FOREST WILDLIFE STEWARDSHIP PLAN

FOR

DUDGEON LAKE WILDLIFE MANAGEMENT AREA

Developed by:

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District Forester

And

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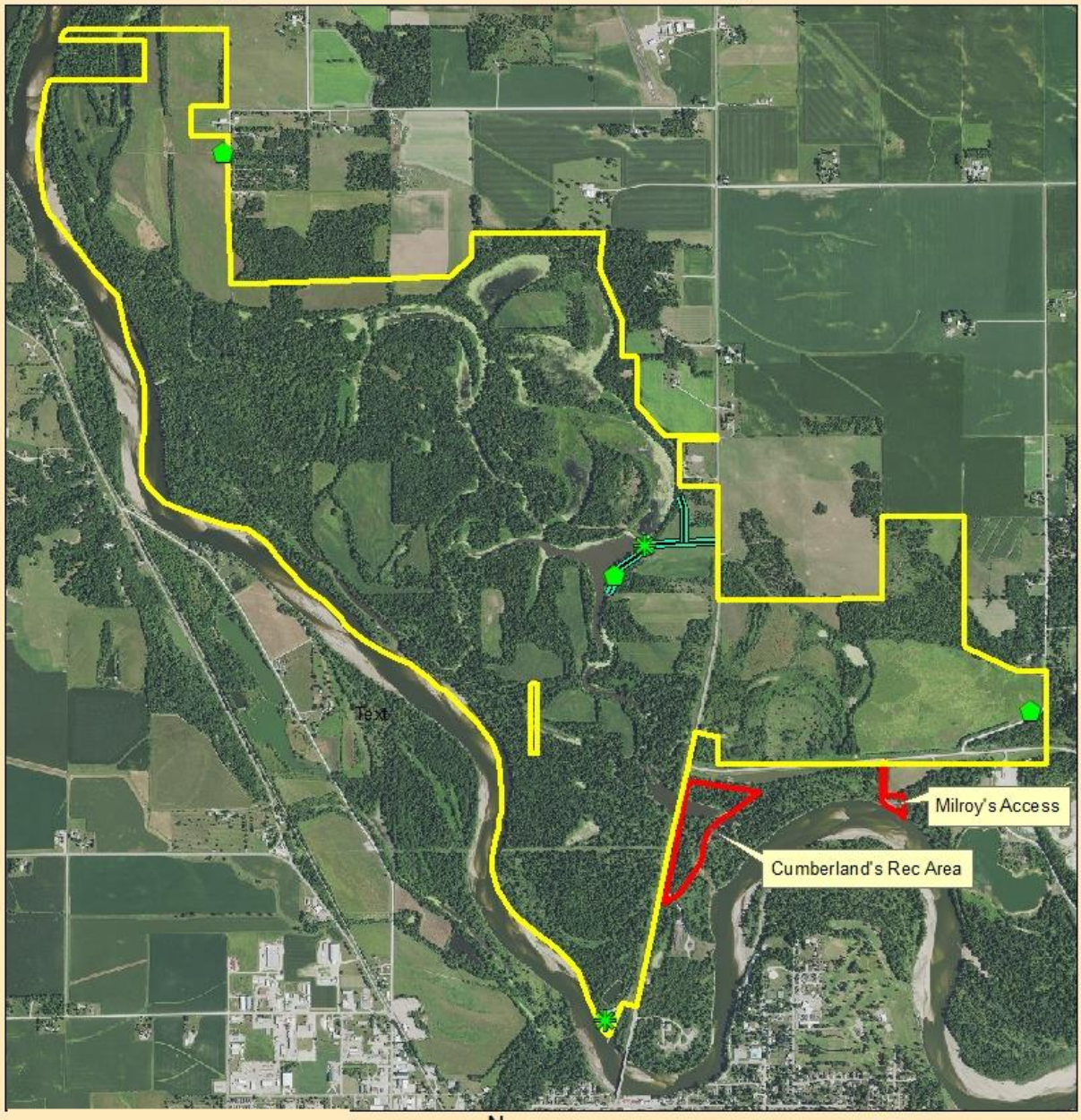
Dudgeon Lake Wildlife Management Area



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Contact: Rodney Ellingson
Iowa River Wildlife Unit
641-751-9767

Acres: 2039

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

Species: Deer, Squirrel, Dove, Pheasant, Waterfowl

FOREST WILDLIFE STEWARDSHIP PLAN
FOR
DUDGEON LAKE WILDLIFE MANAGEMENT AREA

MANAGER:
Rodney Ellingson
Wildlife Biologist
2805 Highway E66
Chelsea, IA 52215
641-751-9767

LOCATION:
Sections 4, 5, 6, 8, 9, 10, 16, 17, & 31, T85N, R10W, Benton County

TOTAL & WOODLAND ACRES: 2,047 & 1,069

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 some nest in the area. 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 1069 acres addressed in this plan are outlined on the attached aerial photos. The forested areas are divided into 8 different areas or stands, labeled 1-8 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 2023 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 2,047 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 called a Derecho 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 (portions of stands 3, 4, 5, & 7) 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 Derecho

In the winter of 2012/13 a salvage harvest was completed in the southern portion of the property (Stands 1 & 2) 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 in stand 1 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. A number of these seedlings survived initially, but with an increase in flooding events including high water in the month of December in one case overall survival has been limited. Thanks to the new openings there has been some natural regeneration of Kentucky coffeetree in some locations of stand 1.

Harvest operation winter of 2012/13

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 bringing in any species that may exist in the Cedar River.

- The secondary objective is for the public recreationist with emphasis on hunting, trapping, fishing, mushroom hunting, bird watching, and hiking.

Stand Descriptions

This area has been divided into 8 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 (~100.7 Acres)

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 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 consists of scattered seedling to pole-sized hackberry, scattered seedling-sized silver maple, honeylocust, green ash, Kentucky coffeetree, and white mulberry (non-native invasive species). 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. Flooding events after 2015 moved some of these debris piles from their original locations. In the spring of 2015 a mix of bur oak, pin oak, Kentucky coffeetree, swamp white oak, and sycamore seedlings from the State Forest Nursery were planted in spots. Due to significant and odd timing of flooding in the first few years after planting, overall survival has been limited.

Stand 1 Piles of storm/harvest debris in spring of 2015

Stand 2 (`337.6 Acres)

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 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 is 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 consists of scattered seedling to sapling-sized hackberry, white mulberry, and hawthorn.

Stand 2

<u>Stand 3 (~235.9 Acres)</u>

The overstory 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 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. In 2018 ~30 acres of crop tree release to improve growth of selected black walnut, red oak, and Kentucky coffeetree was completed during the winter months. In the winter of 2022 where there were two small pockets of large-sized bur oak, removal of non-oak understory trees was completed to create open oak habitat.

Stand 3

Stand 4 (~76.2 Acres)

The overstory 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 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. In 2018 ~35 acres of crop tree release to improve growth of selected black walnut and oak was completed during the winter months.

Stand 4 Trees marked to be girdled in 2018

Stand 5 (~100.6 Acres)

The overstory 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 of this stand. In 2018 ~10 acres of crop tree release to improve growth of selected black walnut and oak was completed during the winter months. In the winter of 2022 where there was one small pocket of large-sized bur oak, removal of non-oak understory trees was completed to create open oak habitat.

Stand 6 (~145.6 Acres)

The overstory 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 of this stand consists of scattered seedling to sapling-sized ash. The native shrub dogwood is also present in this lower layer.

Stand 7 (~56.2 Acres)

This stand sits a little above the main flood plain compared to most stands on this property. The overstory 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 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. In the winter of 2020 a forestry mower was used to mow non-native honeysuckle in ~17 acres of this stand. In the following two growing seasons re-sprouting honeysuckle were spot sprayed with a broad spectrum herbicide.

~ 17 acres of understory forestry mowing winter 2020

Stand 7 Honeysuckle re-sprouts spring 2020

Stand 8 (~16.5 Acres)

As part of the newer Crisman Tract there was ~50 acres of scattered tree cover and as part of an Ornate Box Turtle habitat improvement project ~33 acres of scattered tree cover is being reduced significantly and stand 8 will include some of the remaining woodland cover. The overall quality of this stand is limited. The overstory of this stand consists of scattered sapling to a few small sawtimber-sized hackberry and white mulberry (non-native invasive species), sapling to pole-sized black cherry, pole-sized white elm and ash (ash is infested with Emerald Ash Borer (EAB), sapling to large-sized honeylocust, a few pole-sized bitternut and shagbark hickory, black walnut, eastern redcedar, bur oak, a few small sawtimber to large-sized black oak, and on the south edge a few sapling to large-sized river birch. The understory consists of scattered seedling to sapling-sized hackberry. The native shrubs dogwood, gooseberry, and prickly-ash along with non-native invasive plants honeysuckle and burning bush euonymus are also present in this lower layer. These non-native invasive shrubs are very dense across this stand.

Stand 8 **Very dense non-native invasive shrubs**

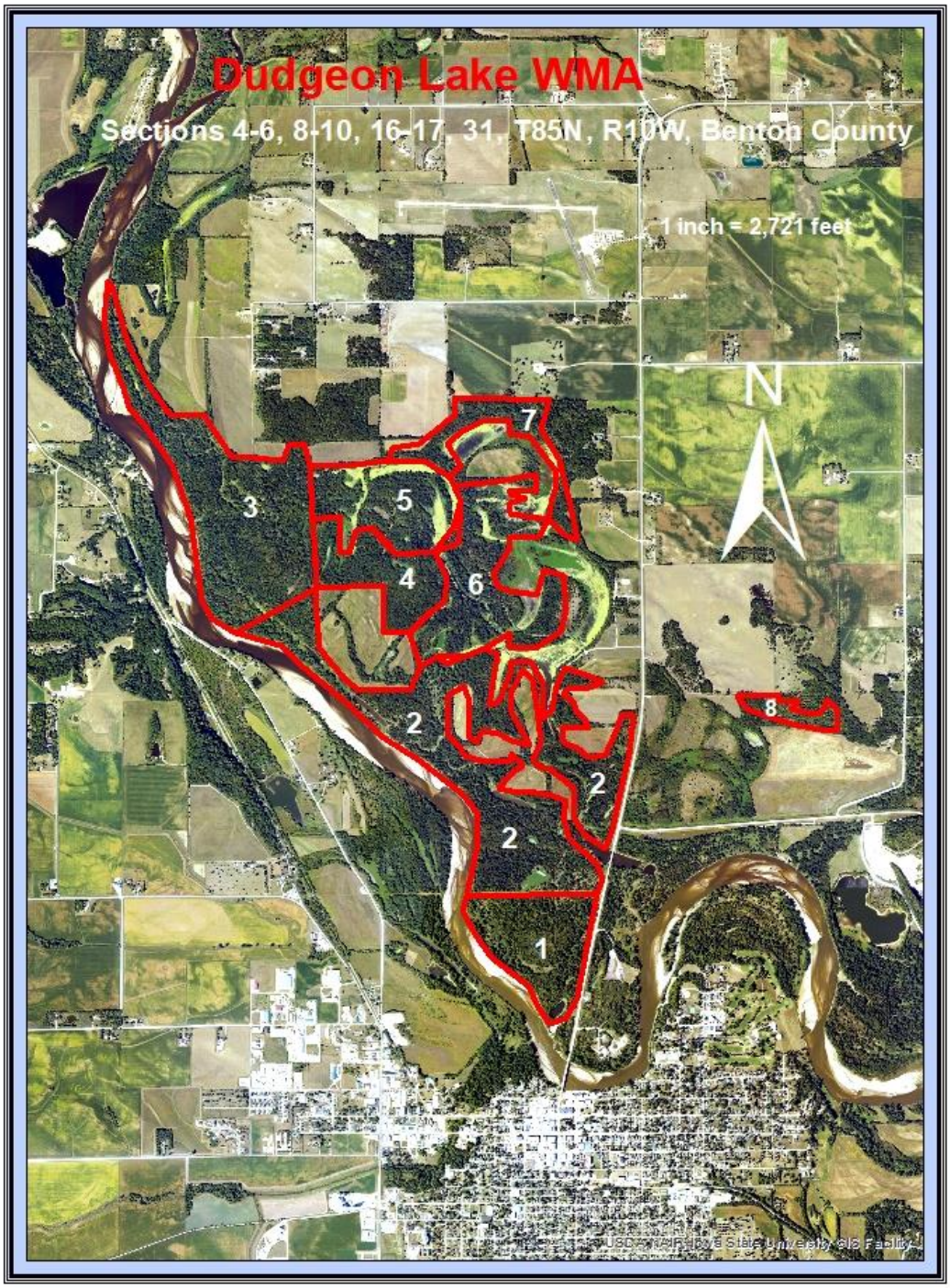


Figure 1. Aerial photo showing woodland cover in 2023 for stands 1 through 8

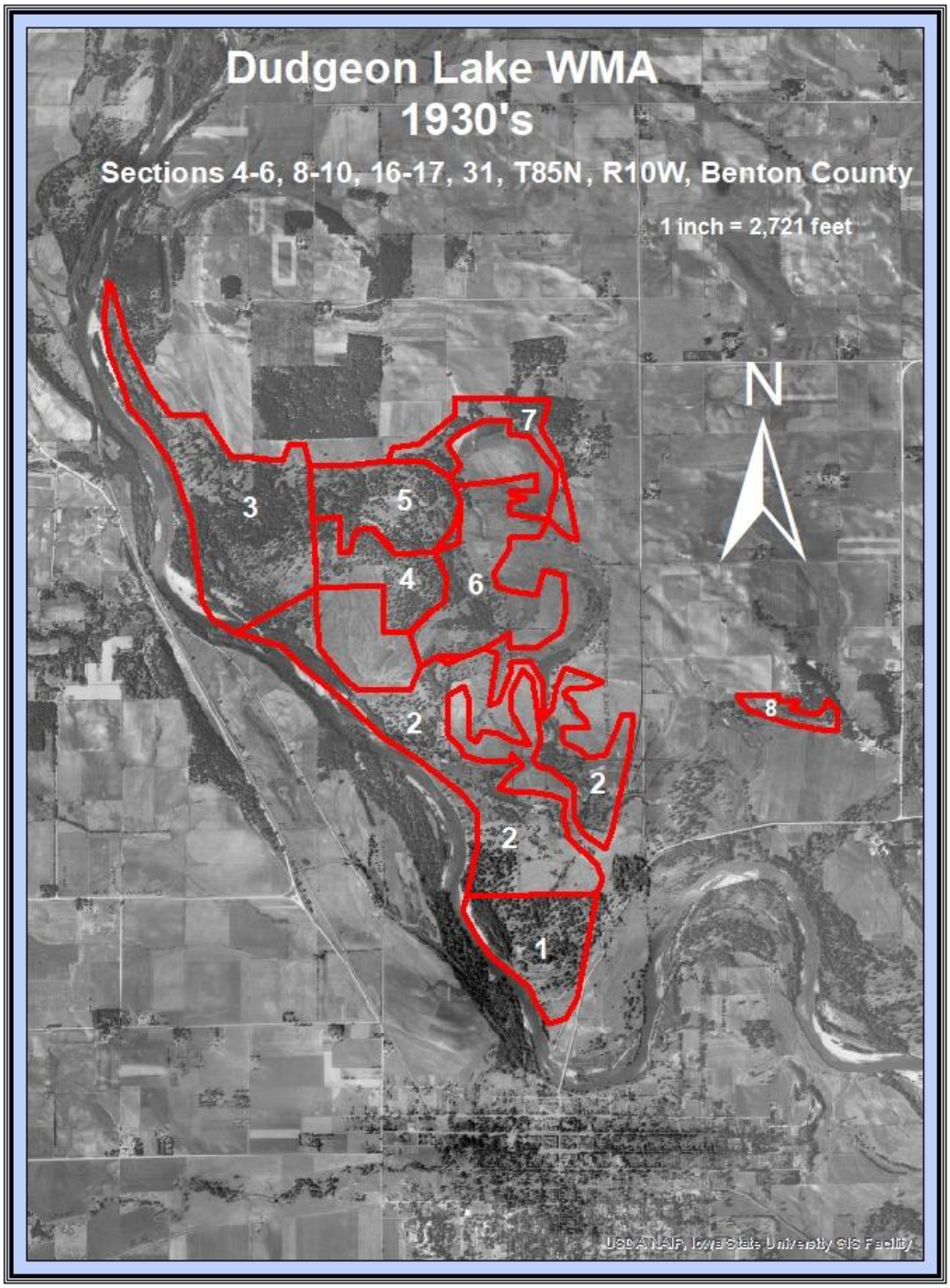


Figure 2. Aerial photo showing woodland cover in the 1930's

Current Conditions of Dudgeon Lake WMA Woodlands

Before 2018 to assess the current conditions of the woodland for the original plan, the District Forester walked the 1050 acres of forest cover at that time 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. Since 2018 the District Forester has revisited many portions of these stands for a variety of reasons and has been able to continue to monitor these areas, plus the additional woodland acres on the newer Crisman Tract were walked in the early winter of 2023 for the purpose of adding information to this revised plan.

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 in diameter at breast height (sawtimber) and much of this was damaged by the 2011 Derecho, 45% is between 13 and 18 inches in diameter (small sawtimber), and 45% 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 Derecho, but 45% of the remaining trees are younger trees that sustained less damage during the 2011 Derecho. This means around 485 acres has trees that sustained minimal damage and will have an opportunity to continue to develop into the future. Not all of these acres are 100% pole-sized trees but there are significant numbers of these sized trees acres in these areas. 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 55% Silver maple, cottonwood, green ash, river birch, willow, elm, etc. *Most of the ash has died

Bottomland Hardwoods Second Bench 39% Silver maple, cottonwood, green ash, river birch, willow, elm, and black walnut, red oak, bur oak and bitternut hickory. *Most of the ash has died

Central Hardwoods
6% 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). Across this property in general hackberry is the most common understory tree. This means hackberry could be a significant component long-term in the future overstory of this property.

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

*Most of the ash has died

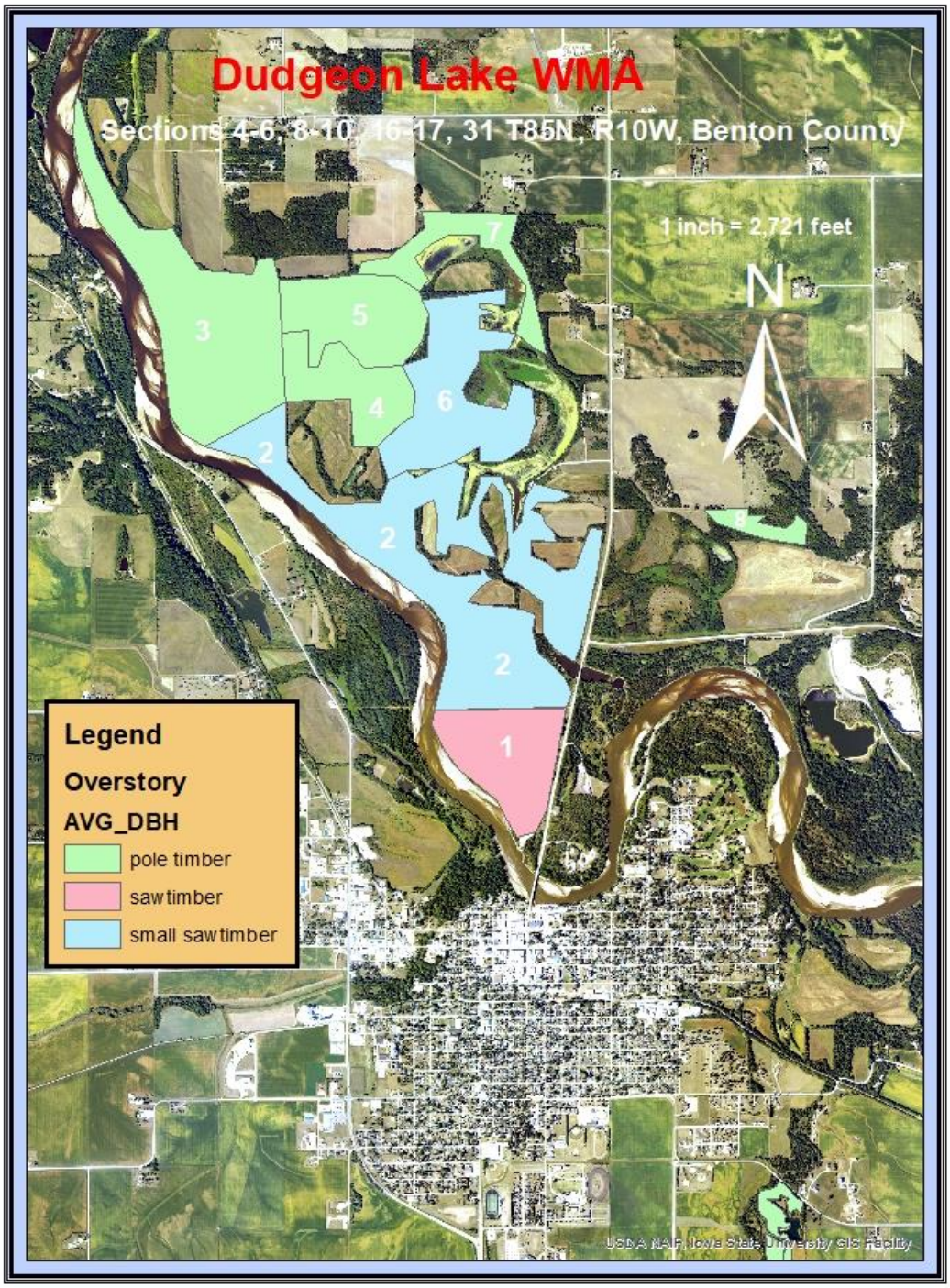


Figure 3. Average tree diameter of overstory trees stands 1 through 8

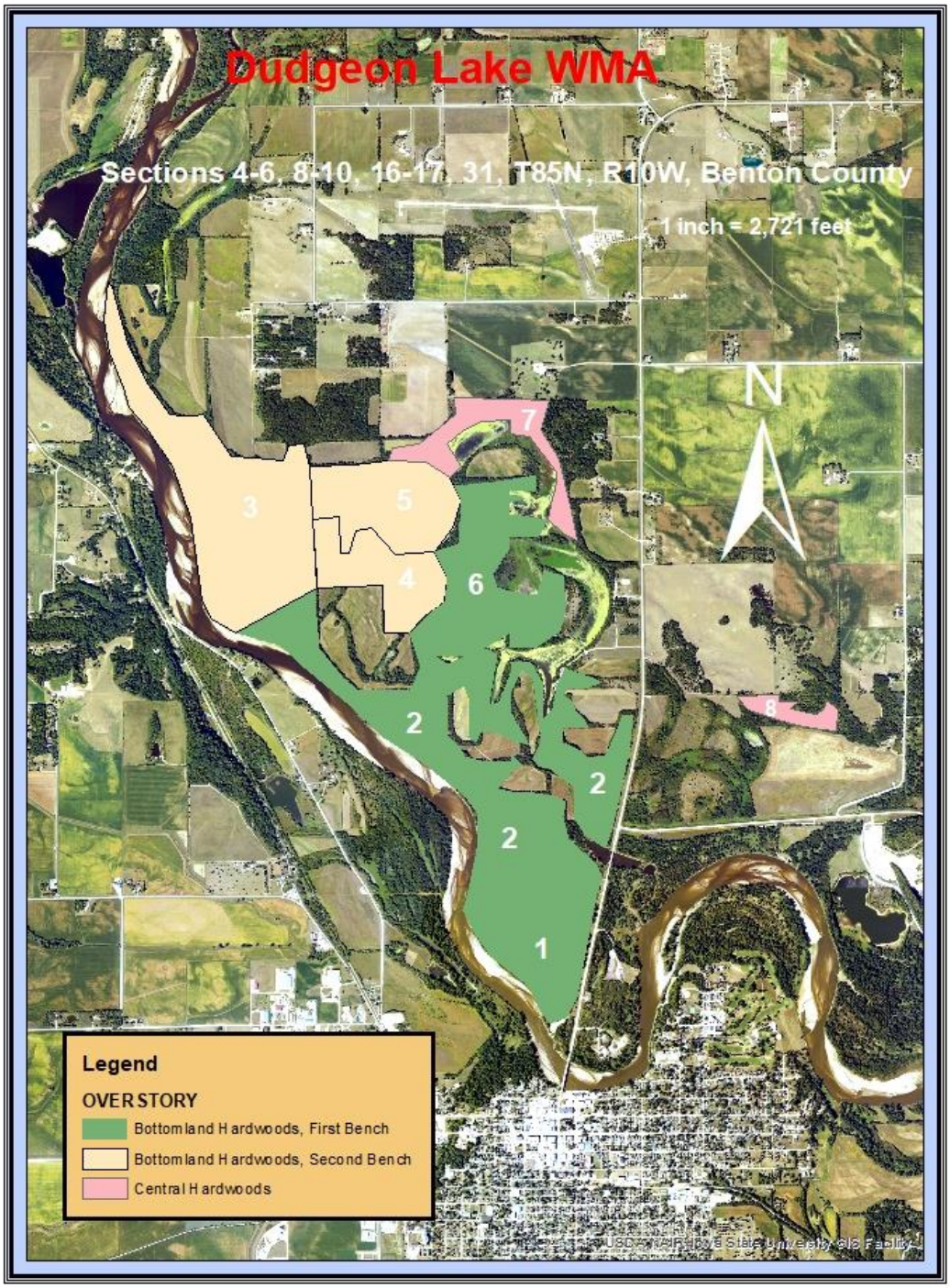


Figure 4. Forest type of overstory layer of stands 1 through 8

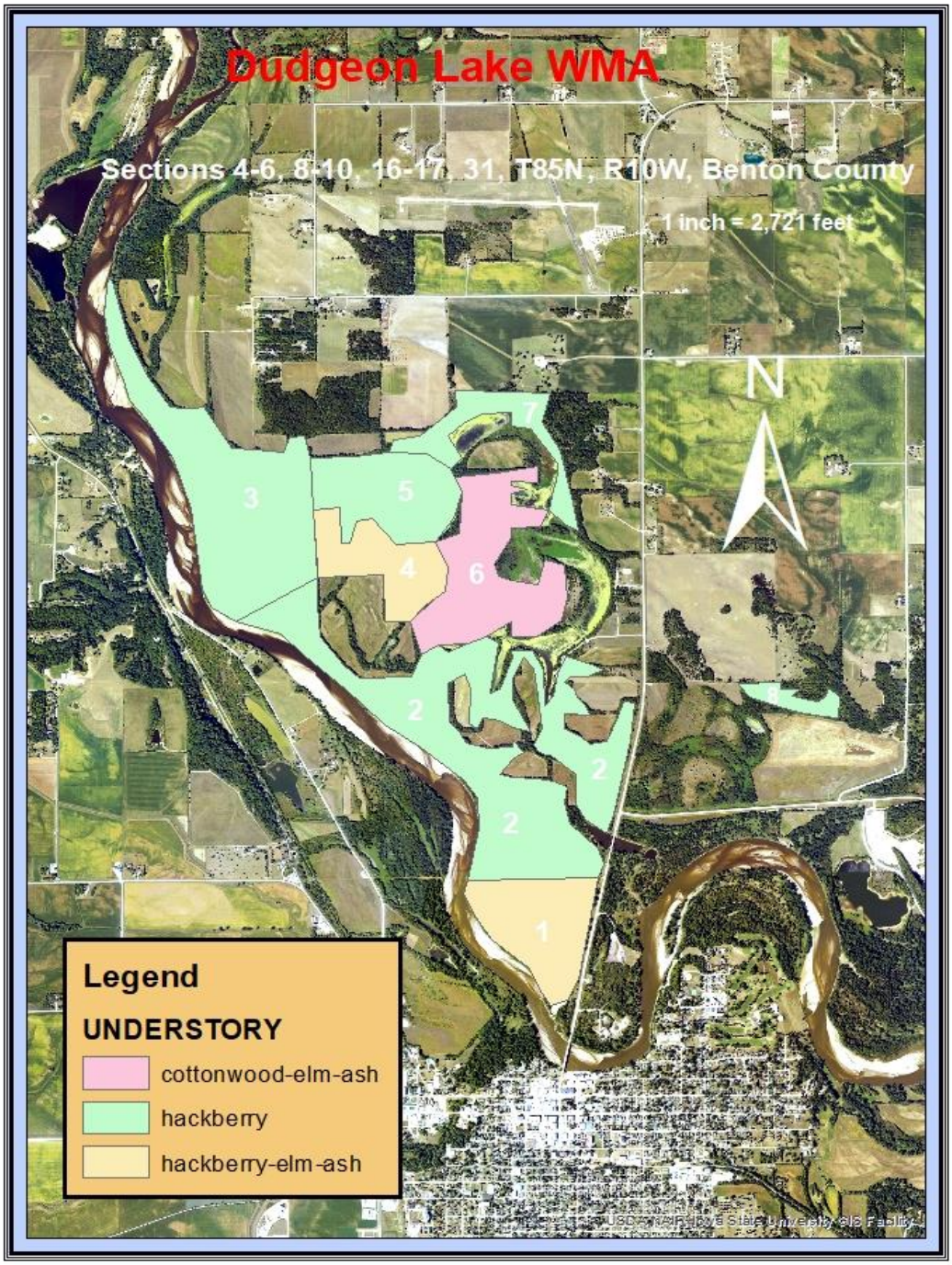


Figure 5. Tree species of understory forest layer of stands 1 through 8

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" significant acres of oak as the old oaks die and do not replace themselves. The good news for Dudgeon Lake WMA is that 45% (~485 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 (including black 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. There is significant black oak in the Crisman Tract. 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 or wound 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.

Bur Oak Blight Symptoms July-August

Invasive Plant Species

Non-native invasive plant species that are introduced to an ecosystem without any competition can become invasive and disruptive to the balance of the natural ecosystem. Non-native invasive species have the ability to out-compete native species and subsequently cause a decline in biodiversity, recreational accessibility, and ecosystem health. **This is not something that will be accomplished over-night; instead it will have to be a long-term commitment and effort to manage many of these plants.** Non-native invasive 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, burning bush euonymus, multi-flora rose, Amur corktree (possible stand 7), Oriental bittersweet (possible stand 8), and garlic mustard. Currently, 6 of the 8 stands (Stands 1,2,3,4,7, & 8) have some type of non-native invasive species becoming established. In the Dudgeon Lake WMA white mulberry, honeysuckle, burning bush euonymus, and Oriental bittersweet (if present in stand 8) are the woody plants that currently create the biggest threat to the recreational potential of this property.

Starting in 2020 a significant effort was started in a portion of stand 7 to manage understory non-native woody invasive species such as honeysuckle. If an aggressive/consistent effort is not continued across this property 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

Autumn Olive

Oriental bittersweet

Multi-Flora Rose

Burning Bush Euonymus

Amur Corktree

There is not one method in most cases that works in managing non-native invasive plant species, and it often takes an array or collection of methods to reach success. Below are a few methods that can be considered depending on the specific target plant (s):

- 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. Pulling works best for plants 3 feet tall or less. Avoiding pulling and digging plants greater than 3 feet tall to minimize site disturbance.

Pulled honeysuckle hung from tree

- Cut trunk(s) and treat stump(s) with registered herbicide. Or single girdle trees standing and treat girdle with an appropriate herbicide. This treatment usually works best from late summer to late fall each year. **Follow Chemical Label Directions At All Times! Do not use any chemical with the active ingredient picloram (i.e. Tordon) for this purpose.**

Stump Treatment

Girdle Treatment

- Mow understory with a forestry mower or fecon and follow-up by treating re-sprouts with a registered herbicide. **Follow Chemical Label Directions At All Times!**

Mowed area Fecon

- Spot treat or basal bark spray target plants with registered herbicide.
- Utilize flash goat grazing to reduce and minimize plant populations and follow-up with cutting and treating with an appropriate herbicide.
- Prescribed (Rx) fire in specific situations (Must have a burn plan), and the Iowa DNR Prescribed Fire Policy must be followed. Prescribed fire is a good forest management tool if used correctly, but if not used correctly it can cause significant damage to the site.

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

The Emerald Ash Borer has been in Benton County for a number of years, and the majority of ash on this property are dead or will be dead within the next few years. The loss of ash due to this pest was significantly minimized by the substantial loss of this species during the 2011 wind storm (Derecho).

The Spongy 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 harm to the state's black walnut population. This beetle is being monitor across the state of IA annually by the Iowa DNR. It potentially vectors the disease "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.

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 (Derecho) 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) (~45% and 485 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. Go to Table 2 Habitat Preferences for Species of Greatest Conservation Need in eastern Iowa. In the future if any tree harvests are considered all management guidelines associated with any specific species found in the area will be followed.

Special Note on Northern Long-Eared Bat, Indiana Bat, and Tricolored Bat
For use with USDA and REAP funded projects

The Indiana Bat (*Myotis sodalis*) is a federal (50CFR Part 17) and state (Code of Iowa, Chapter 481B) endangered species that occurs in southern Iowa as far north as Highway 30. The Northern Long-Eared Bat (*Myotis septentrionalis*) is a federally Endangered Species that can occur in any county of Iowa. The Tricolored Bat (Perimyotis subflavus) is a federally Proposed Endangered Species that can occur in any county in Iowa. All three bats can be active from April through September in forested areas. Female Indiana bat and Northern Long-Eared Bats may roost and rear young in standing trees 3" DBH and larger, either dead or alive, with loose, shaggy, or peeling slabs of bark, cavities in the trunk or large limbs, or large cracks or openings. Tricolored bats roost in similar forested habitat but roost within leaf clusters instead of under loose bark.

To protect summer habitat for all three species of bats, adhere to the following guidance:

- Avoid felling any dead standing or live trees 3" DBH and larger that contain cavities, cracks or crevices, or loose, platy, peeling, or shaggy bark from April 1st through September 30th.
    - Such trees meeting the above criteria may be felled beginning October 1 through March 31; however, in all forest management projects, retain a minimum of 9 suitable habitat trees per acre if present above this rate.
    - Live trees may be girdled any time of year to create habitat snags in Forest Stand Improvement operations.
- Avoid conducting prescribed burns in woodlands from April 1st until September 30th.
    - If prescribed burning operations must take place after April 1st through September 30th, then protect trees 9" DBH and larger that contain cavities, cracks or crevices, or loose, platy, peeling, or shaggy bark.
- Avoid clearcuts, seed tree harvests, or site preparation projects larger than 10 acres that could negatively affect suitable habitat.

Ornate Box Turtle

Status
THREATENED and Species of Greatest Conservation Need. It is illegal to kill or collect this species by law in Iowa.

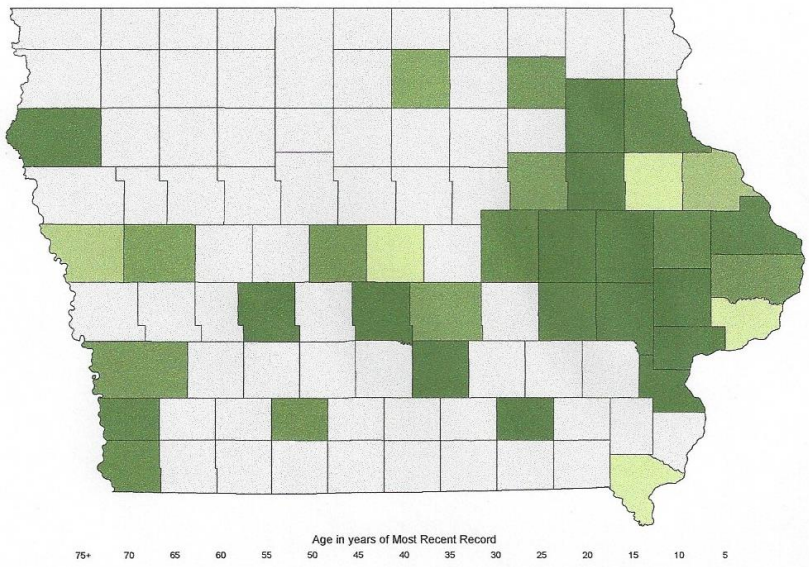
Description
The ornate box turtle is a truly unique Iowa turtle. It is the only turtle in Iowa that is fully terrestrial. Specimens grow to about 5 inches' carapace length. The carapace is high domed and quite tortoise-looking. It is uniquely marked with yellow radiating lines on a black or brown ground color. There is also a yellow vertebral stripe down the back. The fully developed plastron has a single front hinge that allows this turtle to completely close its shell. The plastron is yellow with many well defined dark wavy stripes. The skin color is dark, from black to olive, and there is numerous yellow, orange, or red spots on the front legs and head. The feet are not webbed and have a rather club-like appearance. Males have red or orange eyes and a longer tail with the cloacal opening past the marginals. Females usually have brown eyes and much smaller tails. Hatchling box turtles are similar to adults, but may have more yellow coloration on the shell. Subspecies. The subspecies found in Iowa is the plains box turtle, Terrapene ornata ornata.

Range

The box turtle is only found in few, small scattered populations along the Mississippi Alluvial plain in eastern Iowa, and in isolated pockets with suitable habitat in western, northwestern, and parts of eastern and southern Iowa.

Description: 4 - 5 inches. Ornate Box Turtles have a brown or black upper shell (carapace) with bright yellow dots and lines. The bottom shell (plastron) is a light yellowish color marbled with darker markings. Male Ornate Box Turtles usually have bright red eyes, while the eyes of female tend to be maroon, yellow, or green.

Similar Species: Blanding's Turtles have dark head with a bright yellow chin.



This map is generated from data provided by the Drake University Biodiversity Center, observations from HerpMapper.org, the Iowa DNR Natural Areas Inventory, as well as other sources. Please help us keep it up to date by reporting your sightings to HerpMapper.

Habitat

Box turtles require sandy open areas. These habitats are disappearing rapidly in Iowa. Many areas that once had good box turtle populations are now gone due to habitat destruction.

Habits

Box turtles are active from April to October. They are diurnal and spend their mornings and evenings traveling and searching for food. The rest of the day and at night, box turtles bury themselves face first into the loose sand. Sometimes they will leave a large part of the back of their shell exposed and other times they will burrow completely. Although box turtles are terrestrial, they are good swimmers and will enter water. They usually are not able to submerge themselves in deep water due to stored fat in the carapace.

Courtship and mating occurs in spring, but as with many other species, there is some evidence that occasional matings take place in late summer or fall. The female digs a nest in loose sandy soil and deposits five or six eggs. The eggs hatch in two or three months. The hatchlings have many predators and spend most of their time hiding. Box turtles are thought to be a long-lived animal. Some reports of 50-year-old specimens may be true, but are rare. Wild box turtle have an average lifespan of about 25 years (Metcalf and Metcalf, 1985). Adult box turtles are preyed upon by large carnivorous mammals, but humans have the worst effect upon populations. Humans may collect them, but destroying their habitat and automobile mortality is extremely high.

Food

Ornate box turtles are more carnivorous than the eastern box turtle, Terrapene carolina, a southeastern U.S. species of box turtle. Ornates consume mostly insects and earthworms, but a wide variety of other foods will be eaten if they are happened upon. A great amount of carrion is eaten if available, and nearly any dead animal will do! When in season, several kinds of berries are consumed, as well as dandelions, prickly pear cacti, and sometimes colorful fruits and flowers. Most of their water comes from the plant material they eat, but they will drink water when it is available to them.

Management Guidelines

Burning prairies or grasslands is a common practice to maintain a healthy prairie ecosystem. Although, where Ornate Box Turtles exist, it is highly recommended not to conduct burns later than April 1st and no earlier than October 10th. It's also recommend not to drive any equipment on the area so not to crush OBT nests or turtles basking in the sun during this period. Most habitat work should be done when soil temperatures are cool and turtles are in their underground burrows.

If brush is a concern on the prairie, browsing goats are a good option to help reduce brush density. Goats are light weight will have low impact on the area.

Illegal take or possession

Under State Law, it is illegal to take, possess or sell Ornate Box Turtles or any parts of the turtle.

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.

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
	Horned Lark	Prairies, open areas
	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
	Chimney Swift	Woodlands with hollow trees
	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
	Brown Thrasher	Woodland edges and dense brush
	Eastern Wood-pewee	Woodlands
	Dickcissel	Native Prairies or grasslands
	Veery	Moist forests w/ low tree & shrub understory
	Lesser Yellowlegs	Wetlands and shorelines
	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
	Grasshopper Sparrow	Prairies and grasslands
	Cerulean Warbler	Large, mature, unfragmented forest
	Wilson's Snipe	Wet Meadowa
	Black-and-White Warbler	Large, mature, unfragmented forest
	Sedge Wren	Wet meadows and marshes
	Red-Headed Woodpecker	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
	Bank Swallow	Vertical banks along rivers
	Belted Kingfisher	Streams and rivers
	Northern Flicker	Woodlands
	Eastern Kingbird	Open Grasslands near water
	Baltimore Oriole	Open woodlands
	Eastern Towhee	Brushy, wooded edges of woodland
	American Tree Sparrow	Willow Thickets
	Wood Thrush	Woodlands
	Nighthawk	Open areas with gravel out cropping's
	Field Sparrow	Brushy successional habitat
Migratory birds	Golden-Winged Warbler	Woodland openings with brush and grass
	Canada Warbler	Mature forest with shrubby undergrowth
	American White Pelican	Open water wetlands
	Rusty Blackbird	Shrubby wetlands
Mammals	Evening Bat	Forest, riparian areas
	Indiana Bat	Forest, riparian areas
	Tri-color Bat	Forest, riparian areas
	Plains Pocket Gopher	Open Grasslands and Prairies
	Silverhaird Bat	Forest, riparian areas
	Northern Long-eared Bat	Forest
	Woodland Vole	Forest
	Bobcat	Forest, woodland, grassland
Butterflies	Pepper and Salt Skipper	Woodland edges
	Pipevine Swallowtail	Forest, open fields, and roadsides
	Monarch	Prairies with milkweed
	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
	Leonard's Skipper	Open Prairies
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
	Ornate Box Turtle	Open grass or prairie lands consisting of sandy

		soils
	Snapping Turtle	Rivers, and Wetlands
	Northern Leopard Frog	Wetlands and slow moving streams
	Western Fox Snake	Prairies, streams and woodlands
	Spiny Softshell Turtle	Waters with sandy bottoms
	Prairie Ringneck Snake	Prairies and grasslands
	Northern Prairie Skink	Open grass or prairie lands consisting of sandy soils
	Northern Water Snake	Rivers, and Wetlands
	Northern Map Turtle	Ponds, rivers and wetlands with fallen trees
	Copes Gray Treefrog	Forested areas near wetlands
	Eastern Gray Treefrog	Forested areas near wetlands
	False Map Turtle	Streams and rivers
	Blanding Turtle	Shallow waters with abundant aquatic vegetation
	Blanchard's Cricket Frog	Wetlands with adequate vegetation
	Six-lined Racerunner	Grassy hillsides consisting of sandy soils
	Bullsnake	Deciduous woodland edge

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. Also evaluate potential tree planting in existing cropland immediately west of stand 4.
- 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. In stand 7 ~17 acres of understory non-native invasive species was completed in 2020. Plan for understory removal of understory non-native invasive species and girdle standing white mulberry in stand 8.
- 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. Completed in 2018. Re-evaluate stands between 2028 and 2033.

- 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. Completed 2.5 acres of understory removal in small spots of stand 3 and 5 in 2022.
- 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

Some planting was completed in stand 1 in spring of 2015, but do to an increase in flood events overall survival has been limited. Portions of the ag field just west of stand 4 will be evaluated for future tree planting.

Spring 2015 tree planting stand 1

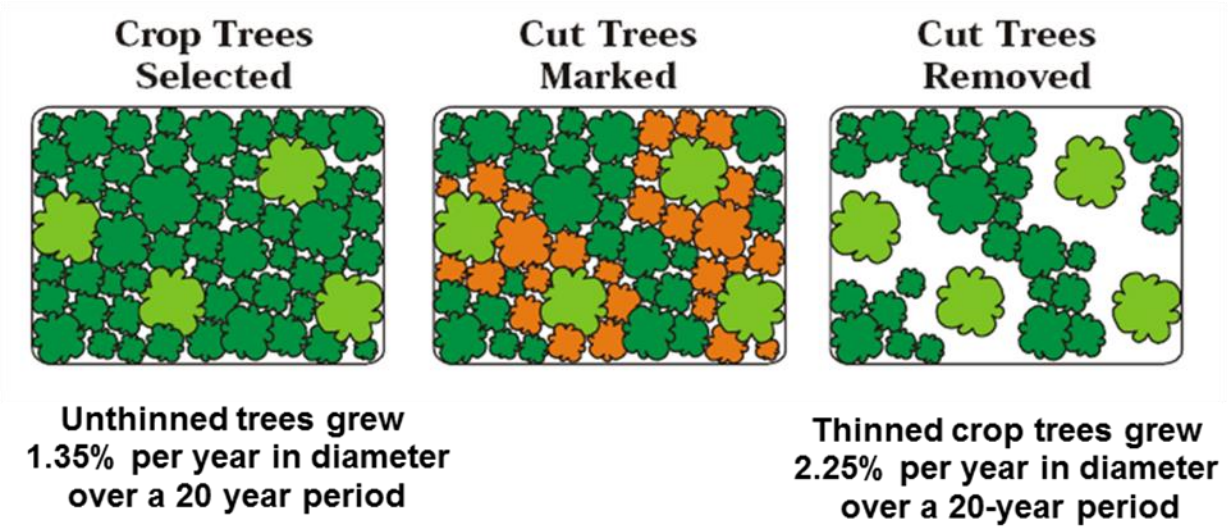
Immature Woodland Thinnings (Crop Tree Release)

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, 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.
- 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.

In the winter of 2018 ~80 acres of this work was completed in portions of stands 3, 4, & 5. In the next 10 to 15 years these areas will be re-evaluated to see if future crop tree release is needed.



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, 5, and 7 where feasible to help set back the competition (i. e. honeysuckle) and promote an open oak woodland habitat and potentially favor the recruitment of oaks in some cases. 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. Two spots in stand 3 and one spot in stand 5 was completed in the winter of 2022 covering a total of ~2.5 acres.

Table 1. Work Plan Management Activity Schedule and Tracking

Work on the original plan started in 2018. Adaptive management will be used to adjust treatments and work as conditions change. This revised plan should be updated in approximately 10 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	1069 Ac.	Monitor & Manage Invasive Species & Monitor Forest Health & Cut Vines on desirable trees. Target all white mulberry where present.	Ongoing Stand 8 16.5 .Ac. FY2026	17 Acres Stand 7 2019/20			
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	Spring of 2015 Stand 1			
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	~80 Acres in winter 2018			
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	2 spots in stand 3 and 1 spot in stand 5 completed winter of 2022 total 2.5 Ac.			
Portions of 3, 4, 5, & 7	1 to 15 Acres	Use Prescribed Fire to minimize non-native invasive shrub species and to help maintain open oak woodland in specific spots within these stands	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:

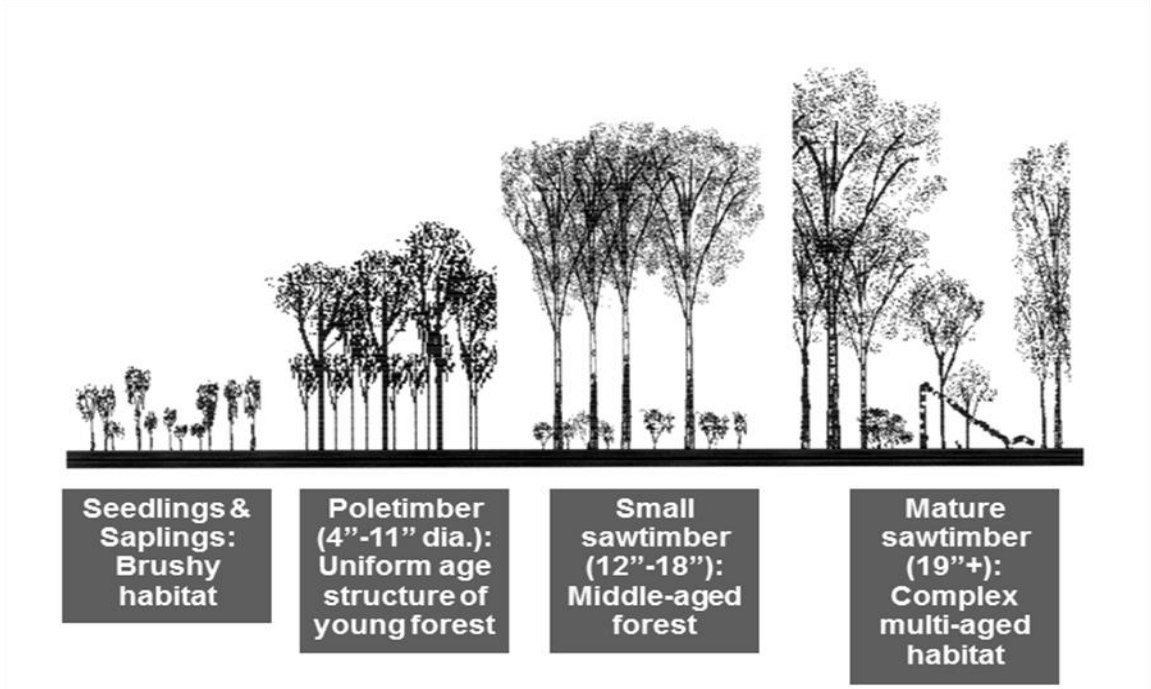
- Any work involving heavy equipment will only be done during times when the ground is frozen and not wet. This prevents compaction of the soil and also protects the fragile herbaceous plants of the forest floor
- No weed tree or crop tree release debris is to be left in streams or flow pathways
- Pesticides 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 1069 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.

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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.

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 inch 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.