FOREST WILDLIFE STEWARDSHIP PLAN

FOR

RED CEDAR WILDLIFE MANAGEMENT AREA

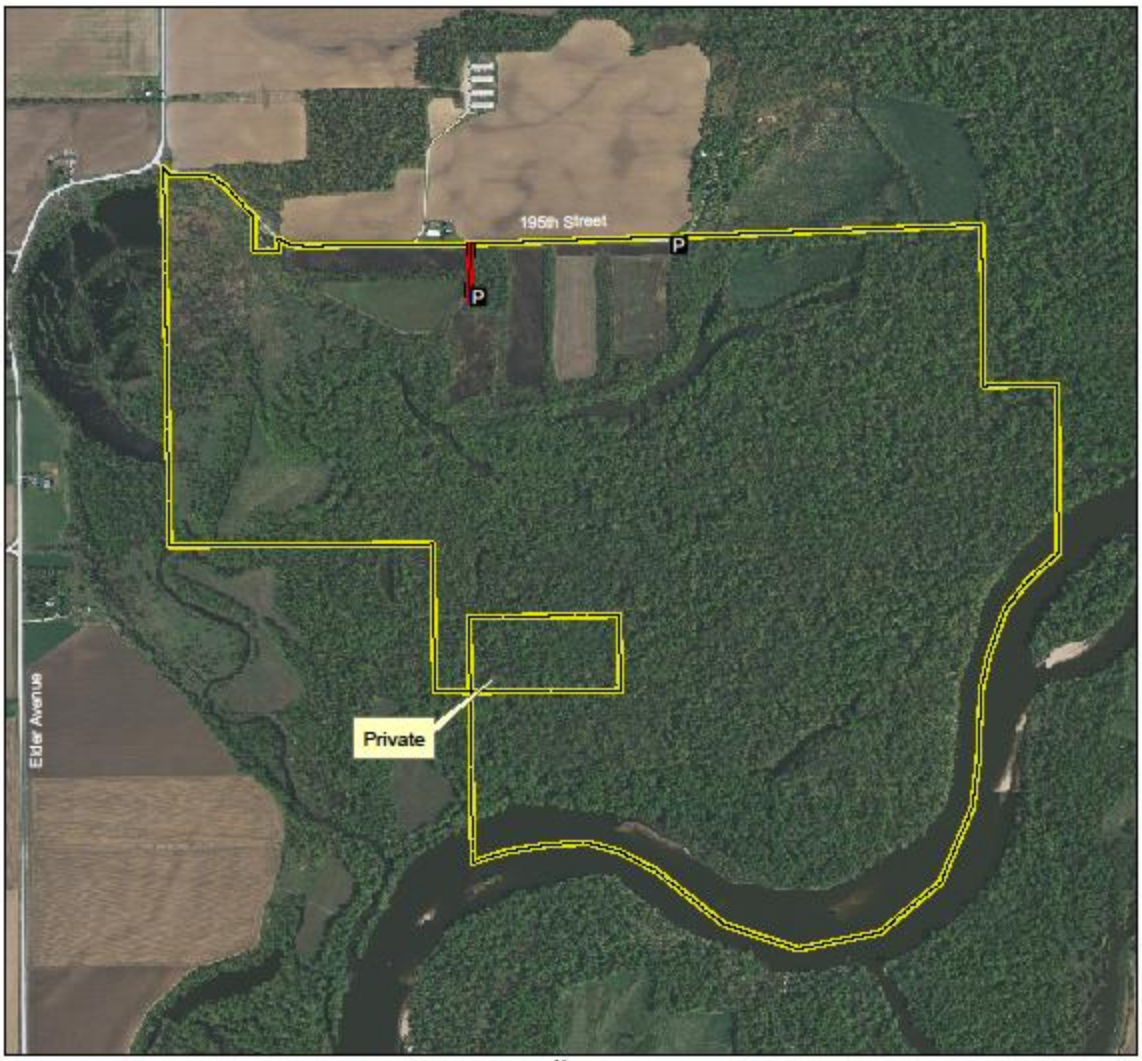
Developed by:

Mark Vitosh
District Forester

And

Andy Robbins
Wildlife Biologist

Red Cedar Wildlife Management Area



Legend

State Areas open to hunting

WMA Boundary

P Parking Lot

Access Road

2010 Aerial Photography

Map Creation Date: 5/2011

N

Miles 0 0.1 0.2

Acres: 786

Habitat: 4/5 Timber, 1/5 Upland & Marsh

Species: Deer, Turkey, Pheasant, Waterfowl, Dove

Contact: Andy Robbins
Odessa Wildlife Unit
319-551-8459

Muscatine County, Iowa
T-77N, R-04W, Sections 23-26

Directions: 1.25 miles E of Nichols on Hwy 22, 1.25 miles S on Elder Ave, 0.5 mile E on 195th St.

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.

Table of Contents

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Wildlife Biologist: Andy Robbins, Odessa Wildlife Unit, 9726 County Road X61, Wapello IA 52653, 319-551-8459
District Forester: Mark Vitosh, 3109 Old Highway 218 S, Iowa City IA 52246, 563-260-0319

Location: Sections 23 through 26, T77N, R04W, Muscatine County
Total Acres: 786
Woodland Acres: 552 (approximately)

INTRODUCTION

The Iowa 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 Iowa DNR's mission. Within the DNR, the Wildlife Bureau manages more than 350,000 acres of land as wildlife management areas (WMAs) for a variety of public users. Many of these WMAs, especially in southern and northeast Iowa, are either partially or mostly forest covered. These forests, if properly managed, provide a unique opportunity for the DNR to carry out its mission by demonstrating to the public the wise use (conservation) and enhancement of these valuable resources for wildlife.

In recent years, the Wildlife Bureau has recognized and acted on the need for forest wildlife stewardship plans (FWSPs) to properly manage 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.

Unfortunately, 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.

A classic example of this conflicting habitat need is the requirement of some species for an abundance of forest edge while others need relatively large blocks of un-fragmented forest. This plan strives to benefit wildlife species in this region of the state, and to find a balance for all wildlife when considered alongside FWSPs for wildlife areas across the state.

HOW THE FOREST WILDLIFE STEWARDSHIP PLAN WAS DEVELOPED

The Wildlife Biologist is the manager of the area and determines the objectives for each wildlife management area. Foresters are assisting the wildlife staff to implement woodland management practices. Approximately one third of the total land area managed by the Wildlife Bureau is woodland. Managing woodland is essential to the long term conservation of the native plant communities occurring on these areas. Actively managing the woodland is also critical to improving these areas for wildlife and wildlife-related recreation.

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

DESCRIPTION OF AREA

The 552 forested acres addressed in this plan are outlined on the attached maps. The area is divided into 28 different areas or stands, labeled 1-28 on the attached maps. Each stand is described in this plan and recommendations are outlined for woodland management. Red Cedar WMA is a 786-acre tract located in Muscatine County. Red Cedar was acquired by the DNR in several parcels during the early 1970s. With 552 acres of woodland (70%), Red Cedar is mostly forested. There are no records of previous forest management on the area, and aerial photos dating back to the 1930s show that the area was heavily forested historically, showing no obvious signs of harvest or clearing for agriculture (other than two small crop fields which have been idled). There are a few areas that are currently in forest cover that were significantly more open in the 1930s or the trees were much more scattered then than they are now.

Most of the forest at Red Cedar is located within the floodplain of the Cedar River which is part of the Mississippi Alluvial Plain ecoregion. Due to the irregular elevations of the floodplain soils on the area, a diverse forest has developed over time with different species favoring different elevations. The floodplain forest at Red Cedar is intersected with many small streams and oxbow wetlands.

While the site is prone to fairly frequent flooding due to its location in the Cedar River floodplain, the duration of flooding on the Cedar River is generally short and the forest appears to be tolerant of these events and does not currently appear to be showing stress from a recent trend of increasingly common flood events.

A small portion of the area is comprised of sandy uplands that prior to DNR ownership were used primarily for row crop agriculture. Early management by the DNR divided these fields by shrub rows to create “edge” habitat. Unfortunately, these shrub plantings included invasive shrubs such as autumn olive and honeysuckle which have spread throughout the upland forest areas of the site. These fields were farmed in a rotation until recently, when many of the fields were converted to native grasses and forbs and most of the shrub rows eliminated. Two small crop fields remain that are currently utilized as food plots.

One unique feature of Red Cedar WMA is that a 50-acre portion of the area is a rich fen composed of Houghton muck soil (locally referred to as a “peat bog”). There is currently an active peat mining operation located on adjacent private land. Historically, this type of habitat was vegetated with a diverse mix of wetland plants. Over time, invasive reed canary grass has overtaken much of the peat bog. Also, some encroachment of undesirable woody vegetation has occurred over recent decades. Historically, the peat bog was devoid of woody vegetation and the DNR has recently started management practices to help control woody encroachment of the site.

Red Cedar WMA is extensively used by hunters and other outdoor enthusiasts. Woodland species thrive in this habitat and it is a destination for hunters in pursuit of deer, wild turkey, and squirrels. The relatively large block of forested habitat on the WMA is intersected by numerous sloughs and streams which makes the area difficult to access and provides seclusion for hunters, outdoor recreationalists, and wildlife alike.

OBJECTIVES

Because Red Cedar WMA is a wildlife management area, the primary focus of the FWSP will be to provide habitat for a wide variety of forest wildlife species. Funding for the management of Red Cedar 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, and squirrels. On the other hand, the IDNR must also consider the effects of its management actions on nongame species as well, particularly those that are threatened, endangered, or species of special concern. Iowa’s “State Wildlife Action Plan” identifies those species it considers to be “species of greatest conservation need” (SGCN). A list of SGCN species potentially found at Red Cedar WMA can be found in Table 2 of this plan. This list provides an important guideline by which management strategies and decisions will be made, while recognizing that it is difficult, if not impossible, to manage for all of these species at the same time on a single tract.

To summarize, the primary objectives for the wildlife area are:

- Creating and maintaining quality wildlife habitat for a wide variety of wildlife species.
- Promoting quality wildlife-dependent recreation.
- Protecting SGCN.

This Forest Wildlife Stewardship Plan strives to develop forest stands that have a wide diversity of tree sizes and species. Developing a diverse forest will benefit the widest variety of wildlife species.

STAND DESCRIPTIONS

This area has been divided into 28 different stands or areas (Figure 1) for the purpose of describing the vegetation on the site. The forest stands will be divided into three different layers: overstory (upper level of the forest), mid-story (middle layer), and understory (lower level) when they are present. The density of each layer will be defined in three possible ways: dense, moderately dense, or scattered. Trees in each stand will be put into five possible size categories: seedling-sized (less than 1 inch in diameter), sapling-sized (1-4 inches in diameter at breast height [DBH, 4.5 feet]), pole-sized (5-12 inches DBH), small sawtimber-sized (13-18 inches DBH), and large-sized (>19 inches DBH). Shrub and non-woody vegetation will also be listed when found in significant populations.

Stand 1 (7 Acres)

The overstory of this stand consists of a mix of pole to small sawtimber-sized black oak, black walnut, hackberry, and ash. There are some scattered large-sized trees also. The mid-story consists of scattered pole-sized hackberry and bitternut hickory. There is one dead black oak that potentially died of the fungus that causes oak wilt. The understory consists of scattered seedling to sapling-sized hackberry and bitternut hickory. The native shrubs dogwood and gooseberry, and the non-native invasive shrub honeysuckle are also present in this lower layer.

Stand 1

Stand 2 (4 Acres)

The overstory of this stand consists of scattered to moderately dense pockets of pole to small sawtimber-sized black oak and a few black locust. There are some scattered large-sized trees also. The understory consists of scattered seedling to sapling-sized hackberry and a few bitternut hickory. The native shrub prickly ash, and the non-native invasive plants honeysuckle, white mulberry, and garlic mustard are also present in this lower layer.

Stand 2

Stand 3 (4 Acres)

The overstory of this stand consists of scattered pole-sized honeylocust and black locust. On the south edge there are a few scattered small sawtimber to large-sized black walnut and oak. The understory consists of a few scattered seedling to sapling-sized hackberry. The native shrub dogwood, and the non-native invasive plants honeysuckle, white mulberry, and garlic mustard are also present in this lower layer. The honeysuckle is heavy in this stand.

Stand 3

Stand 4 (9.5 Acres)

The overstory of this stand consists of a mix of pole-sized bitternut hickory and hackberry, pole to a few large-sized black walnut, and a few scattered small sawtimber to large-sized black/red oak. The understory consists of scattered seedling to sapling-sized hackberry, bitternut hickory, and a few eastern redbud. The native shrubs dogwood and gooseberry, and the non-native invasive shrub honeysuckle are also present in this lower layer.

Stand 4

Stand 5 (3 Acres)

The overstory of this stand consists of scattered sapling to pole-sized black walnut, ash, black locust, Kentucky coffeetree, black oak, and river birch. The understory consists of significant amounts of the non-native invasive shrubs honeysuckle and autumn olive, and the non-native invasive plant garlic mustard.

Stand 5

Stand 6 (6 Acres)

The overstory of this stand consists of scattered large-sized hackberry, red oak, honeylocust, ash, and black locust. There is some pole-sized black locust on the western edge of the stand. The understory consists of scattered sapling to pole-sized hackberry and seedling to sapling-sized bitternut hickory and elm. The native shrubs prickly-ash and bladdernut, and the non-native invasive shrub honeysuckle are also present in this lower layer.

Stand 6

Stand 7 (5 Acres)

The overstory of this stand consists of a mix of pole to large-sized black oak, pin oak, honeylocust, black walnut, and a few pole-sized black cherry. The mid-story consists of pole-sized hackberry. The understory consists of scattered seedling to sapling-sized hackberry and bitternut hickory. The native shrub prickly-ash, and non-native invasive plants honeysuckle and garlic mustard are also present in this lower layer.

Stand 7

Stand 8 (7 Acres)

The overstory of this stand consists of scattered to moderately dense pockets of sapling to pole-sized cottonwood and a few river birch. The understory consists of a few scattered seedling to sapling-sized pin oak.

Stand 8

Stand 9 (13 Acres)

The overstory of this stand consists of scattered small sawtimber to large-sized pin oak, honeylocust, cottonwood, bur oak, pole to small sawtimber-sized black walnut and hackberry, pole-sized ash, and a few large-sized silver maple. The understory consists of scattered seedling to sapling-sized hackberry, hawthorn, and pole-sized elm.

Stand 9

Stand 10 (61 Acres)

The overstory of this stand consists of scattered large-sized silver maple, sycamore, bur oak, and a few shellbark hickory. The understory consists of scattered sapling-sized hackberry and elm.

Stand 10

Stand 11 (35 Acres)

The overstory of this stand consists of scattered pole to small sawtimber-sized hackberry, shellbark hickory, bur oak, Kentucky coffeetree, black walnut, bitternut hickory, few large-sized red oak, pin oak and honeylocust, and a few small sawtimber to large-sized trees of multiple species. The understory consists of scattered sapling-sized hackberry.

Stand 11

Stand 12 (20 Acres)

The overstory of this stand consists of scattered large-sized pin oak, few small sawtimber to large-sized bur oak, and some pole-sized shellbark hickory. The understory consists of scattered sapling to pole-sized shellbark hickory and non-native invasive white mulberry.

Stand 12

Stand 13 (33.5 Acres)

The overstory of this stand consists of mixed pole to small sawtimber-sized hackberry, bitternut hickory, shellbark hickory, Kentucky coffeetree, bur oak, honeylocust, red oak, and black walnut. There are some scattered large-sized trees of some of these species also. The understory consists of scattered sapling-sized bitternut hickory and hackberry.

Stand 13

Stand 14 (16 Acres)

The overstory of this stand consists of scattered large-sized pin oak, bur oak, and honeylocust. The understory consists of scattered sapling-sized shellbark hickory.

Stand 14

Stand 15 (21 Acres)

The overstory of this stand consists of large-sized pin oak and bur oak, small sawtimber to large-sized silver maple and shellbark hickory, and some scattered pole-sized hackberry, bitternut hickory, river birch, Kentucky coffeetree, and bur oak. There is at least one dead bur oak in this stand. The mid-story consists of scattered pole-sized hackberry. The understory consists of scattered sapling to pole-sized hackberry.

Stand 15

Stand 16 (12.5 Acres)

The overstory of this stand consists of scattered large-sized bur oak, pin oak, and silver maple and pockets of pole-sized hackberry, bitternut hickory, bur oak, Kentucky coffeetree, and shellbark hickory. The understory consists of the native shrub dogwood and scattered sapling-sized hackberry.

Stand 16

Stand 17 (7 Acres)

The overstory of this stand consists of scattered large-sized pin and bur oak. The mid-story consists of pole-sized bitternut hickory and shellbark hickory. The understory is generally open.

Stand 17

Stand 18 (7 Acres)

The overstory of this stand consists of scattered large-sized bur oak and pin oak, small sawtimber to large-sized red oak, shellbark hickory, black walnut, Kentucky coffeetree, basswood, and hackberry. The mid-story consists of scattered pole-sized hackberry and bitternut hickory. The understory consists of scattered to moderately dense pockets of sapling-sized hackberry, bitternut hickory, and elm. The native shrub dogwood is also present in this lower layer.

Stand 18

Stand 19 (104 Acres)

This is the largest woodland stand on this property. The overstory of this stand consists of scattered small sawtimber to large-sized silver maple and some bur oak. The understory in this stand is generally open.

Stand 19

Stand 20 (56 Acres)

The overstory of this stand consists of scattered to moderately dense pockets of pole-sized bitternut hickory, scattered small sawtimber to large-sized bitternut hickory, shellbark hickory, red oak, hackberry and pole to small sawtimber-sized Kentucky coffeetree, and a few large-sized bur oak. The mid-story consists of scattered pole-sized bitternut hickory. The understory consists of scattered seedling to sapling-sized bitternut hickory and hackberry.

Stand 20

Stand 21 (25.5 Acres)

The overstory of this stand consists of scattered pole to large-sized silver maple, and a few river birch, pin oak, bur oak, and shellbark hickory. The understory consists of scattered sapling to pole-sized silver maple.

Stand 21

Stand 22 (4 Acres)

This was an open field that trees have encroached over time. The overstory of this stand consists of scattered seedling to sapling-sized pin oak, green ash, silver maple, and a few honeylocust and bur oak. The Emerald Ash Borer (EAB) is present on the ash in this stand. The understory consists mostly of open pockets of reed canary grass.

Stand 22

Stand 23 (28 Acres)

The overstory of this stand consists of scattered large-sized pin and bur oak, small sawtimber to large-sized silver maple, and pole-sized bitternut hickory and river birch. The understory consists of scattered seedling to sapling-sized elm and hackberry.

Stand 23

Stand 24 (18 Acres)

The overstory of this stand consists of scattered large-sized bur oak, pin oak, and black walnut, pole to small sawtimber-sized Kentucky coffeetree and shellbark hickory, and pole-sized hackberry. The understory consists of scattered sapling to pole-sized hackberry and bitternut hickory.

Stand 24

Stand 25 (8 Acres)

The overstory of this stand consists of scattered pole to small sawtimber-sized hackberry, large-sized red, pin, and bur oak, a few small sawtimber to large-sized honeylocust, and pole-sized bitternut hickory, shellbark hickory, and Kentucky coffeetree. The understory consists of scattered sapling-sized hackberry.

Stand 25

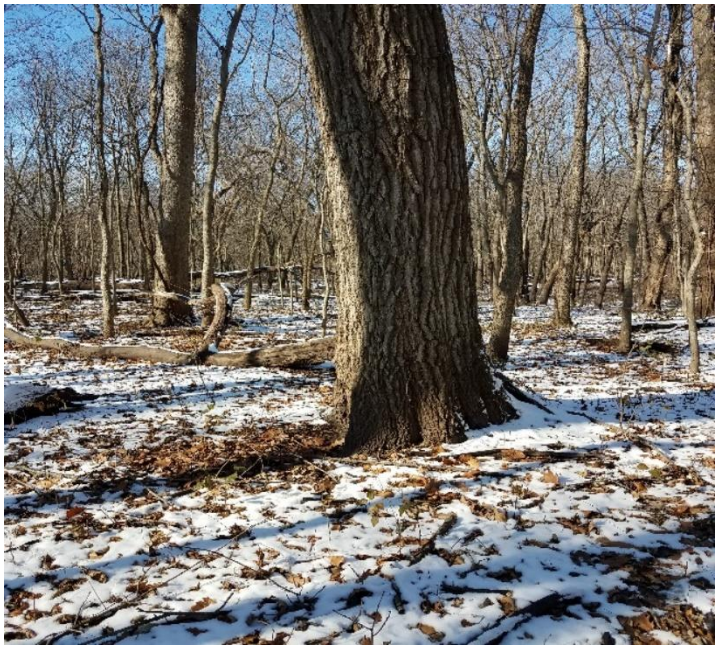
Stand 26 (20 Acres)

The overstory of this stand consists of scattered large-sized bur oak, pin oak, red oak, shellbark hickory, and silver maple, and pole-sized hackberry, bitternut hickory, shellbark hickory, and Kentucky coffeetree. The understory consists of scattered sapling to pole-sized hackberry.

Stand 26

Stand 27 (10 Acres)

The overstory of this stand consists of scattered pole to small sawtimber-sized hackberry, bitternut hickory, black walnut, red oak, Kentucky coffeetree, shellbark hickory, and a few large-sized bur oak, hackberry, and shellbark hickory. The understory consists of scattered sapling-sized hackberry.



Stand 27

Stand 28 (7 Acres)

The overstory of this stand consists of scattered large-sized pin oak, bur oak, shellbark hickory, silver maple, pole-sized silver maple and Kentucky coffeetree, and pole to small sawtimber-sized shellbark hickory. The understory consists of the native shrub dogwood, and sapling-sized elm, white mulberry (non-native invasive), pin oak, hackberry, and honeylocust.

Stand 28

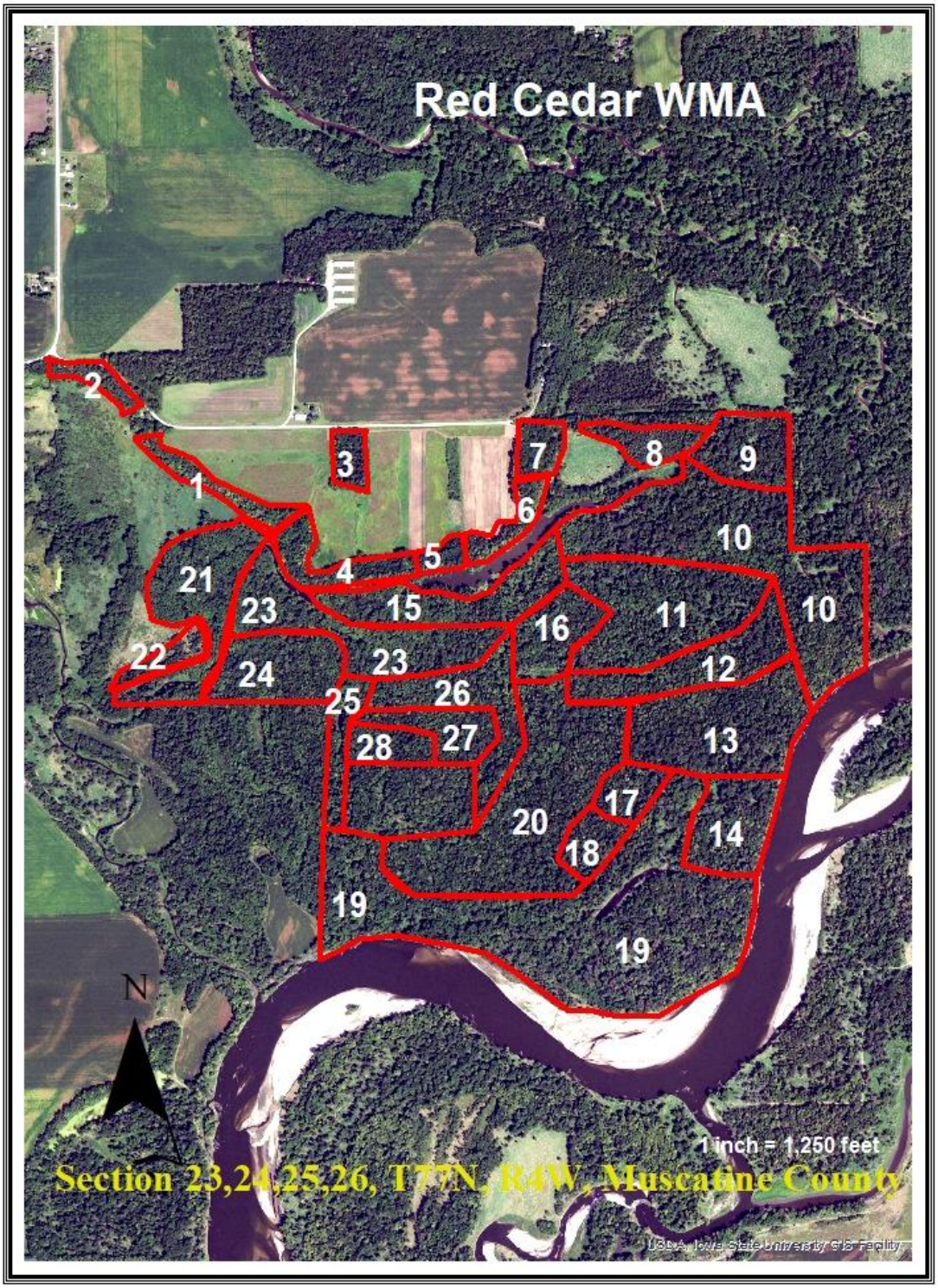


Figure 1. Aerial photo showing woodland cover in 2021 in stands 1 through 28

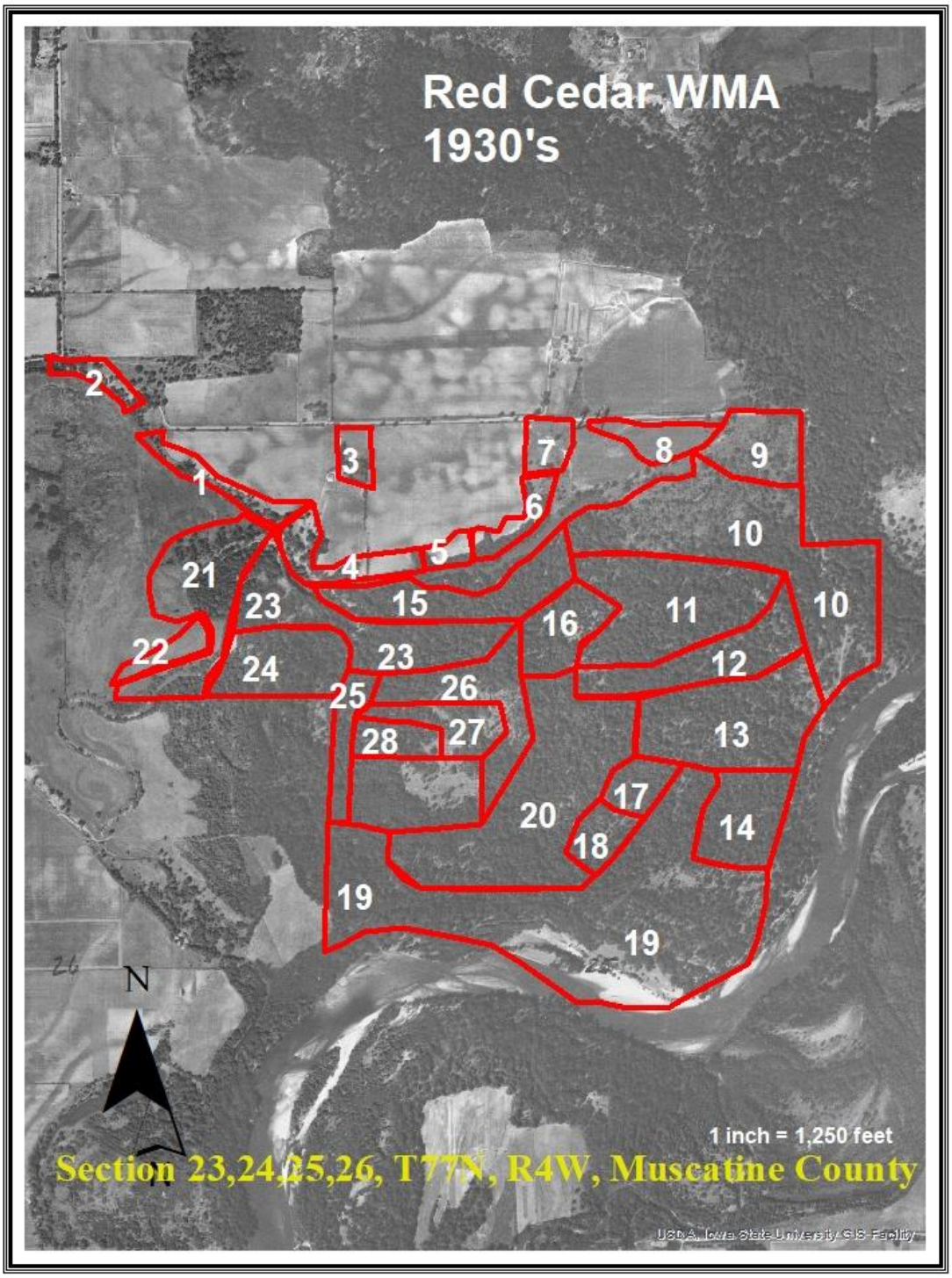


Figure 2. Aerial photo showing woodland cover in the 1930's

CURRENT CONDITIONS OF RED CEDAR WMA WOODLANDS

To assess the current conditions of the woodland, the District Forester out of Iowa City and Odessa Wildlife Unit staff walked the forest cover and recorded data that would help classify and describe the woodland on a stand-by-stand basis. Information collected included mean tree diameter, species composition of the overstory canopy and understory layers, presence of invasive species and pests that could affect forest health, and more. This information was then entered into a Geographic Information System and is summarized below.

Size Class

The size class of the dominant overstory trees indicates the relative age and successional stage of the forest. This metric is useful for understanding the overall diversity of wildlife habitat as well as forest health threats throughout the WMA, because these are both influenced by stand age and structure. For instance, older forests are generally considered to be a more complex ecosystem than younger forests, but they are also more at risk for catastrophic wind/tornado damage and diseases such as oak wilt.

In the Red Cedar WMA 56% of the forest is larger than 18 inches DBH (sawtimber), 8% is between 13 and 18 inches in DBH (small sawtimber), 34% is 5-12 inches in DBH, and 2% is 1-4 inches in DBH (Figure 3). This means that over half of the tree population on the property is of mature size, but there is still 36% of the trees that are younger and developing into future stands.

Overstory Species

The species composition of the woodland reflects the most dominant species in the overstory canopy layer, which are typically the largest and oldest trees. The current breakdown of forest type for Red Cedar WMA is as follows (Figure 4):

- **Bottomland Hardwoods First Bench:** 37% Silver maple, cottonwood, green ash, river birch, willow, sycamore, elm, etc.
- **Bottomland Hardwoods Second Bench:** 17% Silver maple, cottonwood, green ash, river birch, willow, elm, and black walnut, pin oak, Kentucky coffeetree, shellbark hickory, bur oak and bitternut hickory.
- **Central Hardwoods:** 39% Mixed deciduous trees; hackberry, bitternut hickory, red oak, black walnut, Kentucky coffeetree, and shellbark hickory.
- **Oak-Hickory;** 6% Pin oak, bur oak, black oak, red oak, shellbark hickory, and bitternut hickory.
- **Exotic** 1% Black locust.

Even though the majority of the woodland areas are within the floodplain of the Cedar River there are some significant areas of mixed hardwoods like oak, hickory, black walnut, hackberry, and Kentucky coffeetree that really add to the diversity of this property. This is unique habitat within a river floodplain.

Understory Species/Regeneration

The understory of a woodland is the layer which exists at eye level, under the shade of the larger overstory trees. The trees in this layer are critically important to identify because they represent the future species composition of the forest, and its subsequent value for wildlife and all other benefits of the woodland. Currently, the understory/regeneration layers of the woodlands in Red Cedar WMA are as follows (Figure 5):

Hackberry-Bitternut hickory- Black cherry	26%
Hackberry	21%
Hackberry-Elm-Ash	18%
Hickory-Elm-Ash	7%
Open/No Understory	27%
Mixed Shrubs	1%

Hackberry is a significant understory species across the woodland cover and is the most dominant species in 65% of the woodland. This potentially means without forest management (like crop tree release and weed tree removal) hackberry has the potential to become a dominant species in the overstory in the future which could have a specific impact on the overall tree diversity and habitat on the site.

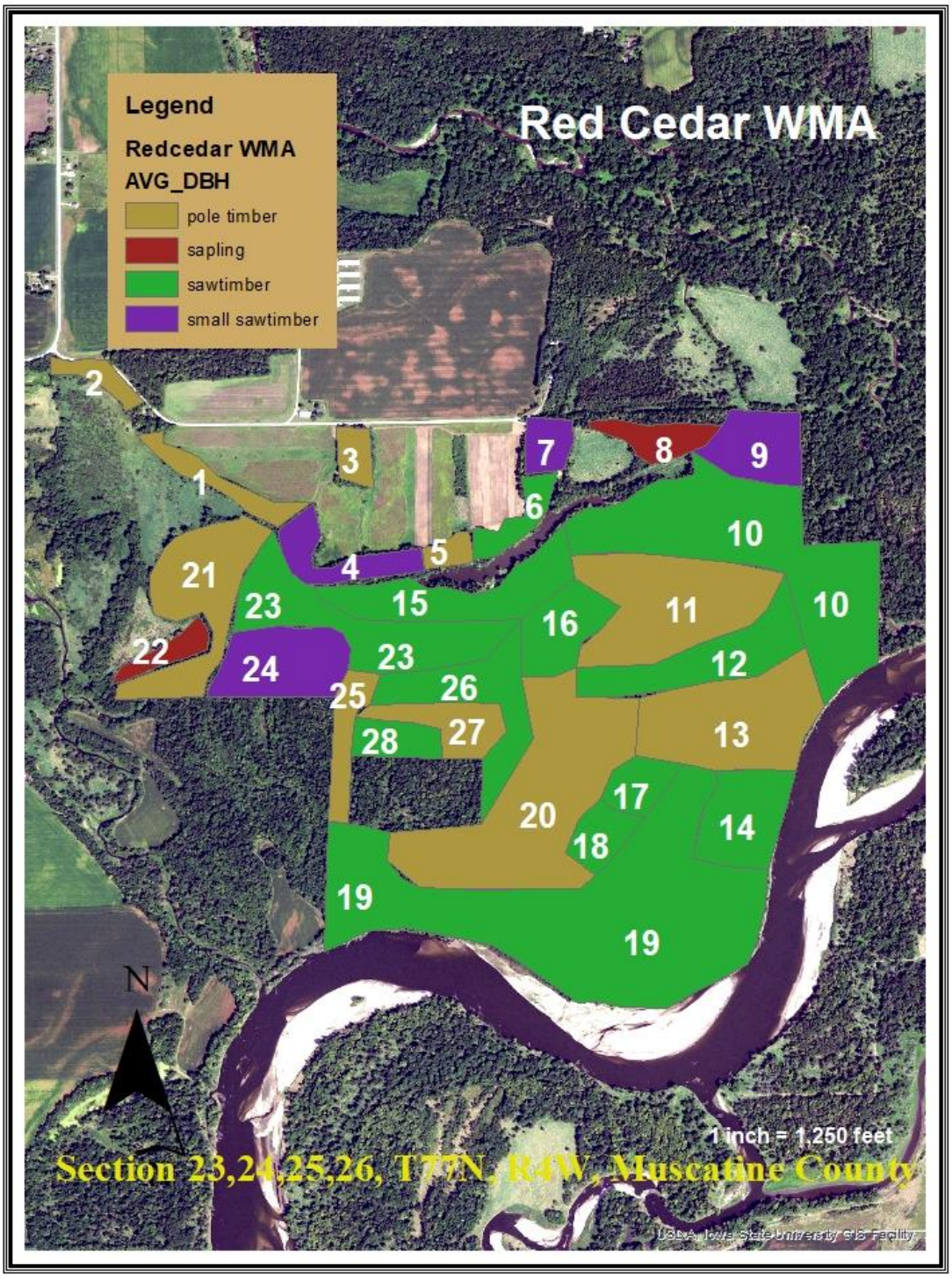


Figure 3. Average tree diameter (DBH) of overstory trees in stands 1 through 28

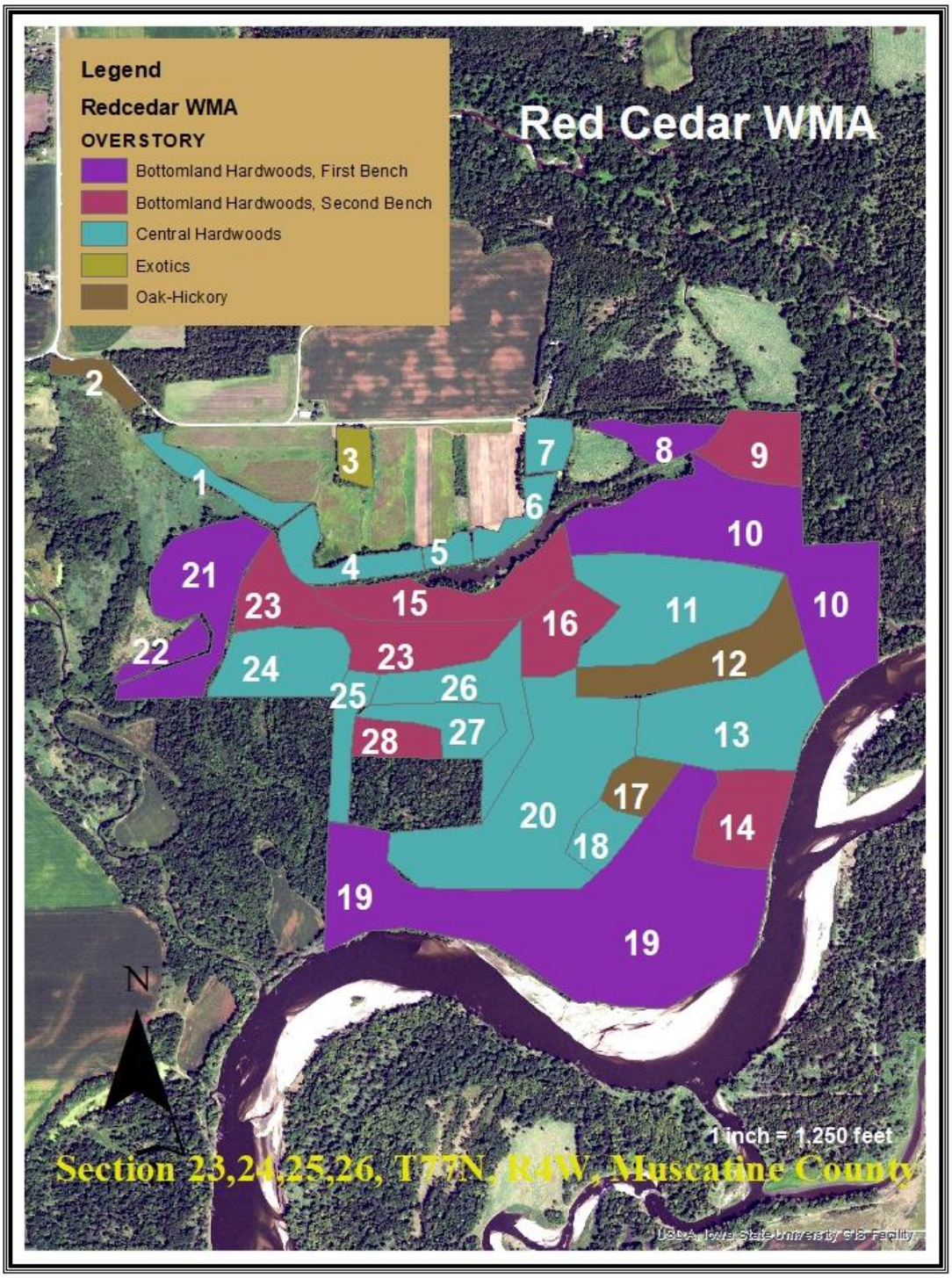


Figure 4. Forest type of overstory layer of stands 1 through 28

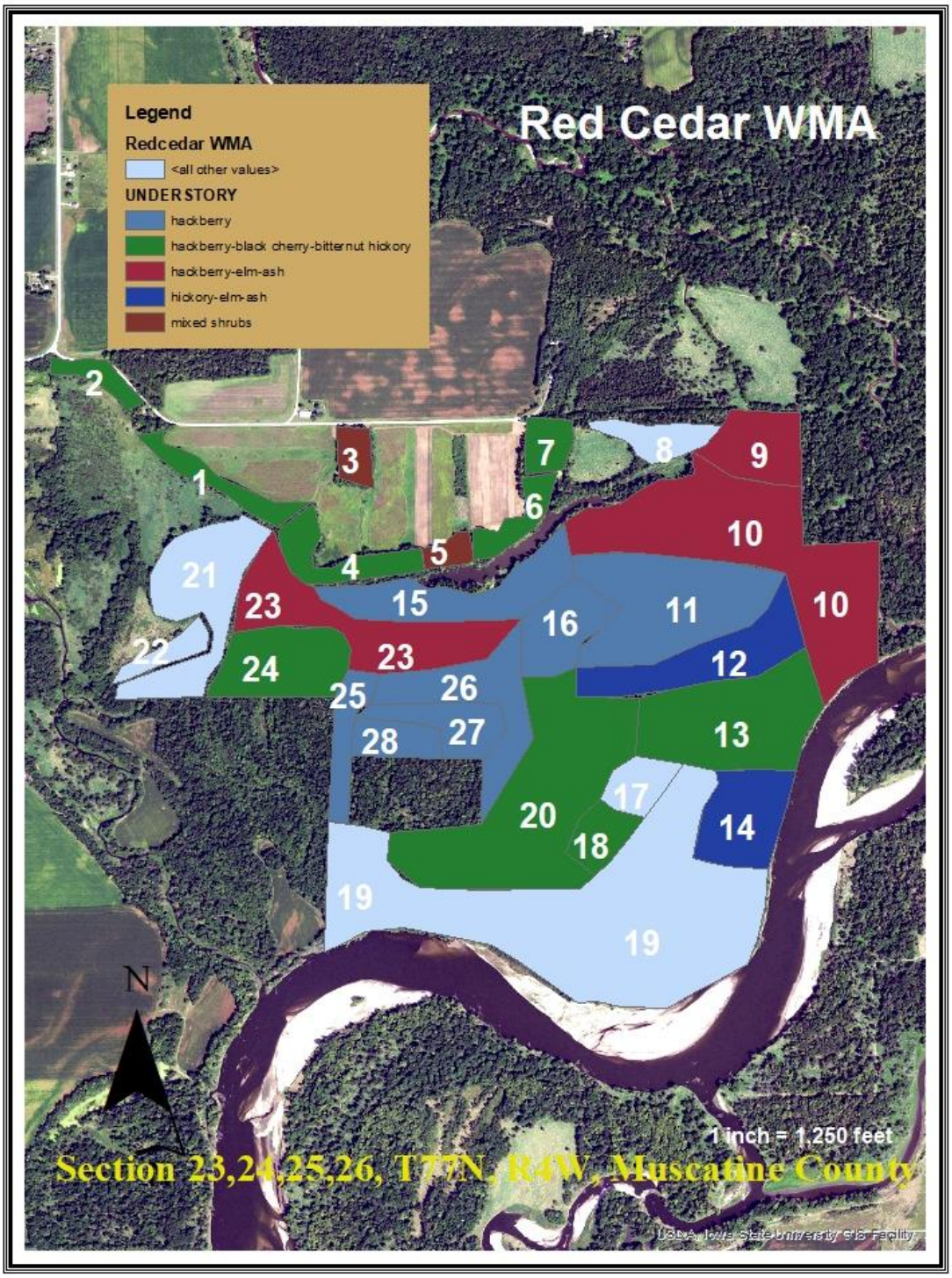


Figure 5. Tree species of understory forest layer of stands 1 through 28

FOREST HEALTH THREATS & CONCERNS

Iowa's woodlands today face unprecedented levels of forest health threats in the forms of non-native invasive species, exotic insect pests and pathogens, urbanization, and more. At Red Cedar WMA, the chief concerns that will affect the forest's functional value to its current and future users include the following, in no particular order.

Loss of Oaks

Oaks are Iowa's official State Tree and are considered by many ecologists to be a "keystone" species to the forest ecosystem, meaning they play a unique and critical role in the ecosystem that other plants cannot provide. Their lack of recruitment into the understory and regeneration is a problem throughout many parts of the state, Midwest, and Eastern U.S., and is largely blamed on the lack of disturbance (i.e., fire) which kept this slow-growing species competitive. With no fire to set back the encroachment of competing trees, the oaks do not succeed and are replaced by more common trees such as hackberry, elm, ironwood, hard maple, basswood, and bitternut hickory which have relatively low value to wildlife and few lumber uses compared with oak. The natural lifespan of oak trees varies by species as well as the multitude of genetic and environmental conditions of each individual tree. Still, most literature sources and experts cite life expectancies for trees in the white oak group (bur, white, swamp white, etc.) to be up to 250 years of age, and trees in the red oak group (black, red, pin, etc.) to be 150 years of age.

In Iowa, US Forest Service inventory data suggests we are "losing" over 5,000 acres of oak forest per year on average as the old oaks die and do not replace themselves. The good news for Red Cedar WMA is that 34% (~188 Acres) of the remaining forest is pole-sized trees (5-12 inches in diameter) and within these areas there are pockets of pole-sized bur oak, pin oak, and red oak. Oak is not the dominant species in these areas but with proper forest management oak can be promoted. There is also a new stand (stand 22-4 Acres) that has had significant pin oak encroach into it along with some bur oak that could be allowed to develop into a new stand of oak.

Oak wilt which is caused by a fungus has the potential to impact stands with an oak component in Red Cedar WMA. Oak wilt is a major player in the decline of oaks, especially red oaks (i.e., pin and red oak), as it can kill large overstory trees rapidly and can spread via root systems from tree to tree. The trees in Iowa most commonly impacted by oak wilt are species such as red and black oak, but it can infect white and bur oak also. If red, pin, or black oak are infected by the fungus that causes this disease they usually die within the summer they are infected. White oak and bur oak can often take a number of years before they succumb to this disease after infection. The key in this situation is to continue to monitor for problems such as this. One way to avoid the potential transfer of the fungus that causes oak wilt problems is to not prune, remove, or wound oaks between March 1st and November 1st each year. The best time to prune oaks is during the dormant season. When planning any type of forest stand improvement activities that might wound residual oaks be sure to target those activities during the dormant season.

It will also be important to monitor the progress of this disease on the overall property long-term to determine if management needs to be adjusted to continue to help maintain an oak component on this property.

Browning and Wilting Symptoms (Oak Wilt)

There is a new disease called Bur Oak Blight (BOB) on bur oak that has been found in Iowa that is starting to cause dieback and death on some selected trees in western and central Iowa. This disease has been found in Muscatine

County. There is still remaining mature bur oak scattered in many of the woodland stands of Red Cedar WMA. Continue to monitor for this disease on this property. For more information on this disease go to the Iowa State University Extension and Outreach Bur Oak Blight webpage.

Bur Oak Blight Symptoms July-August

Other Disease Threats

There is a new disease called Thousand Cankers Disease that is being found on black walnut trees in the Eastern U.S. Currently this disease has been very destructive to eastern black walnut in the Western U.S. This disease has not been found in Iowa at this point, but it is a critical one to watch for. Since there is black walnut in a number of stands in this WMA, monitor the overall health of these trees over time.

Insect Pests: Emerald Ash Borer, Spongy Moth, Asian Long-Horned Beetle

The Emerald Ash Borer (EAB) has been in Muscatine County for a number of years and it is present on this WMA. Basically, all of the ash on this site will most likely die within the next 5 years or so. The good news is that ash is not a significant component of the woodlands at Red Cedar WMA, and the loss of these trees should not have a significant negative impact on the habitat and will provide necessary standing snag habitat for wildlife such as woodpeckers.

The Spongy Moth (formerly Gypsy Moth) has been a pest in the Eastern U.S. for over a century and is finally making its way into Iowa. It causes heavy defoliation of oak, maple, and other hardwoods during the early summer months and degrades recreational and aesthetic uses of the forest. Repeated defoliations can cause decline and death of mature trees. Forest Stand Improvement activities such as crop tree release that helps promote a diversity of species in a number of these stands will help minimize the impact of this insect once it arrives.

The Asian Long-Horned Beetle is a non-native borer that prefers to attack maple, but it has not been found Iowa at this point.

Invasive Plant Species

Exotic (non-native) plant species that are introduced to an ecosystem without the benefits of co-evolution can become invasive and disruptive to the balance of the natural ecosystem. Such is the case with a suite of non-native invasive species in Red Cedar WMA, consisting of species like honeysuckle, white mulberry, black locust, osage orange, autumn olive, burning bush euonymus, and garlic mustard. Some of these different non-native invasive species have the ability to out-compete native species and subsequently cause a decline in plant and wildlife biodiversity and ecosystem health. Currently, stands 1 through 7, and 12 & 28 have some type of non-native invasive species becoming established. In the Red Cedar WMA honeysuckle and white mulberry are the woody plants that currently create the biggest threat to the habitat and recreational potential of this property. The good news is the majority of the woodland cover is in the floodplain so the shrub honeysuckle should only be a threat in the upland woodland areas. If an aggressive/consistent effort is not started soon some of these non-native plants will continue to reduce the bio-diversity, increase the potential of site erosion, and reduce the recreational accessibility on the property in the near future.

Honeysuckle

White Mulberry

There is not one method that works in managing non-native invasive plant species, and in most cases an array or collection of methods have to be used to reach success. Work with the Iowa DNR District Forester and other plant specialists to find specific methods that work for you in managing the targeted plants. Below are a few methods that can be considered depending on the specific target plant:

- Monitor areas on a regular basis to stop plant populations before they get out of control.
- Complete plant removal - dig and destroy if seeds present.
- Cut trunk and treat stump with registered herbicide. Chemicals used in performing this practice must be applied according to authorized use, label direction, and other federal or state policies and requirements.
- Spot treat or basal bark spray target plants with registered herbicide.
- Utilize flash goat grazing to reduce and minimize plant populations.
- Rx fire in specific situations.

Aging Forests

Mature late-successional forests provide critical habitat for many migratory songbirds and other specialist wildlife species, and they also offer high quality recreation and aesthetic benefits. However, very young forests also provide a crucial habitat type for certain types of wildlife. Young forest is also called “early successional habitat” and is typically very brushy with a high density of trees per acre. Early successional habitat occurs on a timeline following a clearcut, major windstorm, or the abandonment of old fields/pasture and typically lasts somewhere between 10-20 years until the trees reach 30-40 feet in height. This habitat is limited on this property and ~56% (309 Acres) of the woodland cover is mature forests. This means that over half of the tree population on the property is of mature size, but there is still 36% of the trees that are younger and developing into future stands.

Deer Density

The hunting pressure on this property will help minimize overbrowsing of desirable species in this WMA, but new tree plantings and natural regeneration still may need some protection to withstand deer and rabbit feeding.

Risk Trees

Risk trees are trees that carry a particularly high risk of structural failure which could cause property damage or personal injury. To be considered a risk tree, a tree must have both of the following: 1) major structural defect that makes it very prone to failure and 2) a nearby target that it could land on, which could be a trail, picnic table, parking lot, campsite, bench, etc. As trees grow larger and bear more weight and become greater in height, they need to be frequently monitored for structural decline in high-use areas that have designated trails or parking areas on a routine basis.

DESIRED FUTURE CONDITIONS AND GOALS FOR RED CEDAR WMA WOODLANDS

Establishing clear and objective goals for the future woodland condition is critical to identifying what management actions are needed to get there. Woodland management goals for Red Cedar WMA include:

- Where possible promote the growth and health of pole-sized pin oak, red oak, bur oak, black walnut, shellbark hickory, Kentucky coffeetree, and bitternut hickory. Stands 7, 11, 13, 20, 22, 25, & 27.
- In areas like stands 1 through 7, and 12 and 28 make efforts to minimize the spread of woody non-native invasive plants such as honeysuckle and white mulberry.
- In a few remaining pockets of mature bur oak, where practical, open up woodland canopies and put fire back on the forest floor to let sunlight return and stimulate native herbaceous vegetation, and potentially promote natural oak regeneration. Possible spots in stands 15, 17, 18, 20, 26, & 28. **Note:** Management activities such as forest burns do have the potential to impact active reptiles and amphibians. Any planned forest burns should only be conducted when 6" soil temps are below 40 degrees and the air temp is 50 degrees or below. Planned forest burn units will be evaluated on a case by case basis and reviewed internally for potential impacts prior to being implemented.
- Conserve and enhance habitat for unusual, threatened, rare, and endangered plants and animals.
- Provide high quality and safe recreational opportunities for WMA users.
- Any stands not listed here or specifically in work plan will continually be monitored for non-native invasive species and need for other management activities.

SILVICULTURAL RECOMMENDATIONS

Forest ecosystem management involves the use of silvicultural practices such as planting, thinning, prescribed burning, and harvesting to achieve a specific goal. All silvicultural actions involve tradeoffs, meaning there will be some positive outcomes and some negative. These tradeoffs must be considered on both spatial and temporal scales so as to optimize the overall forest benefits for society and the environment. Woodland stands were assigned silvicultural recommendations based on their current conditions and the general goals for the WMA during the stand mapping process. A review and filtering process was then done to identify the highest priority projects that will help move the woodlands toward achieving the goals set forth for Red Cedar WMA. These "high priority" practices are summarized below and in Table 1:

- In many of these stands vines are starting to cause competition to quality trees. Any vines on desirable trees that are getting up into the crown and competing for light should be cut in all stands. Vines are also a key wildlife component on this property, so vines on dead trees and less desirable species should be left alive.

Vine cutting

<u>Immature Woodland Thinning's (Crop Tree Release)</u>

This work aims to reduce overcrowding and density for long-term tree health and vigor. The word "immature" implies relatively young or middle-aged stands of hardwoods which have not attained full crown size. It is based on the premise that there are too many trees in the forest canopy competing for limited resources, and to keep the stand healthy some

trees should be thinned. The most promising trees in the overstory are identified throughout the stand and marked as "leave" trees or "crop" trees, and then adjacent trees that are interfering with them are cut or killed to give them more space. In most stands, there are between 5 and 40 crop trees per acre that could receive release. The trees that are chosen comprise a mix of desirable, long-lived species in the upper canopy that show good health, including oak, bitternut hickory, black walnut, hackberry, Kentucky coffeetree, shellbark hickory, and others. This practice will have the following benefits:

- Enhance tree health, vigor, and resilience of selected species. Fast-growing trees that aren't crowded are better able to withstand attacks by pests such as spongy moth, oak wilt, thousands canker disease, and others.
- Grow bigger trees, faster. Trees receiving release from competition can attain a larger size in half or a third as much time as crowded trees.
- Create snags for wildlife. Trees that are girdled will become cavity and den trees which are required by dozens of species of wildlife. For snags to be effective for wildlife use, girdling a variety of larger diameter trees is the most effective technique. For example, 6-8" DBH trees are utilized by chickadees, titmice, downy woodpeckers, bluebirds, and house wrens. 6-12" DBH- hairy woodpeckers, red-headed woodpecker, nuthatches, chimney swift, and flying squirrels. 12-18" DBH - screech owls, flickers, great-crested flycatchers, Indiana bat and northern long-eared bat. >18" DBH- wood duck, hooded merganser, turkey vulture, barred owl, pileated woodpecker, and gray/fox squirrels. >24" DBH- little and big brown bat, gray fox, and raccoon.
- Enhance complexity and structure of the forest. The additional sunlight into the woodland will encourage herbaceous growth on the forest floor, and fallen trees and logs add large woody debris for fungi, insects, and wildlife habitat.

There are 7 stands (11, 13, and portions of 7, 20, 22, 27, & 25) where 68 to 158 acres have been identified as good candidates for this practice.

Unthinned trees grew 1.35% per year in diameter over a 20 year period

Thinned crop trees grew 2.25% per year in diameter over a 20-year period

Source: Perkey et al., 2011. U.S. Forest Service General Tech Report NRS-83.

Crown Release around quality tree

Mature Oak Open Woodland Restoration

These projects will re-create some small pockets of open oak woodland habitat, enhance the opportunity for oak regeneration for future generations, diversify the forest age class structure, reduce non-native invasive species, and increase biodiversity of the herbaceous layer on the forest floor. Silvicultural practices that will be employed include prescribed burning and weed tree removal/understory thinning. These practices are described below - not all treatments will be applied to every stand.

Prescribed Burning

Prescribed fire will be used in a few small pockets potentially in stands 3, 4, and 5 where feasible to help set back the competition and promote an open oak woodland habitat and potentially favor the recruitment of oaks. To accomplish this, burning must be done on a regular rotation (every few years). A detailed burn plan must be prepared following the Iowa DNR Prescribed Fire Policy for each stand to be burned and reviewed before each new burn. Burning is typically done in either late fall or early spring. Burning will be done in as many oak restoration stands as possible, subject to funding, staff resources, and the protection of specific protected wildlife species. This practice will be applied potentially to a few small pockets where there is mature bur oak in stands 15, 17, 18, 20, 26, & 28.

Weed Tree Removal/Understory Thinning

Weed tree removal is a form of Forest Stand Improvement (FSI) that will be used to restore the open oak woodland conditions in a few small pockets of stands. It will focus on removing non-oak woody species from the understory and

mid-story layers that are overly abundant and preventing oak establishment such as white mulberry, boxelder, honeylocust, elm, hackberry, bitternut hickory, honeysuckle, and others. The stumps are chemically treated with a registered herbicide to prevent re-sprouting. Larger trees that are killed during this process are generally girdled and left standing to provide snags for wildlife den trees. This practice will be applied potentially to a few small pockets where there is mature bur oak in stands 15, 17, 18, 20, 26, & 28.

Weed Tree Removal

Before

After

Table 1. Work Plan Management Activity Schedule and Tracking
Implementation of this plan will begin as soon as the plan is approved and be carried out over the next 10-15 years. Adaptive management will be used to adjust treatments and work as conditions change. The plan should be updated in approximately 10 to 15 years.

Stand(s)	Unit (Acres/ Feet, etc)	Treatment Activity Short Description (or reference to description in Plan)	Dates	
			Planned	Completed
All Stands	552 Ac.	Monitor & Manage Invasive Species & Monitor Forest Health & Cut Vines on desirable trees	Ongoing FY 2025 39 Ac. Invasive Mgt.Stands 1 through 7	
11, 13, and portions of 7, 20, 22, 27, & 25)	68 to 158 Ac.	Crop Tree Release to improve growing conditions for quality oak, black walnut, shellbark hickory, bitternut hickory, Kentucky coffeetree, and hackberry	FY 2023 Stands 11 & 13	
Portions of 15, 17, 18, 20, 26, & 28	10 to 25 Acres	Weed Tree Removal to create open oak woodland in selected locations	FY 2024 10 Ac. Stand 26	
Portions of 2, 6, 15, 17, 18, 20, 26, & 28	1 to 25 Acres	Use Prescribed Fire to minimize non-native invasive shrub species and to help maintain open oak woodland	Fall or Spring Dormant Season	

Wood Fiber & Production/Harvesting

There are some scattered merchantable (saleable) trees on parts of this property, but not enough in significant pockets to justify any regeneration harvests at this point. Every 5 to 10 years the Iowa DNR District Forester will re-evaluate the mature stands for any potential need of regeneration harvest management. During that period of time if there are any catastrophic events such as a tornado or an extreme wind event any impacted stands will be evaluated for potential salvage harvesting.

Best Management Practices for Soil, Wetland, and Water Quality Protection

Protection of soil and water resources is of utmost importance. Forest management activities have the potential to negatively impact these qualities, but with careful timing and best management practices these impacts can be made negligible:

- Any work involving heavy equipment will only be done during times when the ground is frozen and not wet. This prevents compaction of the soil and also protects the fragile herbaceous plants of the forest floor.
- No weed tree or crop tree release debris is to be left in streams or flow pathways.
- Pesticides used for invasive species control and weed tree removal are to be applied in the appropriate dosage and at the proper time, according to product label.
- When planning any type of forest stand improvement activities that might wound residual oaks be sure to target those activities during the dormant season, November 1 through March 1, to avoid the potential transfer of the fungus that causes oak wilt problems.

All other considerations and best practices for protecting water & soil resources are discussed in Iowa's Forestry Best Management Practices manual, available online at: https://www.iowadnr.gov/Conservation/Forestry/Wood-Industry-Logging.

Inventory of Rare, Threatened, and Endangered Flora & Fauna and Best Management Practices for Species of Concern

The State's Natural Areas Inventory database was reviewed for the presence of any rare, threatened, or endangered species in Red Cedar WMA. Due to constantly changing listings, priorities, etc., the forest management activities described in this plan will be reviewed internally prior to implementation to determine potential impacts to both state and federally listed threatened or endangered species.

The current guidance for known species of concern in the Red Cedar area is as follows:

- Red Cedar is within the summer range for the federally endangered Indiana bat (also state endangered) and the federally threatened northern long-eared bat. Both species forage and roost in floodplain and upland forests and form maternity colonies in trees with loose exfoliating bark, cracks, crevices, and/or cavities (e.g., live shagbark hickory or dying trees of other species). Management activities that benefit bats (and other wildlife like the southern flying squirrel) include retaining trees with these characteristics and 6-10 snags per acre whenever possible. In areas of suitable habitat, current guidelines allow for tree removal activities from October 1 through March 31 and woodland burns outside of the maternity season (May 15-Aug. 15).
- The state endangered red-shouldered hawk (RSH) is also known to nest in this area. Nest sites have a tendency to be near streams/wetlands in large tracts of forest. Areas with planned management activities in RSH habitat should be checked for nests and management activities planned to avoid the breeding period (mid-March through mid-August) if present to reduce disturbance/stress.
- Muscatine County, and the Lower Cedar River valley in particular, is rich in diversity and abundance of reptiles and amphibians. Several species of herps potentially found in this area are also listed as endangered, threatened, or are of special concern (Table 2). Because these species are cold-blooded, any impacts to these species from tree removal activities should already be minimized as a result of following the bat guidance dates which somewhat mimic the inactivity dates for many of these species. However, specific date guidance for individual species should be reviewed internally prior to any work being completed.
- Management activities such as forest burns do have the potential to impact active reptiles and amphibians. Current guidance for potentially occurring T&E herps suggests that planned forest burns should be conducted when 6" soil temps are below 40 degrees and the air temp is 50 degrees or below in areas of known habitat. Planned forest burn units will be evaluated on a case by case basis and reviewed internally for potential impacts prior to being implemented.

There are a number of plant species that are listed as State Threatened or of Special Concern potentially present on this property:

- Yellow Monkey Flower (Mimulus glabratus), Threatened
- Buckbean (Menyanthes trifoliata), Threatened
- Royal Fern (Osmunda regalis), Threatened
- Slender Dayflower (Commelina erecta), Threatened

All management activities and sites will be analyzed before implementation to avoid any threat to any specific plants or wildlife of concern.

Table 2. Species of Greatest Conservation Need potentially found at Red Cedar WMA based on NAI data and MSIM reports.

Group	Scientific name	Common name	T&E Status
Bird	*Coccyzus americanus*	Yellow-billed cuckoo	
	Geothlypis trichas	Common yellowthroat	
	Spizella pusilla	Field sparrow	
	Ammodramus henslowii	Henslow's sparrow	State Threatened
	Ammodramus savannarum	Grasshopper sparrow	
	Colaptes auratus	Northern flicker	
	Hylocichla mustelina	Wood thrush	
	Melanerpes erythrocephalus	Red-headed woodpecker	
	Sturnella magna	Eastern meadowlark	
	Tyrannus	Eastern kingbird	
	Vermivora chrysoptera	Golden-winged warbler	
	Buteo lineatus	Red-shouldered hawk	State Endangered
	Chordeiles minor	Common nighthawk	
	Colinus virginianus	Northern bobwhite	
	Icterus galbula	Baltimore oriole	
	Spiza americana	Dickcissel	
	Zonotrichia querula	Harris's sparrow	
	Buteo platypterus	Broad-winged hawk	
	Ceryle alcyon	Belted kingfisher	
	Chaetura pelagica	Chimney swift	
	Coccyzus erythropthalmus	Black-billed cuckoo	
	Contopus virens	Eastern wood-pewee	
	Dendroica castanea	Bay-breasted warbler	
	Falco sparverius	American kestrel	
	Oporornis formosus	Kentucky warbler	
	Toxostoma rufum	Brown thrasher	
	Vireo bellii	Bell's vireo	
	Wilsonia canadensis	Canada warbler	
	Prothonotaria citrea	Prothonotary warbler	
	Catherus fuscescens	Veery	
	Empidonax virescens	Acadian flycatcher	
	Otus asio	Eastern screech-owl	
	Haliaeetus leucocephalus	Bald eagle	Special Concern

Group	Scientific name	Common name	T&E Status
Mammal	*Myotis lucifugus*	Little brown myotis	
	Myotis septentrionalis	Northern long-eared bat	Federally Threatened
	Nycticeius humeralus	Evening bat	
	Lasionycteris noctivagans	Silver-haired bat	
	Myotis sodalis	Indiana bat	State & Federally Endangered
	Perimyotis subflavus	Tri-colored bat or Eastern pipistrelle	
	Glaucomys volans	Southern flying squirrel	Special concern
Herptiles	*Acris crepitans*	Blanchard's cricket frog	
	Ambystoma texanum	Smallmouth salamander	
	Apalone mutica	Smooth softshell turtle	
	Anaxyrus fowleri	Fowler's toad	
	Chelydra serpentina	Snapping turtle	
	Diadophis punctatus	Prairie ringneck snake	
	Emydoidea blandingii	Blanding's turtle	State Threatened
	Hyla versicolor	Eastern gray treefrog	
	Lampropeltis calligaster	Prairie kingsnake	
	Lithobates areolata	Crawfish frog	State Endangered
	Pantherophis ramspotti	Western fox snake	
	Pituophis catenifer	Bullsnake	Special concern
	Lithobates palustris	Pickerel frog	
	Lithobates pipiens	Northern leopard frog	
	Sistrurus catenatus	Eastern massasauga	State Endangered-Federally Threatened
	Sternotherus odoratus	Stinkpot or Common musk turtle	State Threatened
	Storeria occipitomaculata	Northern redbelly snake	
	Terrapene ornata	Ornate box turtle	State Threatened
	Thamnophis proximus	Western ribbon snake	
Butterflies	*Speyeria idalia*	Regal fritillary	Special concern
	Eurytides marcellus	Zebra swallowtail	Special concern
	Danaus plexippus	Monarch	Federal Candidate
	Satyrium caryaevorum	Hickory hairstreak	Special concern
	Satyrodes eurydice	Eyed brown	
	Wallengrenia egermet	Northern broken-dash	
	Euphyes Dion	Dion skipper	Special concern
Odonates	*Gomphus fraternus*	Midland clubtail	
	Lestes eurinus	Amber-winged spreadwing	
	Aeshna canadensis	Canada darner	

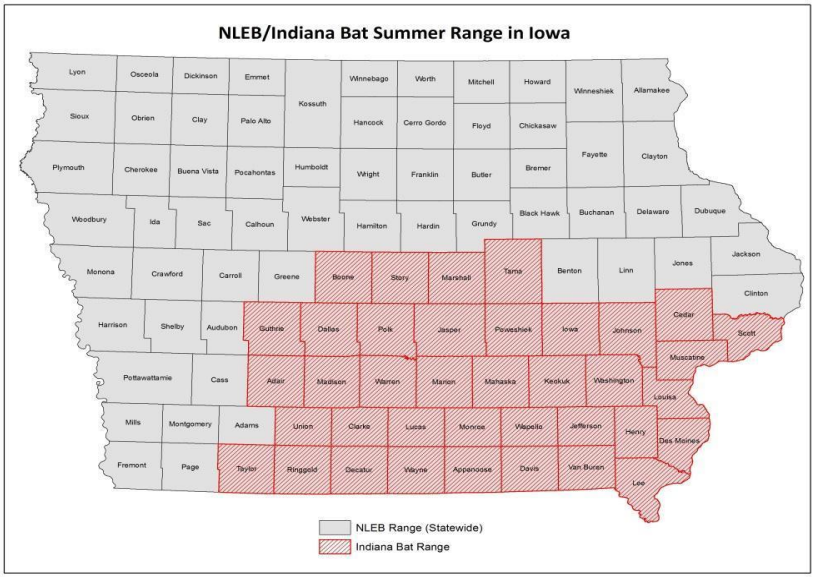
NORTHERN LONG-EARED BAT (NLEB) (*MYOTIS SEPTENTRIONALIS*)

Monica Thelen, 2015

Suitable summer habitat for NLEB consists of a wide variety of forested/woodland habitats and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥3 inches dbh that have exfoliating bark, cracks, crevices, and/or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet of other forested/wooded habitat. NLEB has also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat. NLEBs typically occupy their summer habitat from mid-May through mid-August each year. The spring migration period likely runs from mid-March to mid-May each year and fall migration likely occurs between mid-August and mid-October.

Examples of unsuitable habitat:

- Individual trees that are > 1,000 feet from forested/wooded areas;
- Trees found in highly-developed urban areas;
- A pure stand of less than 3-inch dbh trees that are not mixed with larger trees;
- Living cedar trees encroaching into prairie ecosystems.



Step 1 - Evaluate if there are potential roost trees that will be impacted with a DBH of at least 3".

- ❑ If project will only require removal of trees or shrubs with a DBH of less than 3 inches, proceed to Step 2.
- ❑ If project will impact trees but does not include potential roosts, i.e., live trees and/or snags ≥3 inch DBH having exfoliating bark, cracks, and crevices or other cavities, proceed to Step 2.
- ❑ If project will require removal of trees with a DBH of at least 3 inches that exhibit cracks, crevices or peeling bark, proceed to Step 3. Isolated trees may be considered suitable habitat when they exhibit characteristics of a suitable roost, and are within 1,000 feet of other forested/wooded habitat.

Step 2 - No further action is necessary. Management actions can proceed.

Step 3 - Conservation Measures for Tree Removals

You are "Not Likely to Adversely Affect" the NLEB if you conduct tree removal activities or woodland burns according to the following:

- ❑ Conduct woodland burns after September 30 and before April 1.

- ❑ Conduct tree removals after September 30 and before April 1

If your project is located outside of the Indiana Bat summer range, and you are not able to conduct it after September 30 and before April 1, the project is "Likely to Adversely Affect" the NLEB. **NOTE: If project falls within the Indiana Bat summer range, you must conduct tree removal activities between Sept 30 - April 1 and woodland burns outside of the maternity season (May 15-Aug 15).**

- ❑ If project will need to occur between April 1-May 15 or August 15-September 30, proceed to Step 4.

Step 4 - Solicit Additional Review

USFWS is required to track all activities that are "Likely to Adversely Affect" the NLEB, even if they are not prohibited take under the 4D rule. In order to meet their reporting requirement, you will need to:

- ❑ Prepare and submit a map and description of activity and timing to Monica.
- ❑ If project cannot be covered under existing acres approved in our grant's Section 7, the project will proceed to Step 5.

Step 5 - Additional FWS Review

Information about the project will be submitted to USFWS by the DNR's Endangered Species Coordinator for an up to 30-day review and comment period using the Streamlined Consultation Form

INDIANA BAT (*MYOTIS SODALIS*)

The range of the Indiana bat is the eastern United States and as far west as Iowa, Kansas, and Oklahoma. The FWS describes suitable summer habitat for Indiana bats as consisting of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥5 inches dbh (12.7 centimeter) that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of other forested/wooded habitat. Winter hibernaculum includes caves and mines in southern and eastern states other than Iowa. Indiana bats occur in Iowa during summer months and form maternity colonies under the bark of living or dead trees. These colonies are usually located in wooded areas along perennial streams and rivers. In Iowa, the Indiana bat has been reported in 29 Iowa counties. While management plans implemented under this grant promote the long term health of the forest ecosystem, management practices involving tree removal and woodland controlled burns represent potential impacts to the Indiana bat. These practices include timber stand improvement, early successional management, timber harvest, and reforestation. Management activities will be evaluated by biologists for their proximity to known Indiana bat occurrences and their potential to impact summer habitat. APPENDIX A (PHASE 1 SUMMER HABITAT ASSESSMENTS) of the current Range-Wide Indiana Bat Summer Survey Guidelines will be used to determine if suitable habitat is present. In areas with suitable habitat, woodland burns planned under this grant will be completed outside of the maternity season (May 15 - August 15) and tree removal will be done after September 30 and before April 1 within the counties identified at on the US Fish and Wildlife Iowa Bat Range Map.

RUSTY-PATCHED BUMBLEBEE (*BOMBUS AFFINIS*)
MANAGEMENT RECOMMENDATIONS
Developed by Stephanie Shepherd, September 2021

Introduction

The rusty-patched bumblebee (rpbb) is a ground nesting bee, primarily found in open meadows and woodlands of the northeastern two-thirds of Iowa. It was listed as endangered under the Endangered Species Act in January, 2017.

The species' current global distribution stretches from the U.S.'s eastern coast to Iowa and MN but this distribution has been contracting from the east and the Midwest now serves as their strong hold.

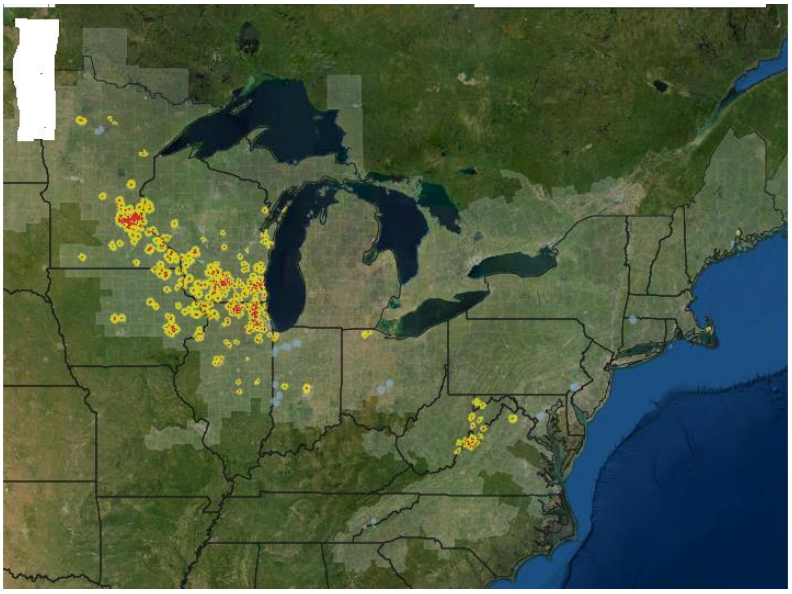


Figure 6. USFWS Distribution map for the rusty-patched bumblebee. This map is updated once or twice a year.

The female worker and male bees can be identified by the half-moon red patch on the second tergite, surrounded by yellow and by the unique shape of the spot on the thorax.

Figure 7. Illustration by Elaine Evans. In order from left to right is the Queen, Female Worker and Male of the Rusty-patched Bumblebee. Suspected records with photos can be submitted to Bumblebee Watch.

Goals for this Species

- Provide and maintain nesting, foraging and overwintering habitat.

Natural History

Phenology

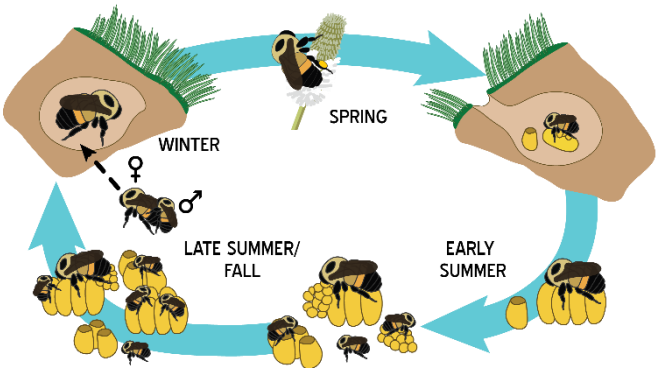


Figure 8. Yearly life cycle of a North American Bumblebee. Graphic from University of Wisconsin

- Mid-March to May: Queen emerges from overwintering spot.
- Emergence until June: Queen fuels up on nectar, scouts for a nesting burrow and once found starts gathering pollen and building cells and laying eggs.
- June to October: Female worker bees take over foraging, building cells and tending eggs.
- August: Males emerge
- Late August-Early September: "New" queens emerge and mating occurs.
- October: New queens go into diapause for winter
- October-March: Winter diapause.

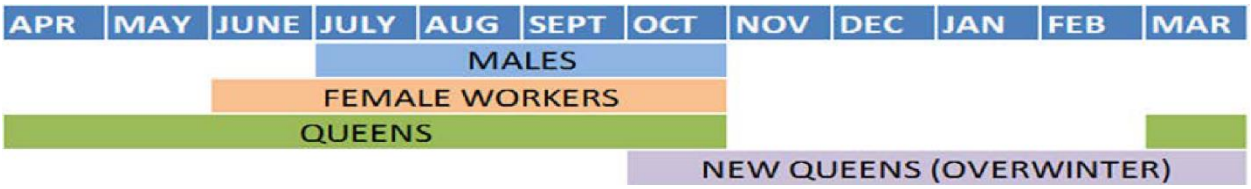


Figure 9. Phenological timing for the Rusty-patched bumblebee. Reproduced from U.S. Fish and Wildlife Service (2018).

Habitat

Habitat by Season

- Winter
  - Little is known about rpbb's specific wintering habitat but we know they overwinter in in open woodlands and woodland edges, and likely particularly those with a healthy spring ephemeral understory.
  - They likely spend the winter in leaf litter or loose dirt, a few centimeters underground or perhaps in brush piles, rodent mounds or burrows etc.
- Spring
  - The primary need and limiting factors in spring are:
    - Nectar and Pollen: woodland spring ephemerals, native trees and shrubs and other plants that bloom in spring are needed.
    - Nesting sites: rodent burrows, brush piles or areas of loose, bare soil in open habitat.
- Summer
  - Use is primarily of open areas with high densities of nectar producing plants. Overall grassland quality does not need to be high if nectar plants are available and urban/suburban areas will be used. They primarily use areas within 1 km of the colony nest site.
  - Colony numbers reach a peak between mid-July to the end of August.
- Fall
  - Areas of high nectar availability to sustain workers, males and new queens into October. They primarily use areas within 1 km of the colony nest site. The number of new queens produced by a colony is likely related to the amount of pollen available to the colony (Burns 2004).

Broad-Scale Habitat Description

Rusty-patched bumblebees need open woodlands in close proximity to open nectar rich areas for nesting. Ideal nesting areas would have high densities of nectar and pollen producing plants within 1 km. The nectar-producing plants in this landscape should be continuously available from April through October. Distribution maps suggest an association with river corridors and they will use habitat in urban developed to rural undeveloped habitats.

There are preferred species of plants which provide the largest quantity of and quality food (superfoods) and/or contribute to disease resistance (immune-boosters) (Table 3). The Xerces Society has created a Habitat Assessment Guide for rpbb.

Table 3. List of superfood and immune boosting plants for rpbb. Super food plants are those that produce nectar rich in amino acids which provide extra protein for adults and larval bumblebees. Immune boosting plants help build bee immune systems. A full list of plants for the Midwest can be found on the US Fish and Wildlife Midwest Plant Guide.

Plant Common Name	Plant Latin Name	Type
Wild Bergamot	*Monarda fistulosa*	Both
Prairie Clover	*Dalea sp.*	Superfood
Hyssop	*Agastache sp.*	Superfood
Goldenrod	*Solidago sp.*	Superfood
Native Thistle	*Cirsium sp.*	Superfood
Coneflowers	*Echinacea sp.*	Superfood
Asters	*Symphyotrichum sp.*	Superfood
Lead Plant	*Amorpha canescens*	Superfood
Jewelweed	*Impatiens capensis*	Superfood
Mountain Mint	*Pycanthemum sp.*	Superfood
Native Spiraea	*Spiraea sp.*	Superfood
Wild cranberry	*Vaccinum sp.*	Both
Sunflowers	*Helianthus sp.*	Immune-boosting
White Turtlehead	*Chelone glabra*	Immune-boosting
Penstemon	*Penstemon sp.*	Immune-boosting

Specific Habitat Goals - Creating, Enhancing and Maintaining Quality Habitat

Foraging

- 50% of management area providing foraging habitat.
- Ten or more native flowering plant species blooming in all growing seasons - Spring, Summer, Fall.
- Nine or more superfood plant species present; Nine or more immune-boosting plant species present.
- Frost and drought hardy plants present.

Nesting

- 20% of area with undisturbed native bunch grasses.
- At least 20% area left undisturbed: no mowing, infrequent burning (3+ year interval), low impact grazing.
- 20% of area with loose soil (i.e. evidence of rodent burrows etc.).
- Fallen leaves/ leaf litter left undisturbed.
- Do not plow or otherwise dig into or disturb soil during nesting period.

Overwintering

- Wooded area with high diversity of spring-time blooming plants.
- Wooded areas with less than 30% cover of noxious weeds (i.e. buckthorn).
- Areas of brush and leaf buildup

Management Actions

Prescribed Fire

- Map out foraging habitat available within 1 km of an area to determine an appropriate size of burn unit.
- Use a burn interval of 3 -6 years.
- Consider timing of the burn and when foraging habitat will and will not be available based on this timing.
- Plan for a patchy and/or less intense fire. This can be done by burning under cool or damp conditions or mechanically by establishing unburned refugia in the burn unit.
- FORAGING HABITAT:
  - Burn mid-October - mid-March
  - If this burn window cannot be met only burn 1/3rd of the habitat area
- OVERWINTER HABITAT (woodland):
  - If burning in mid-October to mid-March, burn only 1/3rd of habitat area.
  - If burning in late spring, divide habitat into as many small burn units as possible.
    - If this is not possible, consider grazing or haying (if habitat allows).

Mowing & Haying

- Perform activity during inactive period - mid-October to mid-March. If done outside of this time frame, don't mow entire foraging area.
- Don't mow/hay more than ½ of the foraging area within a year.
- Mow at highest cutting height possible, ideally 12-16", minimum of 8-10".
- Reduce mowing speeds.

Grazing

- Design and conduct grazing so that it encourages plant diversity and blooming, i.e. low intensity or short duration.
- Grazers should not consume more than 1/3rd of the available rpbb forage.
- Divide grazing area into units so that some areas are left ungrazed.
- Limit grazing in high diversity areas especially during rpbb active time period (mid-March to mid-October).

Use of Pesticides

- Best practice is to not use any insecticide or herbicide in rpbb areas.
- If chemicals must be used, apply in as targeted a way as possible and try to use during inactive season (mid-October to mid-March).

Tree-clearing

- Minimize activity or use of heavy equipment - i.e. avoid soil disturbance - during overwinter period (mid-October to mid-March).
- Minimize activity that destroys blooming plants during their bloom period.
- Control invasive species.
- Consider thinning or dense understory removal to improve overwintering habitat.

Other

- Map areas where management occurs each year to help inform response as well as with planning future management.
- Commercial bumblebees and Honeybee colonies can spread disease and compete for foraging resources so are not recommended in areas with rpbb.

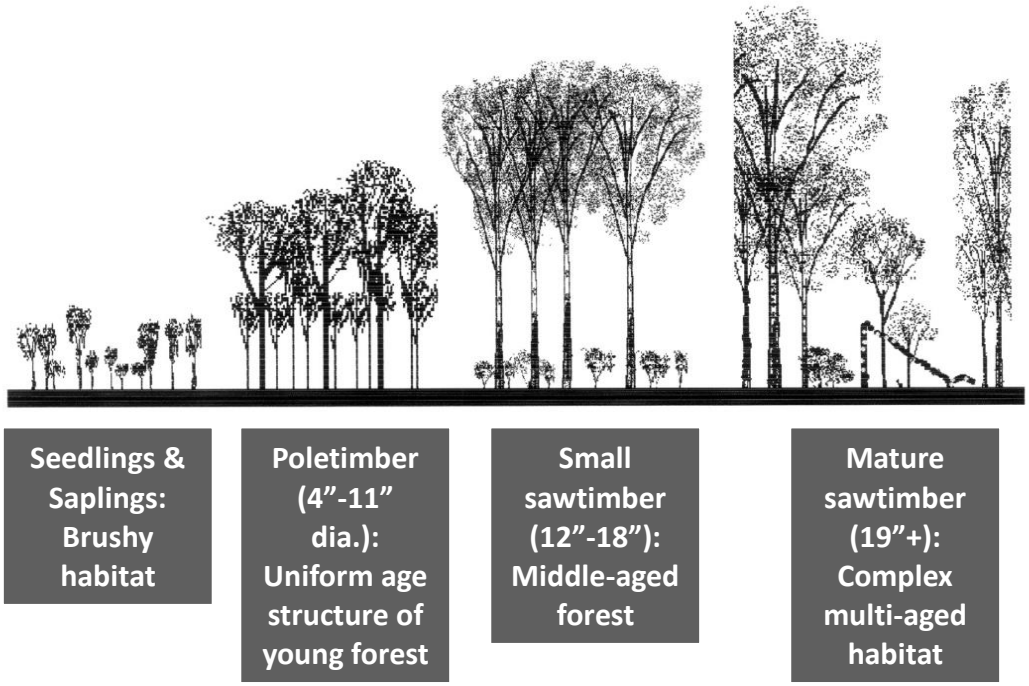
Literature Cited

Burns, I. 2004. Social development and conflict in the North American bumble bee *Bombus impatiens*
Cresson. University of Minnesota. PhD Thesis. November 2004. 211 pages.
U.S. Fish and Wildlife Service. 2018. Conservation Management Guidelines for the Rusty-Patched Bumblebee (*Bombus affinis*), Version 1.6. Department of Interior. 16 pages.

APPENDICES

Forest Succession Management and Wildlife Habitat

The basic tool or means of enhancing wildlife habitat and biodiversity in the forest is to manipulate the successional stages through vegetative management (removal (cutting, burning, herbicide, etc.) and/or planting). Successional stages are the different phases a forest goes through in time as it grows from infancy to maturity, as shown in the diagram below. As a forest naturally progresses through these stages, the plant communities and wildlife inhabitants will also change:



The **seedlings & saplings** stage, also known as early successional cover, contains a mixture of grasses, weeds, small shrubs, thorny brambles, and young trees. It is best described as brushy habitat. Many types of small game such as rabbits, mice, voles, & snakes use this cover. Not surprisingly, it’s also preferred hunting ground for avian predators including hawks, owls, and kestrels. Pheasants, quail, woodcock, and ruffed grouse will use this cover at certain times of the year when heavier cover is desired. Deer will use it for bedding, fawning, browsing, rubbing, and staging. Female wild turkeys use it for nesting. Songbirds that prefer this cover include golden-winged warbler, blue-winged warbler, Bell’s vireo, black-billed cuckoo, yellow-billed cuckoo, eastern towhee, indigo bunting, brown thrasher, and prairie warbler.

During the **pole timber** stage, the forest canopy closes in and very little sunlight reaches the ground. The grasses, weeds, and other ground plants are shaded out by the dense layer of trees up above, which are all about the same age and fairly uniform in height and form. Consequently, this stage of the forest offers the least amount of diversity for wildlife and it’s usually desirable to manually thin some of the trees out to enhance tree growth and speed up the transition to the next stage, which is the **small sawtimber** stage.

Thinning will also increase acorn & fruit production of favored trees, and make the trees stronger, healthier, and more immune to disease & insect attacks, and get sunlight to the ground to stimulate vegetation and new cover for wildlife. As the forest goes deeper into the small sawtimber stage, the habitat becomes more complex with different layers and new shrubs & saplings emerging.

When the forest reaches the **mature sawtimber** stage, some trees have begun to die from natural causes like lightning strikes, wind, snow & ice, competition, or old age. Selective tree harvesting can also have this effect. Trees that have died but are still standing are called snags and are very important to cavity-nesting critters like woodpeckers, chickadees, titmice, nuthatches, great-crested flycatchers, and flying squirrels. Fallen logs & tree tops house or hide

animals on the ground such as whitetail deer, small mammals, reptiles, and amphibians, and then rot back into the soil. Wild turkeys roost in the tops of mature trees and eat the sweet acorns of oak trees. Mosses and wildflowers become more abundant and insects find refuge in small microhabitats.

Many birds prefer this more diverse habitat structure with its complex layers, such as the acadian flycatcher, cerulean warbler, veery, and the black & white warblers among others. Near large rivers, Bald Eagles and various species of herons may make their nests in mature trees. Various reptiles and amphibians also like mature bottomland forests and the mixture of seasonal ponds, emergent logs for sunning, and hiding places.

As this process of succession evolves, certain trees that require full sunlight such as oak & walnut are gradually replaced by tree species that can tolerate shade (such as hackberry, hard maple, basswood, among others). Vegetative management practices such as tree cutting, prescribed burning, or planting are needed to reset the process back to the beginning if the goal is to maintain or restore certain species like oak and walnut.

Another important woodland habitat type in Iowa is the oak savanna or open oak woodland, which is generally defined as a combination or transition between grassland and forest cover. These ecosystems have scattered oak trees at wide spacing with an understory of native forbs, grasses, and shrubs. They have a pleasing "park-like" appearance and are used by many types of wildlife including red-shouldered hawks, redheaded woodpecker, deer, turkeys, and many more. These habitats need routine fire to keep tree encroachment in check while allowing the fire-tolerant oaks to gradually replace themselves. Without burning or cutting, they fill in with other trees and become mixed-species forests.

Forest Management Systems

The Iowa DNR uses a classification system for managing large forested tracts on public areas such as state parks, state forests, wildlife management areas, etc. This system helps to establish the "big picture" of long-term management goals and actions that will take place in a forest stand, so that the appropriate short-term actions can be decided upon. Each stand is assigned a unique classification:

Early successional management: This system establishes a very short rotation period in which the entire area is clearcut every 15 years or so and then allowed to grow back naturally. It applies to woodland edges where the goal is to maintain a young, brushy stage of wildlife habitat that provides a soft edge between a mature woodland and field, and also to aspen stands in NE Iowa to maintain high quality grouse and woodcock habitat.
In southern Iowa, it's a useful practice to help quail, woodcock, pheasants, field sparrows and other wildlife. There are no stands at Red Cedar WMA under this management system.

Even-aged management: Even-aged forests are ones that all began growing at about the same time. In other words, all the dominant canopy trees are the same age. Trees that demand full sunlight to grow well, such as oaks, walnut, aspen, and bottomland species (i.e. silver maple and cottonwood) are all best managed using an even-aged system, because it affords them the open light they need and is the most efficient way to regenerate them. Even-aged management practices include crown release thinning in young immature stands, and then eventually, a clearcut to start the process over. The smallest even-aged stand is usually no less than 3 acres, as anything smaller is considered a forest "gap" or "opening". All 28 stands (552 acres) are under even-age management at Red Cedar WMA. This includes some stands which are immature and will undergo thinning.

Uneven-aged management: This system is used to culture a forest with at least 3 different age classes present throughout the stand continuously. It can involve doing single-tree or small "gap" selection harvests which then fill back in quickly. Thus, it is not an efficient way to manage for shade-intolerant species such as oak, but can be used successfully for tolerant species like hard maple and basswood that tend to accumulate in the understory of mature woodlands on fertile sites. No stands are being considered for uneven-age management at Red Cedar WMA.

Viewshed management: The "viewshed" classification is meant for areas of high visual stature for park or WMA users, so as not to distract from the aesthetic and recreational qualities. It can also include environmentally-sensitive sites such as wetlands or fragile slopes. Viewshed designation may also imply that active management of an area is simply not feasible or practical due to location, access, or a limitation of resources. Invasive species control, risk tree mitigation,

salvage harvesting after storms, or other low-impact activities might be necessary from time to time, but otherwise these areas will not be aggressively managed. There are no stands at Red Cedar WMA designated as viewshed areas.

Technical Description of Timber Harvest Systems
(Adapted from US Forest Service Central Hardwood Notes 2.07-5)

Shelterwood Harvests

The shelterwood system is used to encourage natural regeneration of desirable species before a stand is clearcut. It has the potential to reproduce heavy seeded, shade-intolerant species such as oaks. However, this method has not consistently yielded good results and is still under study. This method involves removing trees in two or more cuttings within a period of about 20 years. In a mixed hardwood stand, 20-30% of the basal area is generally removed from the overstory in the first cut along with all of the undesirable trees in the mid- and understory. The worst trees are removed first while the best trees are left in the woods to provide a seed source for natural regeneration. Once desirable reproduction is well established, the remaining overstory trees can be removed in one final cut and a new stand begins growing.

Clearcut Harvests

Clearcutting is a silvicultural practice done in mature and overmature stands where tree growth rates are slowing down or disease is present, and the current stand needs to be replaced with a new vigorous stand. It may also be done in stands that are so badly degraded that no desirable growing stock exists, and there is a need to start over. Normally all trees 1.0-inch diameter and above are felled to permit full access to sunlight for all seedlings on the ground. However, in some cases scattered large wolf trees and or standing snags may be left to provide important habitat features for wildlife. Clearcutting is done for tree species that are shade-intolerant, meaning they require full sunlight for regeneration. There is no optimum stand size for clearcuts, but a minimum of about ½-acre is needed to establish and develop most shade-intolerant species. Both shade-intolerant and shade-tolerant species are reproduced after a clearcut. If there is no desirable regeneration present in the understory at the time of clearcutting, seedlings are planted immediately prior to or after the harvest. A high density of seedlings is needed to offset mortality and wildlife depredation. Where clearcutting is done periodically on a large property, stands of different ages will contribute to diverse habitat and foster a variety of wildlife species. Well-planned clearcuts in a forest provide variety in tree species and wildlife. Clearcuts are aesthetically displeasing to most peoples' point of view for 5-10 years following the harvest.