

FOREST WILDLIFE STEWARDSHIP PLAN

FOR

DUDGEON LAKE WILDLIFE MANAGEMENT AREA



Developed by:

**Mark Vitosh
District Forester**

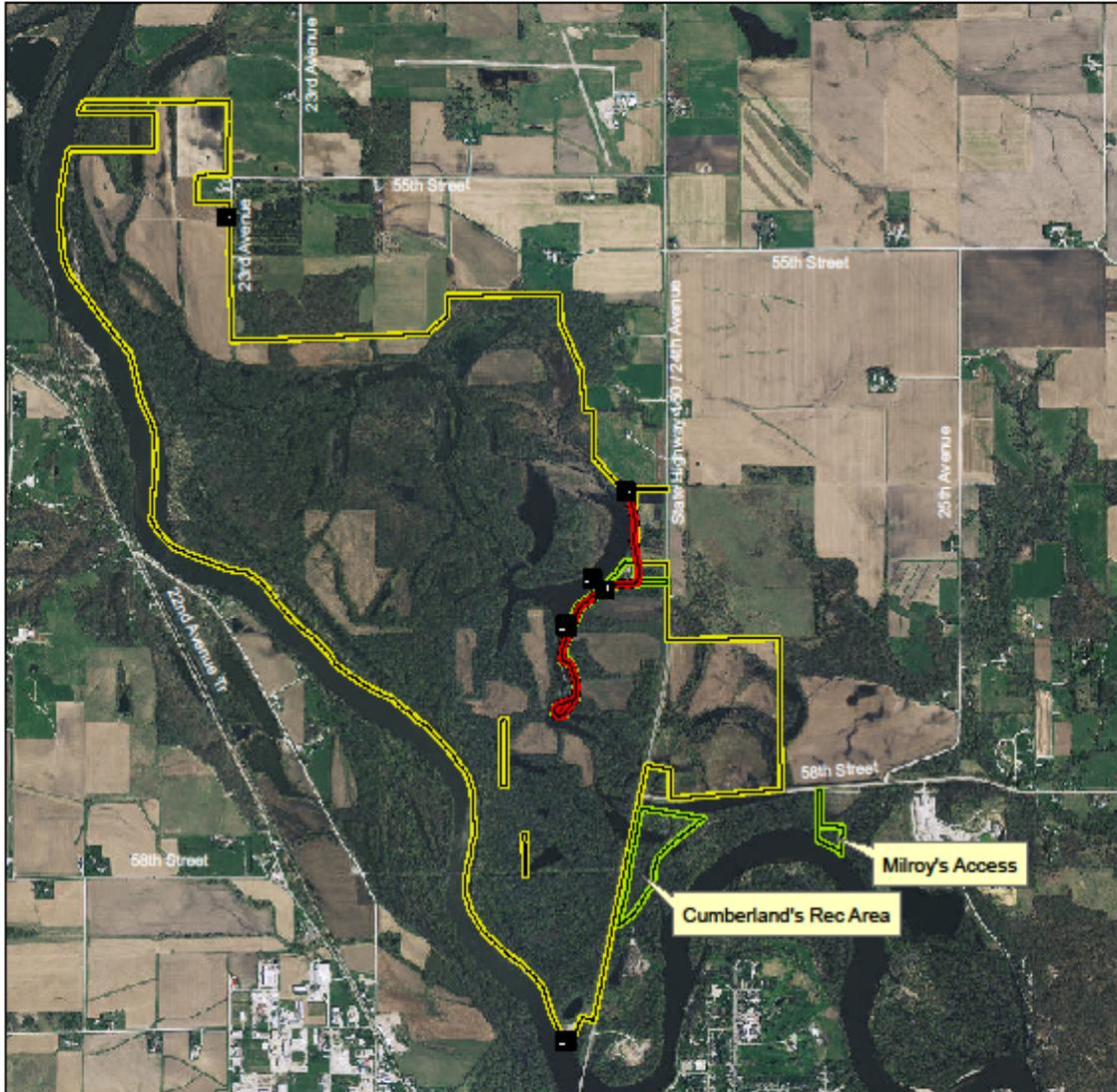
And

**Timothy Thompson
Wildlife Biologist**

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Dudgeon Lake Wildlife Management Area



Legend

State Areas open to hunting

- WMA Boundary
- Parking Lot
- Boat Ramp
- Access Road
- Other Public Land

2010 Aerial Photography

Map Creation Date: 8/2012

Ares: 1,818

Habitat: 1/4 Upland, 1/4 Marsh,
1/2 Timber

Species: Deer, Squirrel, Dove
Pheasant, Waterfowl

Contact: Tim Thompson
Iowa River Wildlife Unit
319-330-7013

Benton County, Iowa
T-85N, R-10W,
Sections 4-6,8-9,16-17,31

Directions: 0.5 mile N of Vinton on
Hwy 150.

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.

FOREST WILDLIFE STEWARDSHIP PLAN FOR DUDGEON LAKE WILDLIFE MANAGEMENT AREA

MANAGER:

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Wildlife Biologist
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LOCATION:

Sections 4,5,6,8,9,16, 17, & 31, T85N, R10W, Benton County

TOTAL & WOODLAND ACRES: 1,818 & 1,050

INTRODUCTION

In Iowa, the Department of Natural Resources (IDNR) is the government agency responsible for the stewardship of indigenous and migratory wildlife species found in the state. Many of these species live near and in IDNR Wildlife Management Area (WMA) forests. Forests are a relatively slow-changing landscape with some stands reaching maturity after a period of 100 years. This time span may extend through the careers of several wildlife managers. The longevity factor emphasizes the need for a Forest Wildlife Stewardship Plans (FWSP) in order to wisely manage our WMA forests.

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 ages 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.

Generally, the Wildlife Bureau manages state-owned forests for the greatest diversity of forest wildlife. The FWSP will be the guiding document that prioritizes management activities to meet the needs of the wildlife species identified by the plan. The Wildlife Bureau's State Comprehensive Wildlife Conservation Plan identifies wildlife "species of greatest conservation need" (SGCN). (Appendix – Table 2). Some of these species use or have used the Dudgeon Lake complex. The Red-Shouldered Hawk has nested on the area. The six-lined racerunner and Ornate Box Turtle have been seen on a sandy prairie knob. Blanding's turtles have a healthy population on the north oxbow wetlands. Bald Eagles migrate through the area and a new nest site exists upstream from Dudgeon Lake. Several amphibians, some SGCN, also use the area.

Habitat needs of these wildlife species will be included in determining forest management decisions. Evaluations will be conducted to monitor the success of these management decisions. Forest and wildlife inventories conducted on each WMA will be used to assess and refine future forest management decisions on the WMA's. The primary goal will be to maintain quality habitat that will support abundant and diverse wildlife populations.

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 1050 acres addressed in this plan are outlined on the attached aerial photos. The forested areas are divided into 7 different areas or stands, labeled 1-7 on the maps. Each area is described in this plan and recommendations outlined for woodland management.

Dudgeon Lake is one of Iowa's oldest wildlife management areas. Acquisition started in the late 1940s blending a unique landscape of river bottom backwaters, floodplain timber, scattered grassy openings, and cropland. The unique thing about the forest cover on this management unit is that the majority of it is in the flood plain, but because of small changes in elevation there are significant pockets of hard mast species such as red oak, bur oak, bitternut hickory, and black walnut present. The characteristics of the forest cover on this site have changed significantly over the last 60 to 80 years. In the 1930's aerial photo (Figure 2) of the WMA the tree cover is less and much more open and scattered compared to a recent 2017 aerial photo (Figure 1). This property is located just north of Vinton, Iowa along Highway 150 with the Cedar River being its westerly boundary. Acquisitions over the last 20 years have increased its size to 1,818 acres which includes significant forest cover and some agricultural fields.



Dudgeon Lake WMA is an excellent example of a floodplain landscape. Because the area is subject to floods, particularly during the spring, much of the area is covered with flood-tolerant trees and shrubs. Since 2008 there have been numerous flooding events on this property. Due to flooding and its location immediately adjacent to the Cedar River the soils on this site range from excessively (sandy) well-drained to poorly-drained. The terrain on most of this property is generally flat.

Scattered throughout this floodplain timber are many isolated potholes and crescent-shaped bodies of water known as oxbow lakes. These oxbow lakes are actually old abandoned segments of the Cedar River that were cut off and left behind when the river changed its location on the floodplain. Several of these old river channels or oxbows have been enhanced by the addition of earthen dikes and water control structures. The floodplain timber is also broken up by numerous grassy openings and small crop fields. In addition, the area is fringed by upland timber along its north and east side. This rich interspersion or mixing of habitat types is reflected in the wide variety of wildlife that is attracted to the area.

Numerous species of wildlife are known to use this complex of different landscapes. Fur and game species include deer, squirrels, raccoon, red fox, cottontail rabbit, coyote, bobcat, mink, beaver, and muskrat. Numerous small mammals are also on the area. Dudgeon Lake is popular with birding groups for the variety of warblers migrating through the area. Wood ducks, hooded mergansers and Canada geese nest on the wetland areas. Trumpeter Swans migrate along the Cedar River.

On July 11, 2011 a wind storm with wind speeds between 110 and 130 miles per hour moved through portions of Benton County including the Vinton area. This storm caused significant damage to houses, buildings, individual trees, and forest stands in the surrounding area. In the Dudgeon Lake WMA over 2,000 trees were topped or completely knocked over causing a tangled mixture of tree trunks and tops. The significant tree damage made it very difficult for a number of different wildlife species to traverse through large portions of the WMA, and the large fields of debris made the area tremendously unsafe for recreational users (i.e. hunters) of the property. Also, significant portions of this damage were visible from Highway 150 which is a main gateway into the community of Vinton. On a positive note there are a number of forested stands or pockets on the property that did not have significant amounts of large trees instead they had smaller pole-sized (5 to 12 inches in diameter) trees that were much less impacted by the wind storm.



Dudgeon Lake Wildlife Management Area Storm Damage from July 11, 2011 Wind Storm

In the winter of 2012/13 a salvage harvest was completed on ~437 acres in the southern portion of the property and a 1,000 plus downed, root lodged, and completely topped trees were harvested. The majority of the trees removed were cottonwood and silver maple, but there were damaged black walnut, ash, and bur oak also removed. In the winter of 2014/15 a bulldozer was used to push some of the storm/harvest debris in piles to create potential openings for natural regeneration of bottomland species such as silver maple and cottonwood and openings for the planting of tree seedlings of a variety of different bottomland species. In the spring of 2015 WMA staff and a crew of AmeriCorps volunteers hand planted a mix of ~1200 bur oak, pin oak, Kentucky coffeetree, swamp white oak, and sycamore seedlings from the State Forest Nursery.



Harvest operation winter of 2012/13



Piles of storm/harvest debris in spring of 2015



Caged Kentucky coffeetree fall 2015

Pin oak seedling fall 2015

Objectives –

- The primary management objective for this wildlife management area is for the production of wildlife, especially waterfowl, although the area is home to numerous forest and upland species of wildlife as well. The backwaters contain numerous fish species and is periodically flooded bring in any species that may exist in the Cedar River.
- The secondary objective is for the public recreationist with emphasis on hunting, trapping, and fishing.

Stand Descriptions

This area has been divided into 7 different stands or areas (See 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 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 to 4 inches in diameter measured at breast height (DBH) 4.5 feet off the ground), pole-sized (5 to 12 inches DBH), small sawtimber-sized (13 to 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

This stand was devastated by the 2011 wind storm. This area was salvage harvested in the winter of 2012/13. Only downed, root lodged, and completely topped trees were harvested. Since this was specifically a salvage harvest any trees with some quality living crowns were not harvested. The overstory (upper layer) of the remaining stand consists of scattered small sawtimber to large-sized silver maple and cottonwood, and a few honeylocust, green ash, bur oak, Kentucky Coffeetree, and black walnut. Many remaining trees have broken tops. The mid-story consists of scattered pole-sized hackberry.

The understory (lower layer) consists of scattered seedling to pole-sized hackberry, scattered seedling-sized silver maple, honeylocust, green ash, and white mulberry. In the winter of 2015 a bulldozer was used to pile downed storm/harvest residue to create openings for natural regeneration and some seedling planting.



Stand 1

Stand 2

As with stand 1 this stand was devastated by the 2011 wind storm. This area was also salvage harvested in the winter of 2012/13. Only downed, root lodged, and completely topped trees were harvested. The overstory (upper layer) of the remaining stand consists of scattered small sawtimber to large-sized silver maple, ash, cottonwood, and honeylocust. Many remaining trees have broken tops. There are some scattered pole to large-sized black walnut and a few large-sized bur oak in this upper layer along with scattered sapling to pole-sized hackberry, elm, honeylocust, and a few Kentucky coffeetree, red oak, and bur oak.

The mid-story consists of sapling to pole-sized hackberry and a few pole-sized black walnut. The understory (lower layer) consists of scattered seedling to sapling-sized hackberry, white mulberry, and hawthorn.



Stand 2

Stand 3

The overstory (upper layer) of this stand consists of some scattered pockets of small sawtimber to large-sized cottonwood, silver maple, honeylocust, and bur oak plus scattered to moderately dense pockets of sapling to pole-sized hackberry, elm, black walnut, ash, honeylocust, and a few Kentucky coffeetree, red oak, and bitternut hickory. There was significantly less storm damage from 2011 in these areas of pole-sized trees. There are also a few small sawtimber to large-sized black walnut. There is some scattered dead red oak in this stand that most likely died from the fungus that causes the disease oak wilt. The understory (lower layer) consists of scattered seedling to sapling-sized hackberry. The native shrubs dogwood, prickly-ash, and non-native invasive species garlic mustard and honeysuckle are also present in this lower layer.



Stand 3

Stand 4

The overstory (upper layer) of this stand consists of scattered small sawtimber to large-sized bur oak and a few red oak, and scattered to moderate dense pockets of pole-sized black walnut, honeylocust, red oak, hackberry, bitternut hickory, bur oak, and a few basswood. There is some scattered red oak that has died in this stand most likely from the fungus that causes the disease oak wilt. The understory (lower layer) consists of scattered seedling to sapling-sized elm and sapling-sized hackberry. The shrub layer in the understory includes spots of gooseberry, prickly-ash, chokecherry, and the non-native invasive shrub honeysuckle.



Stand 4

Stand 5

The overstory (upper layer) of this stand consists of scattered large-sized bur oak and pockets of scattered sapling to pole-sized black walnut, hackberry, bitternut hickory, ash, and a few red oak, honeylocust, and bur oak. The native shrub dogwood is scattered in the understory (lower layer) of this stand.

Stand 6

The overstory (upper layer) of this stand consists of scattered small sawtimber to large-sized silver maple, river birch, ash, and a few bur oak and red oak in spots. The understory (lower layer) of this stand consists of scattered seedling to sapling-sized ash. The native shrub dogwood is also present in this lower layer.

Stand 7

This stand sits a little above the main flood plain compared to most stands on this property. The overstory (upper layer) of this stand consists of scattered sapling to small sawtimber-sized red/black oak, honeylocust, black cherry, hackberry, river birch, cottonwood, silver maple, ash, and a few black walnut. The understory (lower layer) consists of scattered sapling to pole-sized hackberry. The native shrubs dogwood, chokecherry, and prickly-ash along with non-native invasive plants garlic mustard and honeysuckle are also present in this lower layer.

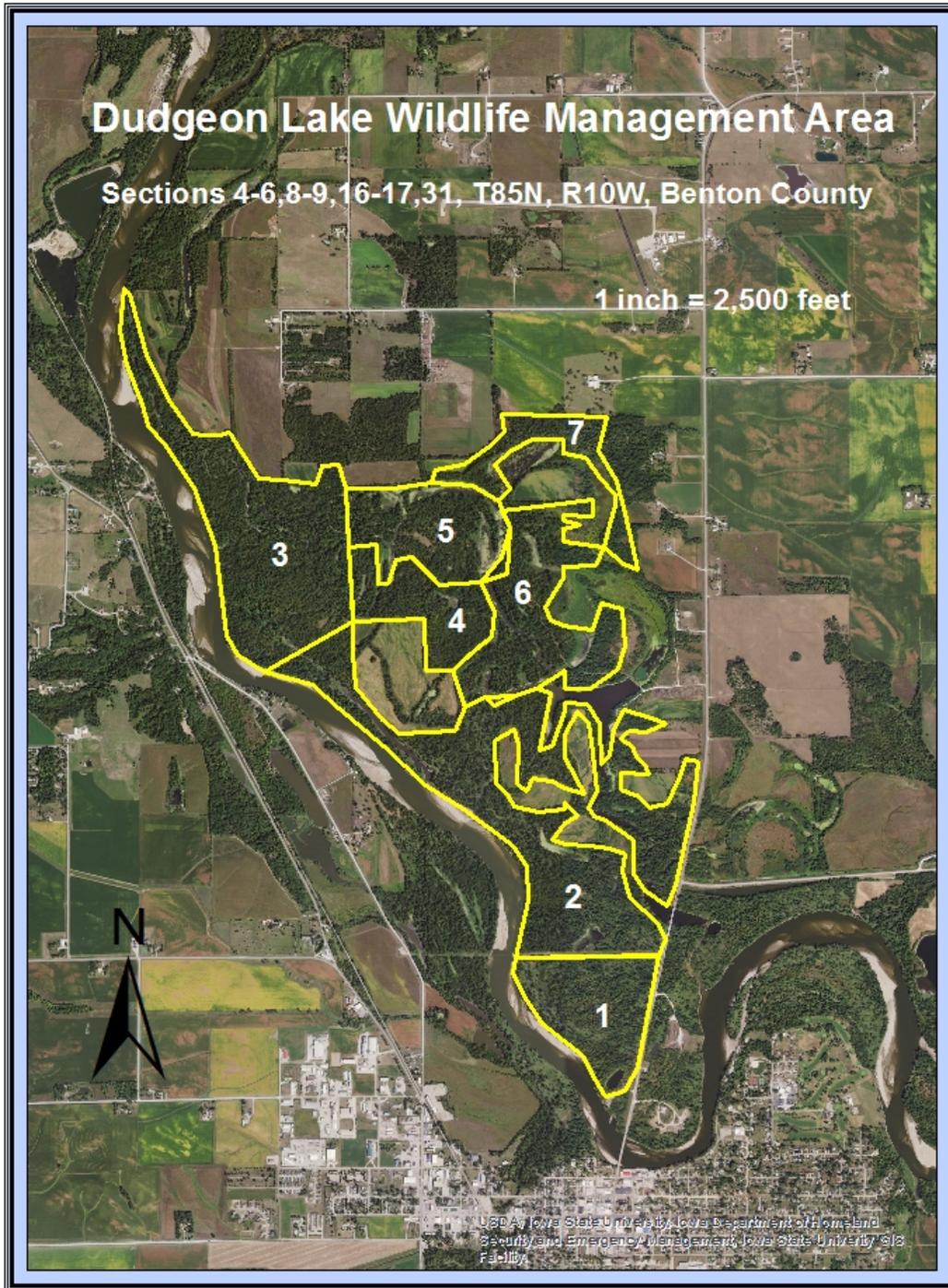


Figure 1. Aerial photo showing woodland cover in 2017 by stands 1 through 7

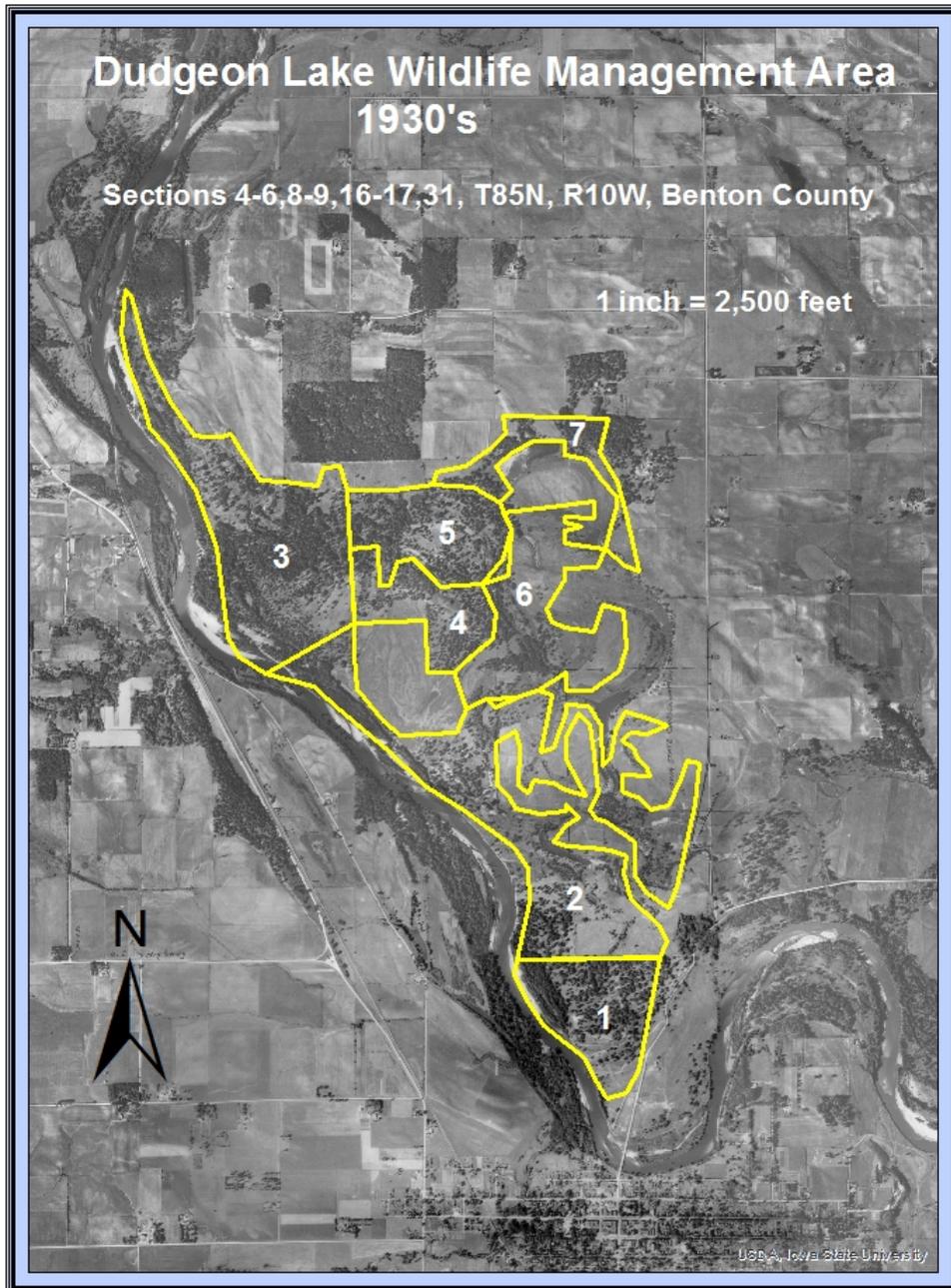


Figure 2. Aerial photo showing woodland cover in the 1930's

Current Conditions of Dudgeon Lake WMA Woodlands

To assess the current conditions of the woodland, the District Forester out of Iowa City walked the 1050 acres of 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 Dudgeon Lake WMA, only 10% of the remaining forest is larger than 18 inches diameter at breast height (sawtimber), 46% is between 13 and 18 inches in diameter (small sawtimber), and 44% of the remaining forest is pole-sized trees (5 to 12 inches in diameter). What this means is a significant portion of the large trees in a number of areas were destroyed during the 2011 wind storm, but 44% of the remaining trees are younger trees that sustained less damage during the 2011 wind storm. This means around 467 acres has trees that sustained minimal damage and will have an opportunity to continue to develop into the future. See Figure 3 for diameter distribution of overstory trees.

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 Dudgeon Lake WMA is as follows (See Figure 4):

Bottomland Hardwoods First Bench 56% Silver maple, cottonwood, green ash, river birch, willow, elm, etc.

Bottomland Hardwoods Second Bench 39% Silver maple, cottonwood, green ash, river birch, willow, elm, and black walnut, red oak, bur oak and bitternut hickory

Central Hardwoods

5% Mixed upland deciduous trees; no single species dominates

Understory Species/Regeneration

The understory of a woodland is that canopy 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 Dudgeon Lake WMA are as follows (See Figure 5):

Hackberry	70%
Hackberry-Elm Ash	16%
Cottonwood-Elm-Ash	14%

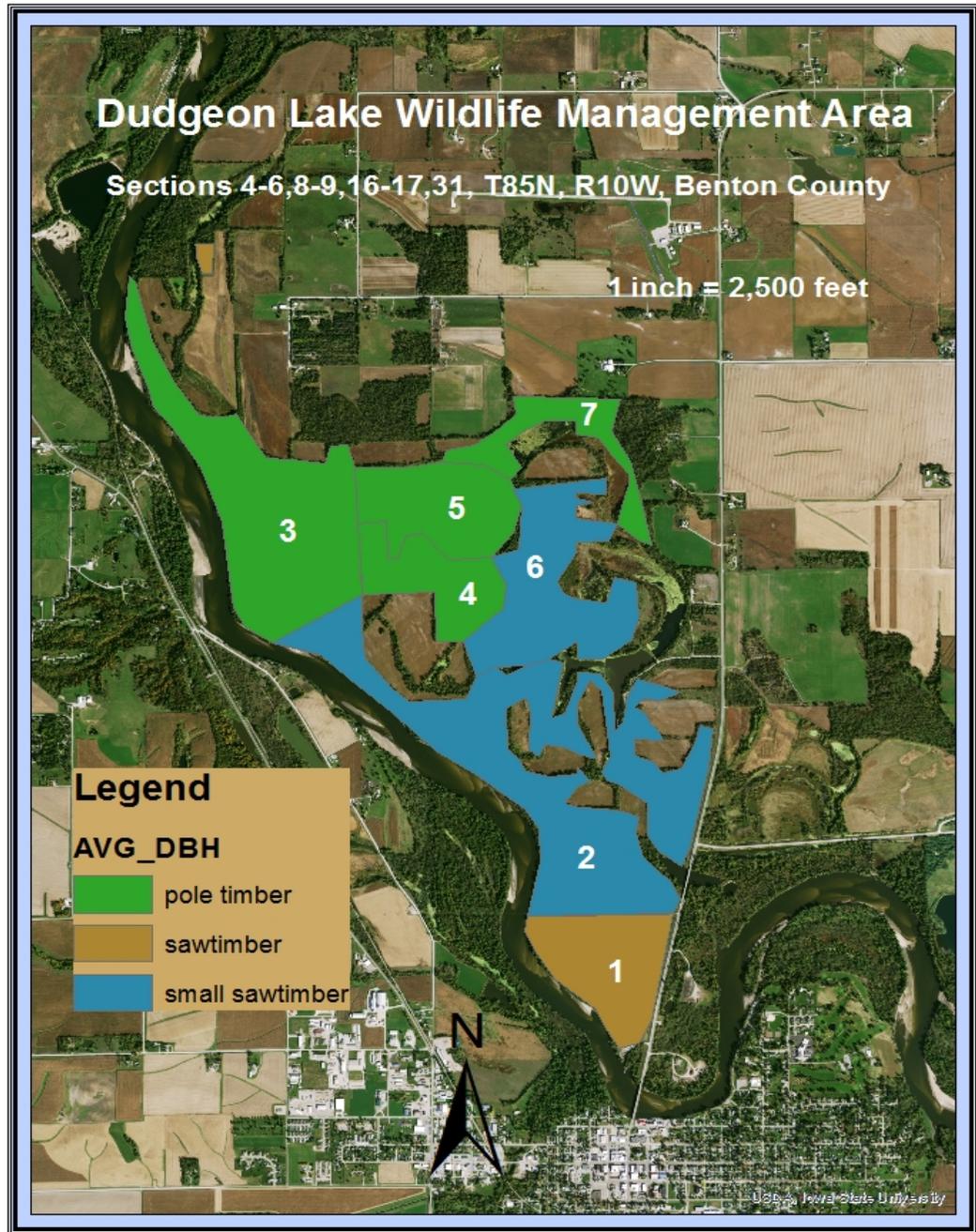


Figure 3. Average tree diameter of overstory trees stands 1 through 7

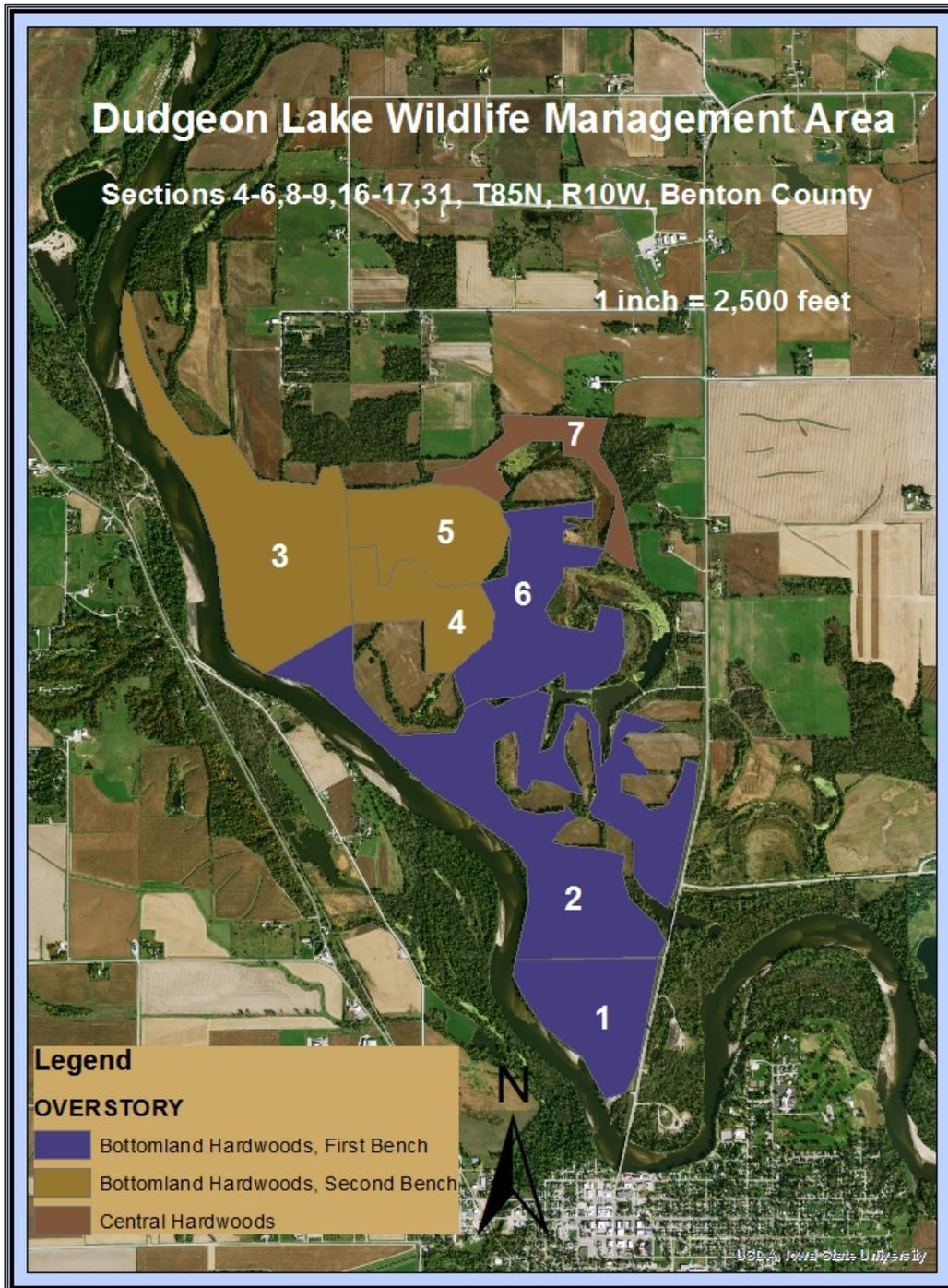


Figure 4. Forest type of overstory layer of stands 1 through 7

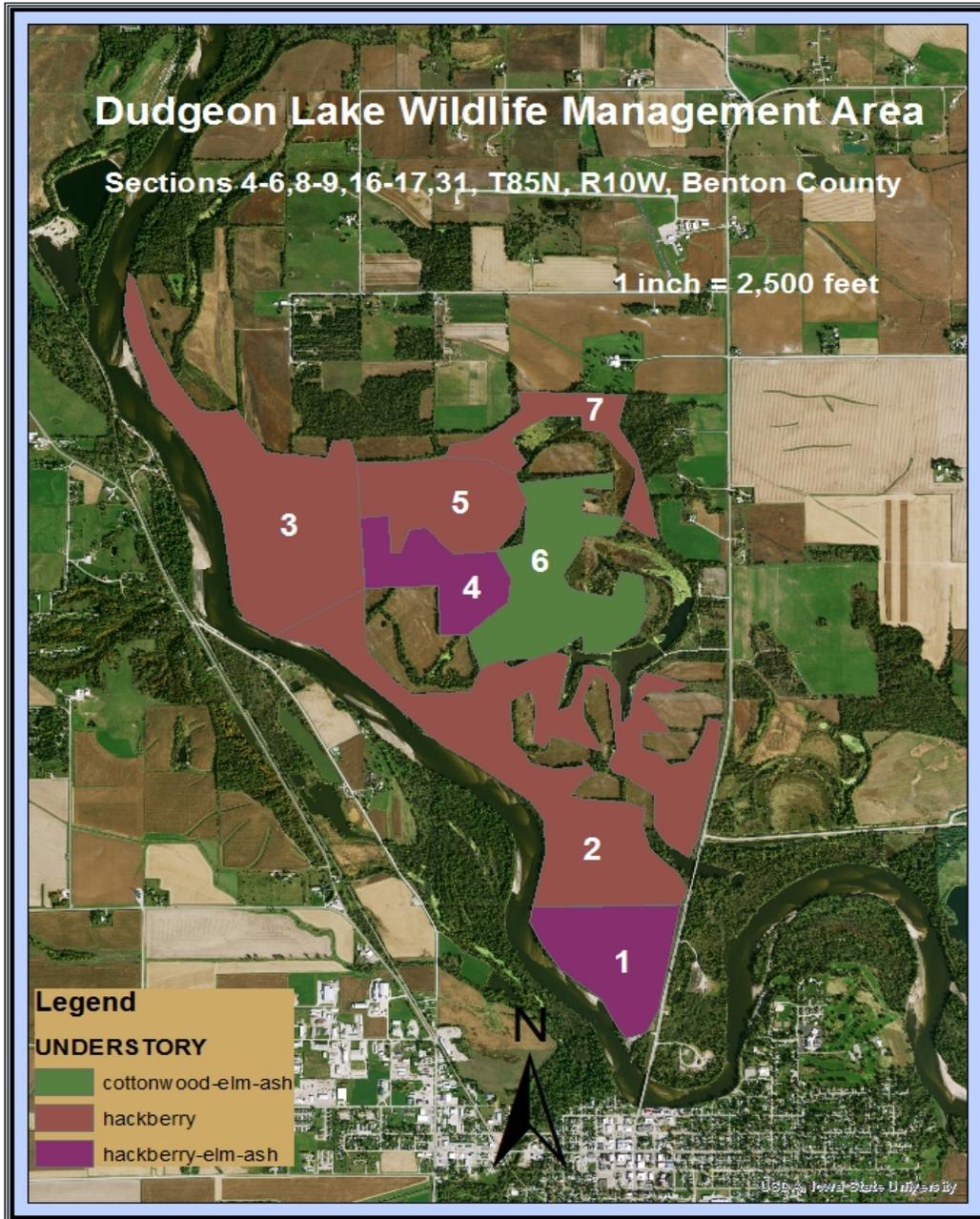


Figure 5. Tree species of understory forest layer of stands 1 through 7

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 Dudgeon Lake 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. Oak's aesthetic value is also arguably greater than the mix of trees that typically succeed it. 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) 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 Dudgeon Lake WMA is that 44% (~467 Acres) of the remaining forest is pole-sized trees (5 to 12 inches in diameter) and within these areas there are pockets of sapling to pole-sized red oak over ~76 acres. Red oak is not the dominant species in these areas but there is a good component.

Oak wilt which is caused by a fungus is present in stands 3, 4, and 7 in Dudgeon Lake WMA, and over the last few years this disease has killed a number of red and black oak on the property. Oak wilt is a major player in the decline of oaks, especially red oaks, 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, northern 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 Benton County. There is still remaining mature bur oak scattered in many of the woodland stands of Dudgeon Lake WMA. Continue to monitor for this disease on this property. For more information on this disease go to <http://fms.extension.iastate.edu/vod/video/2010BobPresentCIC.html> and/or http://na.fs.fed.us/pubs/palerts/bur_oak_blight/bob_screen.pdf.



Bur Oak Blight Symptoms July-August

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 Dudgeon Lake WMA, consisting of species like honeysuckle, white mulberry, and garlic mustard. These different non-native invasive species have the ability to out-compete native species and subsequently cause a decline in biodiversity and ecosystem health. Currently, 5 of the 7 stands (Stands 1,2,3,4, and 7) have some type of non-native invasive species becoming established. In the Dudgeon Lake WMA white mulberry and honeysuckle are the woody plants that currently create the biggest threat to the recreational potential of this property. If an aggressive/consistent effort is not started soon many 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

Garlic Mustard

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 your 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.

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

The Emerald Ash Borer was recently found in Benton County near Belle Plaine and in a number of counties immediately adjacent to Benton County. Emerald Ash Borer attacks and kills any and all species of ash, but the threat of this pest causing significant loss in Dudgeon Lake WMA has been significantly minimized by the substantial loss of this species during the 2011 wind storm.

The 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.

The Walnut Twig Beetle is not yet known to exist in Iowa, but has the potential to cause very serious harm to the state's black walnut population. It potentially vectors the recently discovered "Thousand Cankers Disease". Thousand Cankers Disease 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 are some young and mature black walnuts in a number of stands on this property. See the following site for specific information.
http://na.fs.fed.us/pubs/palerts/cankers_disease/thousand_cankers_disease_screen_res.pdf

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. Before the 2011 wind storm there was significant mature woodlands on this property, but now after the storm and 2012/2013 harvest there are significant areas that are open that will have the potential to establish some early successional habitat. Even though much of the mature late-successional forest cover was significantly reduced on this property there is a significant component of pole-sized trees (5 to 12 inches in diameter) (~44% and 467 acres) in fairly good condition that will have an opportunity to continue to develop into mature woodland in the future.

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 on a routine basis. ***There are still many trees on this property that have broken and hanging branches due to the 2011 windstorm, so it will be critical to monitor any trails or roads on the property for risk tree situations.***

Inventory of Rare, Threatened, and Endangered Flora & Fauna

The State's Natural Areas Inventory database was reviewed for the presence of any rare, threatened, or endangered species in Dudgeon Lake WMA woodlands. Multiple Species Inventory & Monitoring records indicate that Red-Shouldered Hawks were definitely on territory at Dudgeon Lake in 2009. There are records of this species nesting at Dudgeon Lake going back about twenty-five years, so it is valid to assume Red-shouldered Hawks are still nesting in the vicinity. Red-Shouldered Hawks prefer nesting in areas of closed forest canopy, so to prevent any damage to potential nesting sites any proposed harvest sites in the future will be monitored starting in March for active nesting, and if any nest sites are identified harvesting will be restricted within a 350 foot radial distance from these sites during the nesting period.

Two other forest Species of Greatest Conservation Need that occur at this site are the Brown Creeper and Prothonotary Warbler. The Yellow-crowned Night-heron is also found in similar habitats where the creeper and warbler are found. To promote valuable habitat for woodpeckers, Prothonotary Warbler, and Brown Creeper, as well as for a large number of other species a minimum of 7-10 standing dead trees per acre were left during the 2012/13 harvest operations.

To protect potential nesting sites of the Yellow-crowned Night-heron future harvesting activities will not be carried out during the nesting season (May through August).

Follow management guidelines related to the Northern Long Eared Bat (NLEB). Tree removal should not occur within .25 miles of a known hibernaculum. Do not cut or destroy a known occupied maternity roost tree, or any other trees within a 150 foot radius from the maternity roost tree, during the pup season (June 1 through July 31). NLEB can occur in any county, unlike the Indiana Bat. Known hibernaculum and roost trees in the state can be found at: <https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/IowaNLEBHibernaculaAndRoostsByTWPO3May16.pdf> At this point in time there have been no known hibernaculum and/or roost trees found in Benton County.

In the past plant species of Special Concern Cleft Phlox (*Phlox bifida*) and Rock Spikemoss (*Seaginell rupestris*) have been observed in open sandy areas on Dudgeon Lake WMA. An on-site environmental review must be done in all management units prior to the commencement of work such as tree harvesting to assess the presence and abundance of these or other rare, threatened, or endangered species and to ensure no harm is done to them.

Desired Future Conditions and Goals for Dudgeon Lake 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 Dudgeon Lake WMA include:

- Continue to promote a diversity of new growth of forest trees (i.e. silver maple, cottonwood, sycamore, Kentucky coffeetree, bur oak, swamp white oak, river birch, and pin oak) in new openings of stands 1, 2, and parts of 3 through active forest management and tree planting.
- In areas like stand 1, 2, and parts of 3 where new forest growth is being promoted make efforts to minimize the spread of woody non-native invasive plants such as white mulberry and honeysuckle.
- Where possible promote the growth and health of sapling to pole-sized black walnut, red oak, bur oak, hackberry, red elm, and bitternut hickory. Stands 3, 4 and 5.
- 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 potential promote natural oak regeneration. Possible spots in stands 3, 4, and 5.
- Preserve and enhance habitat for unusual, threatened, rare, and endangered plants and animals.
- Provide high quality and safe recreational opportunities for WMA users.

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 Dudgeon Lake WMA. These “high priority” practices are summarized below and Table 1:

- In many of these stands vines are starting to cause heavy 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.



Vine cutting

Tree plantings

This will be limited in size and scope, and are generally done only where there are significant openings in stands 1, 2, or 3 to promote a diversity of species such as silver maple, cottonwood, sycamore, Kentucky coffeetree, bur oak, swamp white oak, river birch, and pin oak. Most plantings will involve the use of 17 to 24 inch or greater bare root seedlings and wildlife protectors (i.e. cages). For a minimum of 3 growing seasons attempt to minimize weed/grass competition with a registered herbicide or light cultivation (no more than 2 inches deep) in a 3 to 4 foot circle around the individual trees.



Spring 2015 tree planting stand 1

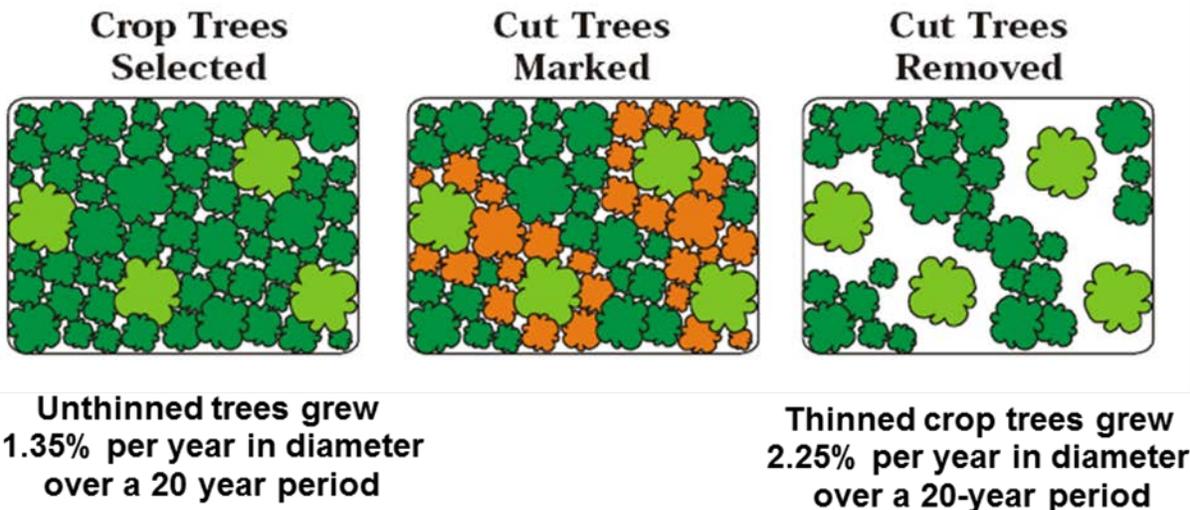
Immature Woodland Thinnings (Crop Tree Release)

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 those adjacent trees that are interfering with them are cut or killed to give them more space. In most stands, there are between 20 and 60 crop trees per acre that 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, and others.

This practice will have the following benefits:

- Enhance tree health, vigor, and resilience. Fast-growing trees that aren't crowded are better able to withstand attacks by pests such as gypsy moth, oak wilt, thousand 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.
- 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 3 stands (4, 5, and portions of 3) where 10 to 80 acres have been identified as good candidates for this practice. More information about crop tree release can be found at http://www.na.fs.fed.us/pubs/ctm/ctm_index.html.



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 can be done in either late fall or early spring. Use media and signage to inform the public of the burning work and smoke issues. Burning will be done in as many oak restoration stands as possible, subject to funding and staff resources.



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 3, 4, and 5. It will focus on removing non-oak woody species from the understory and midstory 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. **Follow label directions at all times!** 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.

Before

Weed Tree Removal

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	Unit (Acres/ Feet, etc)	Treatment Activity Short Description (or reference to description in Plan)	Dates		Incentive Program (s) Used?	Net Cash Flow (optional)	
			Planned	Completed		Cost	Income
All Stands	1050 Ac.	Monitor & Manage Invasive Species & Monitor Forest Health & Cut Vines on desirable trees	Ongoing				
Open spots 1,2, & 3	½ acre to 1 acre pockets	When there are open spots plant a mix of bottomland species swamp white oak, Kentucky coffeetree, pin oak, limited bur oak, silver maple, and sycamore seedlings and protect with wire cages	Spring of 2018 through 2022				
Portions of 3,4,5	30 to 80 Ac.	Crop Tree Release to improve growing conditions for quality oak, black walnut, bitternut hickory, hickory, Kentucky coffeetree, black cherry, and black walnut	Winter between 2017 and 2022				
Portions of 3, 4, & 5	1 to 15 Acres	Weed Tree Removal to create open oak woodland in selected locations	Winter between 2017/18 & 2022				
Portions of 3, 4, & 5	1 to 15 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

Since the 2011 wind storm destroyed most of the merchantable trees on the Dudgeon Lake WMA and the remaining stands of trees are generally young the stands will be re-evaluated in 20 plus years to determine if there will be any need for planned harvest. 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:

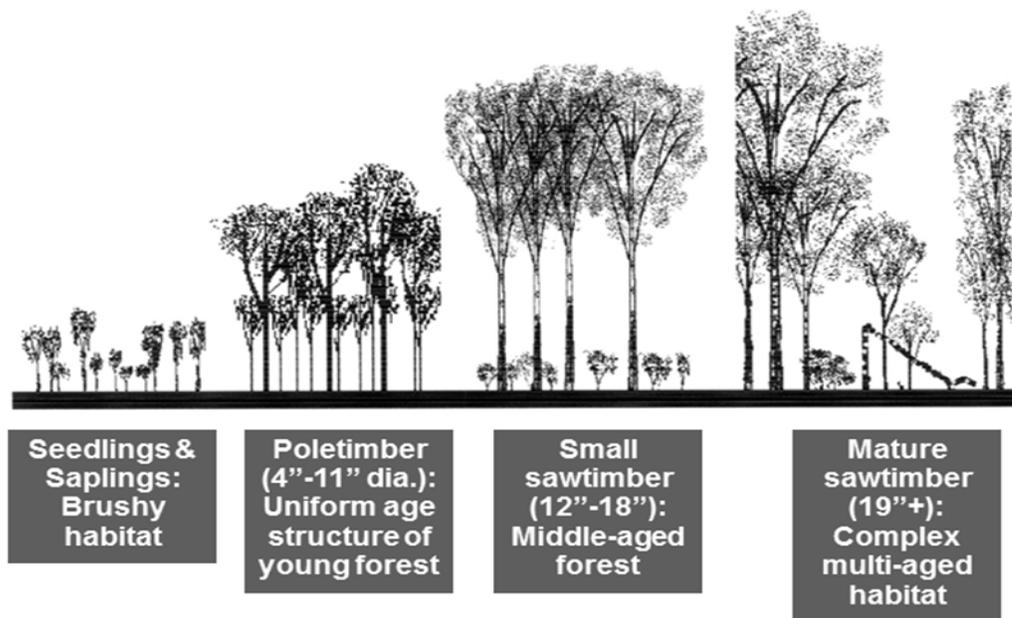
- Any work involving heavy equipment will only be done during times when the ground is frozen and not wet. This prevents compaction of the soil and also protects the fragile herbaceous plants of the forest floor
- No weed tree or crop tree release debris is to be left in streams or flow pathways
- Pesticides used for invasive species control are to be applied in the appropriate dosage and at the proper time, according to product label

All other considerations and best practices for protecting water & soil resources are discussed in Iowa's Forestry Best Management Practices manual, available online at www.iowadnr.gov.

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 (cutting 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, black-billed cuckoo, yellow-billed cuckoo, eastern towhee, 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 and woodpeckers. Fallen logs & tree tops house or hide animals on the ground such as whitetail deer, 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 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 habitat. In southern Iowa, it’s a useful practice to help quail, woodcock, pheasants, and other wildlife. There are no stands in Dudgeon Lake WMA under this management system specifically, but it should be noted that the 2011 wind storm and 2012/13 salvage harvest created significant amounts of openings in stands 1 through 3 which is currently developing into early successional habitat.

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; beyond that, it is considered a forest “gap” or “opening”. All 7 stands a total of 1050 acres are under even-age management in Dudgeon Lake WMA. This includes some stands which are immature and will undergo thinning. It should be noted that the majority of mature/harvestable tree stands were destroyed during the 2011 wind storm, and it will be 50 plus years before any of the remaining pole-sized stands of trees would be evaluated for potential harvesting.

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 active uneven-age management at Dudgeon Lake 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 in Dudgeon Lake WMA designated as viewshed areas.

Table 2. Habitat Preferences for Species of Greatest Conservation Need in eastern Iowa.

Group	Common Name	Preferred Habitat (From Tables 14 & 15 in Iowa Wildlife Action Plan)
Breeding Birds	Black-Crowned Night Heron	Wetlands ringed with shrubs
	Yellow-Crowned Night Heron	Prefers mature lowland woods
	Osprey	Wetland, riparian forest
	Bald Eagle	Riparian forest, deciduous forest
	Red-Shouldered Hawk	Riparian forest
	Broad-Winged Hawk	Large contiguous deciduous forest
	Swainson's Hawk	Savanna, open woodland
	Peregrine Falcon	Riparian forest, deciduous forest
	American Woodcock	Moist, brushy woodlands w/ openings
	Black-Billed Cuckoo	Woodland thickets w/ 2' to 6' shrubs
	Yellow-Billed Cuckoo	Woodland thickets w/ 4' to 8' shrubs
	Long-Eared Owl	Woodland-grassland interface
	Whip-Poor-Will	Ungrazed forest w/ open understory
	Red-Headed Woodpecker	Oak savanna w/ snags
	Acadian Flycatcher	Riparian areas of large unfragmented forests
	Willow Flycatcher	Willow thickets on wetland edges
	Veery	Moist forests w/ low tree & shrub understory
	Wood Thrush	Mature, moist forest with closed canopy
	Northern Mockingbird	Thickets of savanna or very open woodland
	White-Eyed Vireo	Woodland edge brushy habitat
	Bell's Vireo	Thickets in savanna/grasslands
	Blue-Winged Warbler	Overgrown brushy areas in forest clearings
	Cerulean Warbler	Large, mature, unfragmented forest
	Black-and-White Warbler	Large, mature, unfragmented forest
	Prothonotary Warbler	Swampy, mature riparian forest
	Worm-eating Warbler	Large, unfragmented forests w/ shrub understory
	Louisiana Waterthrush	Large, mature forests with permanent streams
	Kentucky Warbler	Riparian ravine areas within forest understory
	Hooded Warbler	Large, mature, unfragmented forest
	Yellow-Breasted Chat	Early successional woodland
Eastern Towhee	Brushy, wooded edges of woodland	
Field Sparrow	Brushy successional habitat	
Migratory birds	Golden-Winged Warbler	Woodland openings with brush and grass
	Canada Warbler	Mature forest with shrubby undergrowth
	Rusty Blackbird	Shrubby wetlands

Mammals	Evening Bat	Forest, riparian areas
	Indiana Bat	Forest, riparian areas
	Northern Myotis	Forest
	Woodland Vole	Forest
	Bobcat	Forest, woodland, grassland
Butterflies	Pepper and Salt Skipper	Woodland edges
	Pipevine Swallowtail	Forest, open fields, and roadsides
	Dreamy Duskywing	Woodland openings or edges
	Olympia Marble	Open woodlands
	Zabulon Skipper	Brushy openings
	Edward's Hairstreak	Forest edge or clearings
	Striped Hairstreak	Forest openings and edges
Group	Common Name	Preferred Habitat (From Tables 14 & 15 in Iowa Wildlife Action Plan)
Reptiles & Amphibians	Central Newt	Well vegetated woodland pools
	Smooth Green Snake	Open shrubland
	Bullsnake	Deciduous woodland edge

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 to 30 percent 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 inches diameter and above are felled to permit full access to sunlight for all seedlings on the ground.

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.



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