FOX HILLS
FOREST WILDLIFE STEWARDSHIP PLAN

Developed by:
Ray Lehn, Retired DNR Forester
Jeff Glaw, Wildlife Biologist
and
Cassidy Robinson, Iowa DNR Forester

Table of Contents

Introduction

A responsibility of the Iowa Department of Natural Resources (DNR) is to assist Iowans in the guidance of habitat management for game and nongame species of animals which live within or migrate through this beautiful land we call Iowa. State-owned lands which are administered by the Iowa DNR receive direct management efforts for wildlife, wood production, recreation, soil conservation, and plant and animal species of special concern. The land management section of the DNR Wildlife Bureau is divided into 16 geographic units. Within a wildlife unit, the wildlife management biologist and technicians are responsible for the maintenance and operation of the Wildlife Management Areas (WMA). The vegetative composition and geography of a WMA can vary greatly. Most contain some type of row crop, some forestland and some areas of non- native grasses and forbs. Many also have creeks or rivers, natural or artificial wetlands, or native prairie grasses and forbs.

In recent years, the wildlife bureau has recognized and acted on the need for forest wildlife stewardship plans (FWSPs) to guide the proper management of their forest resources. Forests are not static systems, even though changes occur 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 lower quality than the forest of today. 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 relentless change requires managers to plan over the long term and leave a written record of these plans in the form of FWSPs. Since Iowa has no old growth forests remaining this component should be considered in some areas whenever possible. Old forest is known to support unique species that are not supported by younger forests and can increase the diversity of the forest that is part of the focus of these FSWPs.

Objectives

Fox Hills WMA is a state managed wildlife management area. The primary focus of the FWSP will be to provide habitat for a wide variety of forest wildlife species. Unfortunately, there is no one type of forest stand that can provide all of the requirements for all forest wildlife species. Wildlife species require different (and sometimes quite specific) forest types and ages classes. For example, some wildlife species require an abundance of forest edge while others need relatively

large blocks of un-fragmented forest. The forest management on Fox Hills WMA will likely favor forest interior and early successional species.

Funding for the acquisition and management of Fox Hills WMA has been almost exclusively hunter generated monies, i.e. license fees and excise taxes on sporting equipment. Consequently, a primary objective for management of the area is to improve habitat for hunted species such as deer, turkey, squirrels, and bobwhite quail. On the other hand, the DNR must also consider the effects of its management actions on non-hunted species as well, particularly those that are threatened, endangered, or species of special concern. The Iowa Wildlife Action Plan identifies those species it considers in "greatest conservation need" (Table 1 through Table 5). Recognizing that it is difficult if not impossible to manage for all of these species at the same time and on one tract, this list does provide an important guideline by which management strategies and decisions will be made.

Management Considerations

There are several considerations that have entered into the formulation of this FWSP for Fox Hills WMA:

1. The decline of many forest interior bird species such as Acadian flycatchers, veerys, wood thrushes, cerulean and Kentucky warblers and other neotropical migrants. Forest fragmentation, declining forest health and associated cowbird parasitism are considered among the factors causing declines in some of these species. Iowa is a state with exceptionally fragmented forests where addressing the needs of some of these large-block, interior nesting species is particularly difficult, if not impossible. It is important to consider the habitat components of these smaller fragmented forests when making land management decisions and every attempt should be made to minimize fragmentation of this forest when designing and implementing silvicultural practices.
2. There has been a loss of early succession forest stands and associated wildlife species throughout much of southern Iowa. Many of the disturbance factors such as fire, grazing, and cutting have dramatically decreased over the past 40 years. As a result, much of the upland forest in this vicinity has progressed beyond the early succession stage. While this may have been beneficial to those wildlife species requiring more mature forests, it has probably been a negative for species such as bobwhite quail, American woodcock, black-billed and yellow-billed cuckoos.
3. There has been a steady decline and projected future decline in oak forest throughout Iowa caused by continuous succession of forest stands to the more shade tolerant species such as maple, basswood, ironwood, and bitternut hickory. Oak-hickory forests are extremely important for a wide variety of wildlife species in Iowa. Oak-hickory woodlands also provide critical habitat for canopy-dwelling birds as well as nesting sites for both birds and mammals that occupy cavities. Mast from these species provides an important food resource for many mammal and bird species and oaks support the highest diversity and density of caterpillars which are an important food source for breeding birds. The eventual replacement of oak forest with more shade tolerant species such as basswood, elm, bitternut hickory or hackberry would undoubtedly have a severe negative effect on a huge variety of wildlife species.

This FWSP starts with the assumption that it is very important to maintain an oak-hickory forest to the extent possible. The maintenance of oak-hickory forest on public land becomes even more important in light of likely future trends on privately held forest. Much of the private forested acres have been subdivided and sold to sportsmen and small acreage holders, many of whom will probably be resistant to implementing the forestry practices necessary to regenerate oak. If this occurs, much of the forest landscape in Iowa will eventually convert to shade tolerant species at the expense of oak.

Management Strategies

Several management strategies will need to be used to implement the objectives of the plan within the management considerations mentioned above:

1. Natural oak regeneration requires sunlight to give the oak seedlings a competitive edge over shade tolerant species. Clearcuts and shelterwood cuts (described under Proposed Management Systems) are the typical systems used for regenerating oak. To prevent any potential negative effects on interior nesting species, clear-cuts should be located along existing forest edges when possible and remain small (3-10 acres) while still large enough to achieve oak regeneration and habitat size requirements for early successional species. To achieve economic feasibility with small clear-cuts, sales may need to be piggy-backed with other sales on public land in

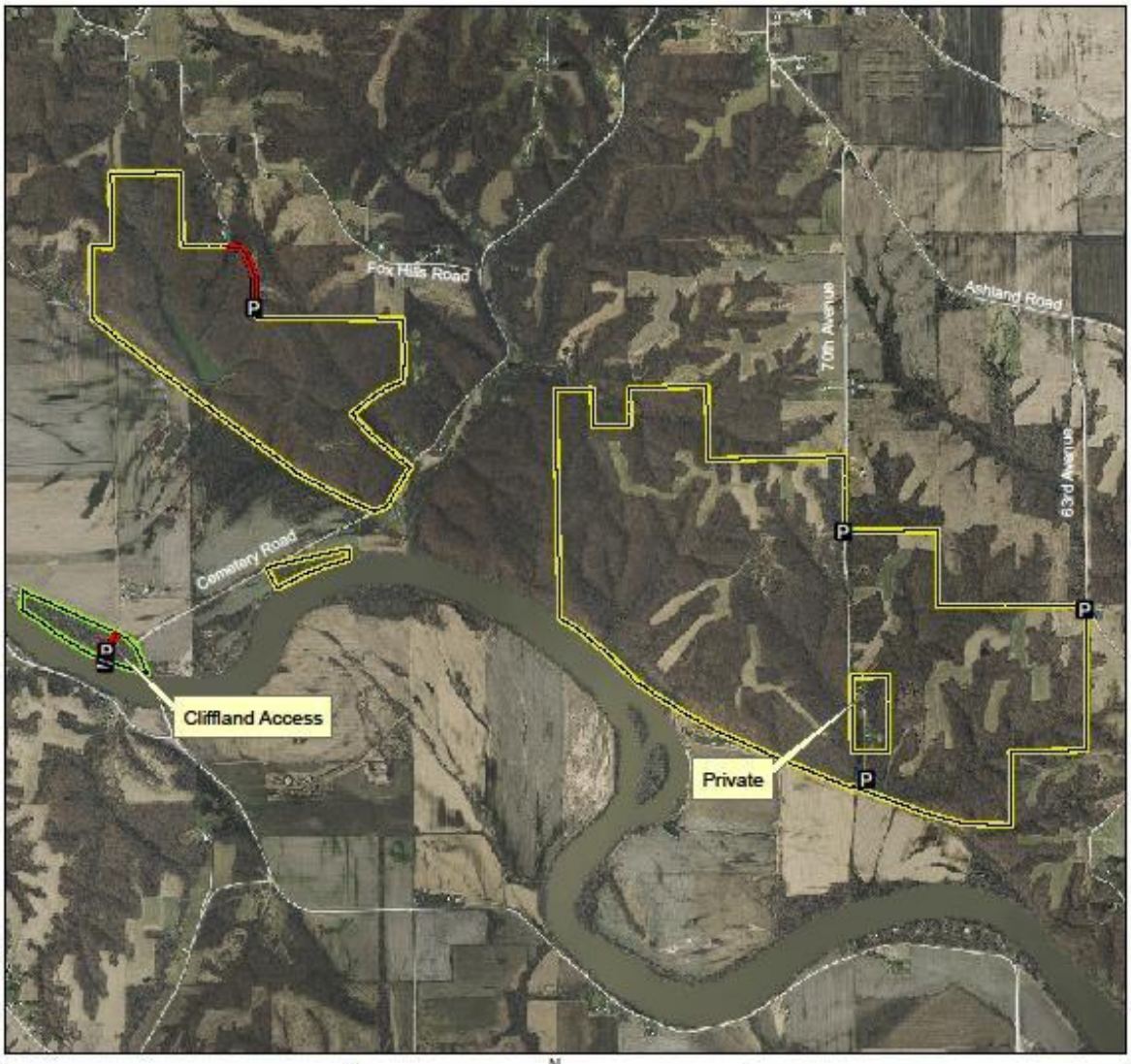
the vicinity. Subdividing larger stands will be necessary to keep clear-cuts as small as possible.

2. Early succession stages and mature stages of forest both tend to be more productive for a variety of wildlife than the intermediate crowded pole-size stage. Practices such as basal area thinning and crop tree release can be used to minimize the time a stand must spend in this intermediate stage. Basal thinning will result in greater sunlight for the entire forest, including desirable grasses, forbs and sedges. More sunlight to the forest floor especially on the edges will mean more flowering plants which will attract insects and other wildlife that favor early successional type areas. Repeated disturbance using fire, mowing/shearing every 15-20 years can help reset succession and keep designated areas in a early successional state.
3. While there is no feasible way of extending the early succession stage of a forest stand, the mature stage of succession may be able to be extended significantly beyond the typical 100 or 120-year rotation age. While this may result in some decline in timber quality and economic return, the trade-off value for certain wildlife species may make it worth it. The longer rotation should tend to postpone the amount of fragmentation needed to regenerate the stand. The limiting factor may be how long the rotation can be extended without jeopardizing natural oak regeneration. Natural regeneration is preferred and planting should be avoided if at all possible.
4. Some interior nesting bird species seem to select for large spreading “wolf trees” within a given stand. When clear cuts and shelter-wood cuts are marked, these trees should be left, especially since they typically have little economic value. Many wildlife species require dead or dying trees to provide insects for food and cavities for nesting. When clear cuts and shelter-wood cuts are marked for harvest, provisions should be made to leave 6-7 cull trees per acre, snags, and cavity trees of a variety of diameters (6” and greater than 24” are better) to provide this component for the future stand.
5. It is probable that Indiana and Northern Long eared bats use this area during the summer, in particular the riparian forest adjacent to Fox Hills WMA’s and its tributary creeks. Cutting on any stands described in this FWSP must be done in a manner that does not disturb potential bat maternity trees during the breeding season. (See Section: Guidelines for Protecting Indiana Bat Summer Habitat).
6. Best Management Practices (BPMs) have been developed by the Iowa DNR for preventing the introduction and spread of invasive species in Iowa’s forests. Periodic assessments will be made by the District Forester and Wildlife Biologist to assess the forest health and management of invasive species. A list of stands that have identified invasive species present is found in the section: Stands with Invasive Species Present.
7. This FWSP should be updated regularly as more information becomes available on wildlife use and on the efficacy of various silvicultural/management procedures. If funding is available, wildlife surveys should be done to determine species use to help evaluate success of management decisions.

Income from Timber Harvest

It should be emphasized that income generation is not the goal behind the development of FWSPs. Harvesting is conducted to regenerate stands to desirable species and to achieve a desirable diversity of tree sizes and species for wildlife habitat and benefit. However, any income generated from timber harvesting operations should be reinvested into the forest management in Iowa to thin young stands, control invasive species, convert areas to more desirable species and otherwise manage the forest for wildlife, and invest in surveys and/or research to evaluate success of management decisions and help direct future management. Without this reinvestment, there is little chance that the WMA annual budget will allow the recommendations in this plan to be implemented. Harvesting is a very minimal portion of this plan. The majority of work recommended is directed at thinning or burning young stands so the oak is not shaded by other trees and at removing undesirable species to encourage regeneration of desirable trees.

Fox Hills Wildlife Management Area



Legend

State Areas open to hunting
- WMA Boundary
- Parking Lot
- Boat Ramp
- Access Road
- Other Public Land

2010 Aerial Photography

Map Creation Date: 3/2011

N

0 0.25 0.5 Miles

Acres: 1,343

Habitat: Timber

Species: Deer, Turkey, Squirrel

Contact: Jeff Glaw
Sugema Wildlife Unit
319-293-7185

Wapello County, Iowa
T-71N, R-12&13W,
Sections 2-3,7,10-13,18

Directions: 1 mile SE of Agency on Alpine Rd, 1 mile S on 70th Ave.

Every effort has been made to accurately depict the boundaries on this map. However, users should rely on boundary signs actually located in this area to ensure they do not trespass on private property.

Introduction to Fox Hills WMA

Manager: Jeff Glaw, Wildlife Biologist
Address: Sugema Wildlife Unit
23213 Iowa Oak Grove Ave
Keosauqua, IA 52565
Telephone: 641-799-0793

The Fox Hills WMA is located in Sections 2,3,10,11,12,13 of Agency Township and Sections 7 & 8 of Washington Township in Wapello County.

Fox Hills WMA purchased in five tracts.

1. 960 acres - R. & Son Friedrich - 1981 - $377,400.40
2. 336 acres - YMCA of Ottumwa - 1983 - $149,844.87
3. 38 acres - Oliver Reeve Et Ux, Schwartz Trust - 2001 - Donation
4. 6 acres - Donna Lee & Jerry Lee Main - 2018 - $17,500.00
5. 116 acres - INHF (Bucketlist) - 2019 - $270,406.00

The Soap Creek - Stephens Forest Bird Conservation Area (BCA) was dedicated in 2018. The BCA occupies 145, 886 acres in portions of Wapello, Appanoose and Monroe counties. The unique landscape is comprised of 35% grasslands, 45 % woodland and 3% aquatic habitat which supports 116 species of nesting birds and a spectacular amount of wildlife diversity. Out of the 256 bird species documented, 88 are Species of Greatest Conservation need (SGCN) including four state endangered and two state-threatened species. Fox Hills WMA is part of this diverse and highly important BCA.

Work Plan for Fox Hills WMA

The work plan for the Fox Hills WMA is designed to aid wildlife staff 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.

For purposes of this FWSP, the Fox Hills WMA forested land was divided into 52 stands shown in Figure 1. Each stand is described in this plan and recommendations are outlined for woodland management by stand. A priority level has been established for each stand recommendation to assist in management decisions.

Current Distribution of the Tree Size on the area

The woodland was stand mapped according to the average tree size as follows: (Fox Hills Size Class map in Appendix)

Tree Size (DBH)	Acres	% of Forested Area
Seedling 0-3”	9.5	0.74%
Sapling 1-4”	10.2	0.80%
Pole 5-10”	165.6	12.91%
Small Saw 12-18”	1057.5	82.43%
Sawlog > 18”	40	3.12%
Total	1282.9	100

Proposed Management Systems for the Fox Hills WMA

(Fox Hills Mgt Systems map in Appendix)

Recommendations for each stand were based on whether the stand will be managed to create an early successional, even or uneven aged stand. The decision on what system would be used was based on the objectives for the area to maintain an oak component where feasible, develop a diverse woodland landscape which support diverse wildlife, and

protect fragile sites. The management recommendations for Fox Hills WMA are shown in the table below:

Management System	Acres	% of Forested Area
Early successional	35.4	2.76%
Even age	981.4	76.50%
Uneven age	266.1	20.74%
Total	1282.9	100%

Early Successional Management

Many bird species such as bobwhite quail, American woodcock, blue-winged warbler, black-billed cuckoo, yellow-billed cuckoo, and eastern towhee are dependent on the early successional stages of woody growth. The high stem density of both trees and shrubs and the abundance of grasses and forbs provides suitable foraging and nesting habitat and protection from predators. Many pollinator species also benefit from the flowering forbs and shrubs in young regenerating stands. Early successional habitat also provides important foraging opportunities for bats and interior-nesting birds like cerulean warblers during the post-fledging period and for long-distance migrants during stopover.

The majority of the early successional management prescribed in this plan is on the woodland edges. This work will "feather" the edges and make a gradual transition from the field edges to the larger trees. Feathering and softening the edges may lessen nest parasitism of interior forest bird species by brown-headed cowbirds and reduce interior forest fragmentation. Early successional feathered edge habitat can also provide important refuge for species like smooth green snakes, woodland voles, and bobcats.

The early successional management areas will be managed on a 15 to 20-year rotation. In other words, every 15 to 20 years the stands will be cut to create areas with high stem density. Fox Hills WMA has 35.4 acres scheduled for early succession management.

Many of the timber edges contain narrow bands of sapling to pole size trees that could be managed for early successional habitat management but were not identified as such. The number of acres to manage for early succession could be increased if desired for management purposes.

Even Age Management

Even age management involves growing a stand of trees which are close to the same age. At some point in a stand's life, the area is clear cut which results in the even age structure. This type of management creates excellent habitat for deer, turkey, squirrels and a wide variety of other wildlife species. It is essential for regeneration of oak, which requires full sunlight. The only way that oak can be maintained as a component of the forest over the long run is by practicing some form of even age management.

Each stage or age class of an even age stand provides habitat for a suite of wildlife species and maintaining a diversity of forest structure and age classes, as well as plant species composition across the WMA increases overall wildlife species diversity. For example, regenerating stands (1-10 years old) benefit the same species as do early successional stands, i.e. blue-winged warblers, black-billed cuckoo, yellow-billed cuckoo, eastern towhee, as well as bobwhite quail and American woodcock.

Sapling to small pole size stands between 10-20 years old may be used by black-and-white, Kentucky, and worm-eating warblers. Pole size to medium size trees (20-60 years) tend to be used by canopy nesters such as eastern wood pewee, scarlet tanagers and ground nesters such as ovenbirds and Kentucky warblers but are also important for early successional species like blue- winged warblers during the post-fledging period.

Mature stands of 60-125+ years of age are used by birds such as the wood thrush, Acadian flycatcher, ovenbird, worm eating warbler, and scarlet tanager, and provide important roosting and foraging habitat for bats.

As woodland stands age, they constantly lose trees to shading, insects, disease, etc. The dead and dying trees provide habitat for cavity nesters such as nuthatches, titmice, southern flying squirrels, and woodpeckers. The federally endangered Indiana bat uses loose barked live trees such as shagbark hickory as well as the sloughing bark from dying trees for their maternity colonies. These trees should be maintained at a level of 6 -8 per acre or more. Thus, even age management has the potential to provide a large variety of age classes that can meet the needs of a variety of wildlife species.

While there are many methods to open a stand to sunlight, clear cutting and shelterwood harvesting are the most common. Clear cutting is a practice that opens the stand all at once. Regeneration using clear cutting requires there to be sufficient oak seedlings or advanced regeneration present. Without these seedlings, planting may be necessary following a clear cut.

Shelterwood harvests are one way of encouraging seedling production prior to a clear cut. Shelterwood harvests include several thinning's done prior to the final clear cut. If the harvest is done correctly, the trees left after the thinning will provide seed and the forest will be open enough to allow sunlight to reach the forest floor. The trees left will also help provide shade that limits the growth of undesirable or invasive plant species. This method can take many years to create the next oak stand and may need mechanical or fire disturbance to keep out undesirable species. After sufficient seedling or advanced regeneration is present, the stand needs to be clear cut to successfully regenerate the oak stand.

Timber Stand Improvement in the form of Crop Tree Release (CTR) is discussed in this plan. This practice is done most frequently when the trees are pole sized. The goal of the practice is to choose no more than 50 trees per acre that are considered to have the best genetics. All trees that touch the canopy of the crop tree are killed to allow the tree to reach maximum growth potential.

Site Preparation for Natural Regeneration (SPNR), is a practice also used in even age management. This practice involves removing trees that are below the main canopy to allow more sun light to get to the forest floor. Ironwood, sugar maple, and other shade tolerant species warrant this practice if species like oak are wanted in the future.

Prescribed fire is an effective and inexpensive tool that has a long history of use and continues to be studied in managing oak stands. Occasional burning of the leaf layer in the woods will kill thin barked species such as hard maple, cherry, elm, bitternut hickory and iron wood. Fire will expose mineral soil and open the ground to sunlight. These conditions favor the natural regeneration of oak. Depending on the extent of root system development, some oak seedlings will tolerate fire better than others, but as a whole, oaks tolerate fire better than other tree species. The top of an oak seedling often will die back following fire but the roots will send up new growth soon thereafter.

While prescribed burning is not listed in individual management recommendations for any of the Fox Hills stands, the Sugema Unit team is planning for development of fire breaks in strategic places. Because of the terrain, stands will most likely not be burned individually. Priority will be given to stands with a dominant oak component and stands that have issues with invasive species.

There are 981.4 acres on this area that will be managed as even aged woodlands to regenerate oak. The eventual acreage requiring clear cutting every 5 years depends on the rotation age used for the stand. With a typical 125-year rotation, approximately 40 acres would need to be clear cut every 5 years. If the rotation age can be extended significantly without jeopardizing the ability to regenerate oak, the acres of clear cutting every 5 years can be reduced correspondingly.

Uneven Age Management

Uneven age management develops a stand of trees with all DBH size classes. 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 hackberry, hickory, hard maple and basswood. Sustainable harvest guidelines dictate the ability to selectively harvest mature and defective trees every 20-25 years in these stands. There are 266.1 acres on Fox Hills WMA that will be managed using uneven management practices.

Uneven management areas will provide continuous tracts of woodland with infrequent disturbance. Large tracts of uneven management timber will provide necessary habitat for neo-tropical migratory birds such as the cerulean, hooded, Canada and Kentucky warblers. Selective harvesting will create small openings in the canopy which 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 nesting structure, support caterpillar diversity, and produce acorns for many wildlife species. Timber stand improvement and selective harvesting will create woody debris on the forest floor that can be utilized by reptiles, amphibians and small mammals.

Monitoring Forest & Wildlife Response to Management Practices

Knowledge of vegetation and wildlife response to silvicultural practices (e.g. oak regeneration, Species of Greatest Conservation Need (SGCN) use of managed stands), will assist managers in developing future FWSPs to reach the goals of conserving SGCN as well as keeping common wildlife common. It will also help build public acceptance of silvicultural practices which are not always viewed favorably by the public. Information from monitoring will allow public and private forest managers to ensure that proper silvicultural techniques are being used in habitat creation to meet the wildlife and vegetation goals of the plan. A detailed forest and wildlife monitoring plan will be developed as an addendum to this forest stewardship plan that will outline procedures, species monitoring to be conducted and timetable.

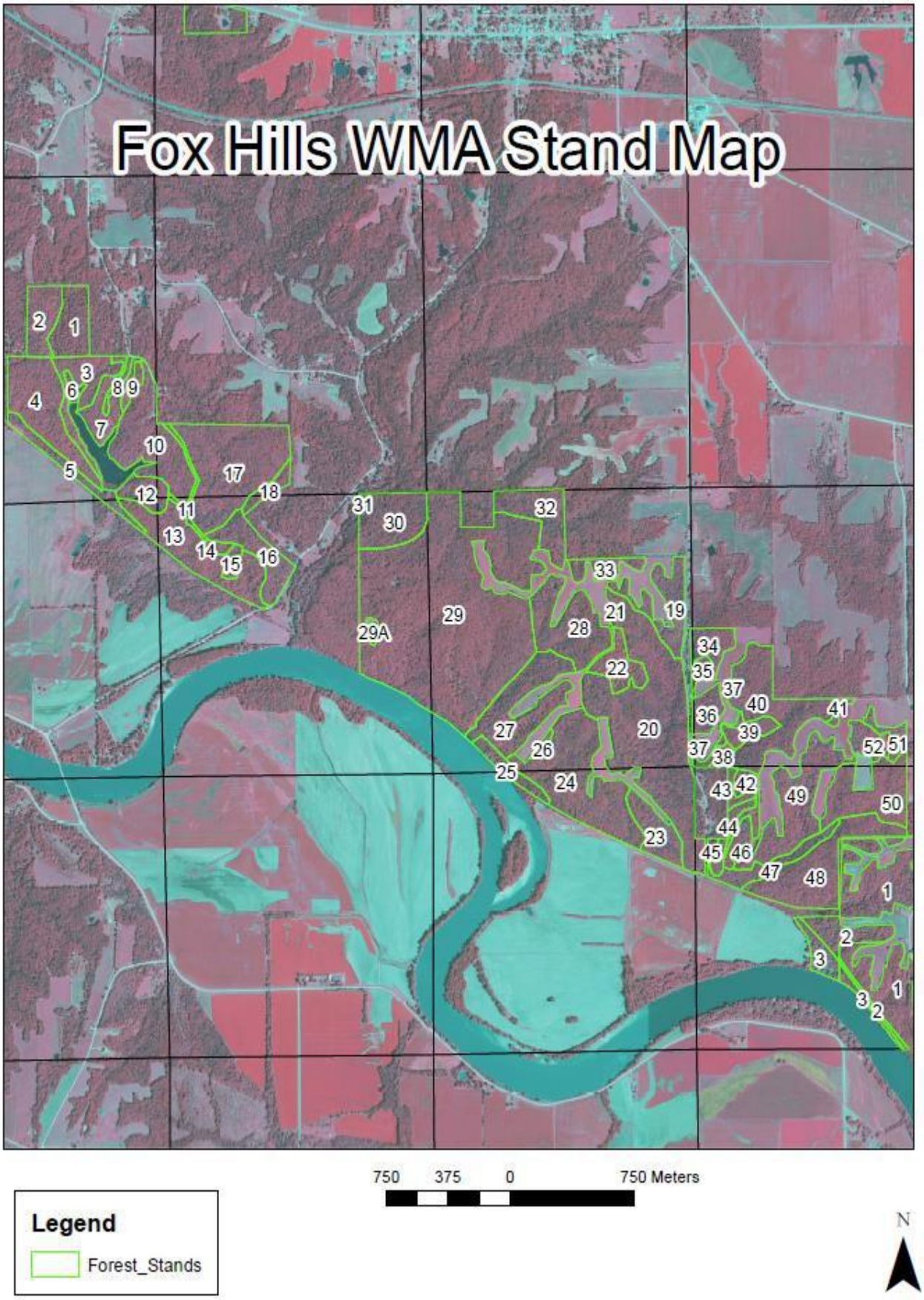


Figure 1. Fox Hills WMA Stand Map

Description and Recommendations for Stands - Fox Hills WMA

Stand 1: 19.8 acres

Woodland Description **-** This area contains an overstory of mostly sawlog size white oak, with some red oak and hickory mostly 16-18 inch diameter that is understocked. Mid and understory are composed of small pole to sapling size elm, cherry, ironwood, ash, and dogwood, with some mixed oak and walnut scattered throughout. Regeneration is composed of elm, ash, cherry, hackberry, and hickory. The area was harvested about 30 years ago.

Management Recommendations **-** This stand would benefit from Timber Stand Improvement in the form of Crop Tree Release (CTR) to release the scattered oak and walnut poles but would be relatively low priority. The crop trees selected will be desirable species with good form and lack of significant defect. Trees with crowns that are touching or overtopping the crown of the crop trees will be killed by felling or double girdling. Species normally selected as crop trees are walnut, white oak, and red oak. Species diversity is encouraged in selecting crop trees.

Another option might be to wait 5-10 years and apply Site Preparation for Natural Regeneration (SPNR). This cultural practice removes the poor quality mid and understory trees to allow more sunlight to the forest floor to increase natural regeneration of oaks. After sufficient oak regeneration is established, the area should have a clearcut harvest to remove the remaining overstory trees.

Stand 2: 17.7 acres

Woodland Description **-** This stand is composed primarily of small sawlog white oak, with some shagbark hickory, mockernut hickory, and red oak, along with some scattered walnut and cherry. Understory is composed of ironwood and gooseberry and some honeysuckle, with hickory, ash, cherry and some scattered oak regeneration. This area was lightly harvested about 30 years ago.

Management Recommendations **-** Crop Tree Release (CTR) is recommended to release the oak and any other desirable trees. Evaluate the amount of honeysuckle encroachment and eliminate using proper control.

Stand 3: 21.4 acres

Woodland Description **-** This stand is composed mostly of sawlog size white oak 12-24 inched in diameter with some red oak and black oak. There are a few small areas with mostly larger pole size trees. Understory is composed of ironwood and gooseberry with some honeysuckle. Regeneration consists of hickory, ash, and cherry. Part of this stand extends on the slope along the southwest side of the lake.

Management Recommendations **-** Site Preparation for Natural Regeneration (SPNR) is recommended. This cultural practice removes the poor quality mid and understory trees as well as poor quality overstory trees to allow more sunlight to the forest floor to increase natural regeneration of oaks. After SPNR is applied, the area should have a shelterwood harvest that removes 50-60% of the overstory. Once acceptable regeneration is established, there should be a final harvest to remove the remaining overstory trees. Evaluate the amount of honey suckle encroachment and eliminate using proper control.

Stand 4: 41.0 acres

Woodland Description **-** This stand is also composed primarily of small sawlog size black oak, hickory, and elm with some honey locust. There are red oak and white oak present in some areas. Understory is composed of dogwood, honeysuckle, autumn olive, and some ironwood. Regeneration consists mostly of elm, ash, and hickory.

Management Recommendations **-** CTR is recommended but is relatively low priority because of low number of preferred high quality crop trees. Evaluate the amount of autumn olive and honeysuckle encroachment and eliminate using proper control.

Stand 5: 13.5 acres

Woodland Description **-** This bottomland stand has a somewhat understocked overstory of small sawlog size elm, hackberry, walnut, and locust with occasional sycamore, Kentucky coffeetree, and red oak. There are scattered larger

size trees. A midstory of pole size trees consists of mostly hickory, hackberry, and elm. Understory is made up of mostly honeysuckle and coralberry with elm, hackberry, and hickory regeneration.

Management Recommendations **-** This stand would benefit from CTR, but would be relatively low priority. Some of the larger trees could be removed if harvesting in an adjacent stand.

Evaluate the amount of honeysuckle encroachment and eliminate using proper control.

Stand 6: 2.6 acres

Woodland Description **-** This stand consists of a bottomland area at the upper end of the lake. It is composed of mostly small sawlog trees with some larger trees and some pole size trees. Species consist of cottonwood, silver maple, river birch, and some willow and occasional swamp white oak, and walnut. Understory is relatively open with some mixed grasses and some elm regeneration.

Management Recommendations **-** This stand would benefit from CTR, but would be low priority. Some of the larger trees could be removed if harvesting in an adjacent stand.

Stand 7: 16.8 acres

Woodland Description **-** This stand is composed of pole to small sawlog red oak, black oak, white oak, hickory, and some cherry and occasional sugar maple and walnut. Understory is composed of ironwood, multiflora rose, honeysuckle, and some autumn olive. Regeneration is mostly cherry and hickory.

Management Recommendations **-** This stand would benefit from CTR and would be medium priority due to the good number of oak. Invasive species such as multiflora rose, honey suckle and autumn olive will be controlled by using the appropriate control methods.

Stand 8: 3.1 acres

Woodland Description **-** This stand consists of a red pine plantation planted about 60 years ago. Most trees are in the 12-15 inch diameter range. A large portion of the trees have died over the past 10-20 years.

Understory is composed or honeysuckle, dogwood, ironwood and sapling to small pole size mixed hardwoods consisting of ash, elm, cherry and occasional oak, hickory, and walnut.

Management Recommendations **-** It appears this stand will eventually convert to mixed hardwoods as the red pine continue to die. Use CTR to release the higher quality hardwood crop trees would be beneficial but would be relatively low priority.

If preserving the red pine is an objective, killing any hardwoods in and around the edge of the stand that are competing for sunlight should be done as well as thinning some of the pine where they are crowding each other. Evaluate the amount of honeysuckle encroachment and eliminate using proper control.

Stand 9: 3.6 acres

Woodland Description **-** This stand is composed primarily of large sawlog size trees with some smaller sawlog and pole size trees. Species consist of white oak, red oak, black oak, shagbark hickory, and mockernut hickory. Understory is mostly ironwood with some gooseberry and honeysuckle. Regeneration is mostly ash and hickory.

Management Recommendations **-** SPNR is recommended. This cultural practice removes the poor quality mid and understory trees as well as poor quality overstory trees to allow more sunlight to the forest floor to increase natural regeneration of oaks. After SPNR is applied, the area should have a Shelterwood harvest that removes 50 to 60% of the overstory. Once acceptable regeneration is established, there should be a final harvest to remove the remaining overstory trees. Evaluate the amount of honey suckle encroachment and eliminate using proper control.

Stand 10: 45.0 acres

Woodland Description **-** This stand is composed mostly of small sawlog size white oak, red oak, hickory and black oak, with some walnut, cherry, basswood and sugar maple. There are some scattered larger size trees as well as pole size trees. Understory is mostly ironwood and gooseberry with some honeysuckle.

Regeneration consists mostly of hickory ash, and some sugar maple.

Management Recommendations **-** CTR is recommended as medium priority because of a good number of crop trees. Evaluate the amount of honeysuckle encroachment and eliminate using proper control.

Stand 11: 4.3 acres

Woodland Description **-** This stand is basically an old roadway and forest edge that is grown up to sapling size honeysuckle and dogwood, with some redbud, autumn olive, and mixed hardwood saplings.

Management Recommendations **-** This area could be maintained as early successional habitat.

Stand 12: 11.5 acres

Woodland Description **-** This stand is composed primarily of pole to small sawlog hickory, sugar maple, red oak, and white oak with some basswood and walnut. There are scattered larger trees. Understory is somewhat open and contains ironwood and some honeysuckle. Regeneration is mostly hickory, ash, sugar maple and basswood.

Management Recommendations **-** CTR is recommended and would be relatively low priority. Control of honeysuckle will be completed when CTR is completed.

Stand 13: 42.7 acres

Woodland Description **-** This stand contains mostly small sawlog to pole size black oak, red oak, white oak, hickory, and basswood with occasional walnut and sugar maple. There are scattered larger trees. Understory is relatively open with ironwood, gooseberry, and some honeysuckle. Regeneration is mostly hickory, ash, maple, and basswood.

Management Recommendations **-** This stand would benefit from CTR and would be medium priority.

Stand 14: 2.9 acres

Woodland Description **-** This area is an area previously cleared that now consists of sapling and small pole size ironwood, hickory, and basswood with dogwood and honeysuckle in the understory.

Management Recommendations **-** This area could be managed as early successional habitat by periodically cutting the existing stems and allowing them to grow back.

Another option could be to convert the area to more desirable species by killing the existing trees/shrubs and planting higher quality species such as oak and walnut. Control of honeysuckle will be completed using cut/stump method and glyphosate.

Stand 15: 3.6 acres

Woodland Description **-** This stand contains mostly pole size bitternut hickory, elm, ash, cherry and occasional red and black oak, with scattered larger trees. Understory is composed of ironwood and dogwood.

Management Recommendations **-** This stand would benefit from CTR to release the oak but would be low priority.

Stand 16: 22.3 acres

Woodland Description **-** This stand is comprised mostly of small sawlog and pole size trees with scattered larger trees. Black oak, hickory, and red oak are primary species present with some white oak and walnut and occasional honey locust, hackberry, and cherry. Understory is mostly ironwood with some gooseberry and honeysuckle. Regeneration consists of hickory, hackberry, and cherry.

Management Recommendations - This stand would benefit from CTR to release the oak and walnut but would be medium to low priority.

Stand 17: 69.0 acres

Woodland Description - This stand is composed primarily of small sawlog size white oak, black oak, hickory, and red oak, with some walnut, cherry, sugar maple, and hackberry. There are scattered larger trees and some small pockets of pole size trees. Understory is ironwood and gooseberry with hickory, ash, sugar maple, and hackberry regeneration.

Management Recommendations - This stand would benefit from CTR and would be high to medium priority.

Stand 18: 5.9 acres

Woodland Description - This stand is composed primarily of pole size trees with sawlog size trees scattered throughout. Species consist primarily of black oak, white oak, and hickory, with occasional cherry and walnut. Understory is composed of ironwood and gooseberry with elm, ash, and hickory regeneration.

Management Recommendations - CTR is recommended and would be medium priority.

Stand 19: 24.3 acres

Woodland Description - This stand consists mostly of pole and sapling size trees with scattered small sawlog trees. Species consist primarily of elm, honey locust, shingle oak, and walnut with some hackberry, cherry, cedar, and ash. There is some bur oak, swamp white oak, white oak, and black oak scattered in some areas. Understory consists of dogwood, honeysuckle, multiflora, and ironwood. There is some pole to small sawlog cottonwood along the draws.

Management Recommendations - This stand would benefit from CTR. Although there are not a lot of high quality oak, the priority would be low to medium because of the abundance of walnut. Control of honey suckle and multiflora rose will be completed using the appropriate methods for each plant.

Stand 20: 123.1 acres

Woodland Description - This stand consists of mostly small sawlog size trees with some areas containing pole size trees. There are scattered larger trees, especially on the steeper slopes. Primary species present include black oak, hickory, white oak, and honey locust with some walnut, swamp white oak, and cherry. There are also some Kentucky coffeetree at the south end of the stand. Understory contains ironwood, gooseberry, multiflora rose, and honeysuckle. Regeneration consists of hickory, hackberry, elm, and buckeye, with some white oak on the south and west facing slopes.

Management Recommendations - CTR is recommended and would be medium priority.

Evaluate honeysuckle and multiflora rose encroachment in the stand and use appropriate treatments to remove it.

Stand 21: 1.0 acres

Woodland Description - This stand consists of sapling size dogwood, ash, elm, and shingle oak.

Management Recommendations - This stand could be maintained as early successional habitat by periodic cutting.

Stand 22: 14.7 acres

Woodland Description - This stand consists of pole and sapling size elm, honey locust, ash, and shingle oak, with black oak, red oak, and walnut scattered throughout. There are some small sawlog trees along the draws. Understory is honeysuckle, dogwood, and multiflora rose.

Management Recommendations - This stand would benefit from CTR to release the scattered oak and walnut but would be low priority. Evaluate the amount of multiflora rose encroachment and eliminate using proper control.

Stand 23: 17.6 acres

Woodland Description **-** This stand is comprised of pole to sapling size trees with a scattered overstory of low quality sawlog size trees. Primary species present include hickory, elm, and ash, with some walnut, cherry, and mixed oak, including chinkapin oak. Understory consists of dogwood, honeysuckle, coralberry, multiflora rose, and ironwood.

Management Recommendations **-** This stand would benefit from CTR to release the oak and walnut, but would be low priority. Control of honeysuckle and multiflora rose using the appropriate methods for each plant.

Stand 24: 67.4 acres

Woodland Description **-** This stand is comprised of mostly small sawlog to pole size trees with scattered larger trees. Species present consist of hickory, black oak, white oak, and red oak with occasional walnut and cherry. Understory composed of ironwood and gooseberry. Regeneration is mostly hickory and ash.

Management Recommendations **-** This stand would benefit from CTR and would be medium to low priority.

Stand 25: 9.1 acres

Woodland Description **-** This bottomland stand consists of mostly small sawlog size trees with some areas of pole size trees and scattered larger sawlog trees. Species consist mostly of hackberry, hickory, elm, and walnut with occasional red oak. Understory consists of coralberry and multiflora rose with hackberry, elm, and buckeye regeneration.

Management Recommendations **-** This stand would benefit from CTR but would be low priority. Evaluate the amount of multiflora rose encroachment and eliminate using proper control.

Stand 26: 2.1 acres

Woodland Description **-** This stand consists mostly of pole size elm, shingle oak, locust, and cedar with some scattered other mixed oak. Understory is mostly dogwood and honeysuckle, with ash and elm regeneration.

Management Recommendations **-** This stand could be maintained as early successional habitat. Another option is to apply CTR, but it would be low priority. Evaluate the amount of honeysuckle encroachment and eliminate using proper control.

Stand 27: 43.4 acres

Woodland Description **-** This stand is composed of mostly small sawlog with some pole size trees as well as scattered large sawlog trees. Species consist of black oak, red oak, honey locust, sugar maple, and walnut with some white oak, hackberry, and elm. Understory is composed mostly of dogwood and ironwood. Regeneration consists mainly of hackberry, elm, hickory, ash, and sugar maple.

Management Recommendations **-** This stand would benefit from CTR to release the oak and walnut and would be low to medium priority.

Stand 28: 38.9 acres

Woodland Description **-** This stand is similar to stand 27 but without the sugar maple and with slightly more white oak.

Management Recommendations **-** This stand would benefit from CTR to release the oak and walnut and would be medium to low priority.

Stand 29: 252.6 acres

Woodland Description **-** This stand is mostly small sawlog size trees 12 to 16 inches in diameter with scattered larger sawlog size trees. Species consist of white oak, black oak, hickory, and red oak with some walnut scattered throughout. There are some sugar maple at the south part of this stand. Understory is composed of ironwood, prickly ash, and gooseberry with elm, hackberry, and hickory regeneration.

Management Recommendations **-** This stand would benefit from CTR to release the oak and walnut and would be high

to medium priority due to the abundance of high quality white oak.

Stand 29A: 1.7 acres
Woodland Description **-** This area was a food plot but is now in mixed grasses and weeds

Management Recommendations **-** This stand could be maintained as early successional habitat.

Stand 30: 28.0 acres
Woodland Description **-** This stand is mostly small sawlog to pole size red oak, black oak, and hickory with scattered white oak, cherry, and walnut. Understory is composed of ironwood, coralberry, and multiflora rose with hickory, ash, and buckeye regeneration.

Management Recommendations **-** This stand would benefit from CTR and would be medium priority. Evaluate the amount of multiflora rose and eliminate it in the stand using proper controls.

Stand 31: 1.4 acres
Woodland Description **-** This bottomland stand is composed of mostly pole size trees with a scattered overstory of sawlog size trees. Species consist of hackberry, honey locust, elm, and river birch with occasional cherry and walnut. There are some large cottonwood along the drainage. Understory is composed of coralberry and dogwood with ash, elm, and buckeye regeneration.

Management Recommendations **-** Use CTR to release the oak and walnut but would be low priority.

Stand 32: 24.6 acres
Woodland Description **-** This stand contains mostly pole and small sawlog size trees with scattered larger trees. Species consist of red oak, black oak, hickory, and honey locust with some walnut, swamp white oak, white oak, and shingle oak. Understory is mostly ironwood and gooseberry with hickory, ash, elm, and buckeye regeneration.

Management Recommendations **-** This stand would benefit from CTR and would be medium priority.

Stand 33: 9.6 acres
Woodland Description **-** This stand is composed mostly of small sawlog size red oak, black oak, hickory, and locust with some white oak, elm, and cherry. Understory is composed of ironwood, gooseberry, multiflora rose, and some honeysuckle.

Management Recommendations **-** This stand would benefit from CTR and would be medium to low priority. Evaluate the amount of honeysuckle and multiflora rose present and eliminate it using the proper controls.

Stand 34: 14.6 acres
Woodland Description **-** This stand is composed primarily of pole and some small sawlog size black oak, hickory, elm, ash, and red oak, with some white oak, swamp white oak, and walnut. There are some larger cottonwood along the drainage by the road. Understory is composed of gooseberry, dogwood, and ironwood with elm, ash, and hickory regeneration.

Management Recommendations **-** This stand would benefit from CTR and would be low to medium priority.

Stand 35: 1.5 acres
Woodland Description **-** This stand is composed mostly of pole and sapling size cedar, dogwood, and mixed hardwood saplings including elm, ash, shingle oak, locust, and swamp white oak.

Management Recommendations **-** This area could be managed as early successional habitat by periodically cutting the existing stems and allowing them to grow back, or it could be left as is to provide wildlife habitat (deer bedding area).

Stand 36: 10 acres

Woodland Description **-** This stand is composed mostly of small sawlog size black oak, hickory, red oak, ash, and white oak with some cherry. There are scattered larger trees. Understory is composed of ironwood, gooseberry, and multiflora rose with elm, ash, and hickory regeneration.

Management Recommendations **-** This stand would benefit from CTR and would be low to medium priority.

Stand 37: 5.7 acres

Woodland Description **-** This stand is composed mostly of pole and sapling size locust and elm with some cedar and shingle oak. There are some pole and small sawlog size trees along the east edge. Understory is composed primarily of dogwood, honeysuckle, and multiflora rose. There is some ash, elm, and cherry regeneration. Evaluate the amount of multiflora rose encroachment and eliminate using proper control.

Management Recommendations **-** This stand could be maintained as early successional habitat. Another option is to apply CTR, but it would be low priority.

Stand 38: 2.8 acres

Woodland Description **-** This stand is composed mostly of small sawlog and some pole size hickory, black oak, white oak, hackberry, and ash with occasional walnut and cherry. Understory is composed of ironwood, coralberry, and multiflora rose with elm, ash, hickory, and hackberry regeneration.

Management Recommendations **-** This stand should receive CTR to release existing desirable trees from competition.

Priority level is low because of limited number of high quality crop trees. Evaluate the amount of multiflora rose encroachment and eliminate using proper control.

Stand 39: 7.9 acres

Woodland Description **-** This stand is composed mostly of small sawlog size white oak with lesser amounts of red oak, black oak, and hickory, with some scattered walnut and cherry. There are some scattered larger trees, Understory is composed of ironwood and coralberry with elm, ash, and hickory regeneration.

Management Recommendations **-** This stand should receive CTR to release existing desirable trees from competition. Priority is high due to the amount of good quality white oak.

Stand 40: 50.4 acres

Woodland Description **-** This stand is composed mostly of small sawlog size black oak, hickory, ash, and red oak, with lesser amounts of white oak, cherry, walnut, and hackberry. Understory is composed of ironwood, coralberry, and gooseberry with hickory, elm, ash, and hackberry regeneration.

Management Recommendations **-** This stand should receive CTR to release existing desirable trees from competition. Priority would be low to medium.

Stand 41: 2.1 acres

Woodland Description **-** This stand is composed mostly of pole size elm, locust, and ash, with occasional hickory, mixed oak, and walnut. There are some small sawlog size trees. Understory is mostly dogwood.

Management Recommendations **-** This stand could receive TSI in the form of CTR to release existing desirable trees from competition but would be low priority.

Another option is to maintain this area as early successional habitat by periodically cutting the existing stems and allowing them to grow back.

Stand 42: 9.1 acres

Woodland Description **-** This stand is composed mostly of an old clearing that is now mostly pole size red cedar and elm with some other mixed hardwoods and a wide strip along a roadway and field edge that is mostly pole to sapling size locust, elm, cedar and black oak with some small sawlog size trees. Understory is mostly dogwood and multiflora rose.

Management Recommendations **-** The edge of this area could be managed as early successional habitat by periodically cutting the existing stems and allowing them to grow back to create a feathered forest edge, while the larger part of the old clearing could be left as is to provide wildlife habitat (deer bedding area). Evaluate the amount of multiflora rose encroachment and eliminate using proper control.

Stand 43: 4.0 acres

Woodland Description **-** This stand is composed mostly of small sawlog size white oak with some hickory and black oak. There are some pole size trees. Understory is mostly ironwood and gooseberry with ash, hickory, elm, and some buckeye regeneration.

Management Recommendations **-** This stand should receive CTR to release existing desirable trees from competition. Priority level is medium to high.

Stand 44: 6.5 acres

Woodland Description **-** This stand is composed mostly of small sawlog to pole size black oak and hickory with some walnut and red oak and occasional white oak. Understory is mostly ironwood, gooseberry, and coralberry with some dogwood and multiflora rose along the edge. Regeneration is mostly ash and hickory.

Management Recommendations **-** This stand should receive CTR to release existing desirable trees from competition. Priority is low to medium. Evaluate the amount of multiflora rose encroachment and eliminate using proper control.

Stand 45: 1.6 acres

Woodland Description **-** This bottomland area along the road is composed mostly of pole and some sapling size river birch with occasional elm, swamp white oak, and black oak. Understory is ironwood, gooseberry, honeysuckle, and multiflora rose. Regeneration is ash and elm.

Management Recommendations **-** Due to its proximity to the road, this area could be left as early successional. Evaluate the amount of autumn olive and multiflora rose encroachment and eliminate using proper control.

Stand 46: 5.9 acres

Woodland Description **-** This stand is composed mostly of small sawlog size red oak, white oak, hickory, walnut, and black oak with some hackberry, and cherry. There are some larger sawlog trees on the slopes.

Understory is mostly ironwood with ash and hickory regeneration.

Management Recommendations **-** This stand should receive CTR to release existing desirable trees from competition. Priority is medium to low.

Stand 47: 13.4 acres

Woodland Description **-** This wide bottomland stand is composed mostly of small sawlog size locust, river birch, hackberry, elm, and basswood, with occasional oak, walnut, and cherry. There are scattered larger trees.

Understory is relatively open with ironwood, coralberry, and multiflora rose. Regeneration consists of mostly ash and hackberry.

Management Recommendations **-** This stand should receive CTR to release existing desirable trees from competition. Priority is low. Evaluate the amount of multiflora rose encroachment and eliminate using proper control.

Stand 48: 46.0 acres

Woodland Description **-** This stand is composed mostly of small sawlog size trees with some areas of mostly pole size trees and scattered larger trees throughout. Predominant species present are black oak, red oak, hickory and white oak with occasional walnut and cherry. There is basswood on the north facing slopes. Understory is mostly ironwood and gooseberry with hickory and ash regeneration.

Management Recommendations **-** This stand should receive CTR to release existing desirable trees from competition. Priority is medium.

Stand 49: 51.3 acres

Woodland Description **-** This stand is composed mostly of small sawlog size black oak, hickory, red oak, locust, and elm with occasional walnut, white oak, and cherry. There are larger trees scattered throughout and pole size locust and elm along the edges. Understory is mostly ironwood, gooseberry, and coralberry with hickory, ash, and elm regeneration.

Management Recommendations **-** This stand should receive CTR to release existing desirable trees from competition. If larger competing trees are to be removed for CTR, consider girdling and leaving them for increased wildlife value. Priority is low to medium.

Stand 50: 35.3 acres

Woodland Description **-** This stand is composed mostly of small sawlog size trees 10-16 inches in diameter with scattered larger trees. White oak is the main component with lesser amounts of black oak, red oak, and hickory. There is pole size locust, elm, ash, and dogwood along the edges. Understory is mostly ironwood and coralberry with ash and hickory regeneration.

Management Recommendations **-** This stand should receive CTR to release existing desirable trees from competition. Priority is high to medium.

Stand 51: 6.6 acres

Woodland Description **-** This stand is composed mostly of pole size black oak, ash, hickory, elm, locust, and hackberry with some walnut and occasional white oak and cherry. Understory is mostly coralberry and some dogwood with hackberry and elm regeneration.

Management Recommendations **-** This stand would benefit from CTR to release existing desirable trees from competition. Priority is low.

Stand 52: 2.0 acres

Woodland Description **-** This old field is mostly mixed grasses and dogwood with sapling size ash, elm, and mixed oak.

Management Recommendations **-** This area could be managed as early successional habitat by periodically cutting the existing stems and allowing them to grow back.

Fox Hills Summary of Stands

Stand #	Acres	Timber Type	Tree Size	Prescription	Priority
1	19.8	W. oak, r. oak, hic	Sm. saw	CTR	low
2	17.7	W. oak, hic, some r. oak. walnut, cherry	Sm. saw	CTR	med
3	21.4	W. oak, some r. oak, bl. Oak	Lg. saw	SPNR, Shelterwood	med
4	41.0	Bl. Oak, hic, elm, some r. oak, w. oak	Sm. saw	CTR	low-med
5	13.5	Hackberry, hic, walnut, elm	Sm. Saw	CTR	low
6	2.6	Cottonwood, maple, river birch	Sm.- lg. saw	CTR	low
7	16.8	Bl. Oak, r. oak, hic, w. oak, some cherry, wal.	Sm. saw	CTR	med

Stand #	Acres	Timber Type	Tree Size	Prescription	Priority
8	3.1	Red pine	Sm. saw	CTR	low
9	3.6	W. oak, r. oak, hic	Lg. saw	SPNR, harvest	med
10	45.0	W. oak, bl. oak, hic, r. oak, some cherry, wal.	Sm. Saw	CTR	med
11	4.3	Dogwood, honeysuckle, mixed hdwds.	Sapling	Early successional	low
12	11.5	Hic, sugar maple, mixed oak	Pole- sm. saw	CTR	low
13	42.7	Bl. Oak, r. oak, hic, w. oak some walnut	Sm. Saw	CTR	med
14	2.9	Hic, basswood, ironwood	Sapling-pole	Early successional	low
15	3.6	Hic, elm, cherry, ash, some mixed oak	Pole	CTR	low
16	22.3	Bl. oak, hic, r. oak, some walnut	Sm. saw	CTR	med-low
17	69.0	W. oak, bl. Oak, hic, r. oak, some walnut	Sm. saw	CTR	high-med
18	5.9	Bl. Oak, w. oak, hic	Pole	CTR	med
19	24.3	Locust, walnut, elm, shingle oak	Pole - sm. saw	CTR	low-med
20	123.1	Bl. Oak, hic, some walnut, W. oak, cherry	Sm. saw	CTR	med
21	1.0	Dogwood, ash, elm, shingle oak	Sapling	Early successional	low
22	14.7	Elm, locust, ash, dogwood, some oak, walnut	Pole-sapling	Early successional, CTR	low
23	17.6	Locust, elm, hic, some walnut, oak, cherry	Pole	CTR	low
24	67.4	Hic, bl. oak, w. oak, r. oak, occasional walnut	Sm. Saw	CTR	low-med
25	9.1	Hackberry, hic, walnut, occasional oak	Sm. Saw	CTR	low
26	2.1	Elm, shingle oak, cedar, some mixed oak	Pole	CTR, early successional	low
27	43.4	Bl. Oak, r. oak, hic, sugar maple, some w. oak	Sm. Saw	CTR	low-med
28	38.9	Bl. Oak, r. oak, hic, some walnut, w. oak	Sm. Saw	CTR	med-low
29	252.6	W. oak, bl. Oak, hic, r. oak, some walnut	Sm. Saw	CTR	High-med
29A	1.7	Old food plot, mixed grasses		Early successional	Low
30	28.0	Red oak, bl. Oak, hic,	Sm. Saw-pole	CTR	Low-med
31	1.4	Hackberry, river birch, elm, some walnut	Pole-sm. Saw	Early Successional	low
32	24.6	Red oak, Bl. Oak, Hic, some white oak, walnut	Sm. Saw-pole	CTR	Med
33	9.6	Red oak, bl. Oak, hic, locust, some white oak	Sm. Saw	CTR	Med-low
34	14.6	Bl. oak, hic, elm, some red oak, walnut	Pole-sm. Saw	CTR	Low-med
35	1.5	Cedar, dogwood, mixed hardwoods	Pole-sapling	Early successional	low
36	10.0	Bl. oak, hic, red oak, white oak, ash	Sm. Saw-pole	CTR	Low-med
37	5.7	Locust, elm, cedar, dogwood	Pole-sapling	Early successional	low
38	2.8	Hickory, bl. oak, white oak, ash, hackberry	Sm. Saw-pole	CTR	low
39	7.9	White oak, red oak, bl. oak, hic	Sm. Saw	CTR	High-med
40	50.4	Bl. oak, hic, ash, some white oak, walnut	Sm. Saw	CTR	Low-med
41	2.1	Elm, locust, ash, some hic, walnut, mixed oak	pole	CTR	Low
42	9.1	Cedar, elm, ash, dogwood, bl. Oak	Pole-sapling	Early successional	low
43	4.0	White oak, some bl. oak, hickory	Sm. Saw-pole	CTR	Med-high
44	6.5	Bl. oak, hic, some walnut	Pole-sm. Saw	CTR	Low-med
45	1.6	River birch, some bl. oak, swamp white oak	Pole	Viewshed	low
46	5.9	Red oak, white oak, bl. oak, hic, hackberry	Sm. Saw	CTR	Med-low
47	13.4	River birch, hackberry, locust, elm, some wal	Sm. Saw	CTR	low
48	46.0	Red oak, bl. oak, hic, white oak some walnut	Sm. saw	CTR	med

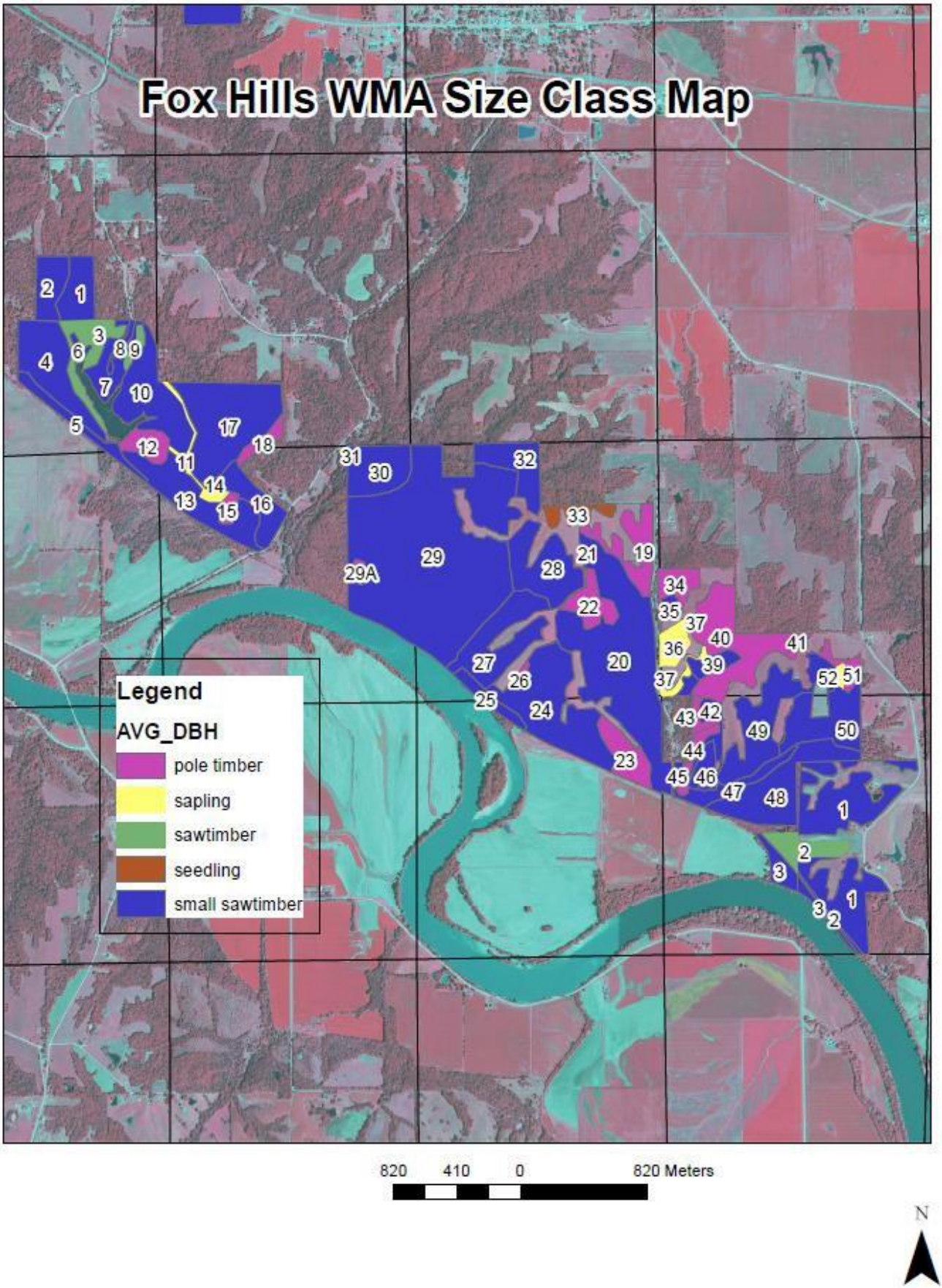
Stand #	Acres	Timber Type	Tree Size	Prescription	Priority
49	51.3	Bl. oak, hic, red oak, locust some white oak	Sm. Saw	CTR	Low-med
50	35.3	White oak, some bl. oak, red oak, hic	Sm. saw	CTR	Hi-med
51	6.6	Bl. Oak, ash, hic., walnut, locust	Pole	CTR	low
52	2.0	Mixed oak, ash	sapling	Early successional	low

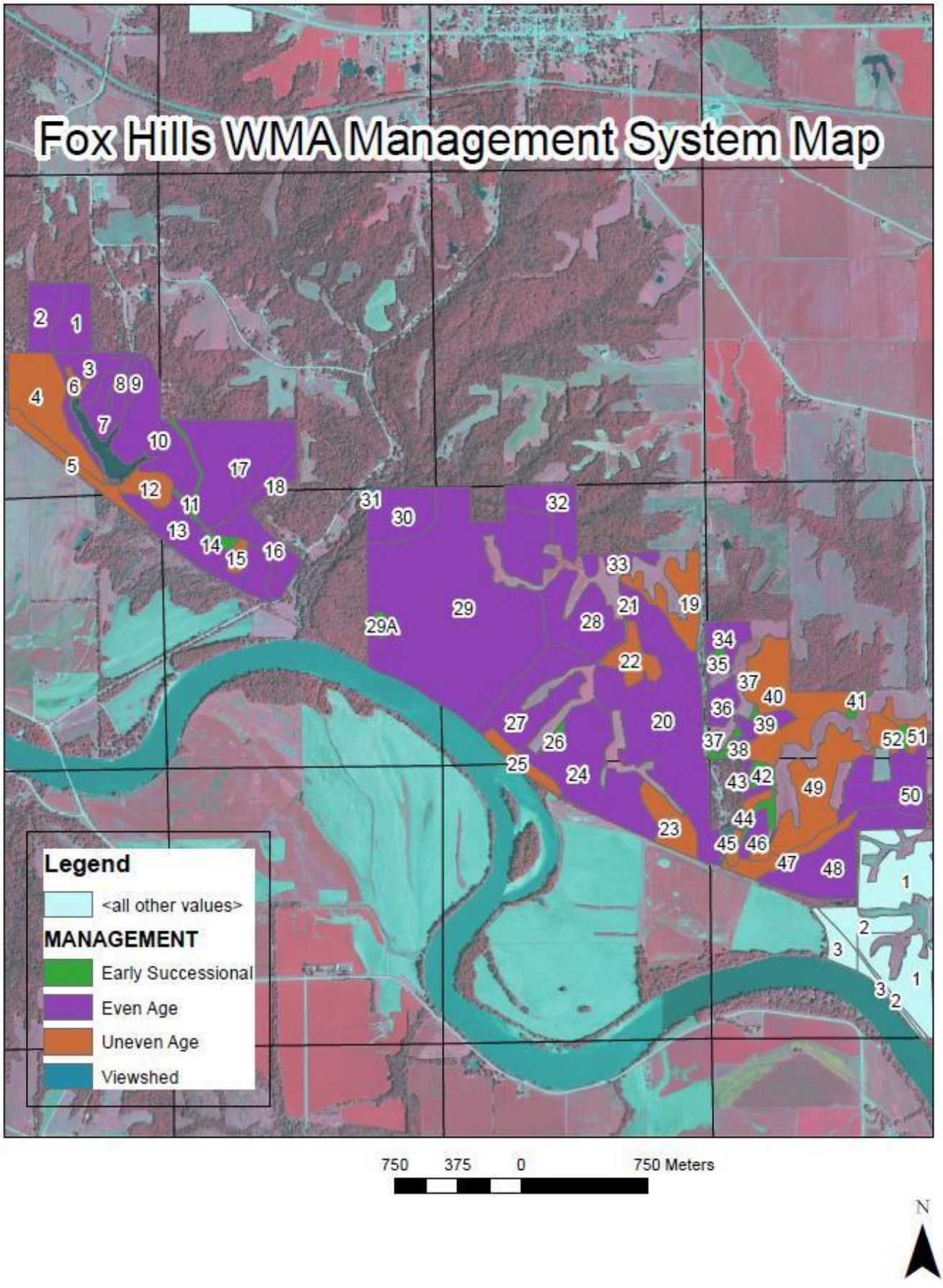
Fox Hills WMA High Priority Projects

Stand #	Acres	Prescription
17	69.0	CTR
29	253.5	CTR
39	7.9	CTR
43	4.0	CTR
50	35.2	CTR

Stands with Invasive Species Present

Stand	Autumn Olive	Honeysuckle	Multiflora Rose
2		X	
3		X	
4	X	X	
5		X	
7	X	X	X
8		X	
9		X	
10		X	
11	X	X	
12		X	
15		X	
16		X	
19		X	X
20		X	X
22		X	X
23		X	
25			X
26		X	
30			X
33		X	X
36			X
37		X	X
38			X
42			X
44			X
45		X	X
47			X


Fox Hills WMA Size Class Map
Legend
AVG_DBH
pole timber
sapling
sawtimber
seedling
small sawtimber
820 410 0 820 Meters
N


Fox Hills WMA Management System Map
Legend
<all other values>
MANAGEMENT
Early Successional
Even Age
Uneven Age
Viewshed
750 375 0 750 Meters
N

Species of Greatest Conservation Need

Table 1. Forest Birds of Greatest Conservation Need Potentially Breeding in Fox Hills Drainage

Common Name	Scientific Name
Bald Eagle	*Haliaeetus leucocephalus*
American Kestrel	*Falco sparverius*
Northern Bobwhite Quail	*Colinus virginianus*
Red-shouldered hawk	*Buteo lineatus*
Broad-winged hawk	*Buteo platypterus*
American woodcock	*Scolopax minor*
Black-billed cuckoo	*Coccyzus erythropthalmus*
Yellow-billed cuckoo	*Coccyzus americanus*
Eastern screech-owl	*Megascops asio*
Long-eared owl	*Asio otus*
Chuck-will's widow	*Caprimulgus carolinensis*
Whip-poor-will	*Caprimulgus vociferous*
Chimney swift	*Chaetura pelagica*
Belted kingfisher	*Megaceryle alcyon*
Red-headed woodpecker	*Melanerpes erythrocephalus*
Northern Flicker	*Colaptes auratus*
Eastern wood-pewee	*Contopus virens*
Acadian flycatcher	*Empidonax virescens*
Eastern kingbird	*Tyrannus tyrannus*
Bell's vireo	*Vireo bellii*
Purple martin	*Progne subis*
Bewick's wren	*Thryomanes bewickii*
Veery	*Catharus fuscescens*
Wood thrush	*Hylocichla mustelina*
Brown thrasher	*Toxostoma rufum*
Bohemian Waxwing	*Bombycilla garrulus*
Blue-winged warbler	*Vermivora pinus*
Chestnut-sided warbler	*Dendroica pensylvanica*
Cerulean warbler	*Dendroica cerulea*
Black-and-white warbler	*Mniotilta varia*
Prothonotary warbler	*Protonotaria citrea*
Worm-eating warbler	*Helmitheros vermivorus*
Kentucky warbler	*Oporornis formosus*
Common yellowthroat	*Geothlypis trichas*
Baltimore oriole	*Icterus galbula*

Table 2. Potential Forest Migrant Birds of Greatest Conservation Need in Fox Hills WMA Drainage

Common Name	Scientific Name
Golden-winged warbler	*Vermivora chrysoptera*
Canada warbler	*Wilsonia canadensis*
Bay-breasted warbler	*Dendroica castanea*
Olive-sided flycatcher	*Contopus cooperi*
American tree sparrow	*Spizella arborea*
Harris's sparrow	*Zonotrichia querula*
White-winged crossbill	*Acanthis flammea*

Table 3. Potential Forest and Forest Edge Mammals of Greatest Conservation Need in Fox Hills WMA Drainage

Common Name	Scientific Name
Short-tailed Shrew	*Sorex haydeni*
Least Shrew	*Cryptotis parva*
Evening Bat	*Nycticeius humeralis*
Indiana Bat	*Myotis sodalist*
Northern Myotis (Northern Long-eared bat)	*Myotis septentrionalis*
Silver-haired Bat	*Lasionycteris noctivagans*
Tri-colored Bat	*Perimyotis subflavus*
Southern Flying Squirrel	*Glaucomys volans*
Southern Bog Lemming	*Synaptomys cooperi*
Woodland Vole	*Microtus pinetorum*
Gray Fox	*Urocyon cinereoargenteus*

Table 4. Potential Forest and Forest Edge Reptiles and Amphibians of Greatest Conservation Need in Fox Hills WMA Drainage

Common Name	Scientific Name
Smallmouth Salamander	*Ambystoma texanum*
Crawfish Frog	*Rana areolata*
Blanchard's Cricket Frog	*Acris crepitans*
Slender Glass Lizard	*Ophisaurus attenuatus*
Smooth Earth Snake	*Virginia valeriae*
Western Worm Snake	*Carphophis amoenus*
Prairie Kingsnake	*Lampropeltis calligaster*
Speckled Kingsnake	*Lampropeltis getulus*
Bullsnake	*Pituophis catenifer sayi*
Timber Rattlesnake	*Crotalus horridus*
Eastern Hognose Snake	*Heterodon platirhinos*

Table 5. Potential Forest and Forest Edge Butterflies of Greatest Conservation Need in Fox Hills WMA Drainage

Common Name	Scientific Name
Pipevine Swallowtail	*Battus philenor*
Columbine Dustwing	*Erynnis lucilius*
Juvenal's Duskywing	*Erynnis juvenalis*
Sleepy Duskywing	*Erynnis brizo*

Common Name	Scientific Name
Zebra Swallowtail	*Eurytides marcellus*
Silvery Blue	*Glaucopsyche lygdamus*
Edward's Hairstreak	*Satyrium edwardsii*
Striped Hairstreak	*Satyrium liparops*
White M Hairstreak	*Parrhasius m-album*
Hayhurst's Scallopwing	*Staphylus hayhurstii*
Compton Tortiseshell	*Nymphalis vaualbum(l-album)*

Endangered Species Considerations Section

While habitat management activities are intended to have an overall conservation benefit for a variety of wildlife through habitat improvement, at times these activities may have unintended consequences for some species. For this reason, prior to implementation, forest management activities described here will be reviewed internally to assess potential impacts to both state and federal species of concern. Site records from the DNR's Natural Areas Inventory Program (NAI) and access to the online database are provided to management biologists for use in project activity planning. When protected species are known to occur in the management area or if suitable habitat for these species is present, management biologists implement conservation measures as described in the Operation & Maintenance Plan for Wildlife Management Areas in the State along with recommendations from NAI staff. Management activities are not initiated until this review has been completed and T/E comments/concerns have been addressed.

Although comprehensive surveys for threatened and endangered plants and animals have not been completed for the Fox Hills WMA to date, numerous state- and federally-protected species are known to occur or may occur in Van Buren County and may be present in the WMA in areas of suitable habitat if present including several species of federally-protected bats. In areas of suitable habitat, conservation measures are implemented to avoid and minimize the potential for impacts.

Guidelines for Protecting Indiana Bat Summer Habitat

Indiana bats have been documented in Wapello County. These guidelines were prepared to provide information about the Indiana bat and its summer habitat requirements in Iowa and to prevent inadvertent harm to the species through various human activities. This update of the guidelines is in response to changes in the US Fish and Wildlife Service requirements for protecting this endangered species. The changes include:

- No cut dates changed to April 1 through September 30
- Updated US Fish and Wildlife Service guidelines for mist net surveys

The Indiana bat is a federal (50CFR Part 17) and state (Code of Iowa, Chapter 481B) endangered species that occurs in southern Iowa from April through September.

Female Indiana bats *(Myotis sodalis)* have their young beneath loose or peeling tree bark. Most nursery colonies have been found on the trunk or large branches beneath the bark of standing dead trees. The nursery colonies are located along streams and rivers or in upland forest areas.

Trees that retain sheets or plates of bark that provide space beneath the bark when dead, such as red oak, post oak, and cottonwood, are potential roost trees. Live trees such as shagbark and shellbark hickory are also occasionally used as roosts.

Indiana bats have also been captured on the edge of urban areas. It is likely that the bats would use areas on the edge of urban areas only if there is suitable habitat such as a greenbelt or a large park with a natural forest component. This would exclude city parks that are maintained as mowed areas.

In Iowa, records for the Indiana bat have occurred in areas of 10% or greater forest cover and near permanent water. Trees with slabs or plates of loose bark are considered suitable as summer roosts.

Suitable summer habitat in Iowa is considered to have the following within a one-half or one mile radius of a location:

- Forest cover of 10% or greater within one-half mile.
- Permanent water within one-half mile.
- The potential roost trees ranked as moderate or high for peeling or loose bark within one mile.

Do not cut down potential roost trees between April 1 and September 30. Such trees can be left standing live or dead, during that time period.

Special Note on Northern Long-eared Bat

The Northern Long-eared Bat (NLEB) is also protected under the ESA and is known to occur in Van Buren County. The FWS has published a proposed rule to reclassify the northern long-eared bat (NLEB) as endangered under the ESA. If the proposal is accepted, the FWS will finalize a rule by the end of November 2022. Management guidelines described for the Indiana bat are also protective of the Northern Long Eared Bat (NLEB). In areas of suitable habitat, current guidelines allow for tree removal activities between Sept. 30th and April 1st, and woodland burns outside of the maternity and nesting season (Sept. 30th - April 1st). To further protect habitat for NLEB, tree removal should not occur within 0.25 miles of a known hibernaculum and no trees within a 150-foot radius of a known occupied maternity roost tree may be cut nor destroyed during the pup season (June 1 through July 31). Please contact the FWS or DNR Endangered Species Coordinator for updated information pertaining to the NLEB and other at-risk bat species.