FOREST WILDLIFE STEWARDSHIP PLAN

TURKEY RIVER
WILDLIFE MANAGEMENT AREA

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

07/15/2024

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Forest Wildlife Stewardship Plan
for
Turkey River
Wildlife Management Area

MANAGER: Wildlife Biologist
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3501 Highlandville Rd,
Decorah, IA 52101
563-379-5725

LOCATION: T 99N R 11W Sec 36, T 98N R11W sec. 1 & 2, Howard County
TOTAL ACRES: 410
TOTAL FORESTED ACRES: 219.4

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 410,000 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 lower quality 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 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-dominant 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.

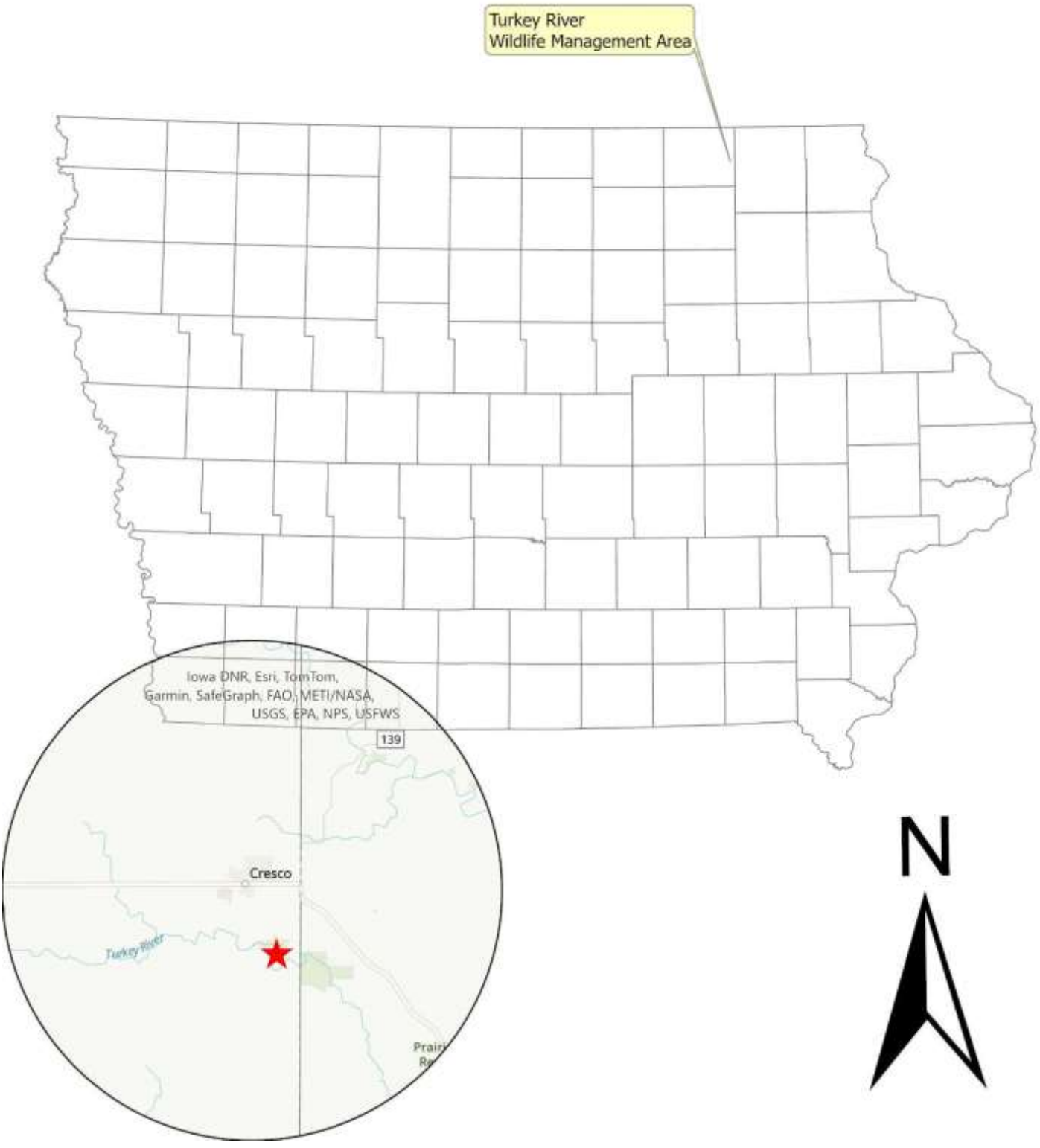
The Wildlife Bureau manages forests for the greatest diversity of forest wildlife. The FWSP will be the guiding document that prioritizes management activities to meet the needs of forest wildlife species. The DNR's comprehensive Iowa Wildlife Action Plan identifies wildlife "species of greatest conservation 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

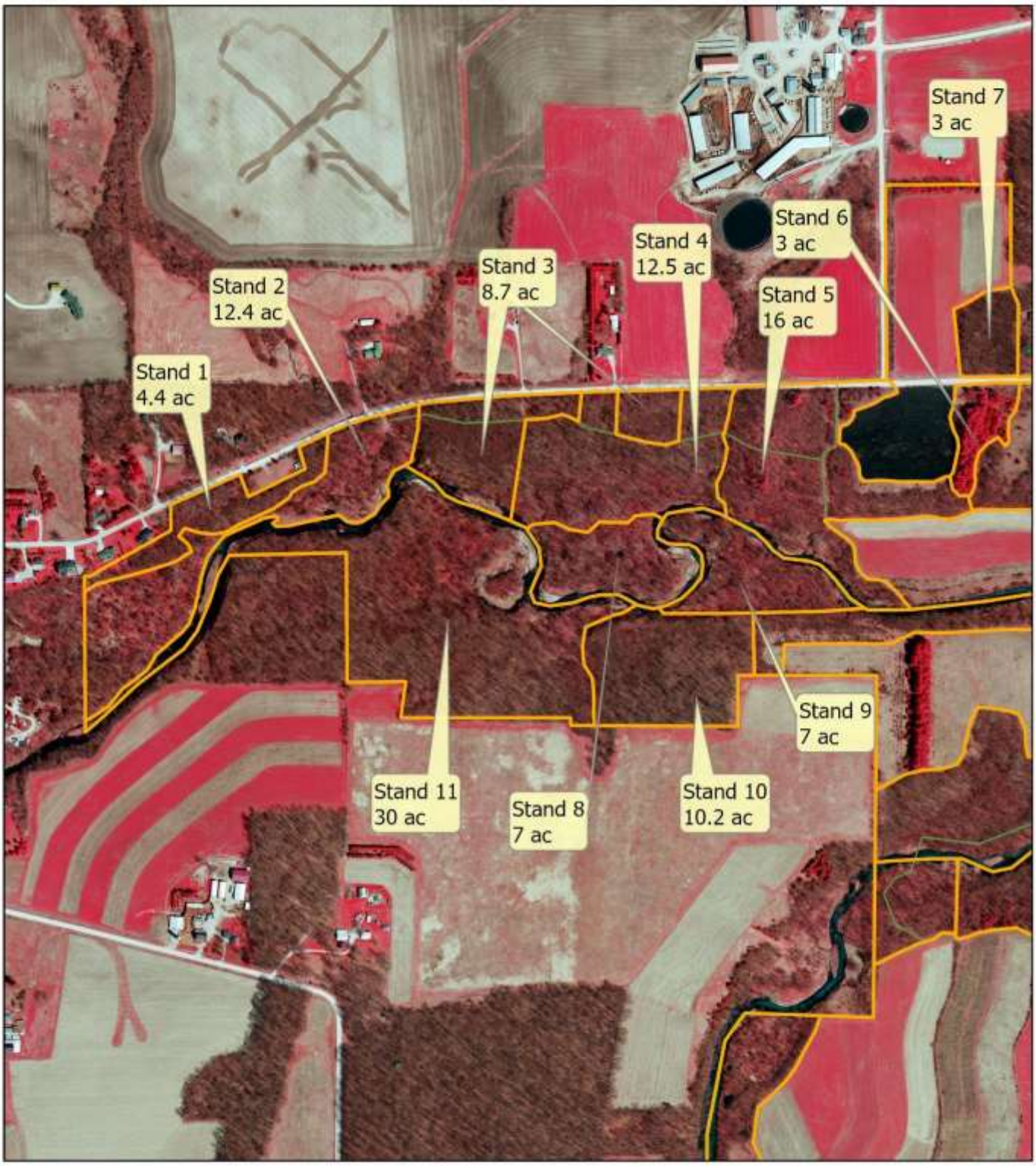
Turkey River Wildlife Management Area (WMA) is located along the Turkey River approximately 1.5 miles southeast of Cresco, IA. This area is a popular fishing, deer and turkey hunting destination. The Turkey River WMA is located on the very Western edge of the geographic region known as the *Driftless Area (Paleozoic Plateau)*, which is characterized by karst topography that features steep bluffs and ravines, rocky outcrops, sinkholes, springs and cold-water streams. Much of the area features this steep, rocky terrain.

The 219.4 forested acres addressed in this plan are divided into 21 different stands. These 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.

Landscape Position



Turkey River
Wildlife Management Area



Howard Co.
T-98N R-11W
Sec 1 & 2

0 0.1 0.2 0.4 Miles

N

Turkey River
Wildlife Management Area

Howard Co.
T-98N R-11W
Sec 1 & 2

0 0.1 0.2 0.4 Miles

N

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 areas. 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 and wildlife communities occurring in these areas.

Management of forested wildlife areas is a cooperative effort between the wildlife unit and foresters. All of the forested land on the WMA is visited and evaluated 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 goals and objectives determined by the biologist, while utilizing strategic and sound forest management practices.

Forest Management Objectives

The primary objectives for the wildlife area are as follows:

- Create and maintain high quality forest habitats for the benefit of diverse wildlife populations
  - Promote structural diversity
  - Increase mast production
  - Protect species of greatest conservation need
  - Improve water quality and associated aquatic ecosystems
- Sustainably manage for a high quality, healthy forest
  - Increase stocking percentage of oak
  - Create a diversity of age classes
  - Enhance species diversity
  - Maintain a native herbaceous layer
- Promote quality outdoor recreational opportunities

Funding for forest management administration and procurement, as well as a portion of the land acquisition costs of the WMAs 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 (SGCN). 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 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 when 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 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 moths and butterflies, with oaks supporting a higher diversity and richness of caterpillars than any other native tree family. Pollinators also benefit from the overwintering habitat provided by the oak. Because of 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. Oak trees use a specific strategy to regenerate that requires full sunlight. This is why 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 natural disturbances that occurred on the landscape historically such as forest fires 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.

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 quaking aspen will reach biological maturity decades 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 of them 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.

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 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.

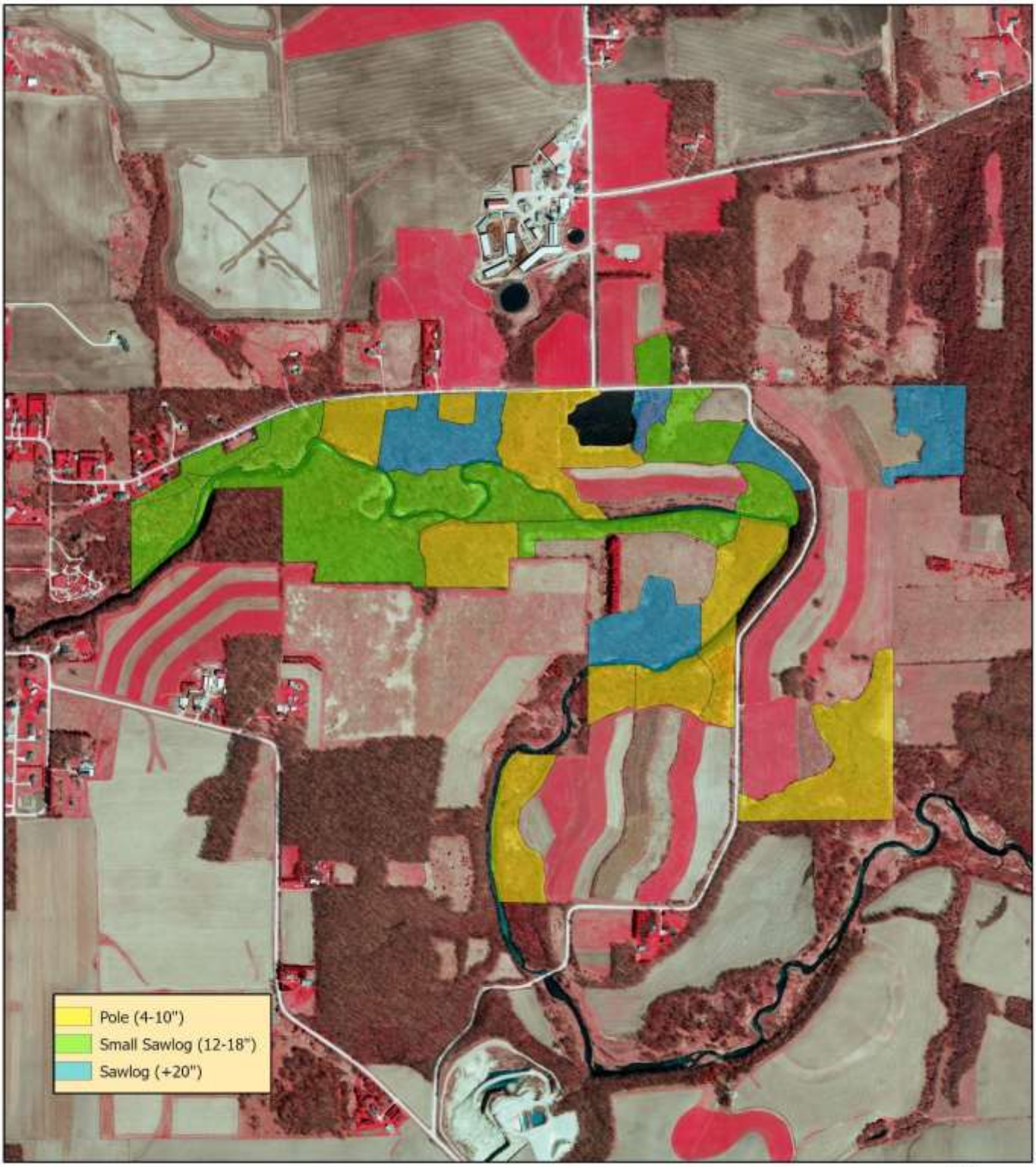
Sustainable forestry aims to manage a forest for maximum distribution of age and size classes and gives an indication of the amount of acreage or volume that can be harvested from a given geographical area periodically, without ever running out of volume or growing stock. Generally speaking, with even-aged 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 actual practice, these figures will fluctuate over and under the allowable harvest periodically.

Stands managed under an uneven-aged system have no rotation age because regeneration in these systems is ever-present and different age classes occur within the same stand. Sustainable harvest volume is estimated by calculating the growth in volume over a period of time, generally 20 years.

Current Distribution of Tree Size on Turkey River WMA
***dbh = diameter at breast height**

Tree Size	Forested Acres	% of Total Area
Sapling (<4” dbh)	0	0%
Pole (4-10” dbh.)	90.6	41%
Small Sawlog (12-18” dbh.)	85	39%
Sawlog (>20” dbh)	43.8	20%
Totals	219.4	100%

Turkey River WMA
Diameter Distribution



Howard Co.
T-98N R-11W
Sec 1 & 2

0 0.17 0.35 0.7 Miles

N

Proposed Management Systems for the Area

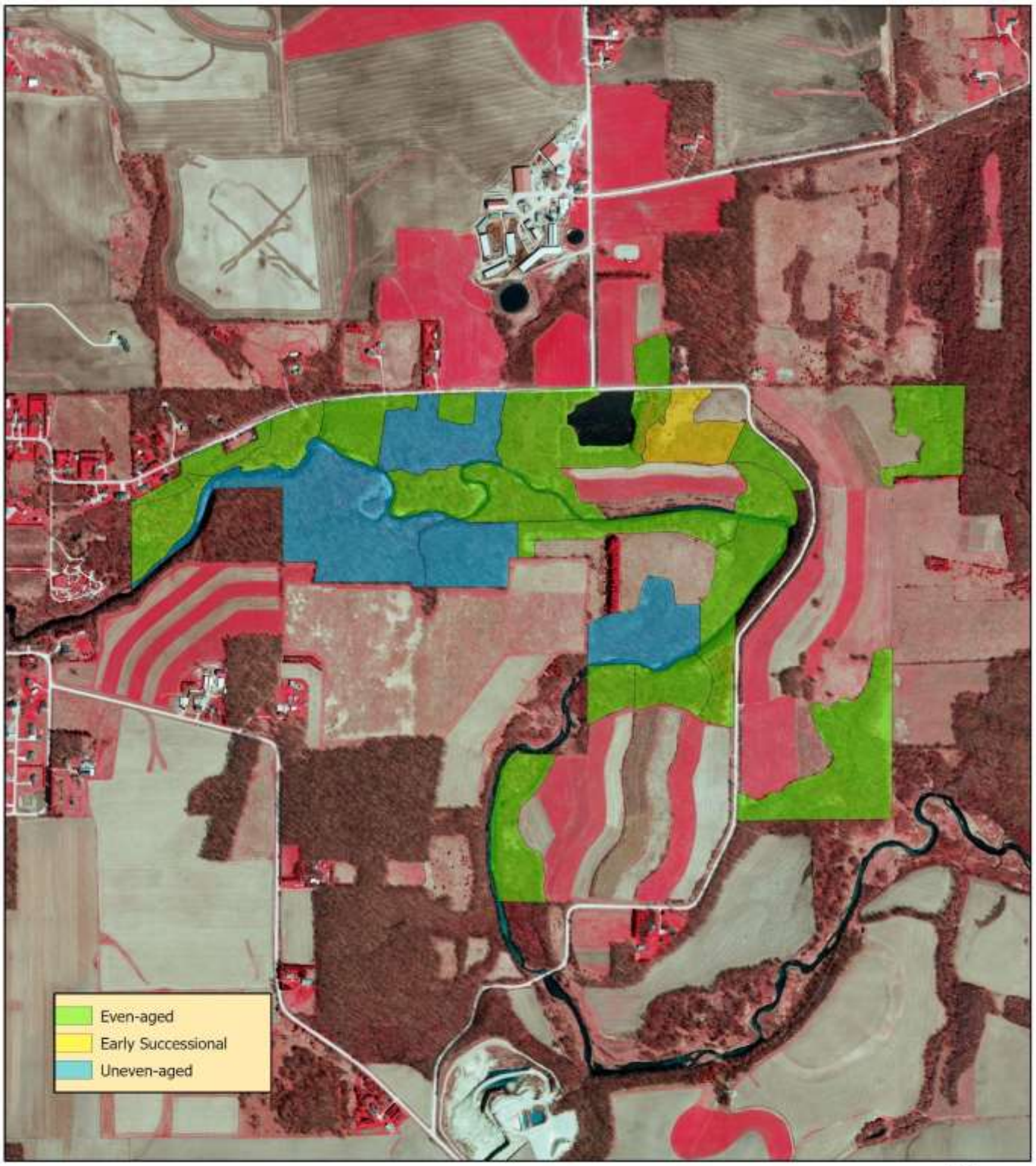
Recommendations for each stand were based on whether the area will be managed to create early successional growth, an even-aged system, an uneven-aged system, or viewshed. The decision on which management system would be used was based on the objectives for the area to create a certain structural cover, 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 Turkey River WMA, the acres under each management system are as follows:

Forest Management Systems

Management System	Acres	% of Total Area
Early Successional	8.2	4%
Even-aged	146.5	66%
Uneven-aged	64.7	30%
Viewshed	0	0%
Total	219.4	100%

Turkey River WMA
Management Systems



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0 0.17 0.35 0.7 Miles

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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. These areas also support flowering plants and pollinators and are suitable foraging habitat for many of Iowa's bat species. One way that this habitat can be created is by cutting a stand and allowing all of the desirable species to re-sprout. Many tree and shrub species stump sprout vigorously after being cut, especially when cut at a younger stand age.

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.

Turkey River WMA has 8 acres (4% of all forested acres) that will be managed as Early Successional Management.

Even-Aged Management
Even-aged management is essential for wildlife species depending 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 and by bats. 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 nesting 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 and the tricolored bat (proposed endangered) 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 stands 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. 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. Snags and large wolf trees nearing the end of their lifespan should be left standing to provide cavity opportunities in the new stand, which would otherwise take decades to create through regeneration.

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 hard maple. 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, at which point it becomes less desirable by wildlife.

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, bitternut hickory, and ironwood. Fire will expose mineral soil and open up the ground to sunlight. These conditions favor the natural regeneration of oak. Oak seedlings will tolerate light fires. The top will be killed by the fire, but the deep root systems survive and sprout. Fire will be utilized on a limited scale to encourage oak regeneration in oak stands. Once an adequate number of oak seedlings are present, the overstory 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 numbers and roughly every five years throughout the even-aged stands. Though fire should be rotated through the stands, so fire-free refuge areas remain for wildlife each year.

Turkey River WMA has 143.6 acres (66% of all woodland acres) that will be managed as even-aged forest to regenerate oak (120-year rotation). Applying sustainable forestry guidelines, approximately 12 acres could be clearcut every 10 years.

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, as single trees or in small groups. Because uneven-aged stands always have large trees present, this system favors species that will grow in shade such as sugar maple and basswood.

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

Uneven-aged management areas will provide continuous tracts of forest with minimal disturbance. Large tracts of uneven-aged management will provide necessary habitat for nesting Neotropical migratory bird species such as eastern wood-pewee, Acadian flycatcher, wood thrush, cerulean warbler, worm-eating warbler, Kentucky warbler, and for migrant Neotropical migratory species such as golden-winged warbler, bay-breasted warbler, and Canada warbler. Area-sensitive species like Red-shouldered Hawk and Pileated Woodpecker will also benefit from this strategy. Selective harvesting will create small openings in the canopy, which will increase ground cover, and enhance stand structure. Den trees will be left to provide cavities for wildlife such as woodpeckers, bats, raccoons and squirrels. Retaining live loose bark tree species (e.g., shagbark hickory) whenever possible and 6-10 snags per acre of varying DBH benefits bats and other wildlife. Timber stand improvement and selective harvesting, along with allowing some natural tree mortality, will

create woody debris on the forest floor that will serve as important habitat for reptiles, amphibians and small mammals along the riparian corridor.

Turkey River WMA has 64.7 acres (30% of all forest acres) that will be managed as uneven-aged forest.Applying sustainable forestry guidelines, a selective harvest prescription (single tree or group selection) can be applied to approximately 16 acres every 5 years. Selective harvests may be used in this area (in conjunction with other management practices) as an important step in the process of creating more species diversity in the forest stand.

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. Managers will monitor these stands and may choose to implement these practices when they integrate with management of surrounding stands or when degradation threatens the entire stand or surrounding areas.

Viewshed management is an important component of the overall forest management in many localized areas in Iowa. Some landform regions, such as the Paleozoic Plateau, experience a greater need for this system of management than do other regions. Like uneven-aged forest management, viewshed areas provide an important core area of relatively stable natural habitat. Many birds, bats, and insects benefit greatly from the areas designated as viewshed.

Turkey River WMA has 0 acres that will be managed as viewshed.

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 common soil types found in this forest management plan are Kenyon-Floyd-Clyde Series. The area also contains many other different types of soil.

These soils developed on a nearly level to gently sloping erosional surface from a two-storied parent material. Original vegetation was dominantly prairie grasses with some scattered trees. *Kenyon* soils are moderately well drained and occur on the convex ridges in the upland. *Floyd* soils are somewhat poorly drained and occur on gently sloping concave lower slopes and upper ends of drainageways. *Clyde* soils are poorly drained and occur mainly in the upper drainageways. A variety of other soils occur in the area, including soils shallow to sands and gravels and alluvial soils associated with the streams. Major management problems are erosion control, some wetness on Kenyon, and drainage on Clyde and Floyd soils.

In order to limit soil erosion from management activities, best management practices within streamside management zones will be used. This will include restricting equipment within the riparian area, location of log landings, and limiting soil exposure.

Work Plan for Turkey River WMA

This is the “working plan” for the Turkey River WMA 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, the forest management activities described here will be reviewed internally to determine potential impacts to both state and federal threatened or endangered species. Project descriptions accompanied by aerial photos will be provided to the Natural Areas Inventory Program staff for T/E review and comment. Management

activities will not be initiated until this review has been completed and all T/E comments/concerns have been addressed.

Stand	Acres	Overstory	Intermediate/ Understory	Size Class	Management System	Prescription	Priority	Year	Stand Comments
1	4.4	Basswood, bur oak, aspen	Ironwood, buckthorn, honey locust, native shrubs	Small Sawlog	Even-aged	Invasive species control, promote native shrubs	Low	2030	Intermediate treatment isn't greatly needed
2	12.4	Boxelder, hackberry, walnut, bur oak	Buckthorn, honeysuckle, native shrubs	Small Sawlog	Even-aged	Invasive species control, promote native shrubs	Low	2030	Low BA
3	8.7	Basswood, cherry, bur oak, black oak, walnut		Pole	Even-aged	Crop Tree Release	High	2025	
4	12.5	Red oak, bur oak, sugar maple	Sugar maple	Sawlog	Uneven-aged	Selective harvest	Med	2028	
5	16	Boxelder, walnut, some oak	Honeysuckle	Pole	Even-aged	Stand conversion	Med	2026	Honeysuckle is a major issue. Stand conversion.
6	6	White pine		Sawlog	Even-aged	BA reduction	Low	2034	
7		White oak, elm, basswood, sugar maple		Small Sawlog	Even-aged	Weed Tree Removal	Low	2032	
8	7	Walnut, hackberry, sugar maple, cottonwood	Sugar maple	Small Sawlog	Even-aged	Weed Tree Removal	Med	2027	Remove maple and hackberry for walnut regen
9	7	Silver maple, boxelder, hackberry, walnut	Reed canary grass	Small Sawlog	Even-aged	Release scattered desirable trees	Med	2027	Low desirable TPA
10	10.2	Sugar maple, bitternut, big tooth aspen, walnut		Pole	Uneven-aged	Release maple and other desirable hardwoods from competition	Low	2028	
11	30	Sugar maple, basswood, red oak, walnut, cherry	Sugar maple, ironwood	Small Sawlog	Uneven-aged	Release any oak, walnut, cherry within the stand	High	2026	The stand will remain dominated by maple, but maintain other desirable hardwoods
12	8.2	Quaking aspen, walnut, red oak, elm, hackberry	honeysuckle	Small Sawlog	Early Successional	Encourage aspen in open field	High	2027	Merchantable oak & walnut
13	3.3	Bur, red, white oak, walnut	Ironwood, boxelder, hackberry, native shrubs, honeysuckle	Sawlog	Even-aged	Weed Tree Removal	Med	2029	Promote desirable regeneration

14	4.7	Hackberry, boxelder		Small Sawlog	Even-aged	Weed Tree Removal - Plant seedlings	Low	2031	
15	9.6	Red oak, walnut		Pole	Even-aged	Crop Tree Release	High	2025	
16	4.5	Scots pine, white pine, walnut, ash		Pole	Even-aged	Allow the scots & ash to self thin the stand	Low	2034	
17	5.8	Black locust, some walnut, oak, sugar maple		Pole	Even-aged	Weed Tree Removal	Med	2034	This would remove almost all the trees. Stand conversion
18	14.6	Walnut, hackberry, rock elm, box elder, bur oak		Pole	Even-aged	Crop Tree Release - emphasis rock elm	Med	2027	BA is fairly low
19	21.2	Black locust, sugar maple, walnut, red, white oak, elm, boxelder		Pole	Even-aged	Eliminate black locust	Med	2028	Black locust is going to plague any management in this stand unless removed.
20	10	Red oak, bur oak	Ironwood, bitternut, maple	Sawlog	Even-aged	Weed Tree Removal	High	2026	West side of the stream could use supplemental planting
21	8.4	Bur oak, walnut, bitternut, siberian elm	Ironwood, honeysuckle	Small Sawlog	Even-aged	Invasive species control	Low	2029	
22	12	Walnut, hackberry, sugar maple, bur oak, red oak	Hackberry, sugar maple, bitternut	Sawlog	Uneven-aged	Weed Tree Removal	Med	2028	Try to establish regen, soils are highly erodible

Threatened and Endangered Species

Mammals:

Common Name	Scientific Name	State Status	Federal Status
Northern long-eared bat	Myotis septentrionalis		E
Tricolored bat	Perimyotis subflavus		PE

Plants:

Common Name	Scientific Name	State Status	Federal Status
Glade Mallow	Napaea dioica	Species of Concern	
Fragile Fern	Cytopteris fragilis		
Puttyroot	Aplectrum hyemale		

Mussels:

Common Name	Scientific Name	State Status	Federal Status

Fish:

Common Name	Scientific Name	State Status	Federal Status
Black Redhorse	Moxostoma duquesnei	Threatened	
Northern Brook Lamprey	Ichthyomyzon fossor		
American Brook Lamprey	Lampetra appendix	Threatened	

Threatened and Endangered Species are listed here to illustrate the types of at-risk species present at the site and the subsequent forest management considerations that will be needed to avoid and minimize adverse impacts to listed species. This is a long term plan and the particular listed species that have been documented in the area will change over time. Therefore, before management actions are carried out, staff will review current T&E species documentation for the WMA and make any modifications necessary to avoid and minimize potential adverse impacts to state and federally listed species.