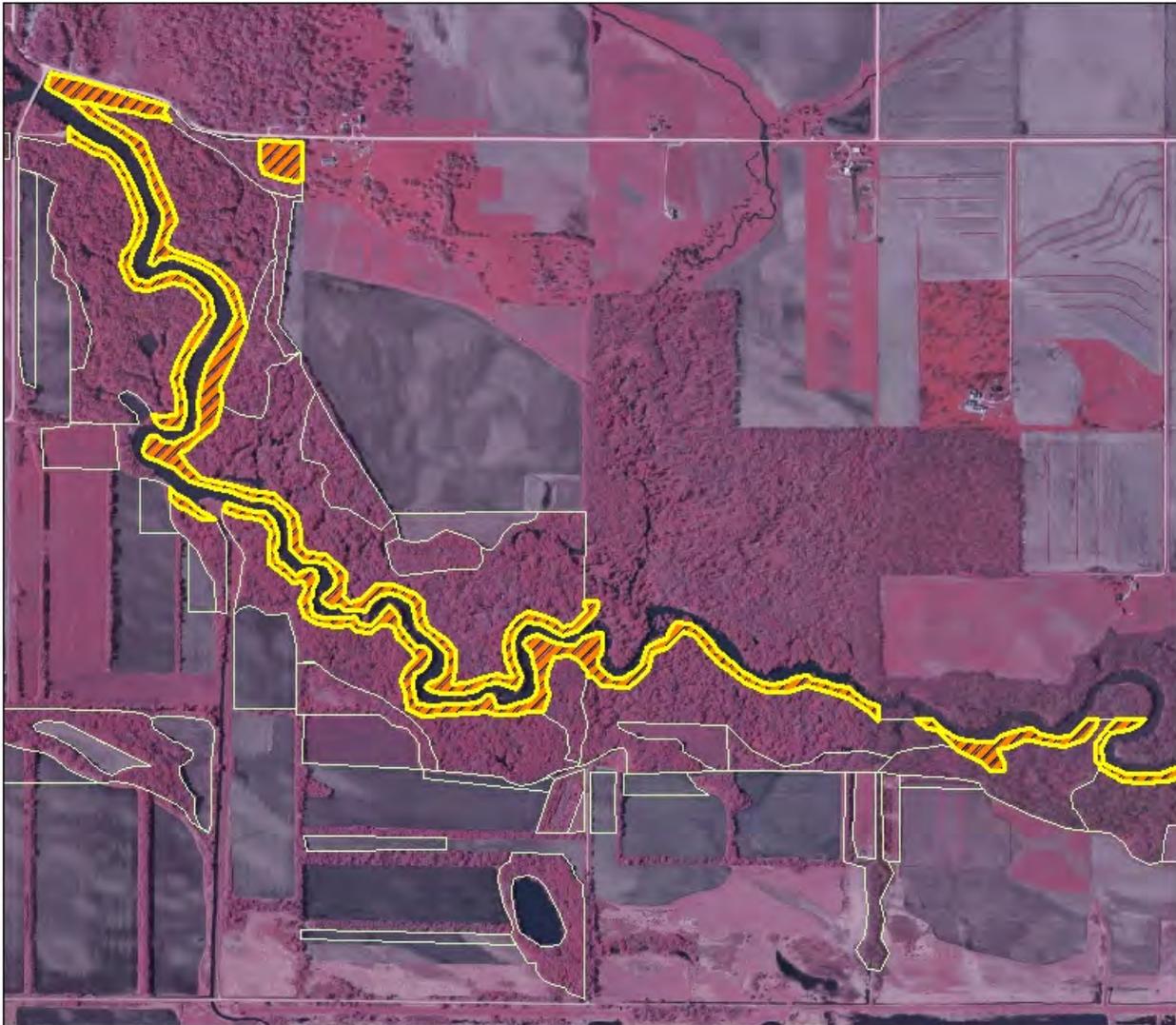


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Sec. 15, 16 and 22, Ripley Twp.
Butler Co.
T91N-R17W

Big Marsh
Forest Stewardship Plan
Big Marsh Map 2
Viewshed map
12-18-2008

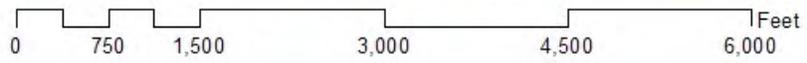
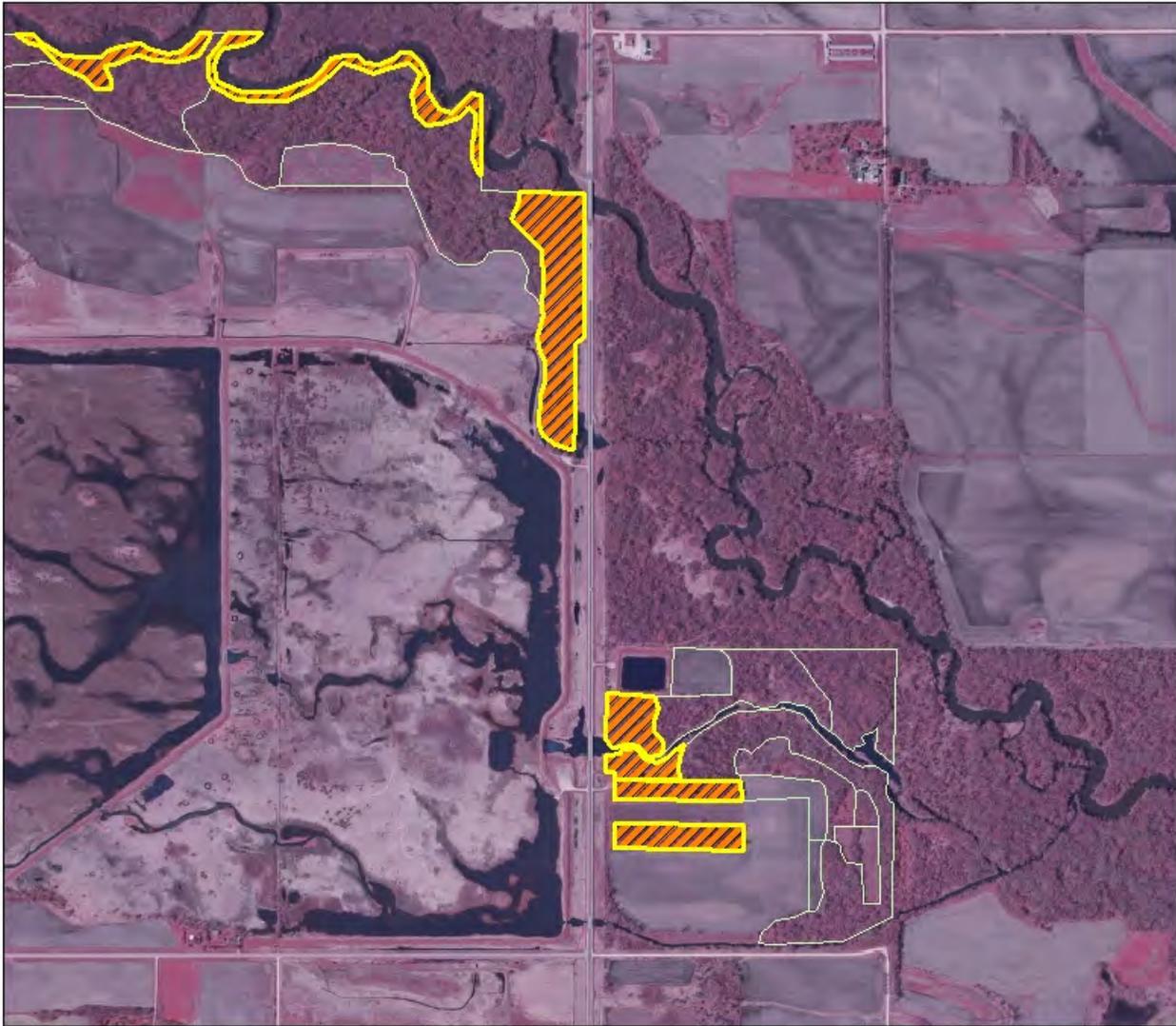


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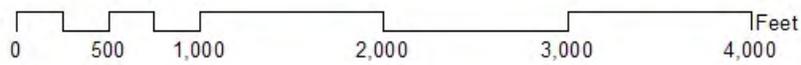
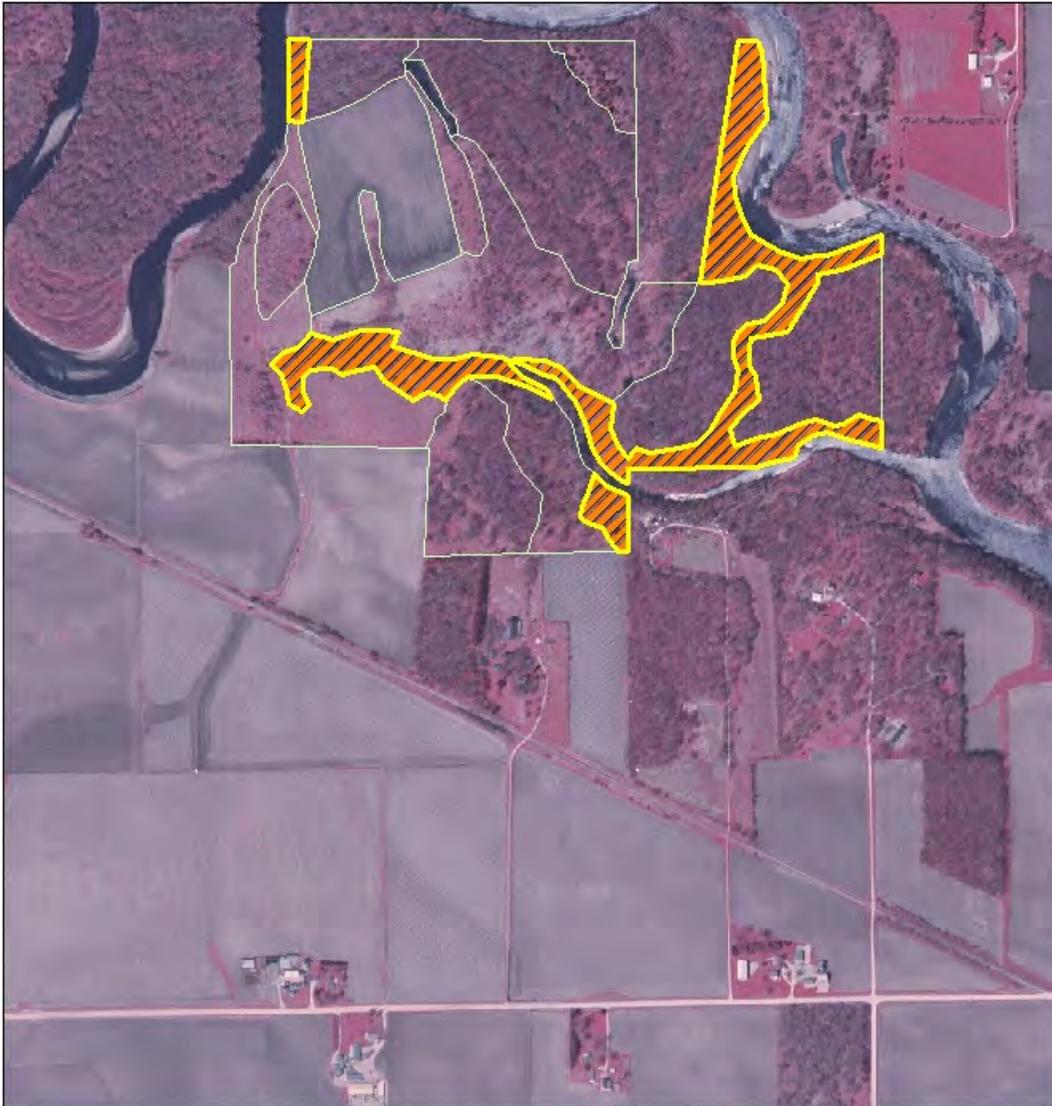
Sec. 15, 23 and 24, Ripley Twp.
Butler Co.
T91N-R17W

Big Marsh
Forest Stewardship Plan
Big Marsh Map 3
Viewshed map
12-18-2008



Sec. 24, Ripley Twp.
Sec. 30, Jefferson Twp.
Butler Co.
T91N-R17W
T91NR16W

Big Marsh
Forest Stewardship Plan
Shellrock Bend
Viewshed map
12-18-08



Sec.13, Shell Rock Twsp.
Butler Co.
T91N-R15W

WORK PLAN

FOR

BIG MARSH AND SHELL ROCK BEND WILDLIFE AREAS

This is the “working plan” for the Big Marsh and Shell Rock Bend Wildlife Management Areas. The plan is designed to aid professional biologists and foresters in the implementation of forest management practices. It is written with the understanding that these professionals have a basic understanding of forest management principles and techniques. Every detail has not been outlined in the plan because the plan would become too long to be of practical use. This plan is intended to get work accomplished on the ground.

SUSTAINABLE FORESTRY GUIDELINES

Sustainable forestry is managing a forest to maximize the distribution of age classes on the property, and insure there is a balanced distribution of tree sizes. With even age management, the acres of even age management divided by the rotation age is the allowable cut per year. The target rotation age for the area is 100 years. This insures that large oaks will always be present on the area.

Savanna-

These areas will be managed to perpetuate a mixture of scattered oaks and shrubs with an understory of grasses and forbs. Fire, mowing, selective planting, and selective cutting will be used over the years.

Early Successional Management -

The early Successional areas will be managed on a 15 year rotation. There are 105.3 acres designated for early Successional management. The allowable cut is 7 acres per year (105.3 acres divided by 15 yrs.). With a working cycle of 5 years, approximately 35 acres could be cut every 5 years.

Even Age Management Area –

There are 735.1 acres under even age management. Dividing 735.1 acres by 100 years, yields an allowable cut of 7.4 acres per year, or 74 acres every 10 years. However, the plan calls for 70% of the overall acres in this plan to remain in medium to large tree sized stands. Therefore, the allowable cut may be altered in the future following evaluation to assure this percentage is maintained.

Uneven Age Management Area –

Stands can be selectively harvested every 20 years to remove mature and defective trees. There are 10.4 acres under uneven age management. The allowable harvest will be 5.2 acres every 10 years.

Viewshed-

These areas are generally supporting medium to large sized trees. There are 170.7 acres under viewshed management. This timber type will be maintained with incidental removal of select trees only when needed.

DESCRIPTION AND RECOMMENDATIONS FOR INDIVIDUAL STANDS

Stand 1: 14.2 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is large sized (20+” dia.) silver maple, ash, bur oak, and scattered cottonwood, swamp white oak , honey locust, and hackberry. The understory is elm, hawthorn, silver maple, ash, and hackberry.

Management Recommendations – Even age

Remove scattered mature trees to even up the stand and release oaks and cottonwoods from competition. Consider leaving 3 or more larger living trees including some with 20+ inch diameters per acre to serve as nesting and perching sites. Three or more snags per acre could be left, as well. After the harvest weed the stand to eliminate less desirable, highly competitive species such as boxelder and honey locust.

Stand 2: 45.2 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is large sized (20+” dia.) silver maple, ash, bur oak, and scattered cottonwood, swamp white oak , honey locust, and hackberry. The understory is elm, hawthorn, silver maple, ash, and hackberry.

Management Recommendations – Even age

Remove scattered mature trees to even up the stand and release oaks and cottonwoods from competition. Consider leaving 3 or more larger living trees including some with 20+ inch diameters per acre to serve as nesting and perching sites. Several snags per acre can be left, as well. After the harvest weed the stand to eliminate less desirable, highly competitive species such as boxelder and honey locust.

Stand 3: 8.3 acres

Site Description –

Second bottomland bench.

Woodland Description -

Large (20” and larger in diameter) swamp white oak, silver maple, ash and honey locust. The understory is hawthorn, elm, bitternut hickory, and hackberry.

Management Recommendations – Even Age

The stand could be clearcut and planted to regenerate oak. All trees 14 inches and larger in diameter would be harvested. Consider leaving 2-3 larger living trees including some with 20+ inch diameters per acre to serve as nesting and perching sites. Several snags per acre can be left, as well.

Following the harvest, all remaining trees 1 inch and larger in diameter should be felled. The stumps of less desirable species should be treated with Pathfinder II to prevent sprouting. Plant the area with bur oak and swamp white oak. Plant a tree every 30 ft. apart or 50 trees per acre. Planting large stock is essential for the oaks to compete with the floodwaters and fast growing competition and to grow above deer browsing height. The trees should be a minimum of 18-24” in height and 3/8” in caliper.



Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 4: 111.8 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is large sized (20+” dia.) silver maple, ash, bur oak, and scattered cottonwood, swamp white oak , honey locust, and hackberry. The understory is elm, hawthorn, silver maple, ash, and hackberry.

Management Recommendations – Viewshed

Due to this stands location along the river, it will be left as is and managed as Viewshed.

Stand 5: 11.1 acres

Site Description –

Bottomland field.

Woodland Description -

This area is currently an open field.

Management Recommendations – Even Age

Plant the area with bur oak and swamp white oak. Plant a tree every 30 ft. apart or 50 trees per acre. Planting large stock is essential for the trees to compete with floodwaters and fast growing competition and to grow above deer browsing height. The trees should be a minimum of 18-24” in height and 3/8” in caliper.

Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 6: 15.6 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is large sized (20+” dia.) silver maple, ash, bur oak, and scattered cottonwood, swamp white oak, honey locust, and hackberry. The understory is elm, hawthorn, silver maple, ash, and hackberry.

Management Recommendations – Even age

Remove scattered mature trees to even up the stand and release oaks and cottonwoods from competition. Consider leaving 3 or more larger living trees including some with 20+ inch diameters per acre to serve as nesting and perching sites. Several snags per acre can be left, as well. After the harvest weed the stand to eliminate less desirable, highly competitive species such as boxelder and honey locust.

Stand 7: 4.4 acres

Site Description -

Level area along wetland.

Woodland Description –

The area is large sized (20+” dia.) silver maple, ash, bur oak, and scattered cottonwood, swamp white oak , honey locust, and hackberry. The understory is elm, hawthorn, silver maple, ash, and hackberry

Management Recommendations – Early Successional

Stand 7 could be clearcut with the exception of leaving most oak and/or 2-3 cottonwood trees per acre. This will add some early Successional habitat to the area while maintaining some perch/nesting sites for raptors and providing some mast production. Stand 7 could be harvested along with Stand 1.

Stand 8: 3.1 acres

Site Description -

Level area along wetland.

Woodland Description –

The area is large sized (20+” dia.) silver maple, ash, bur oak, and scattered cottonwood, swamp white oak , honey locust, and hackberry. The understory is elm, hawthorn, silver maple, ash, and hackberry

Management Recommendations – Early Successional

Stand 8 could be clearcut with the exception of leaving most oak and/or 2-3 cottonwood trees per acre. This will add some early Successional habitat to the area while maintaining some perch/nesting sites for raptors and providing some mast production. Stand 8 could be harvested along with Stand 6.

Stand 9: 4.8 acres

Site Description –

Bottomland timber along county road T25.

Woodland Description -

Medium (12-18” dia.) honey locust, cottonwood and ash along with some scattered bur oak and walnut. The understory is pole sized hawthorn, honey locust, elm, silver maple, willow and cottonwood. The regeneration layer is honey suckle, ash, dogwood, and willow.

Management Recommendations – Viewshed

Due to the location of the road and pond, this area will be left as is and managed as Viewshed.

Stand 10: 10.8 acres

Site Description –

Bottomland second bench.

Woodland Description -

This area was harvested in 2006. In 2007 all elm, bitternut hickory, silver maple, ash, hackberry and hawthorn less than 14 inches in diameter were cut and treated with Pathfinder II. In the spring of 2008, 300 oak seedlings were planted and covered with vented tree shelters.

Management Recommendations – Even age

In 3 to 5 years, this area should be clearcut where the planted seedlings have established so they can receive full sunlight.

Stand 11: 32.5 acres

Site Description –

Bottomland with poorly drained soils.

Woodland Description -

This area was selectively harvested in 2006. The large silver maple, cottonwood, hackberry and ash were harvested. Most of the large oaks were left for mast production. There are also a few scattered, pole sized walnut and swamp white oak.

Management Recommendations – Even Age

Timber Stand Improvement (Crop Tree Release)

- In pole-sized stands (4-10" dia.), potential crop trees can be selected and released. Select a crop tree every 30-35 ft. apart, or 50 crop trees per acre. Remove trees with crowns that are touching or overtopping the crowns of the crop trees. Species to favor as crop trees are black walnut, hackberry, cherry, silver maple, cottonwood and oak.

The trees to be removed can be felled or double girdled. No herbicide is necessary.



Stand 12: 11.6 acres

Site Description -

Wet bottomland drainage.

Woodland Description –

This area is currently sapling sized willow, silver maple, boxelder and cottonwood.

Management Recommendations – Early Successional

Stand 12 could be cut to add some early Successional habitat to the area. Leave 2-3 cottonwoods per acre.

Stand 13: 3.6 acres

Site Description -

Wet bottomland drainage.

Woodland Description –

This area is currently sapling sized willow, silver maple, boxelder and cottonwood.

Management Recommendations – Early Successional

Stand 13 could be cut to add some early Successional habitat to the area. Leave 2-3 cottonwoods per acre.

Stand 14: 4.3 acres

Site Description -

Bottomland second bench.

Woodland Description -

This area has been planted to oak seedlings and is in need of continued maintenance.

Management Description – Even Age

Competing vegetation should be controlled for a minimum of 5 years. After the trees are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season's weed control.

The area between the rows should be mowed at least 2-4 times per year.



This is good weed control.



This is NOT good weed control.

As the site starts to get weedy during the summer, you may need to spray the tree rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.

Stand 15: 3.3 acres

Site Description –

Bottomland with poorly drained soils.

Woodland Description –

Pole sized silver maple, ash, honey locust and elm. There are a few mature silver maple, cottonwood and ash.

Management Recommendations – Even Age

Timber Stand Improvement (Crop Tree Release) - In pole-sized stands (4-10" dia.), potential crop trees can be selected and released. Select a crop tree every 30-35 ft. apart, or 50 crop trees per acre. Remove trees with crowns that are touching or overtopping the

crowns of the crop trees. Species to favor as crop trees are black walnut, hackberry, cherry, silver maple, cottonwood and oak. Leave 3 or more mature trees per acre for nesting trees.

The trees to be removed can be felled or double girdled. No herbicide is necessary. Work around the big trees.

Stand 16: 14.2 acres

Site Description -

This area is an old crop field that has been planted to trees.

Woodland Description -

This area has been planted to oak seedlings and is in need of continued maintenance.

Management Description – Savanna

Competing vegetation should be controlled for a minimum of 5 years. After the trees are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season's weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the oak trees reach 5-6 feet in height, the grass in the stand needs to be mowed and subsequently sprayed with Round-up at 2 quarts per acre. This should be followed with a seeding of prairie grasses and forbs. A few shrubs can then be planted among the trees after the prairie seeding is established.

Stand 17: 16.7 acres

Site Description –

Bottomland with poorly drained soils.

Woodland Description -

Pole sized (5-10" dia.) silver maple, hackberry, ash, elm and honey locust.

Management Recommendations – Even age

Timber Stand Improvement (Crop Tree Release) - In pole-sized stands (4-10" dia.), potential crop trees can be selected and released. Select a crop tree every 30-35 ft. apart, or 50 crop trees per acre. Remove trees with crowns that are touching or overtopping the crowns of the crop trees. Species to favor as crop trees are black walnut, hackberry, cherry, silver maple, cottonwood and oak. Leave 3 or more mature trees per acre for nesting trees.

The trees to be removed can be felled or double girdled. No herbicide is necessary.

Stand 18: 9.5 acres

Site Description -

Bottomland second bench.

Woodland Description –

Pole sized (5-10” dia.) silver maple, hackberry, ash, elm, walnut, bitternut hickory and honey locust.

Management Recommendations – Even Age

Timber Stand Improvement (Crop Tree Release) - In pole-sized stands (4-10” dia.), potential crop trees can be selected and released. Select a crop tree every 30-35 ft. apart, or 50 crop trees per acre. Remove trees with crowns that are touching or overtopping the crowns of the crop trees. Species to favor as crop trees are black walnut, hackberry, cherry, silver maple, cottonwood and oak. Leave 3 or more mature trees per acre for nesting trees.

The trees to be removed can be felled or double girdled. No herbicide is necessary.

Stand 19: 7.4 acres

Site Description -

This area is an old crop field that has been planted to trees.

Woodland Description -

This area has been planted to trees and is in need of continued maintenance.

Management Description – Savanna

Competing vegetation should be controlled for a minimum of 5 years. After the trees are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season’s weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the oak trees reach 5-6 feet in height, the grass in the stand needs to be mowed and subsequently sprayed with Round-up at 2 quarts per acre. This should be followed with a seeding of prairie grasses and forbs. A few shrubs can then be planted among the trees after the prairie seeding is established.

As the site starts to get weedy during the summer, you may need to spray the tree rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.

Stand 20: 7.1 acres

Site Description -

This area is an old crop field that has been planted to trees in the spring of 2008.

Woodland Description -

This area has been planted to trees and is in need of continued maintenance.

Management Description – Savanna

Competing vegetation should be controlled for a minimum of 5 years. After the trees are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season's weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the site starts to get weedy during the summer, you may need to spray the tree rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.

As the oak trees reach 5-6 feet in height, the grass in the stand needs to be mowed and subsequently sprayed with Round-up at 2 quarts per acre. This should be followed with a seeding of prairie grasses and forbs. A few shrubs can then be planted among the trees after the prairie seeding is established.

Stand 21: 3.5 acres

Site Description -

This area is an old crop field that has been planted to trees.

Woodland Description -

This area has been planted to trees and shrubs and is in need of continued maintenance.

Management Description – Even Age

Competing vegetation should be controlled for a minimum of 5 years. After the trees are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season's weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the site starts to get weedy during the summer, you may need to spray the tree rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have

shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.

Stand 22: 0.8 acres

Site Description -

This area is an old crop field that has been planted to trees.

Woodland Description -

This area has been planted to oak seedlings and is in need of continued maintenance.

Management Description – Even Age

Competing vegetation should be controlled for a minimum of 5 years. After the trees are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season's weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the site starts to get weedy during the summer, you may need to spray the tree rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.

Stand 23: 4.6 acres

Site Description -

This area is an old crop field that has been planted to trees.

Woodland Description -

This area has been planted to trees and is in need of continued maintenance.

Management Description – Savanna

Competing vegetation should be controlled for a minimum of 5 years. After the trees are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season's weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the site starts to get weedy during the summer, you may need to spray the tree rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.

As the oak trees reach 5-6 feet in height, the grass in the stand needs to be mowed and subsequently sprayed with Round-up at 2 quarts per acre. This should be followed with a

seeding of prairie grasses and forbs. A few shrubs can then be planted among the trees after the prairie seeding is established.

Stand 24: 7.2 acres

Site Description -

This area is an old crop field that has been planted to trees.

Woodland Description -

This area has been planted trees seedlings and is in need of continued maintenance.

Management Description – Even Age

Competing vegetation should be controlled for a minimum of 5 years. After the trees are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season's weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the site starts to get weedy during the summer, you may need to spray the tree rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.

Stand 25: 6.30 acres

Site Description -

This area is an old crop field that is scheduled to be planted to trees and shrubs.

Woodland Description -

This area will be planted to hardwood trees and shrubs.

Management Description – Early Successional

The area should be planted with bur oak, swamp white oak, black oak, hawthorne, dogwood, and viburnum seedlings. Large stock, 2-3 ft. tall should be planted. Plant the trees roughly 30 ft. apart or 50 trees per acre on the woodland side and plant the shrubs on a 8 by 10 foot spacing on the grassland/crop side.

Rabbits and deer can really damage a new tree planting by eating the buds and stems off of the newly planted plants. It is fairly important to protect the seedling in some way.

Use 4 to 5 foot tall vented tree shelters to protect each seedling. It will be worth the time and effort to protect these newly planted seedlings. Competing vegetation should be controlled for a minimum of 5 years.

After the trees and shrubs are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with



Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season's weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the site starts to get weedy during the summer, you may need to spray the tree and shrub rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.

Stand 26: 3 acres

Site Description -

This area is an old crop field that is scheduled to be planted to trees.

Woodland Description -

This area will be planted to hardwood trees and shrubs.

Management Description – Savanna

The area will be seeded to prairie grasses and forbs which will be allowed to establish for two years. Then 20 oak seedlings will be planted with about 40 shrubs per acre. . Planting large stock is essential for the trees to compete with the competition and grow above deer browsing height. The trees should be a minimum of 18-24" in height and 3/8" in caliper.

Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 27a: 5 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is medium sized (12-18" dia.) silver maple, cottonwood, ash, honey locust, bitternut hickory, and elm. The understory is silver maple, cottonwood, hackberry, bitternut hickory, elm, boxelder and willow.

Management Recommendations – Even Age

The stand could be clearcut and planted to regenerate oak. Clearcut 3 to 5 acre areas over time.

All trees 14 inches and larger in diameter would be harvested. Following the harvest, all remaining trees 1 inch and larger in diameter should be felled. The stumps of less

desirable species should be treated with Pathfinder II to prevent sprouting. Plant the knobs and ridges with bur oak and swamp white oak. Plant a tree every 30 ft. apart or 50 trees per acre. Planting large stock is essential for the trees to compete with floodwaters and fast growing the competition and to grow above deer browsing height. The trees should be a minimum of 18-24" in height and 3/8" in caliper.

Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 27b: 19.9 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is medium sized (12-18" dia.) silver maple, cottonwood, ash, honey locust, bitternut hickory, and elm. The understory is silver maple, cottonwood, hackberry, bitternut hickory, elm, boxelder and willow.

Management Recommendations – Even Age

The stand could be clearcut and planted to regenerate oak. Clearcut 3 to 5 acre areas over time.

All trees 14 inches and larger in diameter would be harvested. Following the harvest, all remaining trees 1 inch and larger in diameter should be felled. The stumps of less desirable species should be treated with Pathfinder II to prevent sprouting. Plant the knobs and ridges with bur oak and swamp white oak. Plant a tree every 30 ft. apart or 50 trees per acre. Planting large stock is essential for the trees to compete with floodwaters and fast growing the competition and to grow above deer browsing height. The trees should be a minimum of 18-24" in height and 3/8" in caliper.

Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 28: 2.6 acres

Site Description -

This area is an old crop field that is scheduled to be planted to trees.

Woodland Description -

This area will be planted to hardwood trees and shrubs.

Management Description – Savanna

The area will be seeded to prairie grasses and forbs which will be allowed to establish for two years. Then 20 oak seedlings will be planted with about 40 shrubs per acre. Planting large stock is essential for the trees to compete with the competition and grow above deer browsing height. The trees should be a minimum of 18-24” in height and 3/8” in caliper.

Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 29: 11.5 acres

Site Description -

This area is an old crop field that is scheduled to be planted to trees.

Woodland Description -

This area will be planted to hardwood trees.

Management Description – Even Age

The area should be planted with bur oak, swamp white oak and black oak seedlings. Large stock, 2-3 ft. tall should be planted. Plant the trees roughly 30 ft. apart or 50 trees per acre.

Rabbits and deer can really damage a new tree planting by eating the buds and stems off of the newly planted plants. It is fairly important to protect the seedling in some way.

Use 4 to 5 foot tall vented tree shelters to protect each seedling. Competing vegetation should be controlled for a minimum of 5 years.

After the trees are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season’s weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the site starts to get weedy during the summer, you may need to spray the tree rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.

Stand 30: 6.2 acres

Site Description -

This area is an old crop field that is scheduled to be planted to trees.

Woodland Description -

This area will be planted to hardwood trees.

Management Description – Even Age

The area should be planted with bur oak, swamp white oak and black oak seedlings. Large stock, 2-3 ft. tall should be planted. Plant the trees roughly 30 ft. apart or 50 trees per acre.

Rabbits and deer can really damage a new tree planting by eating the buds and stems off of the newly planted plants. It is fairly important to protect the seedling in some way.

Use 4 to 5 foot tall vented tree shelters to protect each seedling. Competing vegetation should be controlled for a minimum of 5 years.

After the trees are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season's weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the site starts to get weedy during the summer, you may need to spray the tree rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.

Stand 31: 4 acres

Site Description -

This area is an old crop field that has been planted to trees.

Woodland Description -

This area has been planted to oak seedlings and is in need of continued maintenance.

Management Description – Even Age

This area is doing fairly well, but you will need to release the oak trees in 5 years.

Stand 32: 11.1 acres

Site Description -

This area is an old crop field that is scheduled to be planted to trees.

Woodland Description -

This area will be planted to hardwood trees and shrubs.

Management Description – Savanna

The area will be seeded to prairie grasses and forbs which will be allowed to establish for two years. Then 20 oak seedlings will be planted with about 40 shrubs per acre. . Planting large stock is essential for the trees to compete with the competition and

grow above deer browsing height. The trees should be a minimum of 18-24” in height and 3/8” in caliper.

Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 33: 1.7 acres

Site Description -

This area is an old crop field that was planted to shrubs.

Woodland Description -

This area is dogwood and plum. This area was thinned in the fall of 2006 to remove invading hardwood trees.

Management Recommendations – Early Successional

Continue to maintain this planting.

Stand 34: 1.4 acres

Site Description -

This area is an old crop field that was planted to red oak and bur oak in 1994.

Woodland Description -

This stand is a pole sized and was also thinned in 2006.

Management Recommendations – Even age

Continue to maintain this planting.

Stand 35: 1.6 acres

Site Description -

This area is an old crop field that was planted to shrubs and conifers in 1994.

Woodland Description -

This area is a mix of conifers, hardwoods and shrubs.

Management Recommendations – Early Successional

Nothing is needed at this time.

Stand 36: 1.6 acres

Site Description -

This area is an old crop field that was planted to shrubs in 1994.

Woodland Description -

This area was planted to shrubs. This area was also thinned of hardwood trees in 2006.

Management Recommendations – Early Successional

Continue to maintain this planting.

Stand 37: 3.1 acres

Site Description -

This area is an old crop field that was planted to shrubs and conifers in 1994.

Woodland Description -

This area is a mix of conifers, hardwoods and shrubs.

Management Recommendations – Early Successional

Nothing is needed at this time.

Stand 38: 3.4 acres

Site Description -

Level area between crop field and stand 39.

Woodland Description –

The area is large sized (20+” dia.) silver maple, ash, bur oak, and scattered cottonwood, bitternut hickory, honey locust, and hackberry. The understory is elm, hawthorn, silver maple, ash, and hackberry

Management Recommendations – Early Successional

Stand 38 could be clearcut with the exception of leaving most oak and/or 2-3 cottonwood trees per acre. This will add some early Successional habitat to the area while maintaining some perch/nesting sites for raptors and providing some mast production. Stand 38 could be harvested along with Stand 39.

Stand 39: 47.2 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is medium sized (12-18” dia.) silver maple, cottonwood, ash, honey locust, bitternut hickory, and elm. The understory is silver maple, cottonwood, hackberry, bitternut hickory, elm, boxelder and willow.

Management Recommendations – Even Age

The stand could be clearcut and planted to regenerate oak. Clearcut 3 to 5 acre areas over time.

All trees 14 inches and larger in diameter would be harvested. Following the harvest, all remaining trees 1 inch and larger in diameter should be felled. The stumps of less desirable species should be treated with Pathfinder II to prevent sprouting. Plant the high knobs and ridges with bur oak and swamp white oak. Plant a tree every 30 ft. apart or 50 trees per acre. Planting large stock is essential for the trees to compete with floodwaters and fast growing competition and to grow above deer browsing height. The trees should be a minimum of 18-24” in height and 3/8” in caliper.

Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 40: 4.2 acres

Site Description -

Stand 40 is a steep hillside along the gravel road.

Woodland Description –

This area has a well established stand of oak and hickory.

Management Recommendations – Viewshed

This area should be left as is.

Stand 41a: 27.5 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is medium sized (12-18” dia.) silver maple, cottonwood, ash, honey locust, bitternut hickory, and elm. The understory is silver maple, cottonwood, hackberry, bitternut hickory, elm, boxelder and willow.

Management Recommendations – Even Age

The stand could be clearcut and planted to regenerate oak. Clearcut 3 to 5 acre areas over time.

All trees 14 inches and larger in diameter would be harvested. Following the harvest, all remaining trees 1 inch and larger in diameter should be felled. The stumps of less desirable species should be treated with Pathfinder II to prevent sprouting. Plant the knobs and ridges with bur oak and swamp white oak. Plant a tree every 30 ft. apart or 50 trees per acre. Planting large stock is essential for the trees to compete with the floodwaters and fast growing competition and to grow above deer browsing height. The trees should be a minimum of 18-24" in height and 3/8" in caliper.

Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 41b: 65.6 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is medium sized (12-18" dia.) silver maple, cottonwood, ash, honey locust, bitternut hickory, and elm. The understory is silver maple, cottonwood, hackberry, bitternut hickory, elm, boxelder and willow.

Management Recommendations – Even Age

The stand could be clearcut and planted to regenerate oak. Clearcut 3 to 5 acre areas over time.

All trees 14 inches and larger in diameter would be harvested. Following the harvest, all remaining trees 1 inch and larger in diameter should be felled. The stumps of less desirable species should be treated with Pathfinder II to prevent sprouting. Plant the knobs and ridges with bur oak and swamp white oak. Plant a tree every 30 ft. apart or 50 trees per acre. Planting large stock is essential for the trees to compete with the floodwaters and fast growing competition and to grow above deer browsing height. The trees should be a minimum of 18-24" in height and 3/8" in caliper.

Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 42: 5 acres

Site Description –

Upland hillside.

Woodland Description –

Pole sized walnut, red oak, bur oak and cherry. This is a very nice stand of trees.

Management Recommendations – Even Age

Timber Stand Improvement (Crop Tree Release) - In pole-sized stands (4-10" dia.), potential crop trees can be selected and released. Select a crop tree every 30-35 ft. apart, or 50 crop trees per acre. Remove trees with crowns that are touching or overtopping the crowns of the crop trees. Species to favor as crop trees are black walnut, cherry, and oak. Several snags per acre can be left.

The trees to be removed can be felled or double girdled. No herbicide is necessary. Work around the big trees.

Stand 43: 3 acres

Site Description -

This stand is an upland area adjacent to a public access parking lot.

Woodland Description -

Large bur oak trees in the overstory with elm, hackberry, bitternut hickory and a few walnut in the understory.

Management Recommendations – Viewshed

Since this area is right next to the parking lot and the road it will be managed as viewshed.

Stand 44: 4 acres

Site Description -

Narrow area between access road and crop field.

Woodland Description -

This is a narrow brushy area with medium sized bottomland hardwoods and shrubs.

Management Recommendations – Early Successional

The area could be clearcut along with Stand 41 to create dense, sapling growth. There are scattered, merchantable trees that could be harvested. The stumps of elm, boxelder and ironwood should be treated with Pathfinder II to prevent sprouting.

Stand 45a: 9.1 acres

Site Description -

Second bench bottomland.

Woodland Description –

This stand has scattered Large (20" in diameter and larger) bur oak in the overstory with hawthorn, hackberry, elm, boxelder, bitternut hickory and scattered walnut.

Management Recommendations – Savanna

Timber Stand Improvement (Crop Tree Release) and Burning - In pole-sized stands (4-10" dia.), potential crop trees can be selected and released. Select a crop tree every 30-35 ft. apart, or 50 crop trees per acre. Remove trees with crowns that are touching or overtopping the crowns of the crop trees. Species to favor as crop trees are black walnut, cherry, silver maple, cottonwood, hackberry and oak. Several snags per acre can be left.

The trees to be removed can be felled or double girdled. No herbicide is necessary. Work around the big trees.

Stand 45b: 9.5 acres

Site Description -

Second bench bottomland

Woodland Description –

Large (20" in diameter and larger) red oak, bur oak, bitternut hickory, walnut, and hackberry. The understory is elm, bitternut hickory, and hackberry. The red oak in this stand is starting to decline.

Management Recommendations – Savanna

Timber Stand Improvement (Crop Tree Release) and Burning - In pole-sized stands (4-10" dia.), potential crop trees can be selected and released. Select a crop tree every 30-35 ft. apart, or 50 crop trees per acre. Remove trees with crowns that are touching or overtopping the crowns of the crop trees. Species to favor as crop trees are black walnut, cherry, silver maple, cottonwood, hackberry and oak. Several snags per acre can be left.

The trees to be removed can be felled or double girdled. No herbicide is necessary. Work around the big trees.

Stand 46: 6.2 acres

Site Description -

This area is an old crop field that has been planted to trees.

Woodland Description -

This area has been planted to trees seedlings and is in need of continued maintenance.

Management Description – Even Age

Competing vegetation should be controlled for a minimum of 5 years. After the trees are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season's weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the site starts to get weedy during the summer, you may need to spray the tree rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.

Stand 47: 6 acres

Site Description -

Second bench bottomland.

Woodland Description –

This stand has scattered pole sized (5-10” in dia.) walnut and hackberry.

Management Recommendations – Even Age

Timber Stand Improvement (Crop Tree Release) - In pole-sized stands (4-10” dia.), potential crop trees can be selected and released. Select a crop tree every 30-35 ft. apart, or 50 crop trees per acre. Remove trees with crowns that are touching or overtopping the crowns of the crop trees. Species to favor as crop trees are black walnut, cherry, silver maple, cottonwood, hackberry and oak. Several snags per acre can be left .

The trees to be removed can be felled or double girdled. No herbicide is necessary. Work around the big trees.

Stand 48a: 37.5 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is medium sized (12-18” dia.) silver maple, cottonwood, ash, honey locust, bitternut hickory, and elm. The understory is silver maple, cottonwood, hackberry, bitternut hickory, elm, boxelder and willow.

Management Recommendations – Even Age

The stand could be clearcut and planted to regenerate oak. All trees 14 inches and larger in diameter would be harvested. Following the harvest, all remaining trees 1 inch and larger in diameter should be felled. The stumps of undesirable species should be treated with Pathfinder II to prevent sprouting. Plant the knobs and ridges with bur oak and swamp white oak. Plant a tree every 30 ft. apart, or 50 trees per acre. Planting large stock is essential for the trees to compete with the floodwaters and fast growing competition and to grow above deer browsing height. The trees should be a minimum of 18-24” in height and 3/8” in caliper.

Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter

around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 48b: 44.9 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is medium sized (12-18" dia.) silver maple, cottonwood, ash, honey locust, bitternut hickory, and elm. The understory is silver maple, cottonwood, hackberry, bitternut hickory, elm, boxelder and willow.

Management Recommendations – Even Age

The stand could be clearcut and planted to regenerate oak. All trees 14 inches and larger in diameter would be harvested. Following the harvest, all remaining trees 1 inch and larger in diameter should be felled. The stumps of undesirable species should be treated with Pathfinder II to prevent sprouting. Plant the knobs and ridges with bur oak and swamp white oak. Plant a tree every 30 ft. apart, or 50 trees per acre. Planting large stock is essential for the trees to compete with the floodwaters and fast growing competition and to grow above deer browsing height. The trees should be a minimum of 18-24" in height and 3/8" in caliper.

Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 49: 8.1 acres

Site Description –

Second bench bordering the crop fields and an existing tree planting.

Woodland Description -

The west end of this stand is sapling to pole sized ash, silver maple, elm, hackberry, and walnut along with wild plum, dogwood and hawthorn. As you move east in the stand you get into larger trees..

Management Recommendations – Early Successional

The edge could be clearcut to feather the edge, increase species diversity, and create dense, sapling growth along the edge.

Stand 50: 10.7 acres

Site Description -

This area is an old crop field that has been planted to trees.

Woodland Description -

This area has been planted to trees seedlings and is in need of continued maintenance.

Management Description – Savanna

Competing vegetation should be controlled for a minimum of 5 years. After the trees are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season's weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the site starts to get weedy during the summer, you may need to spray the tree rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.

As the oak trees reach 5-6 feet in height, the grass in the stand needs to be mowed and subsequently sprayed with Round-up at 2 quarts per acre. This should be followed with a seeding of prairie grasses and forbs. A few shrubs can then be planted among the trees after the prairie seeding is established.

Stand 51: 5.8 acres

Site Description -

Second bench bottomland.

Woodland Description –

This stand has pole sized (5-10" in dia.) walnut, hackberry, ash, elm, honey locust and bitternut hickory. There are also scattered big hackberry, silver maple, walnut and elm.

Management Recommendations – Even Age

Remove scattered merchantable trees to even up the stand. Poor quality and hollow trees should be left for den trees (3 or more per acre).

Timber Stand Improvement (Crop Tree Release) - After the harvest, select a crop tree every 30-35 ft. apart, or 50 crop trees per acre. Remove trees with crowns that are touching or overtopping the crowns of the crop trees. Species to favor as crop trees are black walnut, cherry, silver maple, cottonwood, hackberry and oak. Leave 3 or more mature trees per acre for nesting trees.

The trees to be removed can be felled or double girdled. No herbicide is necessary.

Stand 52: 3.7 acres

Site Description –

Old crop field that was planted to conifers and hardwoods.

Woodland Description -

The west half of the area was planted with white pine and red cedar and the east half was planted to bur oak, red oak and walnut 14-16 years ago. In 2006, the hardwoods were released and the conifers were weeded of invading hardwoods.

Management Recommendations – Even Age

No new management is recommended for this area right now.

Stand 53a: 0.7 acres

Site Description -

This area is an old crop field that is scheduled to be planted to trees and shrubs.

Woodland Description -

This area will be planted to hardwood trees and shrubs .

Management Description – Early Successional

The area should be planted with bur oak, swamp white oak, black oak, hawthorne, dogwood, and viburnum seedlings. Large stock, 2-3 ft. tall should be planted. Plant the trees roughly 30 ft. apart or 50 trees per acre on the woodland side and plant the shrubs on a 4 by 10 foot spacing on the grassland/crop side.

Rabbits and deer can really damage a new tree planting by eating the buds and stems off of the newly planted plants. It is fairly important to protect the seedling in some way.

Use 4 to 5 foot tall vented tree shelters to protect each tree seedling. I really think it will be worth your time and effort to protect these newly planted seedlings. Competing vegetation should be controlled for a minimum of 5 years.

After the trees and shrubs are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season's weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the site starts to get weedy during the summer, you may need to spray the tree and shrub rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.



Stand 53b: 2.1 acres

Site Description -

This area is an old crop field that is scheduled to be planted to trees and shrubs.

Woodland Description -

This area will be planted to hardwood trees and shrubs .

Management Description – Early Successional

The area should be planted with bur oak, swamp white oak, black oak, hawthorne, dogwood, and viburnum seedlings. Large stock, 2-3 ft. tall should be planted. Plant the trees roughly 30 ft. apart or 50 trees per acre on the woodland side and plant the shrubs on a 4 by 10 foot spacing on the grassland/crop side.

Rabbits and deer can really damage a new tree planting by eating the buds and stems off of the newly planted plants. It is fairly important to protect the seedling in some way.

Use 4 to 5 foot tall vented tree shelters to protect each tree seedling. I really think it will be worth your time and effort to protect these newly planted seedlings. Competing vegetation should be controlled for a minimum of 5 years.

After the trees and shrubs are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season's weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the site starts to get weedy during the summer, you may need to spray the tree and shrub rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.

Stand 53c: 1.6 acres

Site Description -

This area is an old crop field that is scheduled to be planted to trees and shrubs.

Woodland Description -

This area will be planted to hardwood trees and shrubs .

Management Description – Early Successional

The area should be planted with bur oak, swamp white oak, black oak, hawthorne, dogwood, and viburnum seedlings. Large stock, 2-3 ft. tall should be planted. Plant the trees roughly 30 ft. apart or 50 trees per acre on the woodland side and plant the shrubs on a 4 by 10 foot spacing on the grassland/crop side.

Rabbits and deer can really damage a new tree planting by eating the buds and stems off of the newly planted plants. It is fairly important to protect the seedling in some way.

Use 4 to 5 foot tall vented tree shelters to protect each tree seedling. I really think it will be worth your time and effort to protect these newly planted seedlings. Competing vegetation should be controlled for a minimum of 5 years.

After the trees and shrubs are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season's weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the site starts to get weedy during the summer, you may need to spray the tree and shrub rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.

Stand 54: 3.8 acres

Site Description -

This area is an old crop field that has been planted to trees.

Woodland Description -

This area has been planted to trees seedlings and is in need of continued maintenance.

Management Description – Even Age

Competing vegetation should be controlled for a minimum of 5 years. After the trees are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season's weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the site starts to get weedy during the summer, you may need to spray the tree rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.

Stand 55: 4.2 acres

Site Description -

This area is an old crop field that has been planted to trees.

Woodland Description -

This area has been planted to trees seedlings and is in need of continued maintenance.

Management Description – Even Age

Competing vegetation should be controlled for a minimum of 5 years. After the trees are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season’s weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the site starts to get weedy during the summer, you may need to spray the tree rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.

Stand 56: 12.3 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description –

This is a nice stand of pole sized (5-10” in dia.) silver maple and ash. There are also a few scattered mature silver maple and cottonwood.

Management Recommendations – Even Age

Timber Stand Improvement (Basal area thin) - In 2020 basal area thin this stand by removing the poorly formed, damaged and declining trees.

Stand 57: 3 acres

Site Description -

This area is an old crop field on sandy soils.

Woodland Description -

This area will be planted to trees and shrubs.

Management Description – Early succession

This area can be direct seeded to hardwood trees.

Site Preparation

If the area is currently grass, it will need to be killed the summer before planting. Mow the area in July, allow the area to green up with 4 inches of new growth and then spray it with 2 quarts per acre Roundup. Allow the area to green up again and spray one more time. After the grass has died, plow all of the sprayed areas and then disk them. The site is now ready to plant. Do not kill or till any waterways or very steep areas. You should also leave a 20 foot wide grass buffer around the entire planting.



If the area is crop field, disk once or twice before seeding in the fall.

Seeding Rates

The following amounts are recommended of green, uncleaned seed. In other words, as the seeds can be collected from the ground, or directly off the tree. You can remove the oak seed if you are going to use seedlings in the spring.

<u>Species</u>	<u>Bu. Per Acre</u>
Green ash	1
Oak (Red & Bur)	2 (1 Red & 1 Bur)
Black Walnut	10

Seeding Steps

1. Broadcast the walnut and oak seed over the entire area.
Disk the seed into the ground so that the majority of the seed is buried 1 to 2 inches deep.
2. Broadcast seed the ash and lightly harrow the area. Ash seed should be buried approximately 1/4 inch deep.
3. Roll the entire field with a cultipacker so that all seed is firmly packed in.
4. Next spring, before any green growth appears, broadcast spray the area with Pendulum herbicide. Apply 3 quarts of Pendulum per acre.
5. If broadleaf weeds become a problem during the first year, mow the area high, so that you are mowing above seedling height.
6. The following spring apply 3 quarts of Pendulum plus 3 quarts of Princep 4L per acre. The Princep will help to control the broadleaf weeds.



You will need to scout your direct seeding in early June of each year to determine what weed and grass problems are beginning to develop. You will almost always have a grass problem or weed problem, or both.

During early to mid-June, broadcast spray the following -

Grass Control -

Apply 1 pint of Fusilade per acre. Add 1/2 pint of a nonionic surfactant per 25 gallons solution. Apply when the grass is 4 to 6 inches tall.

Broadleaf Control -

Apply 1/2 pint per acre of Transline. Apply when the weeds are 6 to 10 inches tall.

It is critical to control the competition for the first 3-4 years. The first two years, pre-emergent herbicides such as Pendulum and Princep can be used. In year 3, Oust can be

broadcast sprayed over the entire area to wipe out perennial vegetation. After the third year, the trees should be dense enough to shade out the competition.

Seedling Plantings

Keeping oak trees alive in direct seedings is difficult due to competition from weeds, other trees, and wildlife species such as deer and rabbit. It is recommended to follow the steps detailed below.

Tree Planting

In mid April, plant high quality swamp white and red oak seedlings throughout the area. These seedlings should be 18 to 24 inches tall, 3/8 inch + caliper and protected by a wire cage or some other type of shelter. Plant the seedlings approximately 40 feet apart. This is approximately 25 trees per acre. Use vented tree shelters around each seedling.

Stand 58: 3.1 acres

Site Description -

This area is an old crop field. Soils on this site are sandy on the west and somewhat wet on the east.

Woodland Description -

This area will be direct seeded to hardwood trees.

Management Description – Even Age

This area can be direct seeded to hardwood trees. See the management description for Stand 57.

Stand 59: 5.1 acres

Site Description -

This area is an old crop field that has been planted to trees.

Woodland Description -

This area has been planted to trees seedlings and is in need of continued maintenance.

Management Description – Even Age

Competing vegetation should be controlled for a minimum of 5 years. After the trees are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season's weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the site starts to get weedy during the summer, you may need to spray the tree rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have

shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.

Stand 60: 5.4 acres

Site Description –

Second bench bordering the crop fields and an existing tree planting.

Woodland Description -

The west end of this stand is sapling to pole sized ash, silver maple, elm, hackberry, and walnut along with wild plum, dogwood and hawthorn. As you move east in the stand you get into larger trees.

Management Recommendations – Early Successional

The edge could be clearcut to feather the edge, increase species diversity, and create dense, sapling growth along the edge. There are some big “wolf” trees scattered throughout this area. Do not remove these trees.

Stand 61: 7.6 acres

Site Description –

Bottomland with poorly drained soils.

Woodland Description -

This area is predominantly medium sized (12-18” dia.) silver maple. There are scattered green ash, cottonwood and hackberry. There are large trees scattered throughout the area.

Management Recommendations – Even Age

About half of the scattered large trees could be harvested. You can sale this stand with stand 48 or 60.

Stand 62a: 3 acres

Site Description –

Old crop field that was planted to conifers and hardwoods.

Woodland Description -

This area was planted with scotch pine, red cedar and bur oak 14-16 years ago. In 2006, the hardwoods were released and the red cedar was weeded of invading hardwoods.

Management Recommendations – Even Age

No new management is recommended for this area right now.

Stand 62b: 3.5 acres

Site Description –

Old crop field that was planted to hardwoods.

Woodland Description -

This area was planted with scotch pine, red cedar and bur oak 14-16 years ago.

Management Recommendations – Even Age

In 2010 to 2015, the hardwoods should be released and the red cedar trees weeded of invading hardwoods.

Stand 63: 18.9 acres

Site Description -

Second bench bottomland.

Woodland Description –

This stand has medium sized (12-18” in dia.) walnut, hackberry, ash, elm, honey locust, boxelder, hawthorn, bitternut hickory and a few oak.

Management Recommendations – Even Age

Timber Stand Improvement (Crop Tree Release) - Select a crop tree every 30-35 ft. apart, or 50 crop trees per acre. Remove trees with crowns that are touching or overtopping the crowns of the crop trees. Species to favor as crop trees are black walnut, cherry, silver maple, cottonwood, hickory, and oak. Leave 3 or more mature trees per acre for nesting trees.

The trees to be removed can be felled or double girdled. No herbicide is necessary. Work around the big trees.

Stand 64: 48 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is medium sized (12-18” dia.) silver maple, cottonwood, ash, honey locust, bitternut hickory, and elm. The understory is silver maple, cottonwood, hackberry, bitternut hickory, elm, boxelder and willow.

Management Recommendations – Even Age

The stand could be clearcut and planted to regenerate oak. Clearcut 3 to 5 acre areas over time.

All trees 14 inches and larger in diameter would be harvested. Following the harvest, all remaining trees 1 inch and larger in diameter should be felled. The stumps of undesirable species should be treated with Pathfinder II to prevent sprouting. Plant the knobs and ridges with bur oak and swamp white oak. Plant a tree every 30 ft. apart, or 50 trees per acre.

Planting large stock is essential for the trees to compete with the floodwaters and fast growing competition and to grow above deer browsing height. The trees should be a minimum of 18-24” in height and 3/8” in caliper.

Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 65: 7.5 acres

Site Description -

This area is an old crop field that has been direct seeded to trees.

Woodland Description -

This area is doing very well and has a great stocking of oak. You will need to thin around the oak trees in this stand in 2015.

Management Description – Even Age

In 5 to 10 years select a crop tree every 30-35 ft. apart, or 50 crop trees per acre. Remove trees with crowns that are touching or overtopping the crowns of the crop trees. Species to favor as crop trees are black walnut, cherry, silver maple, cottonwood, hackberry and oak.

The trees to be removed can be felled or double girdled. No herbicide is necessary.

Stand 66: 18.6 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is medium sized (12-18” dia.) silver maple, cottonwood, ash, honey locust, bitternut hickory, and elm. The understory is silver maple, cottonwood, hackberry, bitternut hickory, elm, boxelder and willow.

Management Recommendations – Viewshed

Due to the location of this stand to the road and access areas, this area will be left as is and managed as Viewshed.

Stand 67: 4.7 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is large sized (18"+ dia.) silver maple, cottonwood, and willow. The understory is boxelder, elm, hackberry and a few bur oak and willow.

Management Recommendations – Viewshed

Due to the location of this stand to the road and access areas, this area will be left as is and managed as viewshed.

Stand 68: 4.6 acres

Site Description -

This area is an old crop field that has been planted to trees.

Woodland Description -

This area has been planted to trees seedlings and is in need of continued maintenance and possibly replanting.

Management Description – Even Age

Competing vegetation should be controlled for a minimum of 5 years. After the trees are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season's weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the site starts to get weedy during the summer, you may need to spray the tree rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.

Stand 69: 12.5 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is medium sized (12 to 18" dia.) silver maple, ash, elm and honey locust. The understory is boxelder, elm, hackberry, hawthorn, honey suckle, gooseberry and dogwood.

Management Recommendations – Early Successional

The edge could be clearcut to provide a nice area of early Successional growth. This cut will increase species diversity, and create dense sapling growth along the edge.

Stand 70: 12.3 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is medium sized (12-18" dia.) silver maple, cottonwood, ash, honey locust, bitternut hickory, and elm. The understory is silver maple, cottonwood, hackberry, bitternut hickory, elm, boxelder and willow.

Management Recommendations – Even Age

The stand could be clearcut and planted to regenerate oak. All trees 14 inches and larger in diameter would be harvested. Consider leaving 3 or more larger living trees including some with 20+ inch diameters per acre to serve as nesting and perching sites. Leave or create 2-3 snags per acre, as well.

Following the harvest, all remaining trees 1 inch and larger in diameter should be felled. The stumps of undesirable species should be treated with Pathfinder II to prevent sprouting. Plant the area with bur oak and swamp white oak. Plant a tree every 30 ft. apart or 50 trees per acre. Planting large stock is essential for the oaks to compete with the floodwaters and fast growing competition and to grow above deer browsing height. The trees should be a minimum of 18-24" in height and 3/8" in caliper.



Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 71: 25.4 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is medium sized (12-18" dia.) silver maple, cottonwood, ash, honey locust, bitternut hickory, and elm. The understory is silver maple, cottonwood, hackberry, bitternut hickory, elm, boxelder and willow.

Management Recommendations – Even Age

The stand could be clearcut and planted to regenerate oak. Clearcut 3 to 5 acre areas over time.

All trees 14 inches and larger in diameter would be harvested. Consider leaving 3 or more larger living trees including some with 20+ inch diameters per acre to serve as nesting and perching sites. Several snags per acre can be left , as well.

Following the harvest, all remaining trees 1 inch and larger in diameter should be felled. The stumps of less desirable species should be treated with Pathfinder II to prevent sprouting. Plant the area with bur oak and swamp white oak. Plant a tree every 30 ft. apart, or 50 trees per acre. Planting large stock is essential for the trees to compete with floodwaters and fast growing competition and to grow above deer browsing height. The trees should be a minimum of 18-24” in height and 3/8” in caliper.

Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 72: 4.3 acres

Site Description -

This area is an old crop field on sandy soils.

Woodland Description -

This area will be planted to trees and shrubs.

Management Description – Savanna

The area will be seeded to prairie grasses and forbs which will be allowed to establish for two years. Then 20 oak seedlings will be planted with about 40 shrubs per acre. . Planting large stock is essential for the trees to compete with the competition and grow above deer browsing height. The trees should be a minimum of 18-24” in height and 3/8” in caliper.

Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 73: 1.2 acres

Site Description -

Second bench bottomland.

Woodland Description –

This stand has scattered pole sized (5-10” in dia.) walnut.

Management Recommendations – Even Age

Timber Stand Improvement (Crop Tree Release) - In pole-sized stands (4-10" dia.), potential crop trees can be selected and released. Select a crop tree every 30-35 ft. apart, or 50 crop trees per acre. Remove trees with crowns that are touching or overtopping the crowns of the crop trees. Species to favor as crop trees are black walnut, cherry, silver maple, cottonwood, hackberry and oak. Several snags per acre can be left .

The trees to be removed can be felled or double girdled. No herbicide is necessary. Work around the big trees.

Stand 74: 3.6 acres

Site Description -

This area is an old crop field that has been planted to trees.

Woodland Description -

This area is doing very well and has a great stocking of oak. You will want to keep an eye on the oak so that it does not get over topped.

Management Description – Even Age

In 2020 select a crop tree every 30-35 ft. apart, or 50 crop trees per acre. Remove trees with crowns that are touching or overtopping the crowns of the crop trees. Species to favor as crop trees are black walnut, cherry, silver maple, cottonwood, hackberry and oak.

The trees to be removed can be felled or double girdled. No herbicide is necessary.

Stand 75: 1.5 acres

Site Description -

This area is an old crop field on sandy soils.

Woodland Description -

This area will be planted to trees and shrubs.

Management Description – Savanna

The area will be seeded to prairie grasses and forbs which will be allowed to establish for two years. Then 20 oak seedlings will be planted with about 40 shrubs per acre. Planting large stock is essential for the trees to compete with the competition and grow above deer browsing height. The trees should be a minimum of 18-24" in height and 3/8" in caliper.

Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 76: 6.9 acres

Site Description –

Second bench bordering the crop fields and an existing tree planting.

Woodland Description -

This stand is sapling to pole sized cottonwood, elm, walnut, dogwood, elderberry and honey suckle.

Management Recommendations – Early Successional

The edge could be clearcut to feather the edge, increase species diversity, and create dense, sapling growth along the edge.

Stand 77: 5.3 acres

Site Description -

Conifer and shrub planting on dry soils.

Woodland Description-

This area was planted to conifers and shrubs many years ago. This stand is currently fully stocked to overstocked.

Management Recommendations – Viewshed

Due to the location of this stand to the road and access areas, this area will be left as is and managed as Viewshed.

Stand 78: 4.1 acres

Site Description -

Conifer and shrub planting on dry soils.

Woodland Description-

This area was planted to conifers and shrubs many years ago. This stand is currently fully stocked to overstocked.

Management Recommendations – Viewshed

Due to the location of this stand to the road and access areas, this area will be left as is and managed as Viewshed.

Stand 79: 3.1 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is medium sized (12-18" dia.) silver maple, cottonwood, ash, honey locust, bitternut hickory, and elm. The understory is silver maple, cottonwood, hackberry, bitternut hickory, elm, boxelder and willow.

Management Recommendations – Viewshed

Due to the location of this stand to the road and access areas, this area will be left as is and managed as Viewshed.

Stand 80: 10.4 acres

Site Description -

This is an upland area on dry soils.

Woodland Description -

This area was harvested fairly hard before the state purchased the property. It is currently medium (12-18"+ dia.) scattered basswood, ash, elm and oak in the overstory. These trees are in very poor shape.

Management Recommendations – Even Age

Girdle all remaining large trees except for 2-3 basswood and/or oak per acre. Leave them standing for den trees and for mast production.

Kill the less desirable species and damaged trees to encourage the development of young desirable trees in the understory.

Stand 81: 7.2 acres

Site Description -

This is an upland area on dry soils.

Woodland Description -

Sapling (1-4"+ dia.) basswood, boxelder, ash, ironwood, cherry, oak, hard maple, walnut and elm. This area was also harvested fairly hard.

Management Recommendations – Even Age

Kill all undesirable species 1 inch in diameter and larger to encourage the development of young desirable saplings. Where possible leave 3 or more basswood or oak and 3 or more snags per acre.

Stand 82: 1.5 acres

Site Description -

This is an upland area on dry soils.

Woodland Description -

Large (18"+ dia.) hard maple, oak, elm and basswood. The understory is hard maple, elm and ironwood

Management Recommendations – Viewshed

This area is right next to a private property with housing so it will be managed as Viewshed.

Stand 83: 10.4 acres

Site Description -

Bottomland second bench.

Woodland Description -

Small (5-10" dia.) elm, ash, walnut, hackberry, hard maple, basswood and cottonwood. There are also scattered large cottonwood, walnut, ash and elm.

Management Recommendations – Uneven Age

Kill all less desirable species 1 inch in diameter and larger excluding walnut, basswood, and cottonwood to encourage the development of young desirable saplings.

Stand 84: 11.9 acres

Site Description -

Second bench bottomland.

Woodland Description –

This stand has scattered pole sized (5-10" in dia.) ash, basswood, honey locust, hard maple, elm, boxelder, hackberry and walnut.

Management Recommendations – Even Age

Timber Stand Improvement (Crop Tree Release) - In pole-sized stands (4-10" dia.), potential crop trees can be selected and released. Select a crop tree every 30-35 ft. apart, or 50 crop trees per acre. Remove trees with crowns that are touching or overtopping the crowns of the crop trees. Species to favor as crop trees are black walnut, cherry, silver maple, cottonwood, hackberry and oak. Leave 2 to 3 mature trees per acre for nesting trees.

The trees to be removed can be felled or double girdled. No herbicide is necessary. Work around the big trees.

Stand 85: 21.6 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is medium sized (12-18" dia.) elm, bur oak, hackberry, honey locust and ash. The understory is hackberry, boxelder, ash and honey locust. This area was also harvested heavily. There are currently few good trees in the stand.

Management Recommendations – Even Age

The stand could be clearcut and planted to regenerate oak. Consider clearcutting 3 to 5 acre areas over time.

All trees 14 inches and larger in diameter would be harvested. Following the harvest, all remaining trees 1 inch and larger in diameter should be felled. The stumps of undesirable species should be treated with Pathfinder II to prevent sprouting. Plant the knobs and ridges with bur oak and swamp white oak. Plant a tree every 30 ft. apart, or 50 trees per acre. Planting large stock is essential for the trees to compete with the floodwaters and fast growing competition and to grow above deer browsing height. The trees should be a minimum of 18-24" in height and 3/8" in caliper.

Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 86: 3.1 acres

Site Description -

Bottomland second bench.

Woodland Description-

This are is a stand of red cedar with invading hardwood.

Management Recommendations – Early Successional

Kill all invading hardwood trees to make sure there is room for the cedars and any shrubs in the area.

Stand 87: 4.2 acres

Site Description -

Bottomland with poorly drained soils.

Woodland Description-

The area is medium sized (12-18" dia.) elm, bur oak, hackberry, honey locust and ash. The understory is hackberry, boxelder, ash and honey locust.

Management Recommendations – Even Age

Leave this stand as is for now.

Stand 88: 2.6 acres

Site Description -

Bottomland second bench.

Woodland Description-

The area is fairly open with small scattered honey locust.

Management Recommendations – Even Age

All less desirable trees 1 inch and larger in diameter should be felled. The stumps of less desirable species should be treated with Pathfinder II to prevent sprouting. Plant the area with bur oak and swamp white oak. Plant a tree every 30 ft. apart, or 50 trees per acre. Planting large stock is essential for the trees to compete with the floodwaters and fast growing competition and to grow above deer browsing height. The trees should be a minimum of 18-24" in height and 3/8" in caliper.

Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 89: 15.2 acres

Site Description -

This is an upland area that was recently planted to oaks.

Woodland Description -

This area has been planted to trees seedlings and is in need of continued maintenance and possibly replanting.

Management Description – Savanna

Competing vegetation should be controlled for a minimum of 5 years. After the trees are planted and before any vegetation emerges, spray a 4 ft. wide band down each row with

Pendulum and Princep (Do not spray Princep on cottonwood or shrubs) herbicide. Apply 3 quarts of Pendulum and 3 quarts of Princep per acre treated.

Each spring before any vegetation emerges, apply Pendulum and Princep again for the next season's weed control. **The area between the rows should be mowed at least 2-4 times per year.**

As the site starts to get weedy during the summer, you may need to spray the tree rows with a 4 to 5 foot wide band of Roundup at 2 quarts per acre. You will need to have shields on your sprayer so that the Roundup can NOT touch the seedlings. Roundup will kill hardwood seedlings! You can repeat this step as needed throughout the summer.

As the oak trees reach 5-6 feet in height, the grass in the stand needs to be mowed and subsequently sprayed with Round-up at 2 quarts per acre. This should be followed with a seeding of prairie grasses and forbs. A few shrubs can then be planted among the trees after the prairie seeding is established.

Stand 90: 3.9 acres

Site Description -

Upland east facing hillside.

Woodland Description-

The area is has filled in with elm, red cedar and honey locust.

Management Recommendations – Savanna

All less desirable trees 1 inch and larger in diameter should be felled. Their stumps should be treated with Pathfinder II to prevent sprouting. Plant the area with red oak, bur oak and white oak. Plant a tree every 50 ft. apart, or 20 trees per acre. Planting large stock is essential for the trees to compete with floodwater and fast growing competition and to grow above deer browsing height. The trees should be a minimum of 18-24" in height and 3/8" in caliper. Trees from previous plantings moved to this area could be considered.

Protect each tree with a 4 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

As the oak trees reach 5-6 feet in height, the grass in the stand needs to be mowed and subsequently sprayed with Round-up at 2 quarts per acre. This should be followed with a seeding of prairie grasses and forbs. A few shrubs can then be planted among the trees after the prairie seeding is established.

Stand 91: 6 acres

Site Description -

Steep north facing hillside.

Woodland Description-

This is a fairly steep hillside with red cedar, elm, locust, hackberry, bur oak, ash and mulberry.

Management Recommendations – Viewshed

Since this are is a steep hillside and fairly rock it will be managed as Viewshed.

Stand 92: 24.1 acres

Site Description -

Bottomland with poorly drained soils

Woodland Description-

This stand covers the wettest portions of the bottomland. This area is a mix of bottomland hardwood species, shrubs, and grass.

Management Recommendations – Early Successional

This area is wet and difficult to manage. Its present condition will be maintained with selective cuts, burning and possible plantings.

HIGH PRIORITY PROJECTS

Savanna

<i>Year</i>	<i>Stand</i>	<i>Acres</i>	<i>Prescription</i>
2013	16	14.2	<i>Competition Control</i>
2013	19	7.4	“
2013	20	7.1	“
2013	23	4.6	“
2013	50	10.7	“
2013	89	15.2	“
<i>Total</i>		59.2	

Early Successional

<i>Year</i>	<i>Stand</i>	<i>Acres</i>	<i>Prescription</i>
2013	38	3.4	<i>Edge mgmt</i>
2013	44	4	“
2013	49	8.1	“
2013	76	6.9	“
2013	86	3.1	<i>Weed tree removal</i>
<i>Total</i>		25.5	

Even Age- Harvests

<i>Year</i>	<i>Stand</i>	<i>Acres</i>	<i>Prescription</i>
2013	2	5	<i>Selective harvest</i>
2013	3	8.3	<i>Clearcut and plant</i>
2013	39	5	“
2013	41a	5	“
2013	41b	5	“
2013	45b	5	“
2013	64	5	<i>Clearcut and plant</i>
2013	81	7.2	“
2013	85	21.6	<i>Weed and plant</i>
<i>Total</i>		67.1	

Even Age- Timber Stand Improvement

<i>Year</i>	<i>Stand</i>	<i>Acres</i>	<i>Prescription</i>
2013	14	4.3	<i>Competition control</i>
2013	21	3.5	“
2013	22	0.8	“
2013	31	4	“
2013	42	5	<i>Crop tree release</i>
2013	46	6.2	<i>Competition control</i>
2013	47	6	<i>Crop tree release</i>
2013	54	3.8	<i>Competition control</i>
2013	55	4.2	“
2013	59	5.1	“
2013	63	18.9	<i>Crop tree release</i>
2013	68	4.6	<i>Competition control</i>
2013	80	10.4	<i>Weed tree removal</i>
2013	84	11.9	<i>Crop tree release</i>
<i>Total</i>		88.7	

APPENDIX

**Big Marsh and Shellrock Bend
Wildlife Area**

12/18/2008

SUMMARY OF WOODLAND STANDS

No.	Acres	Timber Type	TreeSize	Mngt. System	Prescription	Priority	Year Complete	Comments
1	14.20	Bottom Hrdwds.	Large	Even age	Selective Harvest		2018	5 acres
2	45.20	Bottom Hrdwds.	Large	Even age	Selective Harvest		2013	5 acres
3	8.30	Bottom Hrdwds.	Large	Even age	Clearcut		2013	
4	111.80	Bottom Hrdwds.	Large	Viewshed				
5	11.10	Open		Even age	Planting			
6	15.60	Bottom Hrdwds.	Large	Even age	Selective Harvest		2018	5 acres
7	4.40	Bottom Hrdwds.	Large	E. Success.	Edge management		2018	
8	3.10	Bottom Hrdwds.	Large	E. Success.	Edge management		2018	
9	4.80	Bottom Hrdwds.	Medium	Viewshed				
10	10.80	Bottom Hrdwds.	Sapling	Even age	Planting			
11	32.50	Bottom Hrdwds.	Medium	Even age	Crop tree release			Any time
12	11.60	Willow	Sapling	E. Success.	Edge management			
13	3.60	Willow	Sapling	E. Success.	Edge management			
14	4.30	Oak	Seedling	Even age	Competition Control.		2013	
15	3.30	Bottom Hrdwds.	Small	Even age	Crop tree release			Any time
16	14.20	Oak	Seedling	Savanna	Competition Control.		2013	
17	16.70	Bottom Hrdwds.	Small	Even age	Crop tree release			Any time
18	9.50	Walnut,ash,elm	Small	Even age	Crop tree release			Any time
19	7.40	Oak	Sapling	Savanna	Competition Control.		2013	
20	7.10	Open	Seedling	Savanna	Competition Control.		2013	
21	3.50	Oak and walnut	Sapling	Even age	Competition Control.		2013	
22	0.80	Oak	Sapling	Even age	Competition Control.		2013	

No.	Acres	Timber Type	TreeSize	Mngt. System	Prescription	Priority	Year Complete	Comments
23	4.60	oak	Seedling	Savanna	Competition Control.		2013	
24	7.20	oak	Seedling	Even age	Competition Control.		2008	
25	6.30	Open		E. Success.	Planting		2018	
26	3.00	Open		Savanna	Planting		2018	
27a	5.00	Bottom Hrdwds.	Medium	Even age	Clearcut			
27b	19.90	Bottom Hrdwds.	Medium	Even age	Clearcut			
28	2.60	Open		Savanna	Planting		2018	
29	11.50	Open		Even age	Planting		2023	
30	6.20	Open		Even age	Planting		2023	
31	4.00	Oak	Sapling	Even age	Competition Control.		2013	
32	11.10	Open		Even age	Planting		2018	
33	1.70	shrubs	Small	E. Success.	Competition Control.		2023	
34	1.40	oak	Small	Even age	Competition Control.		2006	
35	1.60	Conifer Hrdwds.	Small	E. Success.	Competition Control.		2023	
36	1.60	shrubs	Sapling	Even age	Competition Control.		2023	
37	3.10	Conifer Hrdwds.	Small	E. Success.	Competition Control.		2023	
38	3.40	Bottom Hrdwds.	Medium	E. Success.	Edge management		2013	Harvest
39	47.20	Bottom Hrdwds.	Medium	Even age	Clearcut		2013	4-5 ac.
40	4.20	Walnut,ash,elm	Small	Viewshed				Endangered plant?
41a	27.50	Bottom Hrdwds.	Medium	Even age	Clearcut		2013	4-5 ac.
41b	65.60	Bottom Hrdwds.	Medium	Even age	Clearcut		2013	4-5 ac.
42	5.00	Oak and walnut	Small	Even age	Crop tree release		2013	
43	3.00	oak	Large	Viewshed				
44	4.00	Bottom Hrdwds.	Medium	E. Success.	Edge management		2013	Harvest
45a	9.10	oak	Medium	Even age	Crop tree release		2023	
45b	9.50	Oak and walnut	Large	Even age	Clearcut		2013	5 acres
46	6.20	oak	Seedling	Even age	Competition Control.		2013	
47	6.00	Walnut,ash,elm	Small	Even age	Crop tree release		2013	

No.	Acres	Timber Type	TreeSize	Mngt. System	Prescription	Priority	Year Complete	Comments
48a	37.50	Bottom Hrdwds.	Medium	Even age	Clearcut			
48b	44.90	Bottom Hrdwds.	Medium	Even age	Clearcut		2023	5 acres
49	8.10	Bottom Hrdwds.	Sapling	E. Success.	Edge management		2013	
50	10.70	oak	Seedling	Savanna	Competition Control.		2013	
51	5.80	Walnut,ash,elm	Small	Even age	Selective Harvest		2018	
52	3.70	Walnut,ash,elm	Small	Even age	Crop tree release		2006	
53a	0.70	Open		E. Success.	Planting		2018	
53b	2.10	Open		E. Success.	Planting		2018	
53c	1.60	Open		E. Success.	Planting		2018	
54	3.80	oak	Seedling	Even age	Competition Control.		2013	
55	4.20	oak	Seedling	Even age	Competition Control.		2013	
56	12.30	Bottom Hrdwds.	Small	Even age	BA Thinning		2023	
57	3.00	Open		Even age	Direct seed		2023	
58	3.10	Open		Even age	Direct seed		2023	
59	5.10	oak	Seedling	Even age	Competition Control.		2013	
60	5.40	Walnut,ash,elm	Small	E. Success.	Edge management		2018	
61	7.60	Bottom Hrdwds.	Medium	Even age	Selective Harvest			
62a	3.00	oak	Small	Even age	Crop tree release		2006	
62b	3.50	oak	Small	Even age	Crop tree release			
63	18.90	Walnut,ash,elm	Medium	Even age	Crop tree release		2013	
64	48.00	Bottom Hrdwds.	Medium	Even age	Clearcut		2013	5 acres
65	7.50	Oak and walnut	Sapling	Even age	Crop tree release		2015	
66	18.60	Bottom Hrdwds.	Medium	Viewshed				
67	4.70	Bottom Hrdwds.	Large	Viewshed				
68	4.60	oak	Seedling	Even age	Competition Control.		2013	
69	12.50	Bottom Hrdwds.	Medium	E. Success.			2023	
70	12.30	Bottom Hrdwds.	Medium	Even age	Clearcut		2023	4-5 ac.
71	25.40	Bottom Hrdwds.	Medium	Even age	Clearcut			

No.	Acres	Timber Type	TreeSize	Mngt. System	Prescription	Priority	Year Complete	Comments
72	4.30	Open		Savanna	Direct seed		2018	
73	1.20	Walnut,ash,elm	Small	Even age	Crop tree release			Any time
74	3.60	oak	Sapling	Even age	Crop tree release		2023	
75	1.50	Open		Savanna	Planting		2018	
76	6.90	Bottom Hrdwds.	Sapling	E. Success.	Edge management		2013	
77	5.30	conifers	Medium	Viewshed				
78	4.10	conifers	Medium	Viewshed				
79	3.10	Bottom Hrdwds.	Medium	Viewshed				
80	10.40	oak, maple, bass	Medium	Even age	weed tree removal		2013	
81	7.20	oak, maple, bass	Sapling	Even age	weed tree removal		2013	
82	1.50	oak, maple, bass	Large	Viewshed				
83	10.40	Bottom Hrdwds.	Small	uneven age	weed tree removal			
84	11.90	Walnut,ash,elm	Small	Even age	Crop tree release		2013	
85	21.60	Bottom Hrdwds.	Medium	Even age	weed tree removal		2013	weed and plant
86	3.10	Conifer Hrdwds.	Small	E. Success.	weed tree removal		2013	
87	4.20	Bottom Hrdwds.	Medium	Even age				
88	2.60	locust	Small	Even age	stand conversion			
89	15.20	oak	Seedling	Savanna	Competition Control.		2013	
90	3.90	elm, ash, hick	Small	Savanna	stand conversion		2023	
91	6.00	Conifer Hrdwds.	Medium	Viewshed				
92	24.10	Bottom Hrdwds.	Medium	E. Success.			2023	

**Wildlife Species of Greatest Conservation Need
For North Iowa Riparian / Wet Woodlands**

Table 1. North Iowa Riparian / Wet Woodland Breeding Birds of Greatest Conservation Need

Common Name	Scientific Name
Bald eagle	<i>Haliaeetus leucocephalus</i>
Red-shouldered hawk	<i>Buteo lineatus</i>
Broad-winged hawk	<i>Buteo platypterus</i>
Swainson's hawk	<i>Buteo swainsoni</i>
Osprey	<i>Pandion haliaetus</i>
Peregrine falcon	<i>Falco peregrinus</i>
American woodcock	<i>Scolopax minor</i>
Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>
Long-eared owl	<i>Asio otus</i>
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>
Yellow-crowned night heron	<i>Nyctanassa violacea</i>
Acadian flycatcher	<i>Empidonax virescens</i>
Brown creeper	<i>Certhia americana</i>
Veery	<i>Catharus fuscescens</i>
Wood thrush	<i>Hylocichla mustelina</i>
Blue-winged warbler	<i>Vermivora pinus</i>
Cerulean warbler	<i>Dendroica cerulea</i>
Prothonotary warbler	<i>Protonotaria citrea</i>
Louisiana waterthrush	<i>Seiurus motacilla</i>
Kentucky warbler	<i>Oporornis formosus</i>
Barn owl	<i>Tyto alba</i>
Common nighthawk	<i>Chordeiles minor</i>
Loggerhead Shrike	<i>Lanius ludovicianus</i>
Yellow-breasted chat	<i>Icteria virens</i>
Eastern meadowlark	<i>Sturnella magma</i>
Lark sparrow	<i>Chondestes grammacus</i>

Table 2. North Iowa Riparian / Wet Woodland Migratory Birds of Greatest Conservation Need

Common Name	Scientific Name
Rusty blackbird	<i>Euphagus carolinus</i>

Table 3. North Iowa Riparian / Wet Woodland Mammals of Greatest Conservation Need

Common Name	Scientific Name
River otter	<i>Lutra canadensis</i>

Table 4. North Iowa Riparian / Wet Wodland Reptiles and Amphibians of Greatest Conservation

Common Name	Scientific Name
Wood turtle	<i>Clemmys insculpta</i>
Blandings turtle	<i>Emydoidea blandingii</i>
Blue-spotted salamander	<i>Ambystoma laterale</i>

Table 5. North Iowa Riparian / Wet Woodland Butterflies of Greatest Conservation Need

Common Name	Scientific Name
Dreamy Duskywing	<i>Erynnis icelus</i>
Olympia Marble	<i>Euchloe olympia</i>

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.

EXPLANATION OF TIMBER MANAGEMENT PRACTICES:

Timber Stand Improvement:

Timber stand improvement (TSI) 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 meet 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.

Harvest:

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.