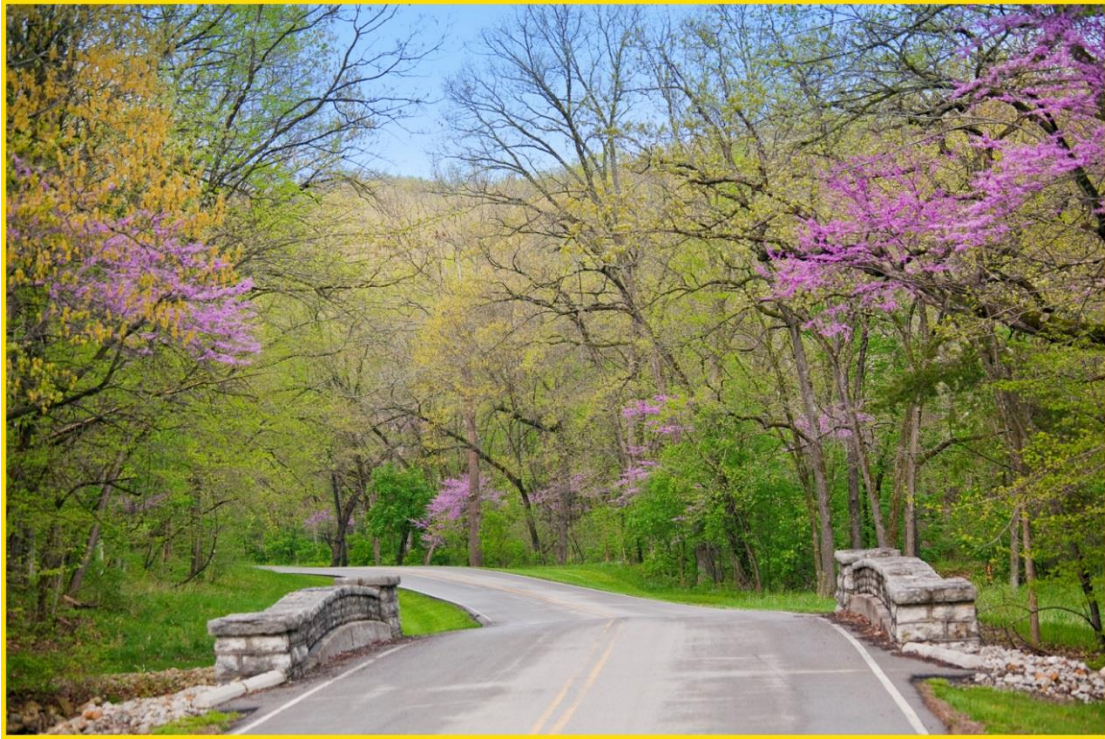


**State Parks
Management Plan
Lacey-Keosauqua State Park
Van Buren County**



Developed by
John Byrd, Area Forester, Iowa DNR
Justin Pedretti, Park Manager, Iowa DNR
Prepared: 1/25/2019

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Introduction

Park Contact: Justin Pedretti, Park Manager
Lacey-Keosauqua State Park
22895 Lacey Trail
Keosauqua, IA 52565
Office Phone: (319) 293-3502

The entrance to Lacey-Keosauqua State Park is located just across the Des Moines River from the City of Keosauqua located in the south-central part of Van Buren County. Lacey-Keosauqua State Park was dedicated in 1921, the second addition to the Iowa State Park system. Edgar Harlan, a Keosauqua resident who served as the second director and curator of the Historical Department of Iowa, initiated development of a park in the area. Van Buren County citizens raised enough money to purchase 640 acres and the Iowa Board on Conservation in Des Moines agreed to purchase an additional 582 acres for a total of 1222 acres. Today, Lacey-Keosauqua State Park encompasses 1653 contiguous acres. Originally called "Big Bend State Park," in reference to the big bend in the Des Moines River was later named Lacey-Keosauqua State Park in 1926 to honor Major John Fletcher Lacey of Oskaloosa, a Civil War veteran, U.S. Congressman, and early naturalist.



Several Civilian Conservation Corp (CCC) camps participated in the work at Lacey-Keosauqua State Park between 1932-1946. During this period, they constructed 3.5 miles of crushed stone roads through the park, an extensive trails system and 49 structures. Some of those structures being the two lodges, shelters, stone house & maintenance shop. Other structures include road bridges and walking bridges on the 13 miles of trails, the 22 acre Lake Lacey and a bathing beach carved out of a hillside by hand.

A very comprehensive look into the park's history can be found in the Geological Society of Iowa guidebook called, "The Natural History of Lacey-Keosauqua State Park, Van Buren County Iowa."

Surveys of park resources were conducted in 2018 and 2019. The resulting data was analyzed after the survey was complete. From this survey, the park property was divided into a number of stands. Each stand represents a unit of land which will be managed in a specific way. Stand maps with stand descriptions and management recommendations were developed after discussions with the Park Manager and Area Forester.

Major Plant Communities

The first glimpse of vegetation in Lacey-Keosauqua State Park is from aerial photographs taken in 1936, 15 years after the Park's dedication. Forest is still the predominant vegetation in the photograph, but large fields are also evident on broad, gently rolling uplands along the east, south, and northwest borders of the state park. When contrasted with the current vegetation aerial photograph, it is obvious that almost all openings have become forested.

In the mature forest in the park, the dominant trees species are white oak, red oak, sugar maple, and basswood. Large diameter oaks typically form a tall canopy of woods. Along the bluffs of the Des Moines River in the northwest part of the park, the mature forest community includes several individual trees of white oak that are 200-300 years old. Ironwood, buckeye and maple are the common understory trees of woody vegetation between the forest canopy and the forest floor. The mid-successional forest that developed on old fields after acquisition for the park in 1936 is characterized by a diverse mixture of tree species in the canopy, including honey locust, black locust, ash, elm, walnut, black cherry and hackberry. The primary oak species present here is shingle oak, a pioneering species in old fields in southern Iowa.

Park Soils

The U.S. Department of Agriculture (USDA) conducted soil survey work throughout Van Buren County, Iowa in 1993 and the names for the soil types was approved in 1995. After analyzing the data, they placed all of the county's soils into map units that, in-turn, were placed within soil series associations.

The soil survey contains information that can be used in land-planning programs in Van Buren County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment. This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment. Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

Natural Resources Management Concerns

Forest succession

Forest Succession is the process of orderly changes in a plant community over time due to a relative lack of major disturbances. In Iowa, this process typically occurs slowly over many decades. Early successional species specialize in colonizing highly disturbed sites. Prior to European settlement, the major disturbance factor that created opportunities for early successional colonizing species was periodic fires. Examples of early successional forest species within the park include eastern red cedar, aspen, oak, walnut and many shrubs. As time progresses, plants that can grow with less and less sunlight move into a site until the climax community has been reached, which is the end of the line for succession. You can witness this process throughout the park since fire has been suppressed for many decades. Common climax forest species for the park includes sugar maple, basswood, white ash, green ash, elm, bitternut hickory and ironwood. Once a forest reaches the climax stage, there tends to be very little vegetation, other than spring ephemerals, in the understory. In Iowa, the early to mid-successional forest stages tend to support far greater plant and animal species diversity. That is the main reason why natural resource managers often work to create or maintain a stand at the early successional Oak-Hickory forest stage verses the late successional Maple-Basswood stage.



Loss of Oak

Oaks are the official State Tree of Iowa and are considered by many to be an important “keystone” species within Iowa’s forest ecosystems. As a keystone species, oaks play a unique and critical role in the ecosystem that other plants cannot provide. A nearly total lack of recruitment of oak trees is a serious problem within the park, and is largely blamed on the lack of disturbances (e.g. fire) which kept this slow-growing species competitive. With no fire to set back the encroachment of competing shade tolerant species, oak seedlings do not persist and are replaced by shade tolerant trees such as ash, elm, sugar maple, basswood, and ash. These tree species have relatively lower wildlife value compared to oak. U.S. Forest Service inventory data suggests the state is losing around 5,000 acres of oak forest per year. The natural lifespan of oak trees varies by species. A healthy mature oak tree’s life expectancy within the white oak group (i.e. bur, white, swamp-white) can to be as high as 250 years; species in the red oak group (i.e. black, red, and pin)

can reach ages as high as 150 years. While there is some diversity throughout the park, many of the oak trees throughout the park are rapidly approaching their natural life expectancy.

Impacts of White-tailed Deer on Forest Vegetation & Wildlife

Just like oak trees are Iowa's keystone tree species, white-tail deer are Iowa's keystone wildlife species. Not too long ago deer were nearly absent from this state and viewing one was considered a rare privilege. Today, thanks to the establishment of hunting rules and their enforcement, deer have become an abundant wildlife resource - a true success story! There is evidence of deer having an impact on some of the understory vegetation, but with proper forest management there can be plenty of understory to go around. The goal when trying to establish oak regeneration is to have at least 2,000 oak seedlings per acre. This should overwhelm the wildlife and ensure an oak population in the future.

Emerald Ash Borer

Emerald Ash Borer (EAB) is an exotic pest native to Asia. It is believed that it hitched a ride in packing material and it was first discovered in southeastern Michigan in 2002. The larvae bore into the ash tree and feed on trees xylem tubes, leaving "S" shaped galleries visible underneath the bark. The larval feeding interferes with the trees ability to transport water and nutrients. EAB is very prevalent throughout the park and killing almost all ash above 3-5" in diameter. In some cases, this is not a complete disaster and in the recreational areas it is a disaster. Ash dying in the forested areas is actually releasing some desirable trees that have been competing for sunlight. This should make the residual trees grow faster and be healthier. Even with this benefit, diversity is a key part of the ecosystem and this is removing ash, maybe forever.



Oak Wilt Disease

Oak Wilt is a systemic vascular wilt disease of oak trees caused by the fungus *Ceratocystis fagacearum*. Oaks in the red oak group, like northern red oak, pin oak and black oak, are highly susceptible to this disease. Oaks in the white oak group, such as white oak, bur oak, chinquapin oak and swamp white-oak, can get this disease but tend to be more resistant to it. This disease travels through a tree's xylem tubes. Xylem is what conducts water and minerals from roots up to the leaves. This fungus blocks these xylem tubes which lead to rapid mortality. Most trees will die within the year in which they first show symptoms. Sap feeding *Nitidulid* beetles are the primary vector that spreads the disease from sick trees to healthy ones. Once established in one tree, the disease can spread to nearby trees via tree-to-tree root grafts. Root grafting can only occur between trees within the same species. As the disease spreads it tends to form pockets of mortality. Breaking root grafts between trees is the most effective way to control this disease. Oak wilt tends to be more of a problem in stands with older red oak trees like those found throughout the park.



Exotic Invasive Species

Sometimes exotic (non-native) plant species introduced into an ecosystem can become invasive and disruptive to the balance of a natural ecosystem. Exotic plant and animal species have the ability to out-compete native species and subsequently can cause a decline in biodiversity and ecosystem health. Such is the case with a host of non-native invasive species within the park including: garlic mustard, autumn olive, bush honeysuckle, multiflora rose, sericea lespedeza black locust, and barberry are the most prevalent. There are some areas where autumn olive and bush honeysuckle have taken over the understory, preventing regeneration of desired species. Management of invasive species could be prescribed in just about any area of the park. This plan does not prescribe any invasive species control management, but it is known that these should be controlled when time allows, any time of the year. The closer to the campground you get, the thicker the invasive shrubs.

Hazard Tree management

Hazard trees carry a higher risk of structural failure which could cause property damage or personal injury. To be considered hazardous, a tree must have the following: 1) major structural defect(s) that make it more prone to failure and 2) a nearby target that it could land on such as a building, picnic table, parked car, campsite, bench, high use trail, etc. Larger, taller trees bear more weight and need to be monitored more frequently for structural decline in high-use areas.

Wildlife Concerns

Forest management activities such as timber harvesting, thinning, burning and tree planting can have both beneficial and/or detrimental effects to wildlife. The conscious decision to do no forest management (i.e., *hands off* management) can also affect wildlife. Such tradeoffs can be hard to quantify and understand due to the complexity of natural ecosystems. Iowa's Wildlife Action Plan (available at www.iowadnr.gov) identifies 296 *Species of Greatest Conservation Need* which are species that are rare, threatened, endangered, or declining in numbers in the state. Before any activities described in the plan are implemented, they will be studied by DNR environmental review staff to determine potential impacts to State and Federal threatened and endangered species. Management activities will not be prescribed or initiated until the environmental review staff is satisfied that threatened and endangered species will not be threatened or negatively impacted. The appendix summarizes the habitat information from the Iowa Wildlife Action Plan for these species in Eastern Iowa. The activities recommended in this plan are meant to optimize the overall diversity and quality of wildlife habitat for both common wildlife species as well as those that are in need of habitat protection and restoration.

Special Archaeologist Significance

Archaeologists have identified 5 mound groups within Lacey-Keosauqua State Park. Their locations are known but the extent of them unknown. The vast majority of the park has not been archaeologically surveyed. Given the concentration of the mounds and habitation site, it is highly likely that there are additional mounds that have not been recorded. Park Staff will work with the Office of the State Archaeologist (OSA) when more definite locations for tree removal are proposed. Special considerations will be followed such as:

1. No heavy machinery should be placed on or driven over mounds or burial sites
2. Appropriate buffer zones established
3. Large trees should be removed from mounds because they can cause unwanted damage if uprooted
4. Trees cut flush with the ground surface and stumps left in place
5. Tree removal should be done in the winter when the ground is frozen or when soil conditions are dry enough to avoid unwanted rutting by necessary vehicles/machinery

Harvesting

Lacey-Keosauqua State Park has a wonderful oak resource that is by all accounts mature. Large areas have been identified as mature and could have harvesting done at any time. The harvest areas will be in five year cutting increments. Harvest areas will remain in the 10-15 acre size range in order for staff to be diligent on the necessary management to maximize oak regeneration and establishment. If there are areas of tree mortality as a result of over maturity or health problems, some more intensive management could and should be performed. In areas identified and even age management, the normal rotation age for oak is 120 years. This means that after clearcutting (regeneration cut), with proper management, it could be harvested in 120 years again. This is the process of creating a forest that will sustain the oak resource for many generations and beyond. Failure to manage on an even age objective will lend the forest to converting to climax species.



Natural Resource Management Objectives

Natural resource management systems are ways of establishing big picture, long-term management goals and objectives that will be placed on stands so that appropriate short-term and long-term management activities can be determined. Figure 2 in the map section of this plan shows the locations where these systems will be employed. What follows is a brief description of the management systems that will be used within the park. In this plan there is also mention of viewsheds. A *viewshed* consists of the resources that are in direct line-of-sight of someone's view. In general, viewshed resources are primarily managed to maintain a high aesthetic appeal. Low impact management activities, like prescribed burns, invasive species control, trail maintenance, etc., are permitted as long as they have limited impacts or improvement of the view. This plan has management activities planned for the next 20 years and should be considered a **working document**. This is because trees are a long-term objective and pests, diseases, environment, climate, etc. do affect the outcome of some management decisions.

Even Age Management: (1,214 Acres)

Even-aged management refers to management activities used to create a forest stand that grows for a period of time until it reaches a desirable harvest age or size. At this point the harvesting options become shelterwood or clearcut harvesting, depending on the amount of natural regeneration present. If the stand contains a desired amount of regeneration, a clearcut should be implemented. Lack of regeneration would necessitate a shelterwood harvest, weed tree eradication and/or prescribed woodland burn in order to open up the canopy and increase chances for natural regeneration. Once the regeneration has been established the shelterwood trees can be removed. Even-aged management is used to ensure that shade intolerant species such as oak will remain as a component of the future forest stand. Forest stand improvement is very necessary to keep the forest system and the individual trees in that system vigorous and healthy.



Un-even Age Management: (85 Acres)

Uneven-aged management refers to an area containing several different age classes within the same stand. These areas may be managed unevenly because of site or species characteristics. An area especially suited to this type of management would be a riparian buffer area or a forest stand comprised of shade tolerant hardwoods. Conifer stands not designated as visual corridors or aesthetic areas will receive uneven-aged management until conversion to native hardwoods is complete. Selective harvesting will occur leaving several different age classes available. Forest stand improvement will be used to eradicate undesirable species and increase the health, vigor, and mast production of the stand.

Limited Management: (15 Acres)

This management class should be considered light management. Examples of limited management areas are riparian areas, visual corridors, ponds, streams, archeological areas, campgrounds, steep slopes, or unique communities that need special protection. Management activities will take careful planning with water quality and/or public perception in mind. Forest stand improvement will be implemented to sustain health and vigor as well as remove undesirable woody vegetation. Harvesting activities will involve selective tree removal, or in some cases salvage cutting, in order to maintain adequate understory and forest floor vegetative cover. Certain species of wildlife may benefit from the small amount of management that is done.

Non-Forest Management: (187 Acres)

Developed areas, paved roads, agriculture fields, prairie, and savanna are included in this management class. Developed areas and paved roads will only receive maintenance and upkeep in order to keep them functioning properly. Agricultural fields will be utilized to the area's potential until the area is ready to be converted to trees or prairie. Prairie and savanna areas will be managed with prescribed fire and inter-seeding native vegetation as needed. Some wildlife species may benefit from non-forest areas because it adds some diversity to the landscape.

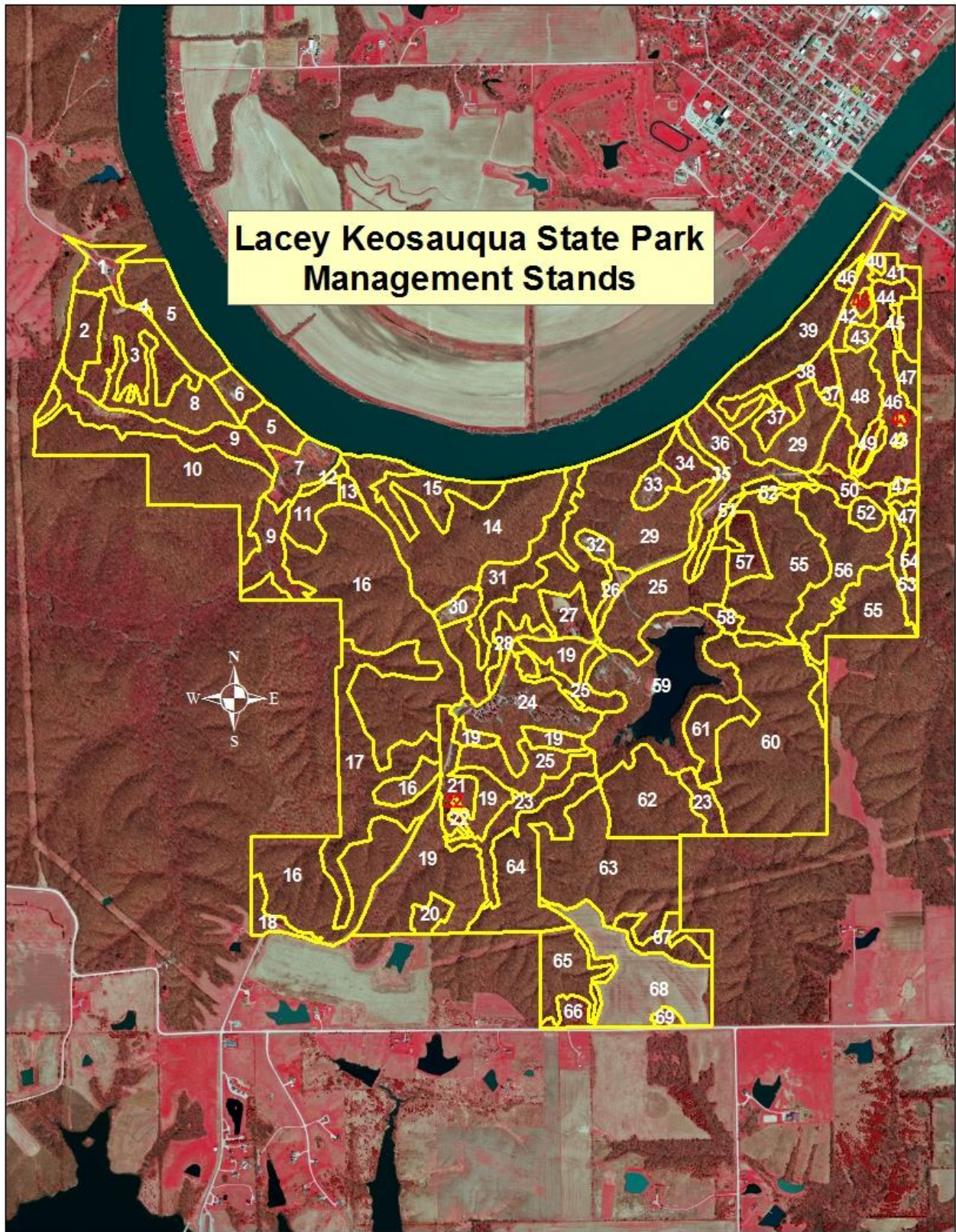


Figure 1: This image shows stand boundaries and labels overlaying a color infrared satellite aerial photo that was taken in 2016.

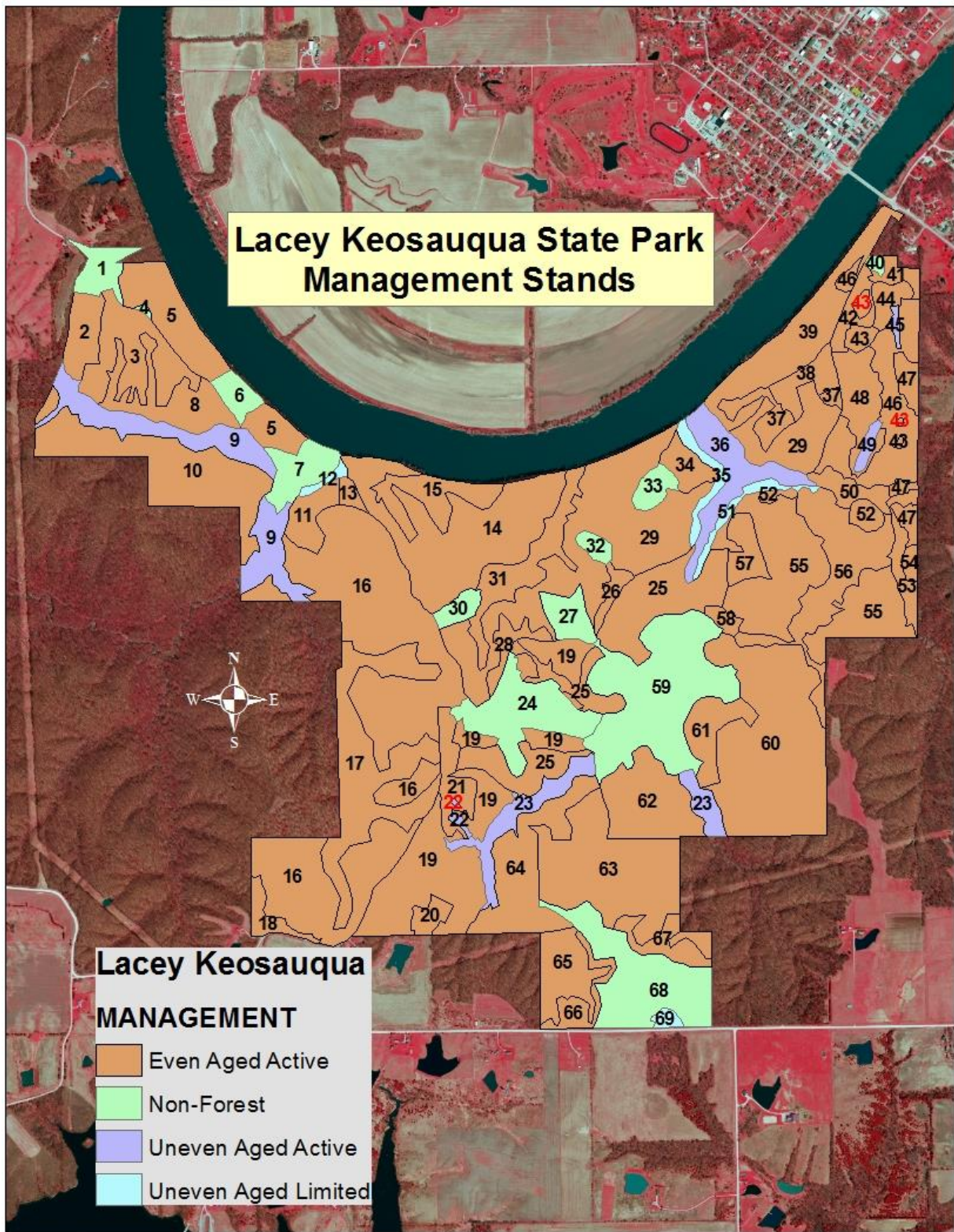


Figure 2: This image depicts management objectives that have been established for each stand. Management objectives help us determine the treatments for each stand. The specific treatment recommendations are described in detail in the descriptions for individual stands section.

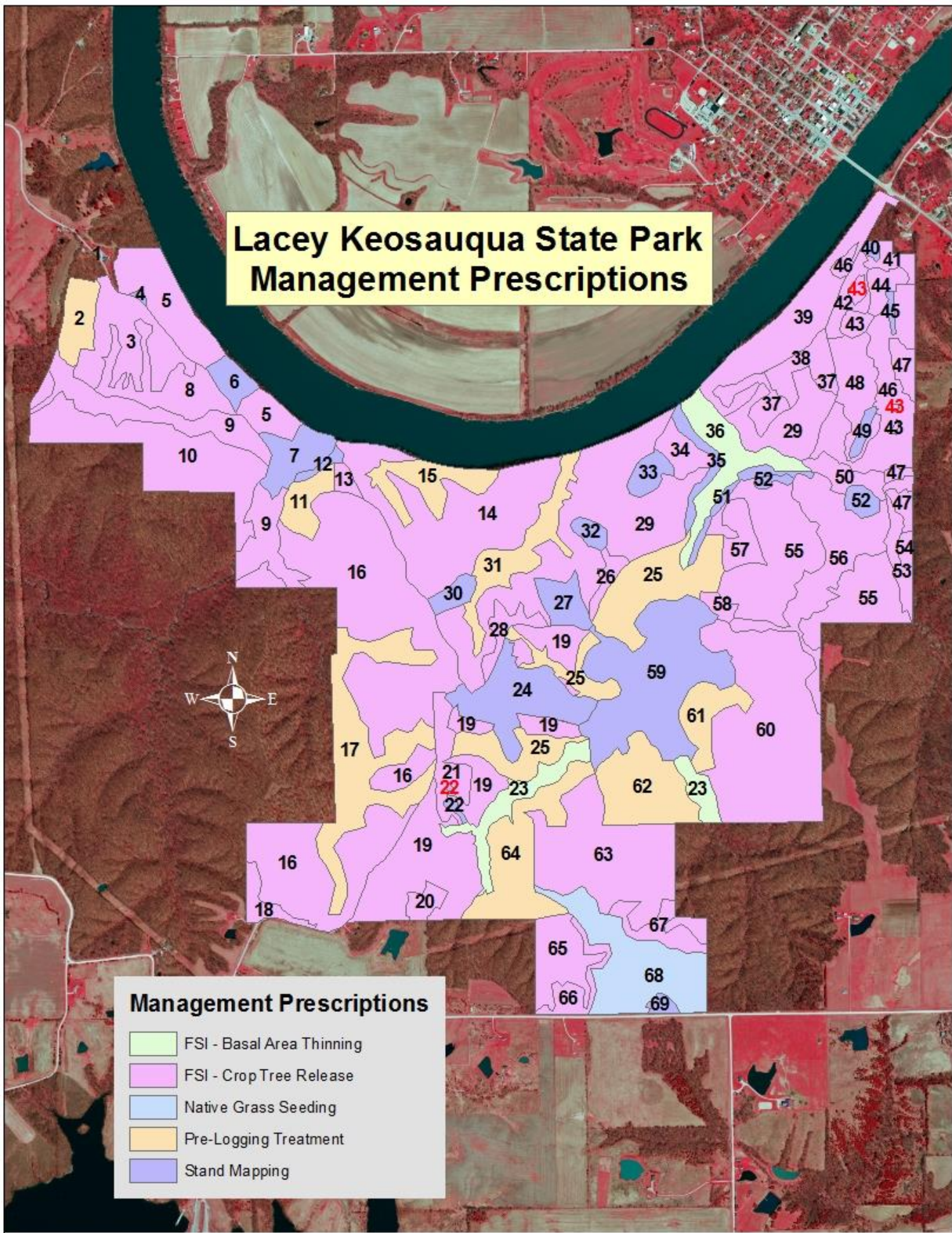


Figure 3: This image shows the management prescriptions for each stand. Each stand has a timeline of when the management will take place. Pre-Logging treatment (understory release) will only be done if a harvest is prescribed.

Descriptions & Recommendations for Individual Stands

Stand 1: 9 acres/ BA: N/A

Stand Description: Stand 1 is located in the northwest corner of the property. (See Figure 1 for stand locations.) This area contains a tribute to the CCC workers who built several structures on the property. This includes a lodge, which is also in this stand. The trees in this area should be maintained for health and as trees die, they should be removed. There could be some planting done in the area if there is significant tree mortality. This area is mowed and has some small areas of prairie. The soil is Weller silt loam.

Management Objectives and Future Conditions: The major objectives for this stand include watching the trees for health problems and removing them as needed. It is also possible if there are several trees dying that some saplings could be planted to replace the dead ones.

Recommendations/Prescriptions (Non-Forest Management): Management activities are basically limited to taking care of hazard trees, buildings, and maintaining as a recreation area.

Stand 2: 7.3 acres/ BA: 100

Stand Description: Stand 2 is located in the northwest part of the park. The western edge of the stand is the property line. The area consists of sawtimber sized (18-26") white oak and red oak. Other species in the stand are an occasional walnut. Understory is cherry, bitternut hickory, ash, and ironwood. Regeneration mainly consists of ash and elm. The soil is Lindley loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have oak for future generations.

Recommendations/Prescriptions (Even age Management): This area could be shelterwood harvested in the next 5 years. The trees are mature and at a good stage to be able to drop seed to establish the next stand of oak. Since there is not much oak regeneration, all understory trees size 1" to 10" should be removed in order to provide more light to forest floor and give new oak seedlings a chance to grow. This will also help new seedlings to become established by seed during a moderate acorn production year. If there are multiple years without a moderate acorn crop then prescribed fire could be used to eliminate small caliper understory vegetation. Once the shelterwood harvest is done this stand should be clearcut harvested when it is determined there is enough oak seedlings to ensure it will be an oak stand in the future. Typically, the clearcut harvest is done at least 10 years after the shelterwood harvest.

Stand 3: 28 acres/ BA: 90

Stand Description: Stand 3 is located in the northwest part of the park. This area was part of the old golf course that existed several decades ago. The area consists of pole sized (8-14") ash, walnut, and shingle oak. Other species in the stand are white oak, red oak, cherry, and honey locust. Understory is ash, red cedar, and ironwood. Regeneration mainly consists of ash and elm. The soils are Keswick and Lindley loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have oak and walnut for future generations.

Recommendations/Prescriptions (Even age Management): This area is a **high** priority for crop tree release due to the composition of the stand and the size of the trees. This size of tree responds very well to increased space for growing. The best crop tree species to select for management in this area is white oak, walnut, red oak, and cherry. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. This stand should be able to have crop tree release performed again in 10 years. This will help to keep them growing fast and healthy.

Stand 4: <1 acre/ BA:N/A

Stand Description: Stand 4 is located in the northwest corner of the property. This area contains a tribute to the person Lacey was named after, John Fletcher Lacey. This area is mowed and has some small areas of prairie. The soil is Weller silt loam.

Management Objectives and Future Conditions: The major objectives for this stand include watching the trees along the edge for health problems and removing them as needed.

Recommendations/Prescriptions (Non-Forest Management): Management activities are basically limited to taking care of hazard trees and maintaining as a recreation area.

Stand 5: 32 acres/ BA: 130

Stand Description: Stand 5 is located in the northwest part of the park. This stand is located along the road and covers the north slope down to the Des Moines River. The area consists of small sawtimber sized (14-18") white oak, red oak, and black oak. There are 22"+ trees scattered throughout the area. Other species in the stand are walnut and shagbark hickory. Understory is buckeye, red bud, elm, sugar maple, and ironwood. Regeneration mainly consists of ash, red bud, and elm. The soils are Gorin silt loam, Lindley loam, and Nordness-Gosport complex. There are areas identified as having Indian mounds in this area so proper management must be considered.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak, walnut, and hickory healthy.

Recommendations/Prescriptions (Even age Management): This area is a **high** priority for crop tree release due to the abundant amount of oak in the stand. There are areas where some oak wilt has managed to kill a few trees but it is not overwhelming death. The best crop tree species to select for management in this area is white oak, walnut, red oak, and shagbark hickory. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. There are scattered trees throughout the area that are 22"+ in diameter. These areas with bigger trees should receive less thinning management because they are already close to maturity. Forest management will help to keep residual trees healthy.

Stand 6: 6 acres/ BA: N/A

Stand Description: Stand 6 is located in the northwest part of the park. This stand is located along the road and covers the picnic area on the ridge. The trees in this area should be maintained for health and as trees die, they should be removed. There could be some planting done in the area if there is significant tree mortality. This area is mowed and has some small areas of prairie. There are areas identified as having Indian mounds in this area so proper management must be considered.

Management Objectives and Future Conditions: The objectives for this stand include watching the trees for health problems and maintaining the facilities for recreation. It is also possible if there are several trees dying that some saplings could be planted to replace the dead ones.

Recommendations/Prescriptions (Non-Forest Management): Management activities are basically limited to taking care of hazard trees, buildings, and maintaining as a recreation area.

Stand 7: 13 acres/ BA: N/A

Stand Description: Stand 7 is located in the northwest part of the park and locally known as Ely Ford. This stand is located along the road and contains the area with a tribute to the Mormons crossing the Des Moines River. The trees in this area should be maintained for health and as trees die, they should be removed. There could be some planting done in the area if there is significant tree mortality. This area is mowed and has 20"+ sycamore trees.

Management Objectives and Future Conditions: The objectives for this stand include watching the trees for health problems and maintaining the facilities for recreation. It is also possible if there are several trees dying that some saplings could be planted to replace the dead ones.

Recommendations/Prescriptions (Non-Forest Management): Management activities are basically limited to taking care of hazard trees, tribute to Mormons, and maintaining as a recreation area.

Stand 8: 23 acres/ BA: 130

Stand Description: Stand 8 is located in the northwest part of the park. This stand is next to the road in the eastern part and in the ditches of the old golf course. The area consists of small sawtimber sized (14-18") white oak, red oak, and black oak. There are 22"+ trees scattered throughout the area. Other species in the stand are walnut and shagbark hickory. Understory is elm and ironwood. Regeneration mainly consists of hickory and oak. The soils are Lindley and Weller loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak, walnut, and hickory healthy.

Recommendations/Prescriptions (Even age Management): This area is a **high** priority for crop tree release due to the abundant amount of oak in the stand. There are areas where some oak wilt has managed to kill a few trees but it is not overwhelming death. The best crop tree species to select for management in this area is white oak, walnut, red oak, and shagbark hickory. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. There are scattered trees throughout the area that are 22"+ in diameter. These areas with bigger trees should receive less thinning management because they are already close to maturity. Forest management will help to keep residual trees healthy.

Stand 9: 38 acres/ BA: 80

Stand Description: Stand 9 is located in the northwest part of the park. This stand is the riparian area running from the west border to Ely Ford. The area consists of small sawtimber sized (12-18") swamp white oak, walnut, and hackberry. There are 22"+ cottonwood trees scattered throughout the area. Other species in the stand are shingle oak, red oak, elm, and honey locust. Understory is buckeye, elm, ash, hickory, and hackberry. Regeneration mainly consists of ash and elm. The soils are Nodaway-Klum-Perks and Nodaway-Coppock-Cantril complex.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak, walnut, and hickory healthy.

Recommendations/Prescriptions (Even age Management): This area is a **moderate** priority for crop tree release due to the amount of walnut and oak in the stand. There are areas where some oak wilt has managed to kill a few trees but it is not overwhelming death. The best crop tree species to select for management in this area is swamp white oak, walnut, red oak, and shagbark hickory. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. There are scattered trees throughout the area that are 22"+ in diameter. These areas with bigger trees should receive less thinning management because they are already close to maturity. Forest management will help to keep residual trees healthy.

Stand 10: 50 acres/ BA: 100

Stand Description: Stand 10 is located in the northwest part of the park. This stand is next to the northern and part of the eastern boundary to Shimek State Forest. The area consists of small sawtimber to sawtimber sized (14-20") white oak and red oak. There are 22"+ trees scattered throughout the area. Other species in the stand are black oak, ash, walnut, and shagbark hickory. Understory is sugar maple, buckeye, hackberry, shagbark hickory, and ironwood. Regeneration mainly consists of elm and ash. The soils are Lindley loam and Gosport silty clay loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak, walnut, and hickory healthy.

Recommendations/Prescriptions (Even age Management): This area is a **high** priority for crop tree release due to the abundant amount of oak in the stand. There are areas where some oak wilt has managed to kill a few trees but it is not overwhelming death. The best crop tree species to select for management in this area is white oak, walnut, red oak, and

shagbark hickory. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. There are scattered trees throughout the area that are 22"+ in diameter. These areas with bigger trees should receive less thinning management because they are already close to maturity. Forest management will help to keep residual trees healthy.

Stand 11: 9 acres/ BA: 100

Stand Description: Stand 11 is located in the northwest part of the park. The northern part of the stand is next to the road and it is close to Ely Ford. The area consists of sawtimber sized (18-22") white oak. Other species in the stand are sugar maple and an occasional walnut. Understory is sugar maple, elm, ironwood, and hackberry. Regeneration mainly consists of hickory, ash, and elm. The soil is Lindley and Keswick loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have oak for future generations. There are several areas similar to this in Lacey that could be harvested. When deciding on harvest only part of this stand will be harvested when based on the annual harvest. When the harvest area is determined, that harvested area will become a new stand to indicate the changes.

Recommendations/Prescriptions (Even age Management): This area should be on the list for shelterwood harvesting. The trees are mature and at a good stage to be able to drop seed to establish the next stand of oak. Since there is not much oak regeneration, all understory trees size 1" to 10" should be removed in order to provide more light to forest floor and give new oak seedlings a chance to grow. This will also help new seedlings to become established by seed during a moderate acorn production year. If there are multiple years without a moderate acorn crop then prescribed fire could be used to eliminate small caliper understory vegetation. Once the shelterwood harvest is done this stand should be clearcut harvested when it is determined there is enough oak seedlings to ensure it will be an oak stand in the future. Typically, the clearcut harvest is done at least 10 years after the shelterwood harvest.

Stand 12: 2 acres/ BA: 90

Stand Description: Stand 12 is located in the northwest part of the park. This stand is located along the road and overlooks Ely Ford. The area consists of sawtimber sized (18-22") white oak and red oak. Other species in the stand are sugar maple, ash, basswood, shagbark hickory, mockernut hickory, black oak, and an occasional walnut. Understory is sugar maple, elm, ironwood, and hackberry. Regeneration mainly consists of hickory, ash, and elm. This stand is very steep and the management should be limited.

Management Objectives and Future Conditions: The objectives for this stand include watching the trees for health problems. Maintain tree cover to reduce erosion.

Recommendations/Prescriptions (Un-even Age Limited Management): Management activities are limited to removing dead trees and maintaining tree cover on the steep slope.

Stand 13: 3 acres/ BA: 120

Stand Description: Stand 13 is located in the northwest part of the park. This stand is next to the road going to Ely Ford. The area consists of small pole and small sawtimber sized (12-18") black locust, walnut, and cherry. Other species in the stand are hackberry, red oak, bitternut hickory, and black oak. Understory is bitternut hickory, hackberry, ash, buckeye, elm and ironwood. Regeneration mainly consists of ash and elm. The soils are Weller silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak, walnut, and hickory healthy. Possible conversion to oak when black locust dies.

Recommendations/Prescriptions (Even age Management): This area is a **high** priority for crop tree release due to the abundant amount of oak and walnut in the stand. There are areas where some oak wilt has managed to kill a few trees but it is not overwhelming death. The best crop tree species to select for management in this area is white oak, walnut, red oak, and black oak. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. Forest management will help to keep residual trees healthy.

Stand 14: 64 acres/ BA: 110

Stand Description: Stand 14 is located in the north central part of the park. This stand is next to the road and next to the Des Moines River. The area consists of pole to sawtimber sized (14-20") white oak and red oak. There are 22"+ trees scattered throughout the area. Other species in the stand are sugar maple, ash, basswood, shagbark hickory, mockernut hickory, black oak, and an occasional walnut. Understory is sugar maple, elm, ironwood, and hackberry. Regeneration mainly consists of hickory, ash, and elm. The soils are Lindley loam and Gorin silty clay loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak, walnut, and hickory healthy.

Recommendations/Prescriptions (Even age Management): This area is a **high** priority for crop tree release due to the abundant amount of oak in the stand. There are areas where some oak wilt has managed to kill a few trees but it is not overwhelming death. The best crop tree species to select for management in this area is white oak, walnut, red oak, and shagbark hickory. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. There are scattered trees throughout the area that are 22"+ in diameter. These areas with bigger trees should receive less thinning management because they are already close to maturity. Forest management will help to keep residual trees healthy.

Stand 15: 16 acres/ BA: 110

Stand Description: Stand 15 is located in the north central part of the park. The northern part of the stand is next to the Des Moines River and covers the drainage areas around stand 14. The area consists of sawtimber sized (16-24") white oak and red oak. Other species in the stand are sugar maple, ash, basswood, shagbark hickory, mockernut hickory, black oak, and an occasional walnut. Understory is sugar maple, elm, ironwood, and hackberry. Regeneration mainly consists of hickory, ash, and elm. The soil is Lindley loam and Nordess-Bentonsport complex.

Management Objectives and Future Conditions: The objective is to manage this area in order to have oak for future generations. There are several areas similar to this in Lacey that could be harvested. When deciding on harvest only part of this stand will be harvested when based on the annual harvest. When the harvest area is determined, that harvested area will become a new stand to indicate the changes.

Recommendations/Prescriptions (Even age Management): This area should be on the list for shelterwood harvesting. The trees are mature and at a good stage to be able to drop seed to establish the next stand of oak. Since there is not much oak regeneration, all understory trees size 1" to 10" should be removed in order to provide more light to forest floor and give new oak seedlings a chance to grow. This will also help new seedlings to become established by seed during a moderate acorn production year. If there are multiple years without a moderate acorn crop then prescribed fire could be used to eliminate small caliper understory vegetation. Once the shelterwood harvest is done this stand should be clearcut harvested when it is determined there is enough oak seedlings to ensure it will be an oak stand in the future. Typically, the clearcut harvest is done at least 10 years after the shelterwood harvest.

Stand 16: 147 acres/ BA: 100

Stand Description: Stand 16 is located in the west part of the park. This stand is next to the road in spots and next to the border to Shimek State Forest. The area consists of pole to sawtimber sized (12-18") white oak and shagbark hickory. There are 22"+ trees scattered throughout the area. Other species in the stand are black oak, post oak, red oak, ash, and mockernut hickory. Understory is sugar maple, elm, ironwood, shagbark hickory, ash, and hackberry. Regeneration mainly consists of hickory, ash, and elm. The soils are Weller loam and Keswick clay loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak, walnut, and hickory healthy.

Recommendations/Prescriptions (Even age Management): This area is a **high** priority for crop tree release due to the abundant amount of oak in the stand. There are areas where some oak wilt has managed to kill a few trees but it is not overwhelming death. The best crop tree species to select for management in this area is white oak, walnut, red oak, and

shagbark hickory. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. There are scattered trees throughout the area that are 22"+ in diameter. These areas with bigger trees should receive less thinning management because they are already close to maturity. Forest management will help to keep residual trees healthy.

Stand 17: 51 acres/ BA: 100

Stand Description: Stand 17 is located in the west part of the park. This stand is next to the road in spots and next to the border to Shimek State Forest. The area consists of sawtimber sized (16-24") white oak and red oak. Other species in the stand are sugar maple, ash, basswood, shagbark hickory, mockernut hickory, black oak, and an occasional walnut. Understory is sugar maple, elm, ironwood, and hackberry. Regeneration mainly consists of hickory, ash, and elm. The soil is Lindley loam and Nodaway-Coppock-Cantril complex.

Management Objectives and Future Conditions: The objective is to manage this area in order to have oak for future generations. There are several areas similar to this in Lacey that could be harvested. When deciding on harvest only part of this stand will be harvested when based on the annual harvest. When the harvest area is determined, that harvested area will become a new stand to indicate the changes.

Recommendations/Prescriptions (Even age Management): This area should be on the list for shelterwood harvesting. The trees are mature and at a good stage to be able to drop seed to establish the next stand of oak. Since there is not much oak regeneration, all understory trees size 1" to 10" should be removed in order to provide more light to forest floor and give new oak seedlings a chance to grow. This will also help new seedlings to become established by seed during a moderate acorn production year. If there are multiple years without a moderate acorn crop then prescribed fire could be used to eliminate small caliper understory vegetation. Once the shelterwood harvest is done this stand should be clearcut harvested when it is determined there is enough oak seedlings to ensure it will be an oak stand in the future. Typically, the clearcut harvest is done at least 10 years after the shelterwood harvest.

Stand 18: 6 acres/ BA: 70

Stand Description: Stand 18 is located in the southwest part of the park. This area is next to private property border, a parking area, and a trail leading into Shimek State Forest. The area consists of pole sized (8-14") shagbark and mockernut hickory. Other species in the stand are walnut, ash, and an occasional post oak, white oak, and black oak. Understory is ash, shagbark hickory, mockernut hickory, and ironwood. Regeneration mainly consists of ash, hickory, and elm. The soils are Rathbun loam and Kniffin silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have oak and walnut for future generations. This is a good time, with forest management, to make this a good oak/hickory stand.

Recommendations/Prescriptions (Even age Management): This area is a **high** priority for crop tree release due to the composition of the stand and the size of the trees. This size of tree responds very well to increased space for growing. The best crop tree species to select for management in this area is white oak, walnut, mockernut hickory, black oak, and post oak. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. This stand should be able to have crop tree release performed again in 10 years. This will help to keep them growing fast and healthy.

Stand 19: 67 acres/ BA: 110

Stand Description: Stand 19 is located in the southwest part of the park. This stand is next to the road and next to the campground in the northern parts of the stand. The area consists of pole to sawtimber sized (12-18") white oak and mockernut hickory. There are 22"+ trees scattered throughout the area. Other species in the stand are black oak, elm, walnut, red oak, bitternut hickory, and an occasional swamp white oak. Understory is hackberry, ironwood, and ash. Regeneration mainly consists of hickory, ash, and elm. The soils are Lindley loam and Keswick loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak, walnut, and hickory healthy.

Recommendations/Prescriptions (Even age Management): This area is a **high** priority for crop tree release due to the abundant amount of oak in the stand. There are areas where some oak wilt has managed to kill a few trees but it is not overwhelming death. The best crop tree species to select for management in this area is white oak, walnut, red oak, and shagbark hickory. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. There are scattered trees throughout the area that are 22"+ in diameter. These areas with bigger trees should receive less thinning management because they are already close to maturity. Forest management will help to keep residual trees healthy.

Stand 20: 4 acres/ BA: 70

Stand Description: Stand 20 is located in the southwest part of the park. This stand is located next to the south property border. The area consists of pole sized (8-14") mockernut hickory and black oak. Other species in the stand are ash, red oak, shingle oak, walnut, and shagbark hickory. Understory is ash, elm, mockernut hickory, shagbark hickory, and ironwood. Regeneration mainly consists of ash and hickory. The soils are Rathbun silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have healthy oak, hickory, and walnut for future generations.

Recommendations/Prescriptions (Even age Management): This area is a **high** priority for crop tree release due to the composition of the stand and the size of the trees. This size of tree responds very well to increased space for growing. The best crop tree species to select for management in this area is white oak, walnut, red oak, mockernut hickory, and shagbark hickory. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. This stand should be able to have crop tree release performed again in 10 years. This will help to keep them growing fast and healthy.

Stand 21: 11 acres/ BA: 80

Stand Description: Stand 21 is located in the south-central part of the park. This stand is located next to the road and by a storage space. The area consists of pole and small sawtimber sized (10-18") black oak and red oak. Other species in the stand are ash, cherry, cedar, mockernut hickory, white oak, and an occasional white pine and walnut. Understory is ash, elm, mockernut hickory, and ironwood. Regeneration mainly consists of ash and oak. The soils are Rathbun silt loam and Keswick loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have healthy oak and hickory for future generations. The high amount of red oak and ash needs to be watched for mortality from oak wilt and Emerald Ash Borer is already present.

Recommendations/Prescriptions (Even age Management): This area is a **moderate** priority for crop tree release due to the composition of the stand and the size of the trees. There is a lot of red and black oak in the stand so there must always be a look out for oak wilt problems. The best crop tree species to select for management in this area is white oak, walnut, mockernut hickory, and red oak. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. This will help to keep them growing fast and healthy.

Stand 22: 1 acres/ BA: 130

Stand Description: Stand 22 is located in the south-central part of the park. The area consists of sawtimber sized (18-24") white pine. Other species in the stand are ash, cherry, cedar, mockernut hickory, white oak, and an occasional white pine and walnut. Understory is ash, elm, and mockernut hickory. Regeneration mainly consists of ash. The soils are lindley loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have healthy white pine stand for added diversity to the park.

Recommendations/Prescriptions (Even age Management): This area should be monitored for health problems every 10 years to ensure that the white pine is not declining. There are some big trees that are growing towards maturity. If there is a significant amount of mortality in the future, then other management options can be implemented.

Stand 23: 21 acres/ BA: 90

Stand Description: Stand 23 is located in the south-central part of the park. This stand is the riparian area protecting the drainage that runs into Lake Lacey. The area consists of small sawtimber sized (12-18") swamp white oak, walnut, and red oak. There are 22"+ trees scattered throughout the area. Other species in the stand are basswood, cottonwood, elm, bitternut hickory, hackberry, ash, shagbark hickory, white oak, shingle oak, cherry, and honey locust. Understory is elm, ash, basswood, and hackberry. Regeneration mainly consists of ash. The soils are Nodaway-Coppock-Cantril complex.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak, walnut, and hickory healthy. This an important drainage for Lake Lacey and should be managed on an un-even aged basis.

Recommendations/Prescriptions (Un-even age Management): This area is a **moderate** priority for basal area thinning due to the amount of walnut and oak in the stand. There are areas where some oak wilt has managed to kill a few trees but it is not overwhelming death. The best tree species to select for management in this area is swamp white oak, walnut, white oak, red oak, and mockernut hickory. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. There are scattered trees throughout the area that are 22"+ in diameter. These areas with bigger trees should receive less thinning management because they are already close to maturity. Forest management will help to keep residual trees healthy.

Stand 24: 30 acres/ BA: N/A

Stand Description: Stand 24 is located in the central part of the property. This area is the campground for recreation at Lacey Keosauqua State Park. There is also materials storage across the road from the campground. The trees in this area should be maintained for health and as trees die, they should be removed so they do not pose a hazard to users. There could be some planting done in the area if there is significant tree mortality. As of 2019, there is a lot of mortality due to EAB and some planting has been done. When planting new trees remember to plant a diverse mix of species in case of future pests/disease. This area is mowed and maintained as a campground. The soil is Rathbun silt loam.

Management Objectives and Future Conditions: The major objectives for this stand include watching the trees for health problems and removing them as needed. It is also possible if there are several trees dying that some saplings could be planted to replace the dead ones.

Recommendations/Prescriptions (Non-Forest Management): Management activities are basically limited to taking care of hazard trees, buildings, and maintaining as a recreation area.

Stand 25: 54 acres/ BA: 100

Stand Description: Stand 25 is located in the central part of the park. This stand is next to several landmarks in the park including, the cabins area, roads, campground, Lake Lacey and Lake Lacey Dam. The area consists of sawtimber sized (16-24") white oak and red oak. Other species in the stand are chinkapin oak, ash, basswood, shagbark hickory, mockernut hickory, black oak, and an occasional walnut. Understory is sugar maple, basswood, shagbark hickory, mockernut hickory, autumn olive, honeysuckle, ash, buckeye, elm, ironwood, and hackberry. Regeneration mainly consists of buckeye, ironwood, ash, and elm. The soil is Lindley loam and Weller silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have oak for future generations. There are several areas similar to this in Lacey that could be harvested. When deciding on harvest only part of this stand will be harvested when based on the annual harvest. When the harvest area is determined, that harvested area will become a new stand to indicate the changes.

Recommendations/Prescriptions (Even age Management): This area should be on the list for shelterwood harvesting. The trees are mature and at a good stage to be able to drop seed to establish the next stand of oak. Since there is not

much oak regeneration, all understory trees size 1" to 10" should be removed in order to provide more light to forest floor and give new oak seedlings a chance to grow. This will also help new seedlings to become established by seed during a moderate acorn production year. If there are multiple years without a moderate acorn crop then prescribed fire could be used to eliminate small caliper understory vegetation. Once the shelterwood harvest is done this stand should be clearcut harvested when it is determined there is enough oak seedlings to ensure it will be an oak stand in the future. Typically, the clearcut harvest is done at least 10 years after the shelterwood harvest.

Stand 26: 4 acres/ BA: 80

Stand Description: Stand 26 is located in the central part of the park. This area is next to the road and is close to the Park Technician residence. The area consists of pole sized (10-18") ash, black locust, and hackberry. Other species in the stand are black oak, red oak, cherry, shagbark hickory, and an occasional walnut. Understory is ash, elm, ironwood, hackberry, and an occasional red oak and black oak. Regeneration mainly consists of ash, oak, hackberry, and elm. The soils are Rathbun and Lindley silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have oak and walnut dominate for future generations.

Recommendations/Prescriptions (Even age Management): This area is a **low** priority for crop tree release due to the composition of the stand and the size of the trees. When the time comes to do the management, the best crop tree species to select for management in this area is walnut, red oak, black oak, shagbark hickory, and cherry. Tree form, health, and dominance must also be considered. Black locust should not be eradicated, but cut if good crop tree will be released, or the added sunlight will encourage root sucker (sprouting). Trees that are dominant or co-dominant should be the majority of the trees selected for release. This stand should be able to have crop tree release performed again in 10 years. This will help to keep them growing fast and healthy.

Stand 27: 9 acres/ BA: N/A

Stand Description: Stand 27 is located in the central part of the park. This area contains the park manager's house and headquarters. The trees in this area should be maintained for health and as trees die, they should be removed. There could be some planting done in the area if there is significant tree mortality. This area is a mix timber around the house and the house itself which is mowed. There are some persimmon trees in the yard. The soil is Rathbun silt loam.

Management Objectives and Future Conditions: The major objectives for this stand include watching the trees for health problems and removing them as needed. It is also possible if there are several trees dying that some saplings could be planted to replace the dead ones.

Recommendations/Prescriptions (Non-Forest Management): Management activities are basically limited to taking care of hazard trees, buildings, and maintaining as a housing.

Stand 28: 6 acres/ BA: 90

Stand Description: Stand 28 is located in the central part of the park. This area is next to the road and is close to the campground. The area consists of pole and small sawtimber sized (10-18") black oak and shagbark hickory. Other species in the stand are ash, mockernut hickory, red cedar, cherry, red oak, and honey locust. Understory is ash, elm, ironwood, hackberry, mockernut hickory, and shagbark hickory. Regeneration mainly consists of ash, ironwood, and elm. The soils are Rathbun silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have oak for future generations. This stand will not have any overstory ash by 2020 because of EAB.

Recommendations/Prescriptions (Even age Management): This area is a **moderate** priority for crop tree release due to the composition of the stand and the size of the trees. When the time comes to do the management, the best crop tree species to select for management in this area is red oak, black oak, and mockernut hickory. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees

selected for release. This stand should be able to have crop tree release performed again in 10 years. This will help to keep them growing fast and healthy.

Stand 29: 79 acres/ BA: 110

Stand Description: Stand 29 is located in the north central and northeast part of the park. This stand is next to the road in places and the Des Moines River on the north. The area consists of pole to sawtimber sized (12-20") white oak. There are 22"+ trees scattered throughout the area. Other species in the stand are black oak, red oak, mockernut hickory, Shagbark hickory, ash, and basswood. Understory is sugar maple, elm, mockernut hickory, ironwood, and ash. Regeneration mainly consists of ash and elm. The soils are Lindley loam, Keswick loam, and Gorin silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak, walnut, and hickory healthy.

Recommendations/Prescriptions (Even age Management): This area is a **high** priority for crop tree release due to the abundant amount of oak in the stand. There are areas where some oak wilt has managed to kill a few trees but it is not overwhelming death. The best crop tree species to select for management in this area is white oak, red oak, black oak, and mockernut hickory. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. There are scattered trees throughout the area that are 22"+ in diameter. These areas with bigger trees should receive less thinning management because they are already close to maturity. Forest management will help to keep residual trees healthy.

Stand 30: 5 acres/ BA: N/A

Stand Description: Stand 30 is located in the central part of the park. This area contains the lagoon for the park. There is not much for trees but the few trees in this area should be maintained for health and as trees die, they should be removed. The soil is Gorin silt loam and Lindley loam.

Management Objectives and Future Conditions: The major objectives for this stand includes, watching the trees for health problems and removing them as needed. Prairie was planted several years ago and should be maintained

Recommendations/Prescriptions (Non-Forest Management): Management activities are basically limited to taking care of hazard trees, lagoon, and prairie establishment.

Stand 31: 21 acres/ BA: 110

Stand Description: Stand 31 is located in the north central part of the park. The northern part of the stand is next to the Des Moines River and covers the drainage areas around stand 14 and 29. The area consists of sawtimber sized (16-24") white oak and red oak. Other species in the stand are sugar maple, ash, basswood, shagbark hickory, mockernut hickory, black oak, and an occasional walnut. Understory is sugar maple, elm, ironwood, and hackberry. Regeneration mainly consists of hickory, ash, and elm. The soil is Lindley loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have oak for future generations. There are several areas similar to this in Lacey that could be harvested. When deciding on harvest only part of this stand will be harvested when based on the annual harvest. When the harvest area is determined, that harvested area will become a new stand to indicate the changes.

Recommendations/Prescriptions (Even age Management): This area should be on the list for shelterwood harvesting. The trees are mature and at a good stage to be able to drop seed to establish the next stand of oak. Since there is not much oak regeneration, all understory trees size 1" to 10" should be removed in order to provide more light to forest floor and give new oak seedlings a chance to grow. This will also help new seedlings to become established by seed during a moderate acorn production year. If there are multiple years without a moderate acorn crop then prescribed fire could be used to eliminate small caliper understory vegetation. Once the shelterwood harvest is done this stand should be clearcut harvested when it is determined there is enough oak seedlings to ensure it will be an oak stand in the future. Typically, the clearcut harvest is done at least 10 years after the shelterwood harvest.

Stand 32: 3 acres/ BA: N/A

Stand Description: Stand 32 is located in the central part of the park. This area contains the park technician house and shop area. The trees in this area should be maintained for health and as trees die, they should be removed. There are some really nice-looking oaks in the front yard. There could be some planting done in the area if there is significant tree mortality. The soil is Weller silt loam.

Management Objectives and Future Conditions: The major objectives for this stand include watching the trees for health problems and removing them as needed. It is also possible if there are several trees dying that some saplings could be planted to replace the dead ones if there is enough sunlight.

Recommendations/Prescriptions (Non-Forest Management): Management activities are basically limited to taking care of hazard trees, buildings, and maintaining as a housing.

Stand 33: 6 acres/ BA: N/A

Stand Description: Stand 33 is located in the north central part of the park. This stand is located along the road and covers the picnic area on the ridge. The trees in this area should be maintained for health and as trees die, they should be removed. There could be some planting done in the area if there is significant tree mortality. This area is mowed and has some other structures. There is a lot of ash in this area declining rapidly.

Management Objectives and Future Conditions: The objectives for this stand include watching the trees for health problems and maintaining the facilities for recreation. It is also possible if there are several trees dying that some saplings could be planted to replace the dead ones.

Recommendations/Prescriptions (Non-Forest Management): Management activities are basically limited to taking care of hazard trees, buildings, and maintaining as a recreation area. There will also be a lot of ash in the circle drive that will need to be removed because of mortality.

Stand 34: 7 acres/ BA: 80

Stand Description: Stand 34 is located in the north central part of the park. This stand is located next to a picnic area. The area consists of pole and small sawtimber sized (10-18") black oak and bitternut hickory. Other species in the stand are ash, chinkapin oak, red oak, basswood, walnut, and red cedar. Understory is ash, elm, hackberry, and ironwood. Regeneration mainly consists of ash, elm, bitternut hickory, and hackberry. The soils are Gorin silt loam and Gosport silty clay loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have healthy oak and walnut for future generations. The high amount of black oak and ash needs to be watched for mortality from oak wilt. Emerald Ash Borer is already present.

Recommendations/Prescriptions (Even age Management): This area is a **moderate** priority for crop tree release due to the composition of the stand and the size of the trees. There is a lot of black oak in the stand so there must always be a look out for oak wilt problems. The best crop tree species to select for management in this area is chinkapin oak, walnut, red oak, and black oak. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. This will help to keep them growing fast and healthy.

Stand 35: 6 acres/ BA: 90

Stand Description: Stand 35 is located in the north central part of the park. This stand is located partly along the road and overlooks the ditch that comes from the spillway of Lake Lacey to the Des Moines River. The area consists of sawtimber sized (14-22") red oak. Other species in the stand are white oak, swamp white oak, chinkapin oak, and basswood. Understory is sugar maple, elm, ironwood, buckeye, and hackberry. Regeneration mainly consists of ash, buckeye, and ironwood. This stand is very steep and the management should be limited.

Management Objectives and Future Conditions: The objectives for this stand include watching the trees for health problems. Maintain tree cover to reduce erosion.

Recommendations/Prescriptions (Un-even Age Limited Management): Management activities are limited to removing dead trees and maintaining tree cover on the steep slope.

Stand 36: 21 acres/ BA: 80

Stand Description: Stand 36 is located in the northeast part of the park. This stand is the riparian area running from the spillway of Lake Lacey to the Des Moines River. The area consists of small to large sawtimber sized (14-20") walnut, swamp white oak, and sycamore. There are 22"+ trees scattered throughout the area. Other species in the stand are sugar maple, bitternut hickory, chinkapin oak, basswood, hackberry, elm, and black locust. Understory is buckeye, elm, ash, bitternut hickory, and hackberry. Regeneration is mostly absent, but mainly consists of ash and elm. The soils are Reeds Creek loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak and walnut healthy.

Recommendations/Prescriptions (Un-even age Management): This area is a **moderate** priority for basal area thinning due to the amount of walnut and oak in the stand. This stand has smaller diameter trees by the road and larger diameter trees close to Des Moines River. The best crop tree species to select for management in this area is swamp white oak, walnut, and chinkapin oak. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. There are scattered trees throughout the area that are 22"+ in diameter. These areas with bigger trees should receive less thinning management because they are already close to maturity. Forest management will help to keep residual trees healthy.

Stand 37: 9 acres/ BA: 120

Stand Description: Stand 37 is located in the northeast part of the park. This stand is next to the road on part of it and on the ridge tops. The area consists of small pole and small sawtimber sized (12-18") black locust, hackberry, and ash. Other species in the stand are walnut, honey locust, red oak, white oak, red cedar, and cherry. Understory is buckeye, hackberry, sugar maple, ash, and an abundant amount of honeysuckle and autumn olive. Regeneration mainly consists of ash, buckeye, sugar maple, and elm. The soils are Weller and Gorin silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak, walnut, and other desirable species healthy. Possible conversion to oak when black locust dies.

Recommendations/Prescriptions (Even age Management): This area is a **low** priority for crop tree release due to the abundant amount of black locust in the stand. There are areas where there is some walnut and oak that could benefit from some management, but there are higher priority areas that should come first. The best crop tree species to select for management in this area is white oak, walnut, red oak, and cherry. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. If there are areas where there is an abundant amount of desirable species present then you could remove a small amount of overstory to benefit them. Do not over thin the black locust or they will root sucker by the thousands. Forest management will help to keep residual trees healthy when the time comes to implement it here.

Stand 38: 9 acres/ BA: 90

Stand Description: Stand 38 is located in the northeast part of the park. This stand is located next to the road and a hiking trail. The area consists of pole sized (10-16") black oak, ash, and red cedar. Other species in the stand are shingle oak, red oak, white oak, black locust, walnut, and cherry. Understory is ash, elm, autumn olive, honeysuckle, and ironwood. Regeneration is basically non-existent due to the invasive shrubs. The soils are Weller silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have healthy oak for future generations. The high amount of black oak and ash needs to be watched for mortality from oak wilt and Emerald Ash Borer is already present.

Recommendations/Prescriptions (Even age Management): This area is a **moderate** priority for crop tree release due to the composition of the stand and the size of the trees. There is a lot of black oak in the stand so there must always be a look out for oak wilt problems. The best crop tree species to select for management in this area is white oak, walnut, black oak, and red oak. The ash in this stand is dying and actually giving room to some of the desirable trees. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. This will help to keep them growing fast and healthy.

Stand 39: 35 acres/ BA: 90

Stand Description: Stand 39 is located in the northeast part of the park. This stand is located next to the Des Moines River on west boundary and road on portions of the east boundary. The northern tip of this stand contains the entrance to the park. The area consists of pole and small sawtimber sized (10-18") black oak and shagbark hickory. Other species in the stand are ash, white oak, red oak, bur oak, basswood, hackberry, sugar maple, walnut, and bitternut hickory. Understory is ash, elm, buckeye, hackberry, and ironwood. Regeneration mainly consists of sugar maple and buckeye. The soils are Lindley loam and Nordess-Bentonsport complex.

Management Objectives and Future Conditions: The objective is to manage this area in order to have healthy oak and walnut for future generations. The high amount of black oak and ash needs to be watched for mortality from oak wilt and Emerald Ash Borer is already present.

Recommendations/Prescriptions (Even age Management): This area is a **low** priority for crop tree release due to the composition of the stand and the size of the trees. There is a lot of black oak in the stand so there must always be a look out for oak wilt problems. The best crop tree species to select for management in this area is white oak, bur oak, walnut, red oak, and black oak. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. This will help to keep them growing fast and healthy.

Stand 40: 1 acre/ BA: N/A

Stand Description: Stand 30 is located in the northeast part of the park. This space is utilized as a parking area. The soil is Gorin silt loam.

Management Objectives and Future Conditions: The major objectives for this stand is to maintain the area for recreational access.

Recommendations/Prescriptions (Non-Forest Management): Management activities are basically limited to taking care of parking space.

Stand 41: 4 acres/ BA: 110

Stand Description: Stand 41 is located in the northeast part of the park. This stand is next to the border on two sides. The area consists of pole to sawtimber sized (12-20") white oak and red oak. There are 22"+ trees scattered throughout the area. Other species in the stand are elm, hackberry, walnut, and ash. Understory is elm, buckeye, ironwood, autumn olive, and honeysuckle. Regeneration mainly consists of ash, elm, autumn olive, and honeysuckle. The soils are Lindley loam and Gosport silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak and walnut healthy.

Recommendations/Prescriptions (Even age Management): This area is a **high** priority for crop tree release due to the abundant amount of oak in the stand. There are areas where some oak wilt has managed to kill a few trees but it is not overwhelming death. The best crop tree species to select for management in this area is white oak, red oak, and walnut. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. There are scattered trees throughout the area that are 22"+ in diameter. These areas with bigger trees should receive less thinning management because they are already close to maturity. Forest management will help to keep residual trees healthy.

Stand 42: 6 acres/ BA: 60

Stand Description: Stand 42 is located in the northeast part of the park. This stand is located next to the road and by a parking area. The area consists of pole and small sawtimber sized (10-18") red oak. Other species in the stand are ash, shingle oak, elm, red cedar, walnut, and hackberry. Understory is ash, elm, hackberry, sugar maple, autumn olive, and honeysuckle. Regeneration mainly consists of ash, autumn olive, and honeysuckle. The soils are Lindley loam, Weller silt loam, and Gorin silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have healthy oak for future generations. The high amount of red oak and ash needs to be watched for mortality from oak wilt and Emerald Ash Borer is already present.

Recommendations/Prescriptions (Even age Management): This area is a **low** priority for crop tree release due to the composition of the stand and the size of the trees. There is a lot of red oak in the stand so there must always be a look out for oak wilt problems. The ash in the stand is dying fast due being fully infested with EAB and it is actually going to make room for some of the other tree species to reach more sunlight. The best crop tree species to select for management in this area is walnut and red oak. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. This will help to keep them growing fast and healthy.

Stand 43: 6 acres/ BA: 60

Stand Description: Stand 43 is located in the northeast part of the park. This stand is not located next to any landmarks and consists of 4 small sections. The area consists of pole and sawtimber sized (14-20") red oak. Other species in the stand are very limited but there is some walnut, honey locust, and ash along the edges. Understory is ironwood, autumn olive, and honeysuckle. Regeneration mainly consists of ironwood, autumn olive, and honeysuckle. The soils are Lindley loam, Weller silt loam, and Gorin silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have healthy oak for future generations. The high amount of red oak needs to be watched for mortality from oak wilt.

Recommendations/Prescriptions (Even age Management): This area is a **low** priority for crop tree release due to the composition of the stand and the size of the trees. There is a lot of red oak in the stand so there must always be a look out for oak wilt problems. The best crop tree species to select for management in this area is red oak. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. This will help to keep them growing fast and healthy.

Stand 44: 5 acres/ BA: 120

Stand Description: Stand 44 is located in the northeast part of the park. This stand is located along the bottomland. The area consists of pole and small sawtimber sized (10-18") red oak and walnut. Other species in the stand are black oak, swamp white oak, shingle oak, white oak, elm, red cedar, and honey locust. Understory is ash, elm, hackberry, and sugar maple. Regeneration mainly consists of ash, hackberry, autumn olive, and honeysuckle. The soils are Gosport silt loam and Linley loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have healthy oak and walnut for future generations. The high amount of red oak and black oak needs to be watched for mortality from oak wilt. There is a good mix of white oak species in the stand for diversity.

Recommendations/Prescriptions (Even age Management): This area is a **moderate** priority for crop tree release due to the composition of the stand and the size of the trees. There is a lot of red and black oak in the stand so there must always be a look out for oak wilt problems. The best crop tree species to select for management in this area is white oak, walnut, swamp white oak, black oak, and red oak. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. This will help to keep them growing fast and healthy.

Stand 45: 1 acres/ BA: 240

Stand Description: Stand 45 is located in the northeast part of the park. The area consists of sawtimber sized (18-24") white pine. Other species in the stand are ash, cherry, cedar, mockernut hickory, white oak, and an occasional walnut. Understory is ash, elm, and mockernut hickory. Regeneration mainly consists of ash. The soils are Gosport silt loam and Linley loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have healthy white pine stand for added diversity to the park.

Recommendations/Prescriptions (Un-even age Management): This area should be monitored for health problems every 10 years to ensure that the white pine is not declining. There are some big trees that are growing towards maturity. If there is a significant amount of mortality in the future, then other management options can be implemented.

Stand 46: 34 acres/ BA: 70

Stand Description: Stand 46 is located in the northeast part of the park. This stand is next to the road on the west and the property boundary on the east. The area consists of small pole and small sawtimber sized (12-18") black locust, elm, and ash. Other species in the stand are walnut, honey locust, red oak, shingle oak, black oak, red cedar, hackberry, sugar maple, cherry, and an occasional white oak and shagbark hickory. There is also a small patch of red pine that is unhealthy looking. Understory is hackberry, sugar maple, ash, and an abundant amount of honeysuckle and autumn olive. Regeneration mainly consists of ash, buckeye, sugar maple, elm, and an abundant amount of honeysuckle and autumn olive. The soils are Lindley loam and Weller silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak, walnut, and other desirable species healthy. Possible conversion to oak when black locust dies.

Recommendations/Prescriptions (Even age Management): This area is a **low** priority for crop tree release due to the abundant amount of black locust in the stand. There are areas where there is some walnut and oak that could benefit from some management, but there are higher priority areas that should come first. Some of the black locust and ash is dying and some have blown over due to wind. The current trees that have died are making some sunlight available for desirable species. The best crop tree species to select for management in this area is white oak, walnut, red oak, black oak, and shagbark hickory. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. If there are areas where there is an abundant amount of desirable species present then you could remove a small amount of overstory to benefit them. Do not over thin the black locust or they will root sucker by the thousands. Forest management will help to keep residual trees healthy when the time comes to implement it here.

Stand 47: 7 acres/ BA: 90

Stand Description: Stand 47 is located in the northeast part of the park. This stand is next to the east property boundary. The area consists of pole to sawtimber sized (12-20") white oak, red oak, and shagbark hickory. There are 22"+ trees scattered throughout the area. Other species in the stand are black oak, walnut, elm, ash, and basswood. Understory is elm, ironwood, and ash. Regeneration mainly consists of ash, elm, autumn olive, and honeysuckle. The soils are Lindley loam and Nordness-Bentonsport complex.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak, walnut, and hickory healthy.

Recommendations/Prescriptions (Even age Management): This area is a **high** priority for crop tree release due to the abundant amount of oak in the stand. There are areas where some oak wilt has managed to kill a few trees but it is not overwhelming death. The best crop tree species to select for management in this area is white oak, red oak, black oak, and shagbark hickory. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. There are scattered trees throughout the area that

are 22"+ in diameter. These areas with bigger trees should receive less thinning management because they are already close to maturity. Forest management will help to keep residual trees healthy.

Stand 48: 16 acres/ BA: 80

Stand Description: Stand 48 is located in the northeast part of the park. This stand is partially located next to the road. The area consists of pole and sawtimber sized (14-20") red oak. Other species in the stand are ash, white oak, black oak, red cedar, and an occasional post oak. Understory is ironwood, ash, sugar maple, red oak, and an occasional swamp white oak. Regeneration mainly consists of ash. The soils are Lindley loam and Weller silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have healthy oak for future generations. The high amount of red oak needs to be watched for mortality from oak wilt.

Recommendations/Prescriptions (Even age Management): This area is a **low** priority for crop tree release due to the composition of the stand and the size of the trees. There is a lot of red oak in the stand so there must always be a look out for oak wilt problems. The best crop tree species to select for management in this area is white oak, post oak, red oak, and black oak. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. This will help to keep them growing fast and healthy.

Stand 49: 2 acres/ BA: 240

Stand Description: Stand 49 is located in the northeast part of the park. The area consists of pole and small sawtimber sized (14-18") red pine. Other species in the stand is an occasional elm and ash. Understory is ash and elm. Regeneration mainly consists of ash and elm. The soils are Linley loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have healthy red pine stand for added diversity to the park.

Recommendations/Prescriptions (Un-even age Management): This area should be monitored for health problems every 10 years to ensure that the red pine is not declining. There is some mortality now but not at catastrophic levels. If there is a significant amount of mortality in the future, then other management options can be implemented.

Stand 50: 7 acres/ BA: 90

Stand Description: Stand 50 is located in the northeast part of the park. This stand is located next to the road and a hiking trail. There is also an old CCC limestone quarry contained in this stand. The area consists of pole sized (8-16") walnut, chinkapin oak, and red cedar. There are some 20+" cottonwood and walnut widely scattered. Other species in the stand are cottonwood, shingle oak, elm, black locust, white oak, swamp white oak, and basswood. Understory is ash, elm, autumn olive, honeysuckle, and ironwood. Regeneration is basically non-existent due to the invasive shrubs. The soils are Reeds creek loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have healthy oak for future generations. There is quite a bit of younger chinkapin in this area that should be managed for health especially. There should be a buffer around the quarry so it isn't disturbed.

Recommendations/Prescriptions (Even age Management): This area is a **high** priority for crop tree release due to the composition of the stand and the size of the trees. The best crop tree species to select for management in this area is white oak, chinkapin oak, walnut, and swamp white oak. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. This will help to keep them growing fast and healthy.

Stand 51: 5 acres/ BA: 90

Stand Description: Stand 51 is located in the north central part of the park. This stand is located partly along the road and overlooks the ditch that comes from the spillway of Lake Lacey to the Des Moines River. The area consists of sawtimber sized (14-22") red oak. Other species in the stand are white oak, swamp white oak, chinkapin oak, and

basswood. Understory is sugar maple, elm, ironwood, buckeye, and hackberry. Regeneration mainly consists of ash, buckeye, and ironwood. This stand is very steep and the management should be limited.

Management Objectives and Future Conditions: The objectives for this stand include watching the trees for health problems. Maintain tree cover to reduce erosion.

Recommendations/Prescriptions (Un-even Age Limited Management): Management activities are limited to removing dead trees and maintaining tree cover on the steep slope.

Stand 52: 5 acres/ BA: 60

Stand Description: Stand 52 is located in the north central part of the park. This stand is located in two separate areas but they have the same composition. The area consists of sawtimber sized (14-22") white oak. Other species in the stand are shagbark hickory, black oak, and cherry. Understory is ironwood and shagbark hickory. Regeneration mainly consists of ironwood. The trees in this stand are over mature and are starting to decline in spots. The trees have surpassed being harvestable due to quality and should remain to help regenerate new oak seedlings.

Management Objectives and Future Conditions: The objectives for this stand include watching the trees for health problems. The current oak trees should be utilized as a seed source for new trees.

Recommendations/Prescriptions (Even age Management): Management activities will be based on monitoring the stand for health. No management will be done in this stand until there are enough gaps from trees dying. If it is determined there are enough gaps then there should be some understory cutting and stump treatment performed to remove shade tolerant species. Removing the shade tolerant trees should allow sunlight to reach the forest floor and help regenerating oak. Fire could also be used to control understory vegetation if oak regeneration is slow.

Stand 53: 8 acres/ BA: 90

Stand Description: Stand 53 is located in the northeast part of the park. This stand is a bottomland area with the property border to the east. The area consists of pole to sawtimber sized (12-18") walnut and red oak. There are 22"+ trees scattered throughout the area. Other species in the stand are bitternut hickory, shingle oak, honey locust, basswood, hackberry, elm, ash, and sugar maple. Understory is elm, ash, ironwood, sugar maple, and shagbark hickory. Regeneration is mostly absent, but mainly consists of ash, ironwood, and elm. The soils are Nodaway-Coppock-Cantril complex.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak and walnut healthy.

Recommendations/Prescriptions (Even age Management): This area is a **high** priority for crop tree release due to the amount of walnut and oak in the stand. The best crop tree species to select for management in this area is walnut and red oak. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. There are scattered trees throughout the area that are 22"+ in diameter. These areas with bigger trees should receive less thinning management because they are already close to maturity. Forest management will help to keep residual trees healthy.

Stand 54: 2 acres/ BA: 90

Stand Description: Stand 54 is located in the northeast part of the park. This stand is located next to the east property border. The area consists of pole and small sawtimber sized (10-18") red cedar and red oak. Other species in the stand are ash, black oak, cherry, elm, and walnut. Understory is cherry, red oak, ash, and sugar maple. Regeneration mainly consists of honeysuckle and multiflora rose. The soils are Lindley loam and Nodaway-Coppock-Cantril complex.

Management Objectives and Future Conditions: The objective is to manage this area in order to have healthy oak and walnut for future generations. The high amount of red oak needs to be watched for mortality from oak wilt.

Recommendations/Prescriptions (Even age Management): This area is a **low** priority for crop tree release due to the composition of the stand. There is a lot of red and black oak in the stand so there must always be a look out for oak wilt problems. The best crop tree species to select for management in this area is walnut and red oak. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. This will help to keep them growing fast and healthy.

Stand 55: 62 acres/ BA: 110

Stand Description: Stand 55 is located in the northeast part of the park. This stand is next to the east property border. The area consists of pole to sawtimber sized (12-20") white oak. There are 22"+ trees scattered throughout the area. Other species in the stand are black oak, red oak, sugar maple, bitternut hickory, mockernut hickory, Shagbark hickory, ash, basswood, and an occasional walnut. Understory is sugar maple, elm, mockernut hickory, ironwood, and ash. Regeneration mainly consists of ash and elm. The soils are Lindley loam, Weller silt loam, and Rathbun silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak, walnut, and hickory healthy.

Recommendations/Prescriptions (Even age Management): This area is a **high** priority for crop tree release due to the abundant amount of oak in the stand. There are areas where some oak wilt has managed to kill a few trees but it is not overwhelming death. The best crop tree species to select for management in this area is white oak, walnut, red oak, black oak, shagbark hickory, and mockernut hickory. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. There are scattered trees throughout the area that are 22"+ in diameter. These areas with bigger trees should receive less thinning management because they are already close to maturity. Forest management will help to keep residual trees healthy.

Stand 56: 36 acres/ BA: 80

Stand Description: Stand 56 is located in the northeast part of the park. This stand is near the east property border on the ridge top. The area consists of pole and sawtimber sized (12-18") red oak, black oak, and shagbark hickory. Other species in the stand are ash, white oak, chinkapin oak, walnut, cherry, mockernut hickory, and honey locust. Understory is ironwood, ash, elm, mockernut hickory, shagbark hickory, and cherry. Regeneration mainly consists of ironwood and ash. The soils are Lindley loam, Rathbun silt loam, and Weller silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have healthy oak for future generations. The high amount of red oak needs to be watched for mortality from oak wilt.

Recommendations/Prescriptions (Even age Management): This area is a **moderate** priority for crop tree release due to the composition of the stand and the size of the trees. There is a lot of red oak in the stand so there must always be a look out for oak wilt problems. Fortunately, there is plenty of hickory and other oak if red oak starts to die. The best crop tree species to select for management in this area is white oak, chinkapin oak, walnut, red oak, black oak, mockernut hickory, and shagbark hickory. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. This will help to keep them growing fast and healthy.

Stand 57: 9 acres/ BA: 90

Stand Description: Stand 57 is located in the northeast part of the park. This stand is located on a ridge overlooking the road. The area consists of pole sized (10-16") red cedar, white oak, black oak, and red oak. Other species in the stand are elm, ash, and walnut. Understory is autumn olive and ironwood. Regeneration mainly consists of autumn olive and multiflora rose. The soils are Weller silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have healthy oak and walnut for future generations. The high amount of red oak needs to be watched for mortality from oak wilt. This stand is diverse if there is some oak wilt mortality.

Recommendations/Prescriptions (Even age Management): This area is a **moderate** priority for crop tree release due to the composition of the stand. There is a lot of red and black oak in the stand so there must always be a look out for oak wilt problems. The best crop tree species to select for management in this area is white oak, walnut, red oak, and black oak. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. This will help to keep them growing fast and healthy.

Stand 58: 3 acres/ BA: 70

Stand Description: Stand 58 is located in the northeast part of the park. This stand is next to the dam of Lake Lacey. The area consists of small pole and small sawtimber sized (12-18") black locust, elm, and ash. Other species in the stand are walnut, honey locust, red oak, shingle oak, black oak, red cedar, hackberry, sugar maple, cherry, and an occasional shagbark hickory. Understory is hackberry, sugar maple, ash, and an abundant amount of honeysuckle and autumn olive. Regeneration mainly consists of ash, buckeye, sugar maple, elm, and an abundant amount of honeysuckle and autumn olive. The soils are Lindley loam and Weller silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak, walnut, and other desirable species healthy. Possible conversion to oak when black locust dies.

Recommendations/Prescriptions (Even age Management): This area is a **low** priority for crop tree release due to the abundant amount of black locust in the stand. There are areas where there is some walnut and oak that could benefit from some management, but there are higher priority areas that should come first. Some of the black locust and ash is dying and some have blown over due to wind. The current trees that have died are making some sunlight available for desirable species. The best crop tree species to select for management in this area is walnut, red oak, black oak, and shagbark hickory. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. If there are areas where there is an abundant amount of desirable species present then you could remove a small amount of overstory to benefit them. Do not over thin the black locust or they will root sucker by the thousands. Forest management will help to keep residual trees healthy when the time comes to implement it here.

Stand 59: 65 acres/ BA: N/A

Stand Description: Stand 59 is located in the central part of the park. This area contains Lake Lacey, the beach, buildings, parking lots, and the cabins.

Management Objectives and Future Conditions: The major objectives for this stand are to work with fisheries on the lake and park staff should care for the trees as needed for safety and viewshed. Maintain cabins for public use.

Recommendations/Prescriptions (Non-Forest Management): Management activities are basically limited to working with fisheries and taking care of general maintenance on cabins and buildings. If there is significant mortality to the trees there should be some hazard tree maintenance.

Stand 60: 88 acres/ BA: 110

Stand Description: Stand 60 is located in the east part of the park. This stand is next to the east property border and the viewshed area on the eastern side of Lake Lacey. The area consists of pole to sawtimber sized (12-20") white oak. There are 22"+ trees scattered throughout the area. Other species in the stand are black oak, red oak, sugar maple, bitternut hickory, mockernut hickory, Shagbark hickory, ash, basswood, and an occasional walnut. Understory is sugar maple, elm, mockernut hickory, ironwood, and ash. Regeneration mainly consists of ash and elm. The soils are Lindley loam, Keswick loam, and Rathbun silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak, walnut, and hickory healthy.

Recommendations/Prescriptions (Even age Management): This area is a **high** priority for crop tree release due to the abundant amount of oak in the stand. There are areas where some oak wilt has managed to kill a few trees but it is not overwhelming death. The best crop tree species to select for management in this area is white oak, walnut, red oak,

black oak, shagbark hickory, and mockernut hickory. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. There are scattered trees throughout the area that are 22"+ in diameter. These areas with bigger trees should receive less thinning management because they are already close to maturity. Forest management will help to keep residual trees healthy.

Stand 61: 13 acres/ BA: 130

Stand Description: Stand 61 is located in the eastern part of the park. This stand is on the southeastern side of Lake Lacey. The area consists of sawtimber sized (16-24") white oak and red oak. Other species in the stand are shagbark hickory, mockernut hickory, and basswood. Understory is ironwood, shagbark hickory, and mockernut hickory. Regeneration mainly consists of ironwood, ash, and elm. The soil is Lindley and Keswick loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have oak for future generations. There are several areas similar to this in Lacey that could be harvested. When deciding on harvest, only part of this stand will be harvested when based off the annual harvest. When the harvest area is determined, that harvested area will become a new stand to indicate the changes.

Recommendations/Prescriptions (Even age Management): This area should be on the list for shelterwood harvesting. The trees are mature and at a good stage to be able to drop seed to establish the next stand of oak. Since there is not much oak regeneration, all understory trees size 1" to 10" should be removed in order to provide more light to forest floor and give new oak seedlings a chance to grow. This will also help new seedlings to become established by seed during a moderate acorn production year. If there are multiple years without a moderate acorn crop then prescribed fire could be used to eliminate small caliper understory vegetation. Once the shelterwood harvest is done this stand should be clearcut harvested when it is determined there is enough oak seedlings to ensure it will be an oak stand in the future. Typically, the clearcut harvest is done at least 10 years after the shelterwood harvest.

Stand 62: 13 acres/ BA: 28

Stand Description: Stand 62 is located in the south eastern part of the park. This stand is on the southeastern side of Lake Lacey. The area consists of sawtimber sized (16-24") white oak and red oak. Other species in the stand are shagbark hickory, mockernut hickory, and basswood. Understory is ironwood, shagbark hickory, and mockernut hickory. Regeneration mainly consists of ironwood, ash, and elm. The soil is Lindley and Keswick loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have oak for future generations. There are several areas similar to this in Lacey that could be harvested. When deciding on harvest, only part of this stand will be harvested when based off the annual harvest. When the harvest area is determined, that harvested area will become a new stand to indicate the changes.

Recommendations/Prescriptions (Even age Management): This area should be on the list for shelterwood harvesting. The trees are mature and at a good stage to be able to drop seed to establish the next stand of oak. Since there is not much oak regeneration, all understory trees size 1" to 10" should be removed in order to provide more light to forest floor and give new oak seedlings a chance to grow. This will also help new seedlings to become established by seed during a moderate acorn production year. If there are multiple years without a moderate acorn crop then prescribed fire could be used to eliminate small caliper understory vegetation. Once the shelterwood harvest is done this stand should be clearcut harvested when it is determined there is enough oak seedlings to ensure it will be an oak stand in the future. Typically, the clearcut harvest is done at least 10 years after the shelterwood harvest.

Stand 63: 59 acres/ BA: 110

Stand Description: Stand 63 is located in the southeastern part of the park. This stand is on the upland. The area consists of pole to sawtimber sized (12-20") white oak and red oak. There are 22"+ trees scattered throughout the area. Other species in the stand are black oak, bitternut hickory, mockernut hickory, Shagbark hickory, ash, basswood, cherry, and an occasional walnut. Due to the ridge tops being more open in the past, more black oak and hickory regenerated there. Understory is shagbark hickory, elm, mockernut hickory, ironwood, and ash. Regeneration mainly consists of ash, hickory, ironwood, and elm. The soils are Lindley loam, Keswick loam, and Rathbun silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to keep existing oak, walnut, and hickory healthy.

Recommendations/Prescriptions (Even age Management): This area is a **high** priority for crop tree release due to the abundant amount of oak in the stand. There are areas where some oak wilt has managed to kill a few trees but it is not overwhelming death. The ridge tops do have more black oak and hickory, but they will be managed the same as the rest of the stand. The best crop tree species to select for management in this area is white oak, walnut, red oak, black oak, shagbark hickory, and mockernut hickory. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. There are scattered trees throughout the area that are 22"+ in diameter. These areas with bigger trees should receive less thinning management because they are already close to maturity. Forest management will help to keep residual trees healthy.

Stand 64: 33 acres/ BA: 130

Stand Description: Stand 64 is located in the southern part of the park. This stand is next to the southern property border and it is up stream of Lake Lacey. The area consists of sawtimber sized (16-24") white oak and red oak. Other species in the stand are shagbark hickory, mockernut hickory, and basswood. Understory is ironwood, shagbark hickory, and mockernut hickory. Regeneration mainly consists of ironwood, ash, and elm. The soil is Lindley and Keswick loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have oak for future generations. There are several areas similar to this in Lacey that could be harvested. When deciding on harvest, only part of this stand will be harvested when based off the annual harvest. When the harvest area is determined, that harvested area will become a new stand to indicate the changes.

Recommendations/Prescriptions (Even age Management): This area should be on the list for shelterwood harvesting. The trees are mature and at a good stage to be able to drop seed to establish the next stand of oak. Since there is not much oak regeneration, all understory trees size 1" to 10" should be removed in order to provide more light to forest floor and give new oak seedlings a chance to grow. This will also help new seedlings to become established by seed during a moderate acorn production year. If there are multiple years without a moderate acorn crop then prescribed fire could be used to eliminate small caliper understory vegetation. Once the shelterwood harvest is done this stand should be clearcut harvested when it is determined there is enough oak seedlings to ensure it will be an oak stand in the future. Typically, the clearcut harvest is done at least 10 years after the shelterwood harvest.

Stand 65: 17 acres/ BA:100

Stand Description: Stand 65 is located in the southern part of the park. This stand is located next to the southeastern property border and there is a power line on the northern border. The area consists of pole sized (8-16") white oak and red oak. Other species in the stand are ash, black oak, post oak, shagbark hickory and an occasional red cedar. Understory is ash, cherry, and ironwood. Regeneration mainly consists of ash, elm, autumn olive and honeysuckle. The soils are Lindley loam and Ashgrove silty clay loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have healthy oak and hickory for future generations.

Recommendations/Prescriptions (Even age Management): This area is a **high** priority for crop tree release due to the composition of the stand and the size of the trees. This size of tree responds very well to increased space for growing. The best crop tree species to select for management in this area is white oak, post oak, red oak, black oak, and shagbark hickory. Tree form, health, and dominance must also be considered. Tree that are dominant or co-dominant should be the majority of the trees selected for release. This stand should be able to have crop tree release performed again in 10 years. This will help to keep them growing fast and healthy.

Stand 66: 8 acres/ BA: 50

Stand Description: Stand 66 is located in the southern part of the park. This stand is located next to 240th street and along the west edge of the open field. The area consists of pole sized (12-14") red cedar. Other species in the stand are ash, shingle oak, honey locust, shagbark hickory, osage orange, and an occasional, white oak, swamp white oak, red oak,

and black oak. Understory is hackberry, autumn olive, and honeysuckle. Regeneration mainly consists of invasive autumn olive and honeysuckle. The soils are Ashgrove silty clay loam, Kniffin, and Rathbun silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have healthy oak for future generations. There is an abundance of ash in the stand that is already dead from EAB. The cedar in this stand should remain, because it is getting used heavily by wildlife.

Recommendations/Prescriptions (Even age Management): This area is a **low** priority for crop tree release due to the composition of the stand. Almost all the ash is dying which is creating a natural crop tree release for oaks. The best crop tree species to select for management in this area is white oak, swamp white oak, black oak, and red oak. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. This will help to keep them growing fast and healthy. Red cedar should not be cut in order to keep the wildlife cover.

Stand 67: 36 acres/ BA: 80

Stand Description: Stand 67 is located in the southern part of the park. This stand is near the east property border on the ridge top and close to the powerlines. The area consists of pole sized (8-14") shagbark hickory. Other species in the stand are ash, white oak, black oak, red oak, mockernut hickory, and red cedar. Understory is ironwood, ash, elm, and autumn olive. Regeneration mainly consists of ironwood, autumn olive, and ash. The soils are Rathbun silt loam, and Ashgrove silty clay loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have healthy oak and hickory for future generations.

Recommendations/Prescriptions (Even age Management): This area is a **low** priority for crop tree release due to the composition of the stand and the size of the trees. There is a lot of hickory in the stand that is competing with some desirable oak. There are higher priority areas that need to be managed first. The best crop tree species to select for management in this area is white oak, red oak, black oak, mockernut hickory, and shagbark hickory. Tree form, health, and dominance must also be considered. Trees that are dominant or co-dominant should be the majority of the trees selected for release. This will help to keep them growing fast and healthy.

Stand 68: 40 acres/ BA: N/A

Stand Description: Stand 68 is located in the southern part of the park. This stand is near the south and east property border. The area consists of mixed grass. The area was farmed for a few years to slow down the spread of invasive autumn olive and honeysuckle. The soils are Kniffin, Appanoose, and Rathbun silt loam.

Management Objectives and Future Conditions: The objective is to manage this area in order to have prairie for diversity.

Recommendations/Prescriptions (Non-Forest Management): This area is a great location to have some prairie planted to add some diversity to the area. The field is very easy to access and because it is next to the road it can be monitored for any updated management decisions. Fire should also be a tool used in establishing and maintain the prairie.

Stand 69: 2 acres/ BA: 80

Stand Description: Stand 69 is located in the southern part of the park. This stand is located next to 240th street. The area consists of pole sized (10-16") silver maple. Other species in the stand are elm and sycamore. Understory is autumn olive and grass. Regeneration mainly consists of autumn olive. The soils are Rinda and Kniffin silt loam.

Management Objectives and Future Conditions: The objective is to manage this area for a buffer for erosion. The mix of trees and grass is a combination for slowing down water.

Recommendations/Prescriptions (Un-even age Management): This area should be maintained as a buffer for soil erosion. The silver maple trees are going together thick in spots and could be managed if there was a health concern. Monitoring this area should be easy since it is next to the road.

Table 1: Proposed project completion schedule

Stand	Forest Type	Management System	Management Prescription	Work Acres	Implementation Year (approximate)
1, 4, 6, 7, 24, 27, 30, 32, 33, 40, 59	Recreational Areas	Non-Forest	No Forestry management in these areas. There is maintenance and upkeep needed from time to time.	148	2020
3, 18, 47, 65	Oak-hickory	Even Age	Forest Stand Improvement-Crop Tree Release	60	2020
2	Oak-hickory	Even Age	Forest Stand Improvement-Pre-logging Treatment	11	2020
8, 14	Oak-hickory	Even Age	Forest Stand Improvement-Crop Tree Release	85	2021
16	Oak-hickory	Even Age	Forest Stand Improvement-Crop Tree Release	147	2022
10, 13, 20, 41, 50, 53	Oak-hickory	Even Age	Forest Stand Improvement-Crop Tree Release	77	2023
5, 19	Oak-hickory	Even Age	Forest Stand Improvement-Crop Tree Release	99	2024
29	Oak-hickory	Even Age	Forest Stand Improvement-Crop Tree Release	79	2025
2	Oak-hickory	Even Age	Shelterwood Harvest	11	2025
64	Oak-hickory	Even Age	Forest Stand Improvement-Pre-logging Treatment	10-15	2025
60	Oak-hickory	Even Age	Forest Stand Improvement-Crop Tree Release	88	2026
55, 63	Oak-hickory	Even Age	Forest Stand Improvement-Crop Tree Release	121	2027
9, 44	Bottomland Hardwoods	Even Age	Forest Stand Improvement-Crop Tree Release	43	2028
36	Bottomland Hardwoods	Un-even Age	Forest Stand Improvement-Basal Area Thinning	21	2028
21, 28, 56, 57	Oak-hickory	Even Age	Forest Stand Improvement-Crop Tree Release	62	2029
23	Bottomland Hardwoods	Un-even Age	Forest Stand Improvement-Basal Area Thinning	21	2029
3, 18, 26, 34, 37, 38, 39, 42, 65, 66, 67	Oak-hickory-cedar	Even Age	Forest Stand Improvement-Crop Tree Release	139	2030
64	Oak-hickory	Even Age	Shelterwood Harvest	10-15	2030
64	Oak-hickory	Even Age	Forest Stand Improvement-Pre-logging Treatment	10-15	2030
ALL STANDS			Re-Inventory/Stand Map	1501	2030
43, 48, 54	Oak-hickory	Even Age	Forest Stand Improvement-Crop Tree Release	23	2031
46, 58	Black Locust-Walnut-Oak	Even Age	Forest Stand Improvement-Crop Tree Release	37	2031
3	Oak-hickory	Even Age	Forest Stand Improvement-Crop Tree Release	23	2031

Stand	Forest Type	Management System	Management Prescription	Work Acres	Implementation Year (approximate)
20	Oak-hickory	Even Age	Forest Stand Improvement-Crop Tree Release	4	2032
64	Oak-hickory	Even Age	Shelterwood Harvest	10-15	2035
2	Oak-hickory	Even Age	Clearcut Harvest	11	2035
31	Oak-hickory	Even Age	Forest Stand Improvement-Pre-logging Treatment	10-15	2035
28	Oak-hickory	Even Age	Forest Stand Improvement-Crop Tree Release	6	2039
26	Oak-hickory	Even Age	Forest Stand Improvement-Crop Tree Release	4	2040
31	Oak-hickory	Even Age	Forest Stand Improvement-Pre-logging Treatment	10-15	2040
31	Oak-hickory	Even Age	Shelterwood Harvest	10-15	2040
64	Oak-hickory	Even Age	Clearcut Harvest	10-15	2040
ALL STANDS			Re-Inventory/Stand Map	1501	2040

The proposed project completion table is a recommendation of when management activities should be performed. The environment can go through changes which can create different strategies for when dealing with climate, disease, pests, and human interactions.

Appendix

The Iowa DNR's *Iowa Wildlife Action Plan (IWAP)* identifies certain wildlife species as species of "greatest conservation need". Management activities must always take into consideration these Species of Greatest Conservation Need, and also to "keep common species common."

Table 2: Iowa Wildlife Action Plan (IWAP) identifies the species below as species of greatest conservation need in Van Buren County Iowa.

County	Common Name	Scientific Name	Class	State Status	Federal Status
VAN BUREN	Central Newt	<i>Notophthalmus viridescens</i>	AMPHIBIANS	T	
VAN BUREN	Crawfish Frog	<i>Rana areolata</i>	AMPHIBIANS	E	
VAN BUREN	Bald Eagle	<i>Haliaeetus leucocephalus</i>	BIRDS	S	
VAN BUREN	Barn Owl	<i>Tyto alba</i>	BIRDS	E	
VAN BUREN	Henslow's Sparrow	<i>Ammodramus henslowii</i>	BIRDS	T	
VAN BUREN	Northern Harrier	<i>Circus cyaneus</i>	BIRDS	E	
VAN BUREN	Red-shouldered Hawk	<i>Buteo lineatus</i>	BIRDS	E	
VAN BUREN	Short-eared Owl	<i>Asio flammeus</i>	BIRDS	E	
VAN BUREN	Orangethroat Darter	<i>Etheostoma spectabile</i>	FISH	T	
VAN BUREN	Topeka Shiner	<i>Notropis topeka</i>	FISH	T	E
VAN BUREN	Butterfly	<i>Ellipsaria lineolata</i>	FRESHWATER MUSSELS	T	
VAN BUREN	Pistolgrip	<i>Tritogonia verrucosa</i>	FRESHWATER MUSSELS	E	
VAN BUREN	Edwards' Hairstreak	<i>Satyrium edwardsii</i>	INSECTS	S	
VAN BUREN	Pipevine Swallowtail	<i>Battus philenor</i>	INSECTS	S	
VAN BUREN	Regal Fritillary	<i>Speyeria idalia</i>	INSECTS	S	

County	Common Name	Scientific Name	Class	State Status	Federal Status
VAN BUREN	Zabulon Skipper	<i>Poanes zabulon</i>	INSECTS	S	
VAN BUREN	Indiana Bat	<i>Myotis sodalis</i>	MAMMALS	E	E
VAN BUREN	Northern Long-eared Bat	<i>Myotis septentrionalis</i>	MAMMALS		T
VAN BUREN	Southern Bog Lemming	<i>Synaptomys cooperi</i>	MAMMALS	T	
VAN BUREN	Spotted Skunk	<i>Spilogale putorius</i>	MAMMALS	E	
VAN BUREN	Cream Violet	<i>Viola striata</i>	PLANTS (DICOTS)	S	
VAN BUREN	Creeping Bush-clover	<i>Lespedeza repens</i>	PLANTS (DICOTS)	S	
VAN BUREN	Downy Woodmint	<i>Blephilia ciliata</i>	PLANTS (DICOTS)	T	
VAN BUREN	Drummond St. John's Wort	<i>Hypericum drummondii</i>	PLANTS (DICOTS)	S	
VAN BUREN	Dwarf Sumac	<i>Rhus copallina</i>	PLANTS (DICOTS)	S	
VAN BUREN	Earleaf Foxglove	<i>Tomanthera auriculata</i>	PLANTS (DICOTS)	S	
VAN BUREN	False Loosestrife	<i>Ludwigia peploides</i>	PLANTS (DICOTS)	S	
VAN BUREN	Frost Grape	<i>Vitis vulpina</i>	PLANTS (DICOTS)	S	
VAN BUREN	Golden Corydalis	<i>Corydalis aurea</i>	PLANTS (DICOTS)	T	
VAN BUREN	Hortulan Plum	<i>Prunus hortulana</i>	PLANTS (DICOTS)	S	
VAN BUREN	Lance-leaf Ragweed	<i>Ambrosia bidentata</i>	PLANTS (DICOTS)	S	
VAN BUREN	Low Bindweed	<i>Calystegia spithamea</i>	PLANTS (DICOTS)	S	
VAN BUREN	Northern Gooseberry	<i>Ribes hirtellum</i>	PLANTS (DICOTS)	S	
VAN BUREN	Paw Paw	<i>Asimina triloba</i>	PLANTS (DICOTS)	S	
VAN BUREN	Prairie-tea	<i>Croton monanthogynus</i>	PLANTS (DICOTS)	S	
VAN BUREN	Rough Buttonweed	<i>Diodia teres</i>	PLANTS (DICOTS)	S	
VAN BUREN	Sensitive Briar	<i>Schrankia nuttallii</i>	PLANTS (DICOTS)	S	
VAN BUREN	Slender Copperleaf	<i>Acalypha gracilens</i>	PLANTS (DICOTS)	S	
VAN BUREN	Smooth Black-haw	<i>Viburnum prunifolium</i>	PLANTS (DICOTS)	S	
VAN BUREN	Softleaf Arrow-wood	<i>Viburnum molle</i>	PLANTS (DICOTS)	S	
VAN BUREN	Spring Avens	<i>Geum vernum</i>	PLANTS (DICOTS)	S	
VAN BUREN	Waxyfruit Hawthorn	<i>Crataegus pruinosa</i>	PLANTS (DICOTS)	S	
VAN BUREN	White Evening Primrose	<i>Oenothera speciosa</i>	PLANTS (DICOTS)	S	
VAN BUREN	Winged Monkey Flower	<i>Mimulus alatus</i>	PLANTS (DICOTS)	T	
VAN BUREN	Broom Sedge	<i>Andropogon virginicus</i>	PLANTS (MONOCOTS)	S	
VAN BUREN	Bush's Sedge	<i>Carex bushii</i>	PLANTS (MONOCOTS)	S	
VAN BUREN	False Hellebore	<i>Veratrum woodii</i>	PLANTS (MONOCOTS)	T	
VAN BUREN	Glomerate Sedge	<i>Carex aggregata</i>	PLANTS (MONOCOTS)	S	
VAN BUREN	Meadow Bluegrass	<i>Poa wolfii</i>	PLANTS (MONOCOTS)	S	
VAN BUREN	Oval Ladies'-tresses	<i>Spiranthes ovalis</i>	PLANTS (MONOCOTS)	T	
VAN BUREN	Pale Green Orchid	<i>Platanthera flava</i>	PLANTS (MONOCOTS)	E	
VAN BUREN	Slender Ladies'-tresses	<i>Spiranthes lacera</i>	PLANTS (MONOCOTS)	T	
VAN BUREN	Soft Rush	<i>Juncus effusus</i>	PLANTS (MONOCOTS)	S	
VAN BUREN	Purple Cliff-brake Fern	<i>Pellaea atropurpurea</i>	PLANTS (PTERIODOPHYTES)	E	
VAN BUREN	Southern Adder's-tongue	<i>Ophioglossum vulgatum</i>	PLANTS (PTERIODOPHYTES)	S	
VAN BUREN	Copperhead	<i>Agkistrodon contortrix</i>	REPTILES	E	
VAN BUREN	Slender Glass Lizard	<i>Ophisaurus attenuatus</i>	REPTILES	T	

County	Common Name	Scientific Name	Class	State Status	Federal Status
VAN BUREN	Speckled Kingsnake	<i>Lampropeltis getulus</i>	REPTILES	T	
VAN BUREN	Western Worm Snake	<i>Carphophis amoenus</i>	REPTILES	T	

E: Endangered Species is an animal or plant that is seriously at risk of extinction.

T: Threatened Species are likely, in the near future, to become endangered within all or much of its range.

S: Special Concern Species is not endangered or threatened, it is extremely uncommon, or has unique or specific habitat requirements and deserves careful monitoring.

Conducting Timber Sales on State Lands

Iowa Department of Natural Resources

Timber sales may be conducted on state owned forested lands in accordance with an approved Forest Management Plan. Once an area has a plan in place, forest management activities (including timber harvesting) may be scheduled and implemented according to the plan.

Management Planning

A District Forester will meet with the Area Manager, stand map and inventory the area, and develop a management plan based upon the Area Manager’s management objectives and the current, science-based forestry practices that will meet those objectives. Once a plan is developed, it will be sent to the Area Supervisor, Bureau Chief, State Forester and Lands and Waters staff (*currently send to John Pearson, Mark Leoschke and Kelly Poole*) for distribution and review. Once the plan is reviewed and approved by the State Forester, it will be posted on the respective Bureau’s website.

Public Meeting

The management plan will be presented at a public meeting.

Natural Areas Review

Planned timber sales must be sent to Land and Waters Bureau staff for review to determine if a natural areas inventory needs to be conducted (*currently send to John Pearson, Mark Leoschke and Kelly Poole for distribution and review*). Land and Waters staff will complete a natural areas review and identify any species of concern; or determine that no inventory is necessary.

Timber Sale Checklist

A timber sale checklist must be completed for the sale using the current template from the Forestry Bureau. The checklist must be completed and signed by appropriate staff (or email confirmation must be attached) before the sale can proceed.

Timber Marking

The District Forester will mark and scale the trees in the timber sale area. A tally of board foot volume and number of trees by species will be completed.

Bid Solicitation

The Area Manager, with the assistance of the District Forester will prepare a “Notice of Timber for Sale”. The District Forester will provide a list of Bonded Timber Buyers to whom bid notices can be sent. (*The contract routing process will begin here. Legal approval of the bid notice is needed before it is sent out.*) The bid opening date will be set at least 4 weeks from the date the bid notices are sent. Bids will be opened locally, and the results will be sent to the Area Supervisor.

Additional Public Meeting

If the timber sale is in a state park or preserve, a public hearing must be conducted prior to the sale if the amount of timber sold exceeds 10,000 board feet in volume, or \$5000 in value. Once the public hearing has been conducted, the sale may proceed (Code of Iowa 461A.31A).

NRC Approval

If the winning bid is \$25,000 or more, the sale must be approved by the Natural Resource Commission prior to executing a contract. The Area Supervisor will prepare the project brief for the NRC agenda if approval is necessary. Once the NRC has either approved the sale, or the sale is under \$25,000 and does not need approval, a contract may be executed.

Execution of Contract

The District Forester will assist the Area Manager with drafting of the timber sale contract. (The current contract routing process must be followed, including legal approvals and the use of the current timber sale contract template from the Forestry Bureau.) Once legal has approved the contract, **the timber buyer must sign the contract and pay for the sale in full before any trees are cut.** The timber buyer may proceed with the harvest once the full payment has been received and the contract is signed by the timber buyer and the appropriate DNR signatory.

Follow-up Management

Once the harvest is completed, the District Forester will meet with the Area Manager and assist with implementing the plan for reforestation. Post-harvest work, tree planting, or any other prescribed work will commence during the first year following completion of the harvest.

Checklist for Conducting Timber Sales

Item	Description	Date Completed
Management Plan	Area Manager and District Forester develop a Forest Management Plan	
Public Meeting	Forest Management Plan is presented at a public meeting	
Natural Areas Review	Land and Waters Bureau staff will review site and conduct a natural areas inventory if required	
Timber Sale Checklist	Checklist is completed and approval signatures or emails are obtained	
Timber marking	District Forester marks and scales the timber and provides volume estimates	
Bid Solicitation	Area Manager and District Forester prepare bid notice, bid notices are sent out and bids are received	
Additional Public Meeting	For state parks and preserves only if sale is over 10,000 board feet or \$5000	
NRC Approval	Required for sales over \$25,000	
Execution of Contract	Contract is drafted, reviewed, and signed by both parties	
Follow-up Management	Reforestation and follow -up work completed following harvest	

Glossary of Forestry Terms

Acre: An area of land containing 43,560 square feet, roughly the size of a football field, or a square that is 208' on a side. A "forty" of land contains 40 acres and a "section" of land contains 640 acres.

Basal area: The cross-sectional area of the base of any object. In forestry it means the cross-sectional area of a tree at a point 4.5' above the ground line expressed in square feet. The sum of all the trees on an acre is a measure of the density of the population of trees growing on the acre and is useful for making forest management decisions. A helpful way to think of basal area is to imagine all the trees on an acre cut off with 4.5' stumps. Basal area on the acre could be measured by measuring and totaling the cross-sectional area of all stumps. Fortunately, it is not necessary to cut trees to measure basal area. It can be calculated from tree diameter or can be easily measured with an angle gauge when certain relationships are known. Basal area will commonly range from 20-70 square feet per acre for poorly stocked stands to more than 200 square feet per acre for dense stands of conifers.

Board foot: A unit of measure wood 1" thick and 1 foot on each side equaling 1/12 cubic foot of wood. In practice, a board foot seldom contains 1/12 of a cubic foot due to loss from surfacing such as planing and sanding. For

example, an 8-foot 2x4 would be said to have 5 1/3 board feet, but would actually be more like 4.08 board feet after losses from surfacing.

Clearcut: A method of regenerating a forest in which all trees on a given area are cut. Clearcutting results in conditions which allow the greatest amount of sunlight to reach the forest floor, a desirable condition for the re-growth of certain valuable tree species which need a lot of sunlight to grow, such as oaks and walnut. Clearcutting also confers certain benefits for many wildlife species.

Climax species: Also called late-successional or equilibrium species, are plant species that will remain essentially unchanged in terms of species composition for as long as a site remains undisturbed. They are the most shade tolerant species of tree to establish in the process of forest succession. The regeneration of climax species can grow in the shade of the overstory parent trees, ensuring their dominance.

Competition: The struggle between trees to obtain sunlight, nutrients, water, and growing space. Every part of the tree, from the roots to the crown, competes for space and food.

Cover type: Expressed as the tree species having the greatest in a forest stand. A stand where the major species is oak would be called an oak cover type.

Crop tree release: Natural stands of trees start out with thousands of trees per acre. Planted stands may contain 500-1500 trees per acre. At maturity, due to constraints of space, nutrient availability and the increased size of individual trees, there can be only 50-70 trees per acre. Crop tree release is the practice of selecting the individual trees that are to remain in the stand until maturity and then removing the trees competing with them. Crop trees could be selected on the basis of any of the values associated with trees such as aesthetics or wildlife values, but are almost always selected on an economic basis. In Iowa selected trees would mostly likely consist of walnut and red and white oak. Selected trees would be straight with long, clear boles and would be the trees bringing the best dollar return upon maturity.

Cull: Refers to a tree having no commercial value, usually from having rot, holes, large knots or being crooked rather than from being too small or of a non-merchantable species. It is important to note that a cull, though having no commercial value may have wildlife, aesthetic or other value.

Cultural practice: The manipulation of vegetation to meet objectives of controlling stand composition or structure, such as site improvement, forest tree improvement, increased regeneration, increased growth, or measures to control insects or disease.

DBH: Stands for diameter at breast high. Always taken as 4.5' above the ground, that being a convenient height at which to measure a tree's diameter. For trees on a slope, dbh is taken at 4.5' from the ground on one of the two sides of the tree that is at right angles to the direction of slope.

Dominant (trees): individuals or species of the upper layer of the forest canopy.

Early successional forest: The forest community that develops immediately following the removal or destruction of vegetation in an area. Plant succession is the progression of plants from bare ground (e.g., after a forest fire or imber harvest) to mature forest consisting primarily of long-lived species such as sugar maple and white pine. Succession consists of a gradual change of plant and animal communities over time. Early succession forests commonly depend on and develop first following disturbance events (e.g. fire, windstorm, or timber harvest). Examples of early successional forest tree species are aspen, paper birch, and jack pine. Each stage of succession provides different benefits for a variety of species.

Endangered species: A plant or animal species that is threatened with extinction throughout all or a significant portion of its native range.

Even-aged stand: A stand of trees composed of a single age class.

Floodplain Forest: Characterized by species such as silver maple, cottonwood, walnut, green ash, elm, hackberry and willows. This habitat factor will benefit wildlife such as songbirds and woodpeckers, furbearers, raptors, reptiles and amphibians on relatively level areas inundated by water periodically.

Forest: A forest is an ecosystem, an association of plants and animals. Trees are its dominant feature. They provide many of the benefits of forests like habitat, quality water, recreation, climatic amelioration and wood products. The plants and animals that make up a forest are inter-dependent and often essential to its integrity.

Forester: A professional engaged in the science and profession of forestry- note foresters are commonly credentialed by states or other certifying bodies, e.g., the Society of American Foresters, and may be licensed, certified, or registered indicating specific education and abilities; the requirements for credentialing differ and usually include earning a baccalaureate degree in forestry, sometimes equivalent experience, and usually passing a comprehensive examination.

Forest floor: The accumulated organic matter at the soil surface, including litter and unincorporated humus.

Forest inventory: A set of objective sampling methods designed to quantify the spatial distribution, composition, and rates of change of forest parameters within specified levels of precision for the purposes of management. The listing (enumeration) of data from such a survey- synonym cruise, forest survey- note inventories may be made of all forest resources including trees and other vegetation, fish, insects, and wildlife, as well as street trees and urban forest trees- see dynamic sampling, point sampling

Forest management: The practical application of biological, physical, quantitative, managerial, economic, social, and policy principles to the regeneration, management, utilization, and conservation of forests to meet specified goals and objectives while maintaining the productivity of the forest. Forest management includes management for aesthetics, fish, recreation, urban values, water, wilderness, wildlife, wood products, and other forest resource values.

Forest stand - A stand may loosely be defined as a contiguous group of trees sufficiently uniform in species composition, arrangement of age classes and general condition to be a homogeneous and distinguishable unit. A stand is usually treated as a basic silvicultural unit, but it seldom represents a natural ecological unit. Its composition and structure are most strongly affected by management, other disturbances and chance factors affecting seed distribution, germination and seedling survival.

Forest Stand Improvement: A practice in which the quality of a residual forest stand is improved by removing less desirable trees and large shrubs to achieve the desired stocking of the best quality trees or to improve the reproduction, composition, structure, condition, and volume growth of a stand.

Fully-stocked stand: A forest stand in which all growing space is effectively occupied but having ample space for development of the crop trees.

Gap: The space occurring in forest stands due to individual tree or groups of trees mortality or blown down. Gap management uses timber harvest methods to emulate his type of forest spatial pattern.

Hardwood: Hardwood as opposed to softwood is a relative term. Hardwoods are generally defined as the woods of deciduous trees, i.e., trees which shed their leaves in the winter.

Harvesting vs. silvicultural treatment: The meanings of these two terms are often confused by lay people and sometimes by professionals. Many silvicultural treatments involve harvesting, but not all harvesting is silvicultural treatment. Harvesting is a silvicultural treatment when its purpose is to shape the residual stand or to affect regeneration. Often the two purposes are accomplished simultaneously. Of course, harvesting can be done simply to remove an existing crop, but this is not management and therefore the operation cannot be called a silvicultural treatment.

Landform: Any physical, recognizable form or feature of the earth's surface having a characteristic shape and produced by natural causes. Examples of major landforms are plains, plateaus, and mountains. Examples of minor landforms are hills, valleys, slopes, eskers, and dunes. Together, landforms make up the surface configuration of the earth.

Landscape: A general term referring to geographic areas that are usually based on some sort of natural feature or combination of natural features. They can range in scale from very large to very small.

Management goals: Overall purpose for controlling (managing) the composition and structure of forest land. For example, to protect land from erosion, to maintain wildlife habitat, to grow wood for profit, etc.

Management objectives: Defined conditions for the property, or segments of property (e.g. stands or management units), that will achieve management goals. For example, maintenance of continuous forest cover may be the only objective if watershed protection is the primary goal. Another objective may be to grow tree species with highest yields in order to maximize returns from wood production.

Management plan: A plan outlining the objectives for individual management units and describing steps for achieving them. Silvicultural procedures are identified in broad terms, but detailed prescriptions are developed in the field.

Mast: Nuts, seeds, catkins, flower buds, and fruits of woody plants that provide food for wildlife.

Mature tree: A tree that has reached the desired size or age for its intended use. Size or age will vary considerably depending on the species and the intended use

Multiple use: Using and managing a forested area to provide more than one benefit simultaneously. Common uses may include wildlife, timber, recreation, and water.

Natural regeneration: The growth of new trees from one of the following ways: (a) seeds naturally dropped from trees or carried by wind or animals, (b) seeds stored on the forest floor, or(c) stumps that sprout or roots that sucker.

Non-forest land: Land that has never supported forests, and land formerly forested where use for timber management is precluded by development for other uses such as crops, improved pasture, residential areas, city parks, improved roads, and power line clearings.

Overstory: The canopy in a stand of trees.

Plantation: A stand composed primarily of trees established by planting or artificial seeding.

Pole or pole timber: A young tree or stand of young trees between 3.5" and 12.9" in diameter at a point 4.5' above the ground. In referring to a stand of trees the upper limit holds, however, when referring to processed round wood, pieces larger than 12.9" in diameter could be correctly referred to as poles.

Prairie: An extensive tract of level or rolling land that was originally treeless and grass covered. A prairie is generally characterized by deep fertile soil.

Prescribed burn: To deliberately burn wild lands in either their natural or their modified state under specified environmental conditions, which allows the fire to be confined to a predetermine area and produces the fire line intensity and spread required to attain planned resource management objectives.

Pruning: The practice of removing tree limbs so that a straight, bole, free of limbs, will develop. Several years after pruning the resulting wound will have grown over and the wood that grows over the site of the former branch will be clear, that is knot free. Pruning is a component of FSI.

Recreation: Leisure activities involving the enjoyment and use of natural resources. This habitat factor will favor hunting activities while taking into consideration secondary activities such as wildlife watching, mushroom picking, photography, and hiking.

Recreation facility: The improvements within a developed recreation site offered for visitor's enjoyment.

Regeneration: The act of renewing tree cover by establishing generation usually maintaining the same forest type forest was removed. Regeneration may be artificial (direct seeding or planting) or natural (natural seeding, or planting).

Release (release operation): A treatment designed to free young trees from undesirable, usually over topping, competing vegetation.

Riparian: Related to, living, or located in conjunction with a wetland, on the bank of a river or stream but also at the edge of a lake.

Riparian Buffer- Woodland next to streams, lakes and wetlands that is managed to enhance and protect aquatic resources from adjacent fields. This habitat factor will provide a woody cover buffer to enhance soil and water conservation while providing wildlife habitat.

Rotation age: The period of years between when a forest stand (i.e., primarily even-aged) is established (i.e., regeneration) and when it receives its final harvest. This time period is an administrative decision based on economics, site conditions, growth rates, and other factors.

Salvage cut: A harvest made to remove trees killed or damaged by fire, wind, insects, disease, or other agents. The purpose of salvage cuts is to use available wood fiber before further deterioration occurs to recover value that otherwise would be lost.

Sapling: A young tree larger than a seeding but smaller than a pole. When a tree has grown to a diameter of a 3.5" in diameter at a point 4.5' above the ground it is no longer a sapling, having become a pole.

Saw log: A log large enough to produce lumber or other products that can be sawed. Its size and quality vary with the utilization practices of the region.

Sawtimber: Trees that yield logs suitable in size and quality for the production of lumber.

Seedling: A baby plant. In forestry the term usually used to refer to young trees that have grown beyond the stage where they have just emerged from the soil up to the point that they become saplings.

Selective harvest: Removal of single scattered trees or small groups of trees at relatively short intervals. The continuous establishment of reproduction is encouraged and an all-aged stand is maintained. A management option used for shade-tolerant species.

Shade tolerance: Relative ability of a tree species to reproduce and grow under shade. The capacity to withstand low-light intensities caused by shading from surrounding vegetation. Tolerant species tolerate shade, while intolerant species require full sunlight.

Shelterwood: A method of regenerating a forest whereby a portion of the stand is harvested and the rest of the stand is evenly distributed over the area to protect the site and provide seed to reseed the area. After the new stand is well established, the residual trees are harvested. This method is used to regenerate species not tolerate of shading.

Shelterwood harvest: A harvest cutting in which trees in the harvest area are removed in a series of two or more cuttings to allow the establishment and early growth of new seedlings under partial shade and protection of older trees. Produces an even-aged forest.

Silviculture: The art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.

Silvicultural prescription: Specific steps prescribed to achieve specific management objectives. Examples: If the management objective is to maintain an oak component in a mixed stand, the silvicultural prescription may include opening up the forest canopy to initiate the establishment of seedlings of shade-intolerant oaks. If undesirable species are dominating the canopy and a desirable species is becoming in the understory, the silvicultural prescription may be to remove over story trees to release the suppressed species. Thinning and planting are other examples

Site index: A measure of the productive quality of an area where trees grow. Site index is based on the height of dominant and co-dominant trees at age 50. That is to say, if the average height of dominant and co-dominant trees on a site was 70' at age 50, 70 would be the site index. Graphs are developed to enable determination of site index over a range of tree ages.

Stand: a contiguous group of trees similar in age, species composition, and structure, and growing on a site of similar quality, to be a distinguished forest unit. One stand will usually have characteristics that will distinguish it from other stands. Difference could be species, average diameter, density and location.

Succession: The natural replacement, over time, of one plant community with another.

Sucker: A shoot rising from below ground level from a root. Aspen regenerates from suckers.

Suppressed: The condition of a tree characterized by low growth rate and low vigor due to competition from overtopping trees or shrubs.

Sustainability: Protecting and restoring the natural environment while enhancing economic opportunity and community well-being. Sustainability addresses three related elements: the environment, the economy, and the community. The goal is to maintain all three elements in a healthy state indefinitely. Meeting the needs of the present without compromising the ability of future generations to meet their own needs.

Thinning: A silvicultural treatment made to reduce the density of trees within a forest stand primarily to improve growth, enhance forest health, or recover potential mortality. Row thinning is where selected rows are harvested, usually the first thinning, which provides equipment operating room for future selective thinning. Selective thinning is where individual trees are marked or specified (e.g., by diameter, spacing, or quality) for harvest. Commercial thinning is thinning after the trees are of merchantable size for timber markets. Pre-commercial thinning is done before the trees reach merchantable size, usually done in overstocked (very high stems per acre) stands to provide more growing space for crop trees that will be harvested in future years.

Threatened species: A plant or animal species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Tolerance (shade tolerance): A plant's ability to tolerate conditions under a forest canopy. Normally thought of as tolerance to low light conditions, but other understory conditions, such as root competition for water and nutrients, are also factors.

Under-stocked: A stand of trees so widely spaced that even with full growth potential realized, crown closure will not occur.

Under-story: The shorter vegetation (shrubs, seedlings, saplings, small trees) within a forest stand that forms a layer between the over-story and the herbaceous plants of the forest floor.

Uneven-aged stand: A stand with trees of three or more distinct age classes, either intimately mixed or in small groups.

Uneven-aged management: A planned sequence of treatments designed to maintain and regenerate a stand with three or more age classes. Uneven-aged (selection) methods will maintain a multi-aged structure by removing some trees in all size classes either singly, in small groups, or in strips-synonym all-aged methods

Viewshed: A physiographic area composed of land, water biotic and cultural elements which may be viewed from one or more viewpoints and which has inherent scenic qualities and/ or aesthetic values as determined by those who view it. Viewshed's are a habitat factor that will be primarily a "hands-off" area for aesthetics, proper soil and water conservation, along with providing special wildlife habitats.

Volume: Refers to the amount of wood in a tree or log. Expressed as board feet, cords or other measures.

Well-stocked: The situation in which a forest stand contains trees spaced widely enough to prevent competition yet closely enough to utilize the entire site.

Woodland: A plant community in which, in contrast to a typical forest, the trees are often small, characteristically short-boled relative to their crown depth, and forming only an open canopy with intervening area occupied by lower vegetation, commonly grass.

Woodland edge: An area of habitat transition that consists of vegetation (herbaceous and woody) of different heights and densities. This habitat factor will favor early successional vegetation for wildlife benefiting from edge cover.

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