

# FOREST WILDLIFE STEWARDSHIP PLAN

FOR

WAPSI

## WILDLIFE MANAGEMENT AREA

*A plan that will increase the diversity of forest habitats and wildlife*



**Developed by:**

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**Plan Completion Date: 8/18/23**

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# FOREST WILDLIFE STEWARDSHIP PLAN FOR WAPSI WILDLIFE MANAGEMENT AREA

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**LOCATION:** Sec. 36, T81N-R3E and Sec. 1, T80N-R3E (Orange Township), Clinton County

**TOTAL FORESTED ACRES:** 75.7

## INTRODUCTION

The Iowa Department of Natural Resources (DNR) is the state government agency whose vision is to lead Iowans in caring for their natural resources. Conservation and enhancement of natural resources to ensure a legacy for future generations is part of the DNR's mission. Within the DNR, the Wildlife Bureau manages more than 390,000 acres of land as wildlife management areas (WMAs) for a variety of public users. Many of these WMAs are partially or mostly forest covered. These forests, if properly managed, provide a unique opportunity for the DNR to carry out its mission by publicly demonstrating sustainable forest management and the enhancement of these valuable resources for wildlife.

The DNR is also the agency responsible for the stewardship of indigenous and migratory wildlife species found in the state. Many of these species live near and in WMA forests. The DNR recognizes the need for forest wildlife stewardship plans (FWSPs) to properly manage the forest resources. Forests are not static systems, even though changes occur relatively slowly over a long period of time. A hands-off or "preservation" philosophy will ensure that the forest of 100 years from now will be much different and likely less diverse than the forest of today. These changes will negatively impact wildlife species. Some forest stands may take more than 120 years to mature, a time span that may extend through the careers of several managers. This slow but constant change requires managers to plan over the long term and leave a written record of these plans and management activities in the form of FWSPs. This process will help ensure the wise management of our WMA forests and will aid future managers with decision making.

There is no single type of forest stand that can provide all of the requirements for all forest wildlife species. Different species require different (and sometimes quite specific) forest types and age classes. Some generalist wildlife species use all of the forest age classes, while some specialist species have such specific requirements that only one or two particular forest types are needed to survive.

Oak forests are indisputably important in Iowa. The pre-settlement forests across the state were dominated by a mixture of oak species. Wildlife species adapted to the oak forests and thrived amidst their diversity. Today, the forests of Iowa are changing at alarming rates. It is estimated that Iowa loses approximately 5,800 acres of oak dominated forest each year. These losses are due to several factors, including both natural and human controlled. This pronounced loss of oak leads to a reduction in the quality of habitat and food sources available to wildlife, as well as the economic value and quality of the forest. The importance of managing forests for oak cannot be overstated, and the Iowa DNR has made this a priority across much of the state.

The Wildlife Bureau manages forests for the greatest diversity of forest wildlife. The FWSP will be the guiding document that prioritizes management activities to meet the needs of forest wildlife species. The DNR's comprehensive Iowa Wildlife Action Plan identifies wildlife "species of greatest conservation need" (SGCN). Habitat needs of these wildlife species will be considered when determining forest management decisions. The primary goal will be to maintain quality habitat that will support abundant and diverse wildlife populations.

## **DESCRIPTION OF AREA**

Wapsi WMA is located approximately 3 miles south of DeWitt along U.S Highway 61 in Clinton County. The WMA lies within the floodplain of the Wapsipinicon (Wapsi) River, with the river itself making up the south boundary of the WMA. A drainage ditch cuts through the far north end of the WMA. The topography of the WMA is generally very flat, with minor swales, backwater depressions and oxbows that are typical of large river floodplains. A large excavated pond exists in the middle of the WMA, which is a result of being a borrow site for the adjacent highway project in the 1980s. This riparian forest habitat supports unique Iowa SGCN such as yellow-throated warbler, red-shouldered hawk, Louisiana waterthrush, prothonotary warbler, Indiana bat, northern long-eared bat, evening bat, silver-haired bat, swamp darter, midland clubtail, Blanchard's cricket frog, pickerel frog, spiny softshell turtle, Graham's crayfish snake, western ribbon snake, tadpole madtom; mud, blacknose, banded, and blackside darters; and mucket, pink papershell, and fatmucket mussels. The WMA is 99 total acres in size. With 75.7 acres in some form of woodland habitat, Wapsi WMA is 76% forested. The 75.7 forested acres addressed in this plan are divided into 6 different stands. Stands were delineated based on a combination of species composition, size class, topography, and management recommendations. Each stand is outlined in detail in this plan with forest management recommendations provided.

# Wapsi WMA Overview Map



Clinton County, Iowa  
T-80&81N, R-03E, Sections 1-2,36



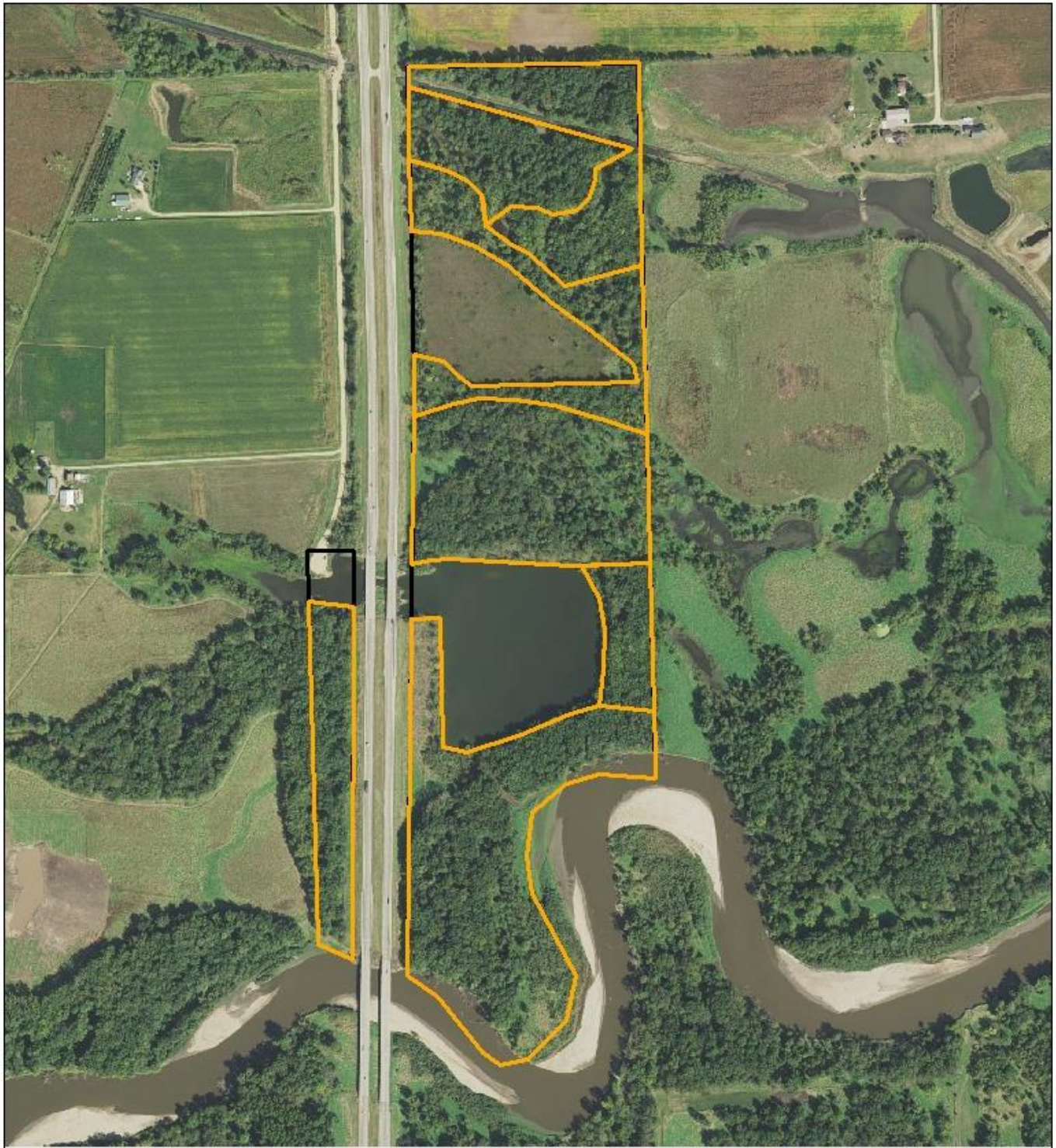
Directions: 2.5 miles S of DeWitt on Hwy 61.

Sec 1,2, & 36 Orange Twsp.  
T-80 & 81N, R-3E  
Clinton County

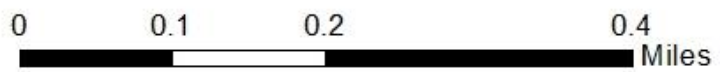
0 0.05 0.1 0.2  
Miles



# Wapsi WMA Forest Stands Overview



Sec. 36 & 1, Orange Twsp.  
T81 & 80N, R3E  
Clinton County



## HOW THE FOREST WILDLIFE STEWARDSHIP PLAN WAS DEVELOPED

The wildlife biologist and the wildlife unit team are the managers of the WMA and determine the objectives for the area. Objectives address the habitat needs of a diverse array of wildlife species and the woodland condition of each area. Approximately one-third of the total land area managed by the Wildlife Bureau across the state is classified as forest. Forest management is essential to the long-term conservation of the native plant communities occurring on these areas. Actively managing the forest is also critical to improving these areas for wildlife and wildlife-related recreation.

Management of forested wildlife areas is a cooperative effort between the wildlife unit and foresters. All forested land on the WMA 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 WMA. Forester recommendations are designed to manage the stand to reach the objectives determined by the biologist, while utilizing strategic and sound forest management practices.

## FOREST MANAGEMENT OBJECTIVES

The primary objective for the wildlife area is:

- Maintaining diverse, high quality forest habitats for the benefit of diverse wildlife populations
  - Emphasis on oak management
  - Emphasis on diversity of age classes and forest structure
  - Emphasis on promoting SGCN habitats
  - Emphasis on promoting forest health

Funding for forest management administration and procurement, as well as a portion of the land acquisition costs of the WMA addressed in this plan can be attributed almost exclusively to hunter-generated monies via license fees and excise taxes on sporting equipment. Consequently, a primary objective for management of the area is to improve habitat for game species such as deer, turkey, rabbit and squirrel. The DNR considers the effects of management actions on nongame species as well, particularly those that are threatened, endangered, or species of greatest conservation need. The DNR recognizes that it is difficult, if not impossible, to manage for all species at the same time on any given tract or WMA. However, this plan operates under the assumption that creating and maintaining diverse forest habitats will benefit the most wildlife species possible, regardless of their protective status. In other words, game and nongame species alike will benefit from good forest habitat management practices.

## OAK MANAGEMENT

As stated in the introduction, oaks are a critical component to Iowa's forests. Iowa's wildlife species adapted, coexisted, and eventually became dependent on the benefits that oaks provided. The acorns of the oak provide a high level of fat and protein to wildlife at a time of year that food resources are low and high quality nutrients are critical. While the mast that oaks provide are a staple food source for many wildlife species, other characteristics of the oak are extremely beneficial as well. Some of those characteristics include deeply furrowed bark that host insects and other invertebrates, creating foraging opportunities for insect eating birds, reptiles, and mammals. The rigor and architecture of the branches provide structure for nesting, roosting, and perching. The leaves provide an important food source for the caterpillars of many species of moths and butterflies, with oaks supporting higher diversity and richness of species than any other native tree family (Narango et al. 2020). Pollinators also benefit from the food resources and overwintering habitat provided by the oak. Due to the critical role that oak trees play in the ecosystem, they are emphasized heavily in this forest wildlife stewardship plan.

Iowa's oak forests are faced with many threats. There are a variety of factors that contribute to the decline of oak forests. Native and non-native pests, pathogens, and diseases contribute to the mortality of oak. The succession of shade-tolerant species creates a shaded forest floor that is not conducive to the regeneration of shade intolerant oak seedlings. Fragmentation of the landscape and invasive species also play a role in the degradation of our oak forest. In order to combat these circumstances, active forest management is essential.

The even aged management of oak described in this plan is used to promote the ecological niche in which oaks thrive. Oaks use a specific strategy to regenerate that requires full sunlight. Harvest techniques that provide high levels of

sunlight to the forest floor such as shelterwoods or clearcuts are used to promote the successful regeneration of oak. These harvest techniques simulate disturbances that occurred on the landscape historically such as fire and windstorms.

**HARVESTS**

Harvesting is conducted primarily to regenerate stands of desirable species, thin stands to a more desirable stocking, or to achieve a diversity of tree size classes. Harvests are an essential tool for simulating natural disturbances and creating suitable growing conditions for desirable shade intolerant tree species. Harvests are scheduled based on an individual stand’s rotation age. The rotation age is determined based on a variety of factors such as growing conditions and tree species composition.

The forest type that is present influences the rotation age of the stand. There are a variety of forest types on any given WMA, with each forest type reaching biological maturity at different times. Biological maturity is the point at which a stand’s volume reaches a plateau or starts to decline based on natural factors such as mortality, breakage or rotting. A species such as bigtooth aspen will reach biological maturity many years before a species such as white oak.

Along with forest type, site productivity influences the point of biological maturity. High site productivity will increase the growth rate, vigor, and health of the stand. This will likely extend the biological maturity of the stand.

Forest health can influence the point at which a stand is harvested. Insects, disease, and pathogens can infect a stand unexpectedly. An event like this can alter the rotation age of the stand.

Landscape level considerations also influence rotation age. WMA objectives may require certain age structures in targeted locations across the area due to how the stand fits in among the broader landscape. This may either increase or decrease the rotation age of the stand.

A variety of regeneration techniques will be used in this forest stewardship plan. Each has been selected to achieve a targeted outcome. The timing of and results of these techniques will influence the point at which a stand is harvested.

Economics and logistics can alter the timing, scope, and size of a harvest. A harvest is implemented based on a silvicultural prescription designed to reach a wildlife management or forest health objective. Any financial return is purely a byproduct of proper forest habitat management and not a driving factor. Income from harvests will be reinvested into the WMA to complete the recommended projects within the plan. Those projects include: tree planting, thinning young stands, removing undesirable and invasive species, converting areas to more desirable species, and completing early successional cuts.

Sustainable forestry aims to manage a forest for maximum distribution of age and size classes and gives an indication of the amount of acreage or volume that can be harvested from a given geographical area periodically, without ever running out of volume or growing stock. Generally speaking, with even aged management the sustainable harvest is the total acreage of the forest divided by the rotation age (the period over which trees grow to maturity). Rotation ages for stands vary by the dominant species in each stand, but are generally set at the point of biological maturity. The majority of actively managed even aged stands use a 120-year rotation, on average. The rotation age calculations reflect only the annual allowable harvest. In practice, these figures will fluctuate over and under the allowable harvest periodically.

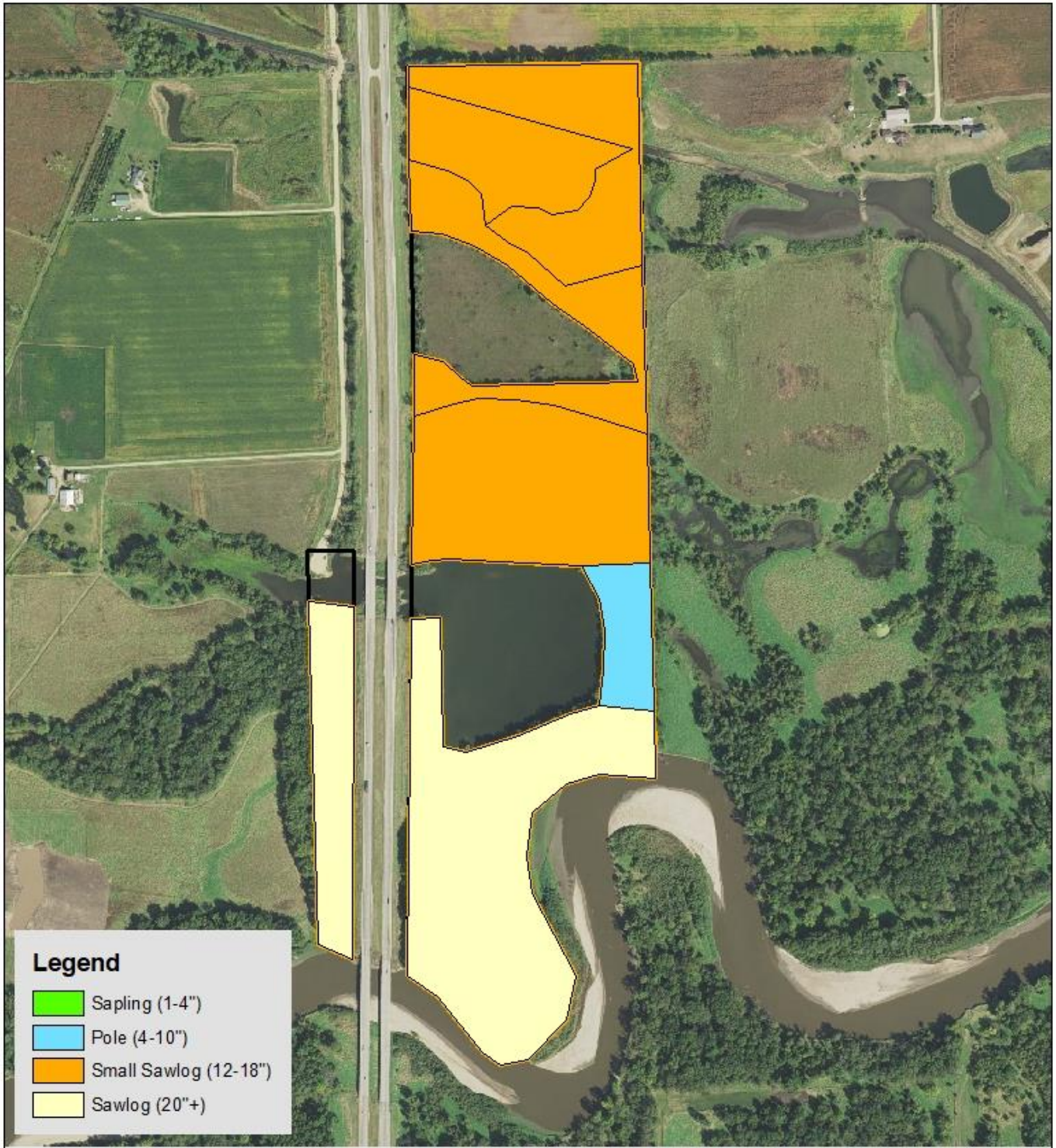
**Current Distribution of Tree Size on the WMA**

**\*dbh = diameter at breast height**

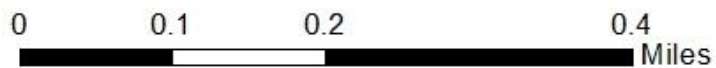
<b>Tree Size</b>	<b>Forested Acres</b>	<b>% of Forested Acres</b>
Sapling (<4" dbh)	0	0%
Pole (4-10" dbh.)	3.5	4.6%
Small Sawlog (12-18" dbh.)	42.8	56.6%
Sawlog (>20" dbh)	29.4	38.8%
Totals	75.7	100%



# Wapsi WMA Diameter Distribution



Sec. 36 & 1, Orange Twp.  
T81 & 80N, R3E  
Clinton County



## PROPOSED MANAGEMENT SYSTEMS FOR THE AREA

Recommendations for each stand were based on whether the area will be managed to create early successional growth, an even aged system, an uneven aged system, or viewshed. The decision on which management system would be used was based on the objectives for the area to create a certain structural cover, maintain an oak component where feasible, develop a diverse woodland landscape, protect fragile sites, and increase the acres of early successional growth.

Based on forester recommendations for Wapsi WMA, the acres under each management system are as follows:

Management System	Acres	% of Total Area
Early Successional	8.7	11.5%
Even aged	37.6	49.7%
Uneven aged	0	0%
Viewshed	29.4	38.8%
Total	75.7	100%

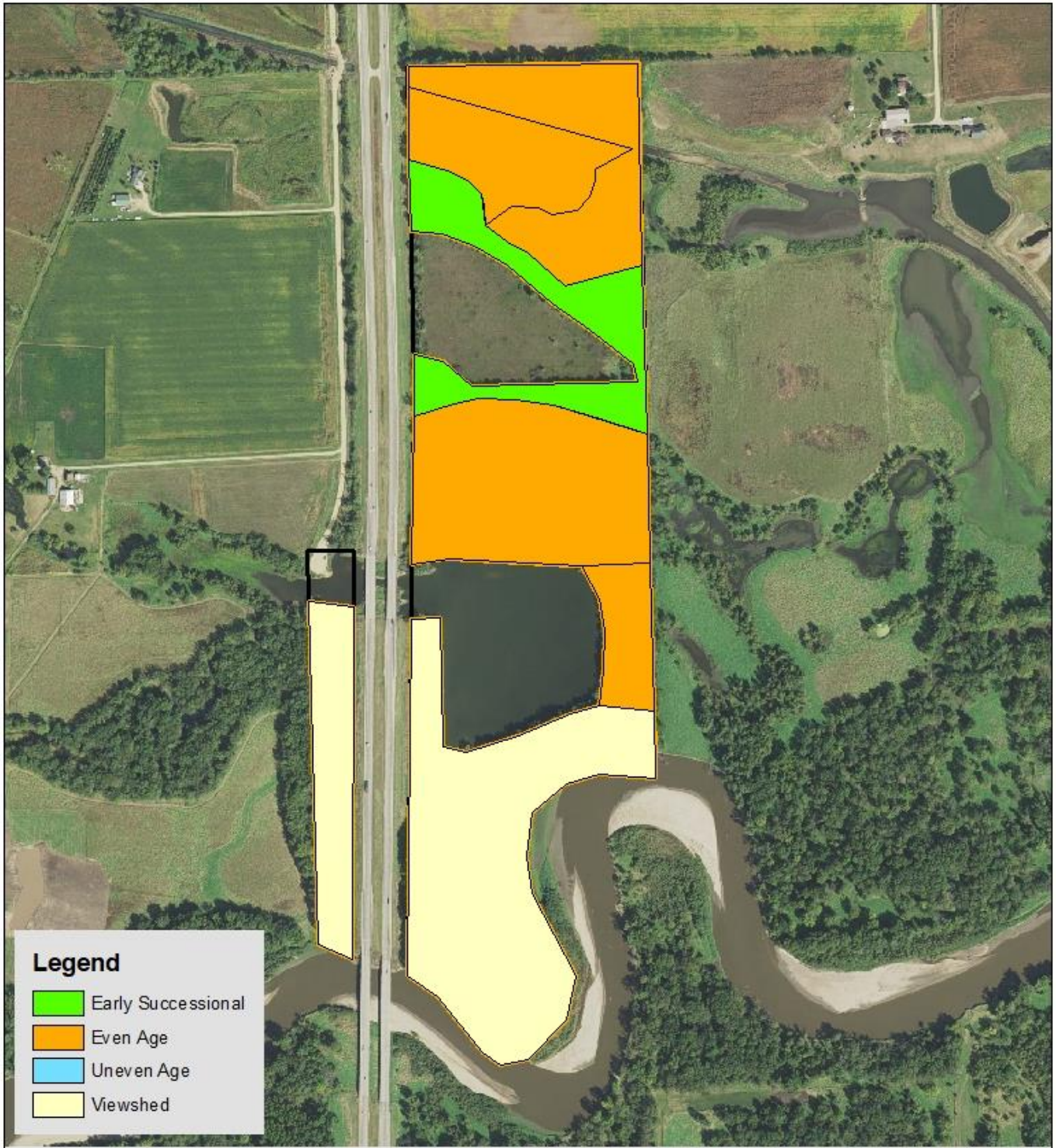
## LANDSCAPE CONSIDERATIONS

Forest wildlife management plans should take into consideration factors beyond the target property. Wildlife do not recognize property lines, and move freely to satisfy their life cycle needs. Land managers need to think on a broader scale to maximize benefits to local wildlife populations. Current and future conditions on surrounding properties may directly affect the planning and effective results of management actions carried out on the WMA.

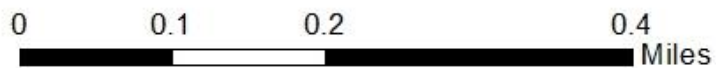
The cumulative effect of periodic regeneration management (clearcuts) in stands managed as even aged will create and maintain an ever-shifting patchwork of young forest that varies spatially and temporally. This mosaic will provide critically important habitat to a vast array of wildlife that depend on or prefer early successional forest types. Young forest is a habitat type that is often considered a limiting factor in forested landscapes in Iowa.

It is important to note that the larger landscape around the WMA was taken into consideration regarding these decisions. Both up and downriver from the WMA is a large expanse of forested floodplain made up of predominantly mature forest habitat. Much of this forested corridor is passively managed by private landowners, which will result in habitats that vary from the WMA over the long term, and will continue to provide abundant habitat for wildlife that depend on or prefer forest interior or large expanses of mature forest habitat.

# Wapsi WMA Management Systems



Sec. 36 & 1, Orange Twsp.  
T81 & 80N, R3E  
Clinton County



## **EARLY SUCCESSIONAL MANAGEMENT**

Many species of birds such as American woodcock, blue-winged warbler, black-billed cuckoo, yellow-billed cuckoo, and eastern towhee are dependent on the early stages of woody growth for breeding. Many mature-forest birds also use early successional forests during the post-fledging and migratory periods. The high stem density of both trees and shrubs provides suitable foraging and/or nesting habitat, and protection from predators. The increased sunlight in young stands also promotes flowering plants which support pollinator and other insect species, and provide foraging habitat for species such as bobcat, bats, reptiles, and small mammals. One way that this habitat can be created is by cutting a stand and allowing all of the desirable species to re-sprout. Many species of trees and shrubs stump sprout vigorously after being cut, especially when cut at a younger stand age.

In general, the majority of early successional management is recommended for the woodland edges adjacent to open habitats. Keeping the woody species growth "low and dense" in these areas will create more attractive habitat for shrubland and "edge" wildlife species. This will "feather" the edges and make a gradual transition from the grassland/agricultural field edges to the larger trees. Feathering or softening the woodland edges creates attractive cover for many species and often results in less nest parasitism of interior forest bird species by brown-headed cowbirds.

The early successional management areas will be managed on a 10-15-year rotation. In other words, every 10-15 years the area will be cut to rejuvenate the desirable species and create areas with high stem density.

Wapsi WMA has 8.7 acres (11.5% of all woodland acres) scheduled for early successional management, all falling within one stand. Half of this stand can be cut on a rotation occurring approximately every 7 years.

## **EVEN AGED MANAGEMENT**

Even aged management is essential for wildlife species dependent on oak/hickory forests. Even though large blocks of forest are needed on some WMAs for some wildlife species, each stage of an even aged stand provides habitat for wildlife. For example, regenerating stands (1-10 years old) benefit the same species of birds as does early successional stands, such as the blue-winged warbler, black-billed cuckoo, yellow-billed cuckoo, eastern towhee and American woodcock.

Sapling to small pole-sized stands between 10 and 20 years old, may be used by species such as the Kentucky warbler. From age 20-60 years, pole to medium-sized trees tend to be used by canopy nesters such as the scarlet tanager and ground nesters such as the ovenbird. Mature stands of 60 to 125 years of age are used by birds such as the wood thrush, Acadian flycatcher, ovenbird and scarlet tanagers. All size classes are important for many game species such as bobcat, deer, squirrel, and wild turkey.

As forest stands age, they constantly lose trees to shading, insects, disease and other factors. The dead and dying trees provide habitat for cavity nesters such as wood ducks, woodpeckers, nuthatches and titmice. Over 30 species of Iowa breeding birds nest in the cavities of trees. Iowa's seven species of woodpeckers (including two SGCN) are the primary cavity builders and nesters, and these woodpeckers are the keystone species that provide the cavities for so many other secondary nesting birds, as well as providing homes for flying squirrels, gray and fox squirrels, bats, and a host of other species. In northeast Iowa, federally endangered northern long-eared bats use loose-barked, live trees such as shagbark hickory as well as the sloughing bark from dying trees for their maternity colonies.

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

Common forms of even aged management in Iowa include clearcutting and planting, clearcutting with regeneration already established, or a shelterwood system to develop desirable seedlings on the ground.

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

Clearcutting to create full sunlight is essential at some point in the stand's life to successfully regenerate oak. If stands are not clearcut, the oak component of the forest will be lost to shade tolerant species such as sugar maple and basswood. 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 (4-10" dia.) stand of trees.

Prescribed fire is an important tool in managing oak stands. Frequent burning of the leaf layer in the woodland will kill thin barked species such as hard maple, cherry, elm, bittersweet hickory, and ironwood. Fire will expose mineral soil and open up the ground to sunlight. These conditions favor the natural regeneration of oak. Oak seedlings will tolerate light fires. The top will be killed by the fire, but the deep root systems survive and sprout. Fire will be utilized on a limited scale to encourage oak regeneration in oak stands. Once an adequate number of oak seedlings are present, the over story will need to be removed or the young oak will die from lack of sunlight.

Fire is also an important tool in promoting a more diverse herbaceous plant community on the forest floor. The conditions that favor oak regeneration also favor many native plants that thrive on periodic disturbance. Fire will combat invasive species such as garlic mustard and multiflora rose that crowd out desirable native plants. Periodic fire, coupled with the practices to provide more sunlight through the canopy, will set the stage for more diversity across even aged stands. It has become apparent that fire is not used frequently enough in many upland forests. It seems to be a novelty practice that is used more as a singular event or for promotional status than as a routine part of forest management. Fire should be used, if feasible, wherever invasive species occur in significant number and roughly every five years throughout established even aged stands.

Wapsi WMA has 37.6 acres (49.7% of all woodland acres) that will be managed as even aged forest to regenerate oak and associated species. Applying sustainable forestry guidelines, approximately 3-4 acres could be clearcut every 10 years assuming a 120-year rotation age.

### **UNEVEN AGED MANAGEMENT**

Uneven aged management develops a stand of trees with multiple tree ages and 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 aged stands always have large trees present, this system favors species that will grow in shade such as maple and basswood.

Uneven aged management is not being prescribed on Wapsi WMA at this time. This type of forest management is expected to be well represented on many of the forested lands in the vicinity of the WMA. Frequent flooding events, storm events, aging out and selective harvest will all contribute to the proliferation of uneven aged forests in the Wapsi corridor.

### **VIEWSHED MANAGEMENT**

Viewshed areas are typically steep slopes, areas along streams which are fragile and are best left to naturally progress through succession, or other particularly sensitive sites (ecologically or socially). Areas where endangered plant or animal species exist may also be under the viewshed system of management. Management can take place on these areas where desirable, but the primary objective is to have very minor disturbance if any. Such management typically includes lower impact practices such as prescribed fire and invasive species control. Like uneven aged forest

management, viewshed areas provide an important core area of relatively stable natural habitat. Many Neotropical migratory birds benefit from the areas designated as viewshed.

Wapsi WMA has 29.4 acres that will be managed as viewshed. These areas occur along Highway 61 and the Wapsi River, primarily in areas that would be very difficult to access. By passively managing these acres, we can provide habitat for wildlife species that prefer late-succession or climax forest communities, while protecting some of the more sensitive sites such as the banks and riparian area of the Wapsi River.

## **SOILS**

Soil is the medium for plant growth and can dictate current and future forest composition. Soil type is a variable that is considered for all forest management decisions. The predominant soil type found in this forest management plan is the Ambraw series.

The Fluvents-Ambraw series consists of soil formed recently (less than 500 years ago) in the floodplains by water-deposited sediments. There are generally stratified layers of sand, silt and clay. The landform is nearly level and has a range of excessively drained to poorly drained areas depending on the proportion of sand, silt and clay.

Other soils types found to a much lesser extent and scattered across the forested portion of the WMA include Shaffton loam, Finchford loamy sand, Granby fine sand and ponded Aquolls. All of these are typical of a forested floodplain. Elevation changes are very slight on this WMA, but a combination of a two-foot elevation change and a change from a clay soil to a sandy soil often creates significant differences in vegetation.

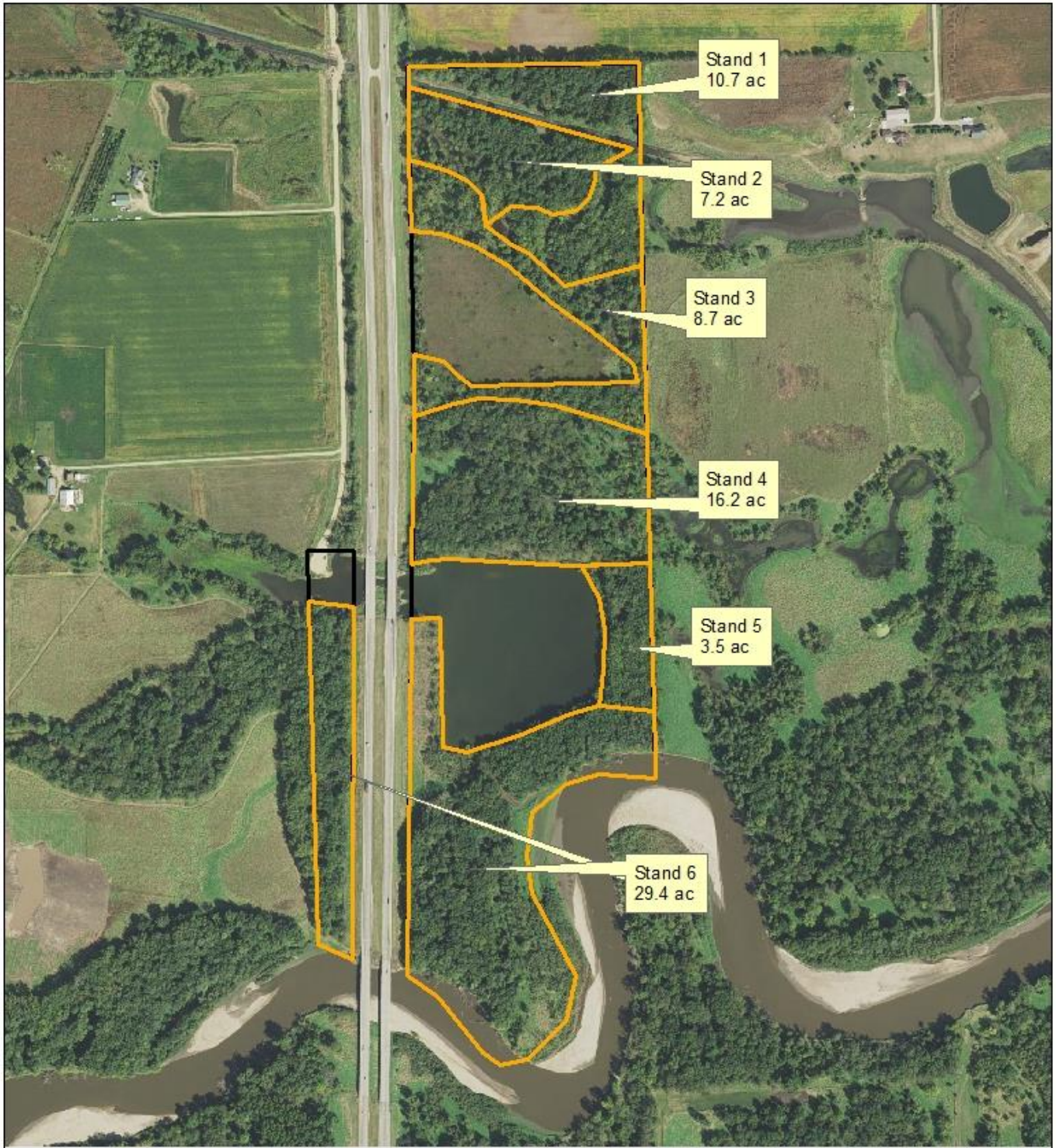
All of the soils covered in this plan are subject to frequent flooding, have a relatively high seasonal water table and are irregular in shape.

## **WORK PLAN FOR WAPSI WMA**

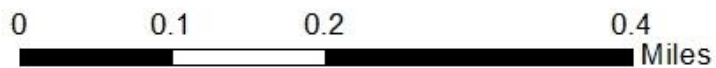
This is the “working plan” for the Wapsi Wildlife Management Area designed to aid professional biologists and foresters in the implementation of forest management practices. It is written with the understanding that these professionals have a basic understanding of forest management principles and techniques. 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.

Before implementation of any prescribed harvests, the project plan will be reviewed internally to determine potential impacts to both state and federal threatened or endangered species. Harvests will not be initiated until this review has been completed and all T/E comments/concerns have been addressed.

# Wapsi WMA Stand Map



Sec. 36 & 1, Orange Twsp.  
T81 & 80N, R3E  
Clinton County



## STAND SUMMARIES & RECOMMENDATIONS

Stand	Acres	Overstory	Intermediate/ Understory	Size Class	Management System	Prescription	Priority	Year	Stand Comments
1	10.7	Silver maple, elm, honey locust, pin oak	Reed canarygrass	Small Sawlog	Even aged	Crop Tree Release	High	2026	Oak regeneration present where canary grass is sparse. Heavy release of oaks will allow sunlight for regeneration.
2	7.2	Pin oak, scattered elm and silver maple	Fairly shaded and bare. Pin oak seedlings apparent.	Small Sawlog	Even aged	Weed Tree Removal	High	2024	Remove non-oaks
3	8.7	Pin oak, river birch, silver maple, elm	Gray dogwood	Small Sawlog	Early Successional	Prescribed Fire Weed Tree Removal	High Med	2024 2027	Burn this stand whenever the prairie is burned. Remove birch, maple and elm to promote dogwood and other native shrubs.
4	16.2	Honey locust, silver maple, pin oak, river birch, elm	Reed canarygrass	Small Sawlog	Even aged	Crop Tree Release	Med	2028	More of a light release of desirable trees as to not promote more canarygrass
5	3.5	Silver maple, river birch	Pin oak	Pole	Even aged	Crop Tree Release	Low	2030	High BA, in stem exclusion phase. Release suppressed desirable trees.
6	29.4	Silver maple, cottonwood	Mostly bare	Sawlog	Viewshed		Low		Monitor stand. It is ready for regeneration, but with poor access and next to river and highway it is low priority.



## ADDITIONAL STAND INFORMATION

### Stand 1

There is a higher stocking of oak in the east side of the stand. Complete a heavy, four-sided release around oaks. This will release oaks from competition as well as provide additional sunlight for oak regeneration. Too heavy of a release will promote reed canarygrass which will suppress oak regeneration. If reed canarygrass becomes an issue, target it with herbicide approved for use near water.

### Stand 2

This stand mainly contains pin oak with some American elm and silver maple. Remove the elm and maple to reduce the stocking of the stand. Natural regeneration of oak is already present in parts of the stand. Additional sunlight is needed to allow these seedlings to grow. This stand is currently not ready for harvest, but recruitment of advanced regeneration at this time will still be beneficial.

### Stand 3

The main objective of this treatment is to maintain and increase the shrub layer around the established prairie. Remove maple, birch and elm where they are competing with oak or dogwood.

## THREATENED AND ENDANGERED SPECIES

The information included here represents the status of listed species at the time this plan was written. Managers understand that these lists continue to change and that updated references must be consulted before undertaking management actions recommended by the plan, in order to avoid and minimize impacts on listed species.

The species listed in the table below have either been documented on the area, or are considered likely to be present in this type of habitat in this geographic region, and therefore warrant appropriate considerations.

Animals:

Common Name	Scientific Name	State Status	Federal Status
Northern long-eared bat	<i>Myotis septentrionalis</i>	--	E
Indiana bat	<i>Myotis sodalis</i>	E	E
Tricolored bat	<i>Perimyotis subflavus</i>	--	Proposed E
Southern flying squirrel	<i>Glaucomys volans</i>	Special Concern	--
Red-shouldered hawk	<i>Buteo lineatus</i>	E	--
Bald eagle	<i>Haliaeetus leucocephalus</i>	Special Concern	--
Blanding's turtle	<i>Emydoidea blandingii</i>	T	--
Central newt	<i>Notophthalmus viridescens</i>	T	--
Bluntnose darter	<i>Etheostoma chlorosomum</i>	E	--
Grass pickerel	<i>Esox americanus</i>	T	--
Rusty patched bumble bee	<i>Bombus affinis</i>	--	E

## BEST MANAGEMENT PRACTICES FOR RIPARIAN AREAS

Active forest management adjacent to rivers, streams, oxbows, wetlands or other aquatic areas is inherent on Barber Creek WMA. Careful planning of forest management activities will greatly reduce threats to these aquatic resources. Forest management is compatible with these areas, and when done responsibly will maintain or enhance the ecological value of the site. The following "best management practices" shall be utilized as applicable for management activities impacting aquatic areas.

- Locate roads and trails away from wetlands and low-lying areas. Use higher elevation and well-drained sites where possible. Limit the number, width and length of trails. Use existing trails as much as possible.
- Limit stream crossings.

- Operate heavy machinery on frozen ground to minimize impacts. Low ground pressure equipment is preferable.
- Locate landings away from wetlands or immediate riparian areas.
- Minimize soil compaction and exposure near wetland or riparian edges. This will help prevent erosion and sedimentation of aquatic areas.
- Avoid harvesting along streambanks, wetland edges or other aquatic/terrestrial transition zones. Leaving an undisturbed buffer zone around aquatic areas may result in multiple benefits to water quality and aquatic habitat. The size of the buffer zone will vary from site to site, but in general will be a minimum of 50 feet in width from the typical saturation zone edge. Benefits include minimizing erosion and sedimentation, reducing the movement of flood debris, maintaining shade to help regulate water temperatures, providing food and habitat for aquatic organisms and providing important loafing, nesting and foraging areas for birds and other terrestrial species of wildlife.

### **LITERATURE CITED**

Narango, DL, DW Tallamy, and KJ Shropshire. 2020. Few keystone plant genera support the majority of Lepidoptera species. *Nature Communications* 11:5751. <https://doi.org/10.1038/s41467-020-19565-4>