FOREST WILDLIFE STEWARDSHIP PLAN

FOR

WATERLOO CREEK WILDLIFE AREA

A plan that will increase the diversity of forest wildlife and prioritize species of greatest conservation need.

Developed by

Gary Beyer
District Forester

And

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Wildlife Biologist

TABLE OF CONTENTS

HOW THE FOREST WILDLIFE STEWARDSHIP PLAN WAS DEVELOPED

The Wildlife Biologist is the manager of the area and determines the objectives for each wildlife area. Objectives address the habitat needs of Species of Greatest Conservation Need determined by the wildlife action plan and the woodland condition of each area. Seventy five per cent of the total land managed by the Wildlife Bureau in northeast Iowa is woodland. Managing woodland is essential to improve the areas for wildlife and recreation.

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

The Wildlife Biologist is the manager of the wildlife area. Foresters are assisting the Wildlife Bureau to implement woodland management practices.

One of four management systems are specified for each stand. This identifies the overall management system for that stand and designates the "road map" for what work will take place on the site in the future.

Each management system is described in detail in this plan. A brief description of each management system is as follows –

Early Successional -

Areas are clearcut every 15 years to maintain young, high stem density habitat. These areas are generally on the woodland edges to feather the edge.

Even Age -

Shade intolerant species such as oak, shagbark hickory, and walnut require full sunlight to grow. Even age management involves a clearcut at some point to create the full sunlight condition. Even age stands are clearcut every 125 years. Clearcutting also creates early successional habitat for the first 15 years.

Uneven Age -

Uneven age management can be used to manage species that will grow in shade such as hard maple and basswood. Every 20 years, the stand can be selectively harvested to remove the mature and defective trees. The openings are filled with young maple and basswood, creating an all age or uneven age forest.

Viewshed **-**

These are steep slopes, high recreational use areas, and buffers along the streams and rivers where management will be minimal.

FOREST WILDLIFE STEWARDSHIP PLAN
FOR WATERLOO CREEK

Sec. 24,25,36 Waterloo Twsp.,
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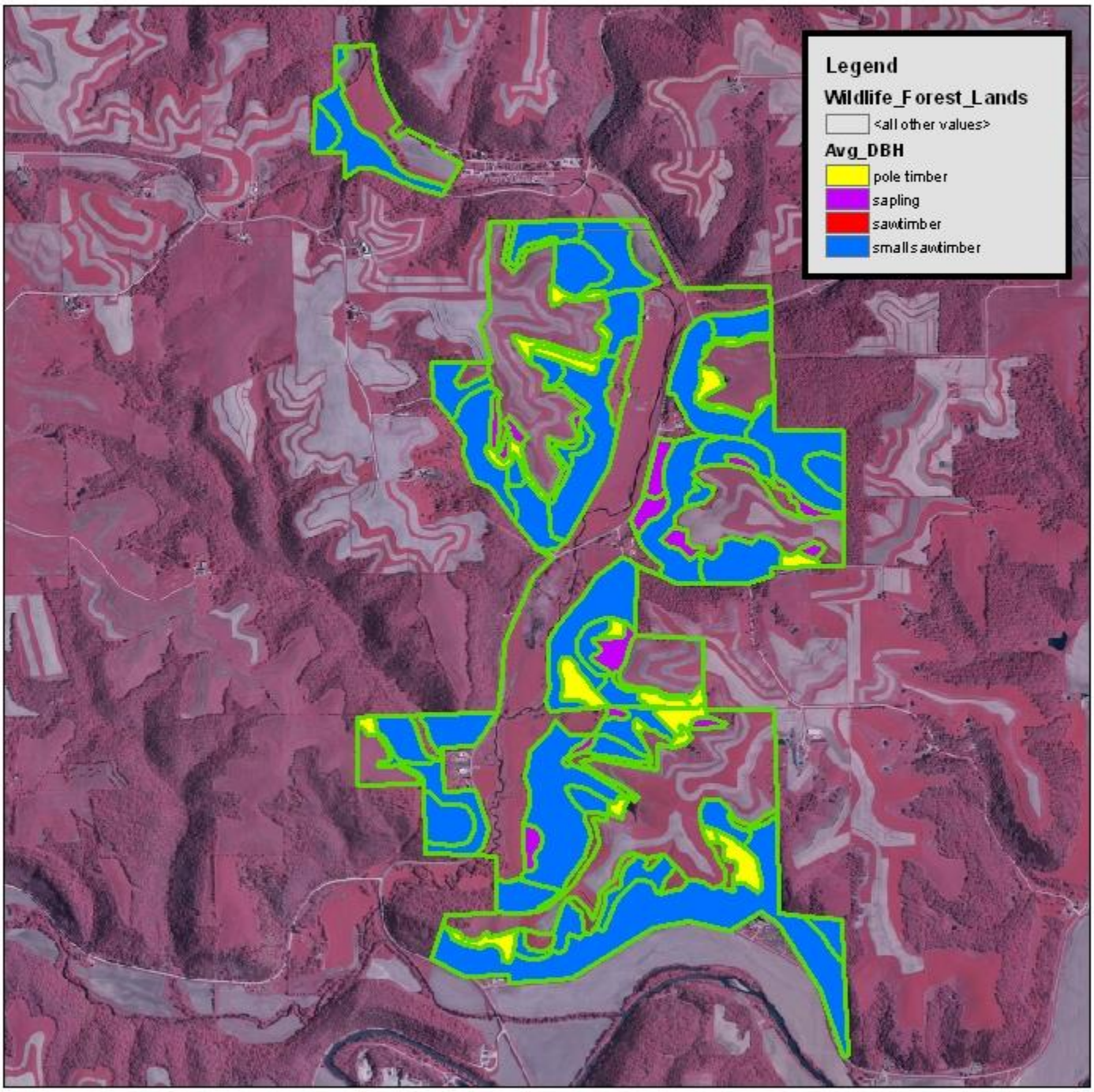
Allamakee County

WATERLOO CREEK
AVERAGE TREE SIZE

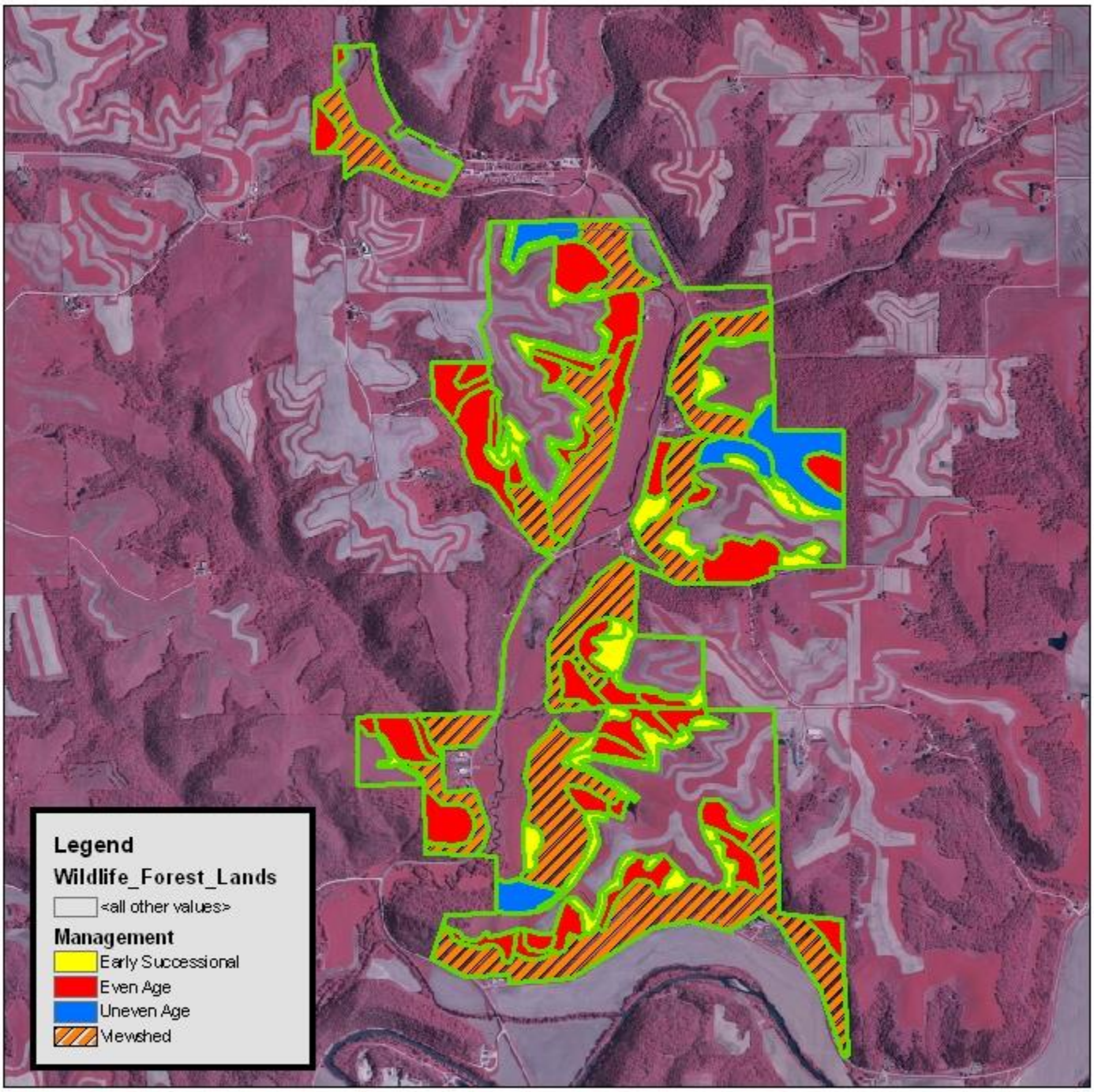


Sec. 24,25,36 Waterloo Twsp., T100N-R6W, and Sec. 19, 30 Union City Twsp., T100N-R5W, Allamakee County

N

0 1,250 2,500 5,000 7,500 10,000 Feet

WATERLOO CREEK
WOODLAND MANAGEMENT SYSTEMS



Sec. 24,25,36 Waterloo Twsp., T100N-R6W, and Sec. 19, 30 Union City Twsp., T100N-R5W, Allamakee County

0 1,250 2,500 5,000 7,500 10,000 Feet

N

DATE: 7/10/09

FOREST WILDLIFE STEWARDSHIP PLAN FOR WATERLOO CREEK WILDLIFE AREA

MANAGER:

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TELEPHONE: 563/380-3422

LOCATION: Sec. 24, 25, 36 Waterloo Twsp., T100N-R6W, and Sec. 19 & 30 Union City Twsp., T100N-R5W, Allamakee County

TOTAL ACRES: 1,008

INTRODUCTION

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

The forest can be managed to improve the forest ecosystem for wildlife species. The method in which the forest is managed effects what wildlife species will use a particular area at any point in time as the forest changes. Forests on state land are also a renewable resource that are owned by the public. Properly managed, these forests can provide multiple benefits such as wildlife habitat, water quality, air quality, recreation, and are a good investment for the people of Iowa.

There are 3 primary factors emphasizing the need for FWSP's for WMA's:

1) The continued succession of many forest stands past the oak-hickory stage to the shade tolerant stands of maple and basswood.
2) The loss of early successional forest stands and associated wildlife species.
3) The lack of proper management to secure mature forest stands with diverse overstory and understory tree species for associated forest-interior wildlife species.

Some wildlife species use all of the forest age classes but others have very specific needs where one or two of particular forest age classes are needed to survive. Although the over-all change in forest succession is relatively slow, changes in the early stages of forest succession occur relatively fast. For example, some populations of indigenous and migratory bird species, dependent on these short-lived forest age classes, are experiencing dramatic declines.

In Iowa, they include the ruffed grouse and the American woodcock. Nation-wide declines of both species have been detected. Many migratory non-game birds including the gold-winged warbler, blue-winged warbler, black-billed cuckoo, yellow-billed cuckoo and eastern towhee are also dependent on this early stage of forest growth. Each of these species is showing populations declines.

Conversely, some species of Neotropical migratory birds are dependent upon mature, undisturbed woodlands. The Acadian flycatcher, Cerulean warbler, and the veery are some examples of bird species needing mature forests. Management objectives will attempt to either protect these types of sites or include needed management to secure these necessary habitats for the future.

The IDNR Wildlife Bureau's Wildlife Action Plan, identifies all of the above species and others as species of greatest conservation needs. (Appendix – Tables 1-6).

Generally, the Wildlife Bureau manages state-owned forest for the greatest diversity of forest wildlife and esthetic value. The IDNR Wildlife Bureau's FWSP will prioritize the species of greatest conservation needs, and the habitat needs of these wildlife species will be guiding factors to forest management decisions. Evaluations will be conducted to monitor the success of these management decisions. Wildlife inventories will be conducted on each WMA and the information will be entered into a database. This database along with the "FWSP Definitions and Guiding Factors"(Appendix) will be used to make forest management decisions on the WMA's now and in the future. The Forest Wildlife Stewardship Plan is dynamic and will change and be updated as new information and techniques become available. The primary goal will be to maintain or increase populations of wildlife species of greatest conservation needs.

DESCRIPTION OF AREA

The Waterloo Creek Wildlife Area is located in northeast Iowa near the town of Dorchester. Waterloo Creek is one of the premier trout streams in Iowa.

The wildlife area consists of steep slopes and ridge tops. There are many archeological sites including a Native American Ovoid, which resembles a sun dial, except the ovoid is laid out on the ground. Native Americans were thought to use the ovoid to monitor seasons.

Waterloo Creek Wildlife Area has many steep slopes with soils shallow to limestone. This limits much of the management to upland ridges and gentle slopes.

There is an active eagle nest along Waterloo Creek south of Dorchester.

The majority of Waterloo Creek was purchased 10-15 years ago. The latest purchase was in 2009. The entire area was logged prior to the state purchasing the property. The majority of large and high quality trees were harvested. Much of the area was also pastured prior to the state buying the land.

Objectives -

The primary objectives for the area are improving wildlife habitat for a variety of wildlife species, recreation, water quality, and protecting endangered species. This Forest Wildlife Stewardship Plan strives to develop a forest ecosystem that has a diversity of tree sizes and species. Developing a diverse forest will benefit the widest variety of wildlife species. Wildlife species have diverse habitat requirements. Even on a Wildlife Management Area, what is productive habitat for one species may be unproductive for another.

Ruffed grouse and woodcock populations in northeast Iowa are declining due to a lack of early successional growth. Neotropical migratory birds dependent on early successional growth are also declining. Waterloo Creek has many field edges and ridge tops conducive to intensive management that will be managed for early successional habitat and even aged management to regenerate oak. . The major emphasis on the area is for early successional species and to maintain a good oak component on the landscape.

Due to the steep slopes and shallow soils, much of the area will be managed as viewshed to protect the trout stream.

Management on the state land will not be enough to greatly impact wildlife populations. The proper management of surrounding private land will be essential to improve habitat for wildlife.

Income from Timber Harvests -

Harvesting is conducted to regenerate stands to desirable species and to achieve a diversity of tree sizes and species. Income from timber harvesting operations will be reinvested into the area to plant trees, thin young stands, convert areas to more desirable species, and create early successional habitat. Harvesting is a very minimal portion of this plan. The majority of work recommended is to thin young stands so that the oak is not shaded out by other trees, remove undesirable species to encourage natural regeneration of desirable trees, complete the early successional work, and tree planting.

Current Distribution of Tree Size on the Area -

The woodland was stand mapped according to the average tree size as follows:

Tree Size	**Acres**	**% of Total Area**
Sapling (<4" dbh)	62	7
Pole size (5-12" dbh.)	85	9
Medium Size (14-18" dbh.)	790.5	84
Large (>20" dbh)	0	0
Totals	937.5	100

Proposed Management Systems for the Area -

Recommendations for each stand were based on whether the area will be managed to create early successional growth, or on an even age system, uneven age system, or as viewshed. The decision on what system would be used was based on the objectives for the area to maintain an oak component where feasible, develop a diverse woodland landscape, protect fragile sites, improve water quality in Waterloo Creek, and increase the acres of early successional growth.

Based on my recommendations for the areas, the acres under each management system are as follows -

Management System	**Acres**	**% of Total Area**
Early Successional	141.5	14
Even Age	318.5	32
Uneven Age	77	7
Viewshed	471	47
Total	1,008	100

Early Successional Management -

Many species of birds such as ruffed grouse, American woodcock, gold winged warbler, blue winged warbler, black billed cuckoo, yellow billed cuckoo, and eastern towhee are dependent on the early stages of forest growth. The high stem density of both trees and shrubs provides suitable nesting habitat and protection from predators. Because aspen will sprout from the roots when the parent tree is cut, aspen is an excellent species to create the dense growth needed by these species. Aspen also is a short lived tree species, and cutting the aspen will rejuvenate and expand the aspen stands through root sprouting.

The majority of early successional management is on the woodland edges and aspen stands. This work will "feather" the edges and make a gradual transition from the field edges to the larger trees. Feathering or softening the edges results in less nest parasitism of interior forest bird species by brown-headed cowbirds.

Aspen provides critical habitat for ruffed grouse. Aspen is most easily regenerated by root suckering. Once aspen is allowed to become over mature, its ability to root sucker is decreased. The best method to maintain aspen and expand the aspen clone is to cut the stand while the trees are in a healthy condition. Big tooth aspen will grow to 16-20" in diameter, but small tooth aspen generally begins to die at 14-16" in diameter. Ideally, 1/3 of the aspen would be 1-2 inches in diameter, 1/3 of the trees 3-4 inches in diameter and 1/3 of the aspen 5-8 inches in diameter.

The early successional management areas will be managed on a 15 year rotation. In other words, every 15 years the area will be cut to rejuvenate the aspen and create areas with high stem density.

Waterloo Creek has 141.5 acres scheduled for early successional management, or 14% of the wooded acres. Applying sustainable forestry guidelines, 47 acres could be cut every 5 years to maximize the diversity of tree sizes.

WATERLOO CREEK
EARLY SUCCESSIONAL MANAGEMENT
141.5 ACRES

Sec. 24,25,36 Waterloo Twsp.,
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N

0 1,250 2,500 5,000 7,500 10,000
Feet

Even Age Management -

Even age management is essential for wildlife species depending on oak/hickory forests. Oak acorns (mast) are at the top of the food list for many species of wildlife. In the absence of even age management techniques, the oak forests in Iowa will eventually be lost. Even though large blocks of forest are needed on some Wildlife Management Areas for some wildlife species, each stage of an even age stand provides habitat for wildlife. For example, regenerating stands (1-15 years old) benefit the same species of birds as does early successional stands, golden-winged warbler, blue-winged warbler, black-billed cuckoo, yellow-billed cuckoo, Eastern towhee, along with ruffed grouse and American woodcock.

Sapling to small pole sized stands between 10 and 20 years old, may be used by black and white, Kentucky, and worm eating warblers. From age 20-60 years, pole to medium size trees tend to be used by canopy nesters such as scarlet tanagers, wood thrushes, and ground nesters such as ovenbirds and black and white warblers.

Mature stands of 60 to 125 years of age are used by birds such as the wood thrush, Acadian flycatcher, ovenbird, worm eating warbler, and scarlet tanagers.

Even age management involves growing a stand of trees which are close to the same age. At some point in the stands life, the area is clearcut which creates the even age structure. Even age management creates excellent habitat for deer, turkey, and grouse and woody debris on the forest floor provides habitat for amphibians and reptiles. Clearcutting is essential for regeneration of oak which require full sunlight. The only way that oak can be maintained as a component of the forest is by practicing some form of even age management.

Even age management involves clearcuttting and planting, clearcutting with regeneration already established, or a shelterwood system to develop desirable seedlings on the ground.

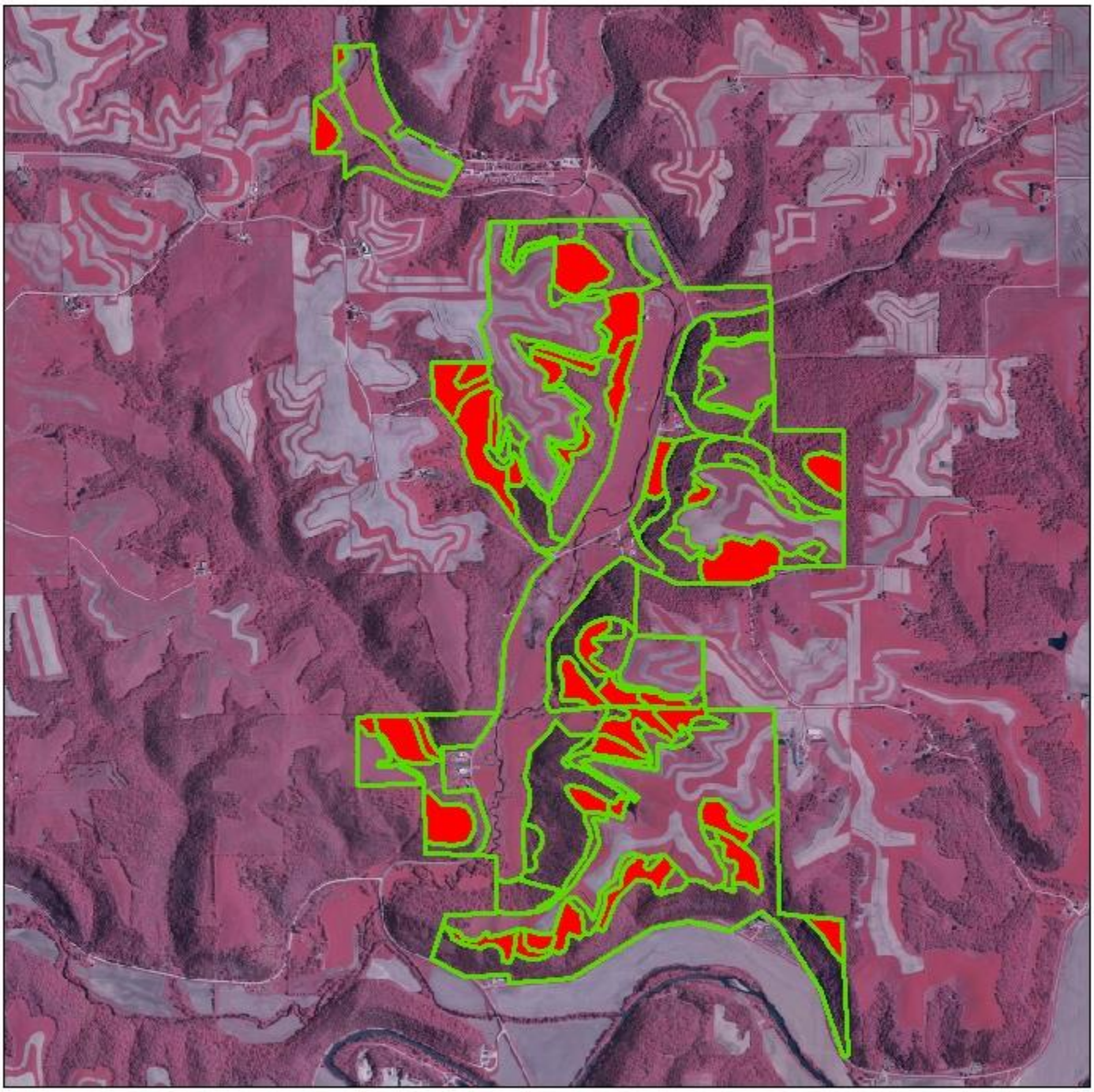
Shelterwood is a form of even-age management. The final cut is a clearcut, but several thinnings are done prior to the final cut. The large, healthy trees are left to provide seed for naturally reseeding the stand, and to create partial shade to inhibit the growth of weeds and brush until the desirable seedlings are well established. The final cut or clearcut is normally done when there are a sufficient number of desirable trees that are 3-5 ft. tall. The shelterwood system can take many years to develop a good stocking of desirable young trees. You may have to kill the undesirable species several times to favor the species you want. The final clearcut should not be made until you are satisfied with the stocking of desirable young trees.

Clearcutting to create full sunlight is essential at some point in the stands life to successfully regenerate oak. If stands are not clearcut, the oak component of the forest will be lost to shade tolerant species. Clearcuts also provide additional early successional habitat in the early stages. The area is in the brushy stage for a very short period, normally 10-15 years. After that time, the trees will totally shade the ground, and the area becomes a pole sized (5-10" dia.) stand of trees.

Fire is a tool in managing oak stands that is currently being studied. Frequent burning of the leaf layer in the woods will kill thin barked species such as hard maple, cherry, elm, bitternut hickory, and ironwood. Fire will expose mineral soil and open up the ground to sunlight. These conditions favor the natural regeneration of oak. Oak seedlings will tolerate light fires. The top will be killed by the fire, but the deep root systems survive and sprout. Fire will be utilized on a limited scale to encourage oak regeneration in oak stands. Once a good number of oak seedlings are present, these stands will have to be clearcut or the young oak will die from lack of sunlight.

There are 318.5 acres of even aged management planned for Waterloo Creek, or 32% of the wooded area. 12-13 acres can be clearcut every 5 years under sustainable forestry guidelines.

WATERLOO CREEK
EVEN AGE MANAGEMENT
318.5 ACRES



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Allamakee County

Uneven Age Management -

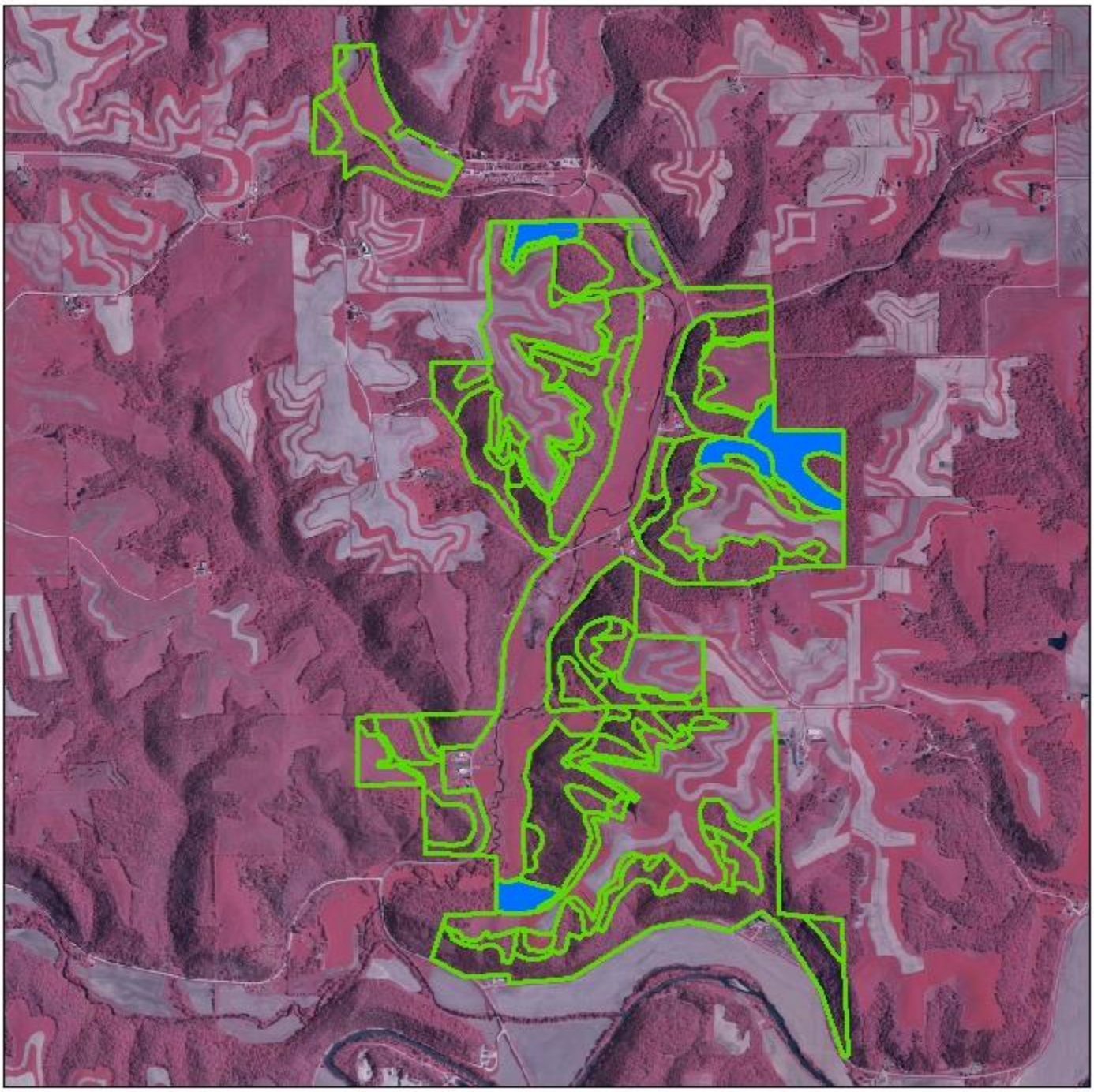
Uneven age management develops a stand of trees with all tree sizes represented. The stand structure is developed by selectively harvesting mature and defective trees, and removing unwanted small trees that are damaged or defective. Because uneven age stands always have large trees present, this system favors species that will grow in shade such as hard maple and basswood.

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

Uneven age management areas will provide continuous tracts of woodland with infrequent disturbance. Large tracts of uneven age management will provide necessary habitat for neotropical migratory bird species such as cerulean, hooded, Canada, and Kentucky warblers. Selective harvesting will create small openings in the canopy, which will increase ground cover, and enhance stand structure. Den trees will be left to provide cavities for wildlife such as woodpeckers, bats, and squirrels. Large oaks that are healthy will be left to provide acorns for many wildlife species. Timber stand improvement and selective harvesting will create woody debris on the forest floor for reptiles and amphibians.

There are 77 acres scheduled for uneven age management, 7% of the area. The majority of the areas are on the steep slopes. 19 acres could be selectively harvested every 5 years under sustainable forestry guidelines.

WATERLOO CREEK
UNEVEN AGE MANAGEMENT
77 ACRES



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Allamakee County

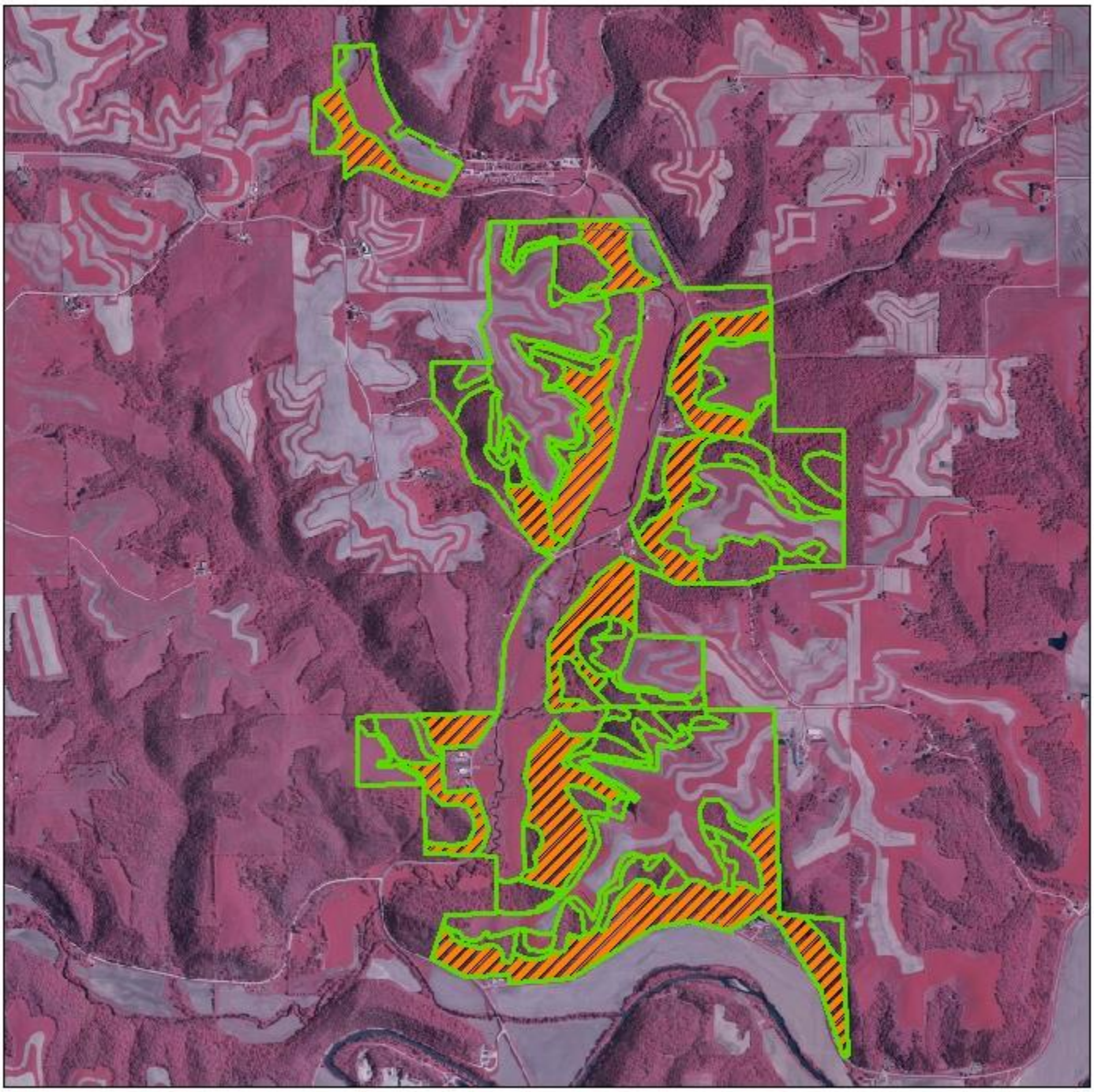
Viewshed Management -

Viewshed areas are typically steep slopes and areas along streams which are fragile and are best left to naturally progress through succession. Areas where endangered plant or animal species exist will also be under viewshed management. Management can take place on these areas where desirable to improve the health and species composition of the forest, and to enhance the area for endangered species, but the major objective is to have minor disturbance.

Many neotropical birds will benefit greatly from the areas designated as viewshed. Algific slopes and maderate slopes will be under viewshed management which will protect 8 species of land snails listed as species of greatest conservation need.

There are 471 acres of viewshed management on the area, or 47% of the wooded areas. Viewshed management is recommended to protect the fragile slopes and floodplain along Waterloo Creek.

WATERLOO CREEK
VIEWSHED MANAGEMENT
471 ACRES



Sec. 24,25,36 Waterloo Twsp.,
T100N-R6W, and Sec. 19, 30
Union City Twsp., T100N-R5W,
Allamakee County

N

0 1,250 2,500 5,000 7,500 10,000
Feet

SOILS

The steep slopes have LaCrescent soils, which are shallow soils over limestone. There are limestone outcrops on the steepest slopes.

The gentle slopes and ridge tops have Fayette, Village, and Paint Creek silt loams. These soils are well drained, fertile loams. These are good sites for upland hardwood trees such as red oak, white oak, bur oak, walnut, hard maple, basswood, and cherry.

The bottomland has Arenzvil and Volney silt loams. These soils are somewhat poorly drained and subject to frequent flooding.

The greatest limitations on the area are the steep slopes with shallow soils over limestone.

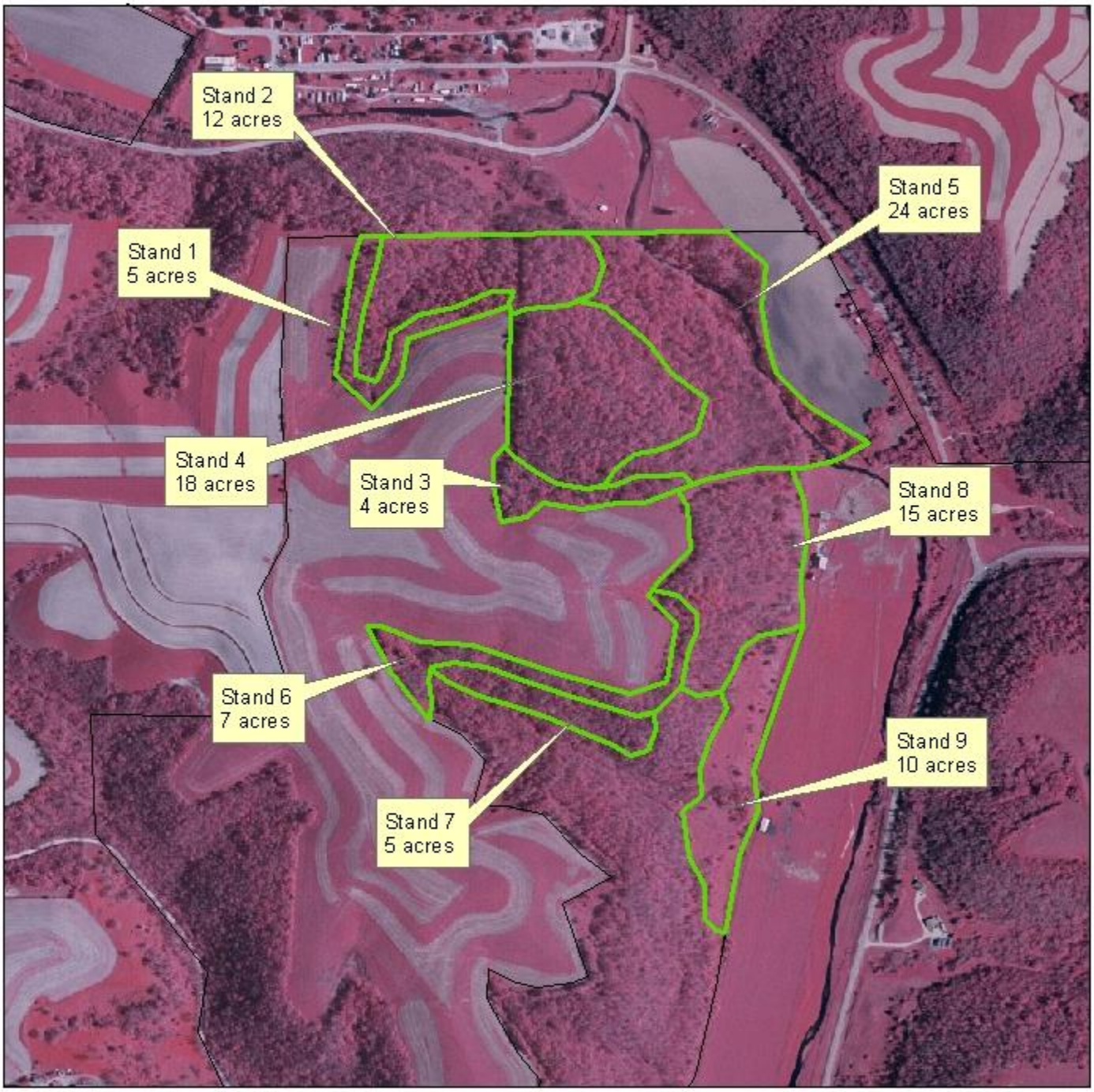
WORK PLAN

FOR

WATERLOO CREEK WILDLIFE AREA

This is the "working plan" for the Waterloo Creek Wildlife Management. The plan is designed to aid professional biologists and foresters in the implementation of forest management practices. It is written with the understanding that these professionals have a basic understanding of forest management principles and techniques. Every detail has not been outlined in the plan because the plan would become too long to be of practical use. This plan is intended to get work accomplished on the ground.

WATERLOO CREEK
Stands 1-9



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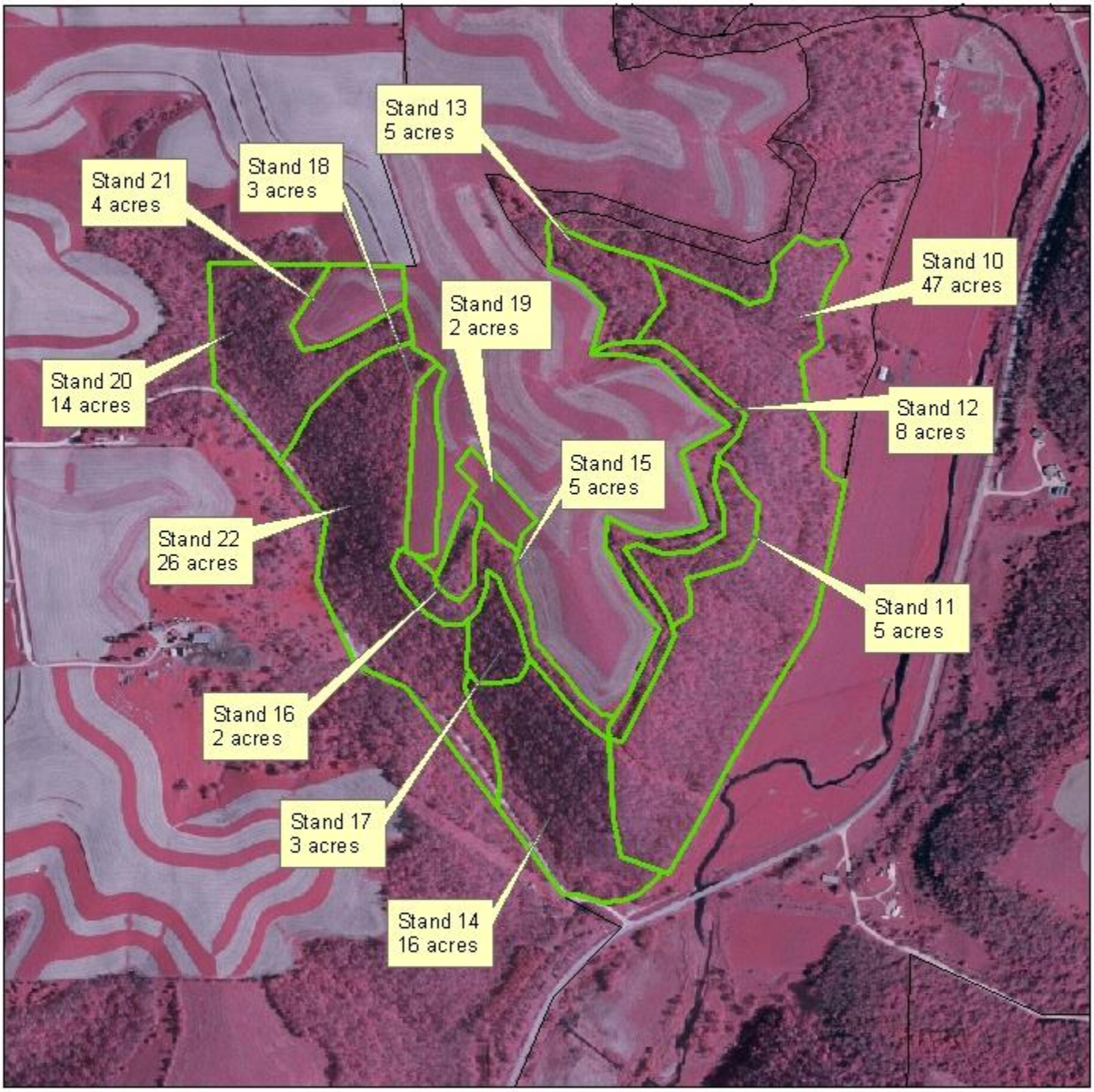
N

0 380 760 1,520 2,280 3,04 eet

WATERLOO CREEK
Stands 10-22



Sec. 24,25,36 Waterloo Twsp., T100N-R6W, and Sec. 19, 30 Union City Twsp., T100N-R5W, Allamakee County

N

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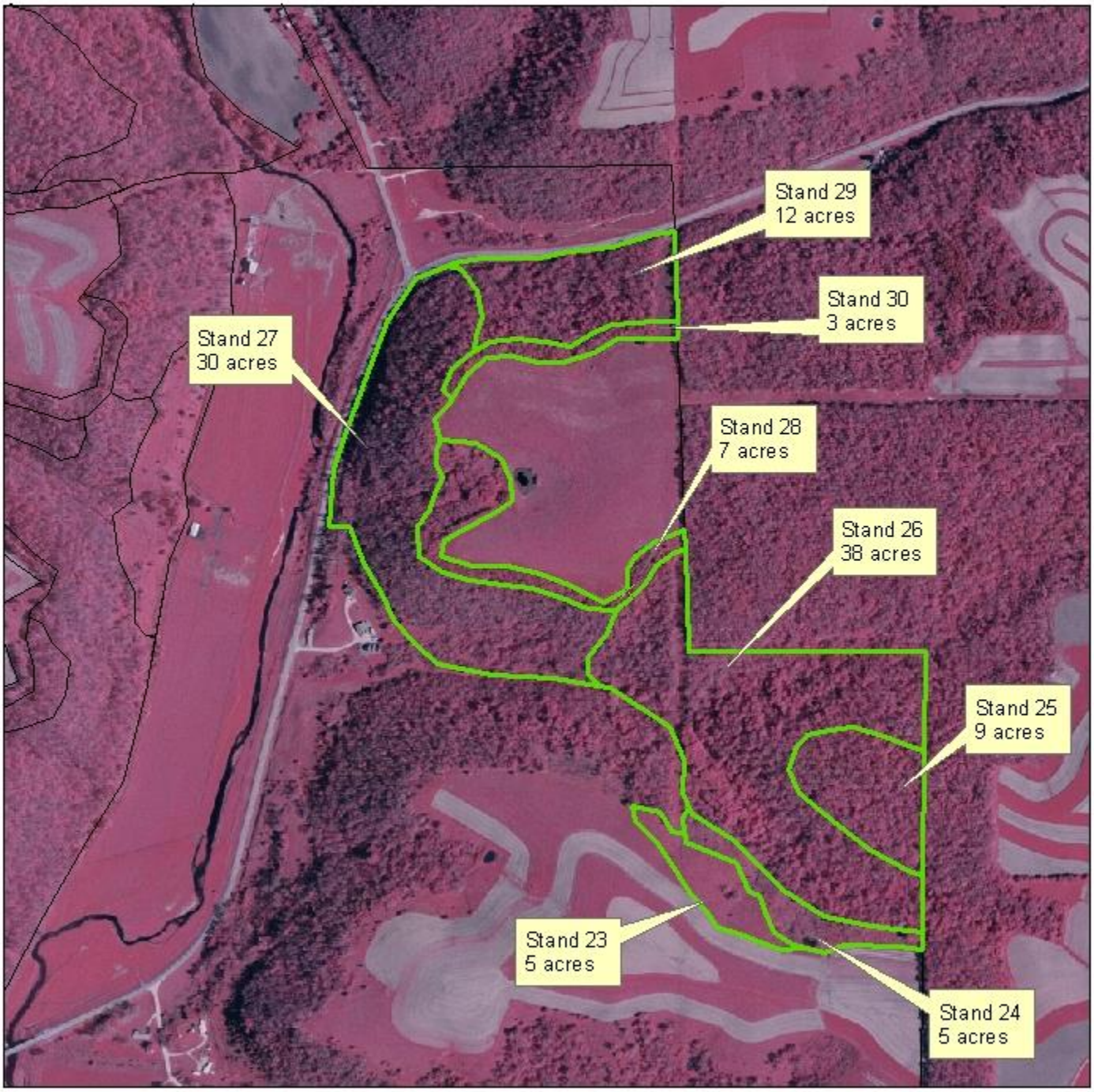
WATERLOO CREEK
Stands 23-30



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T100N-R6W, and Sec. 19, 30
Union City Twsp., T100N-R5W,
Allamakee County

N

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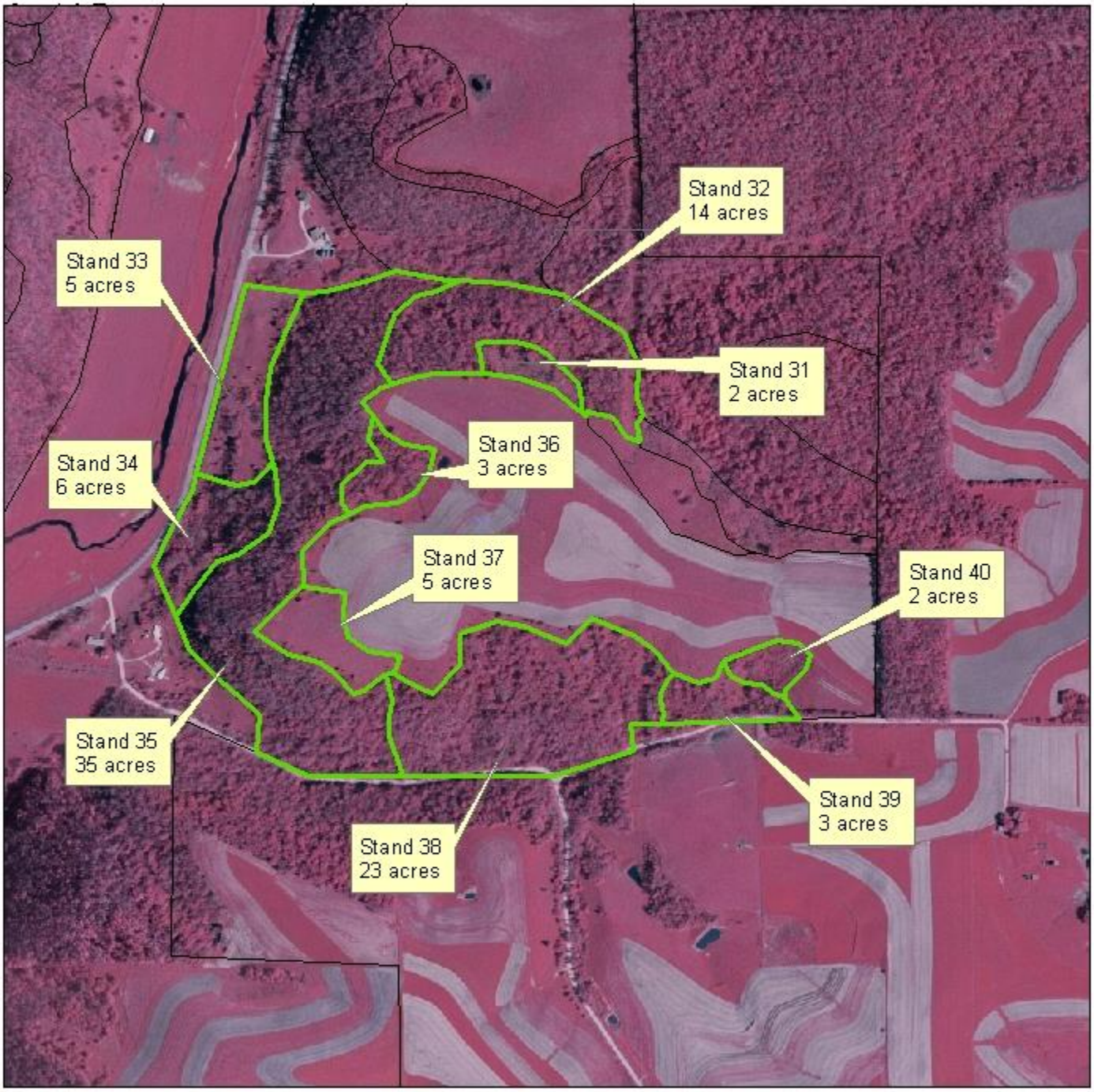
Feet

WATERLOO CREEK
Stands 31-40

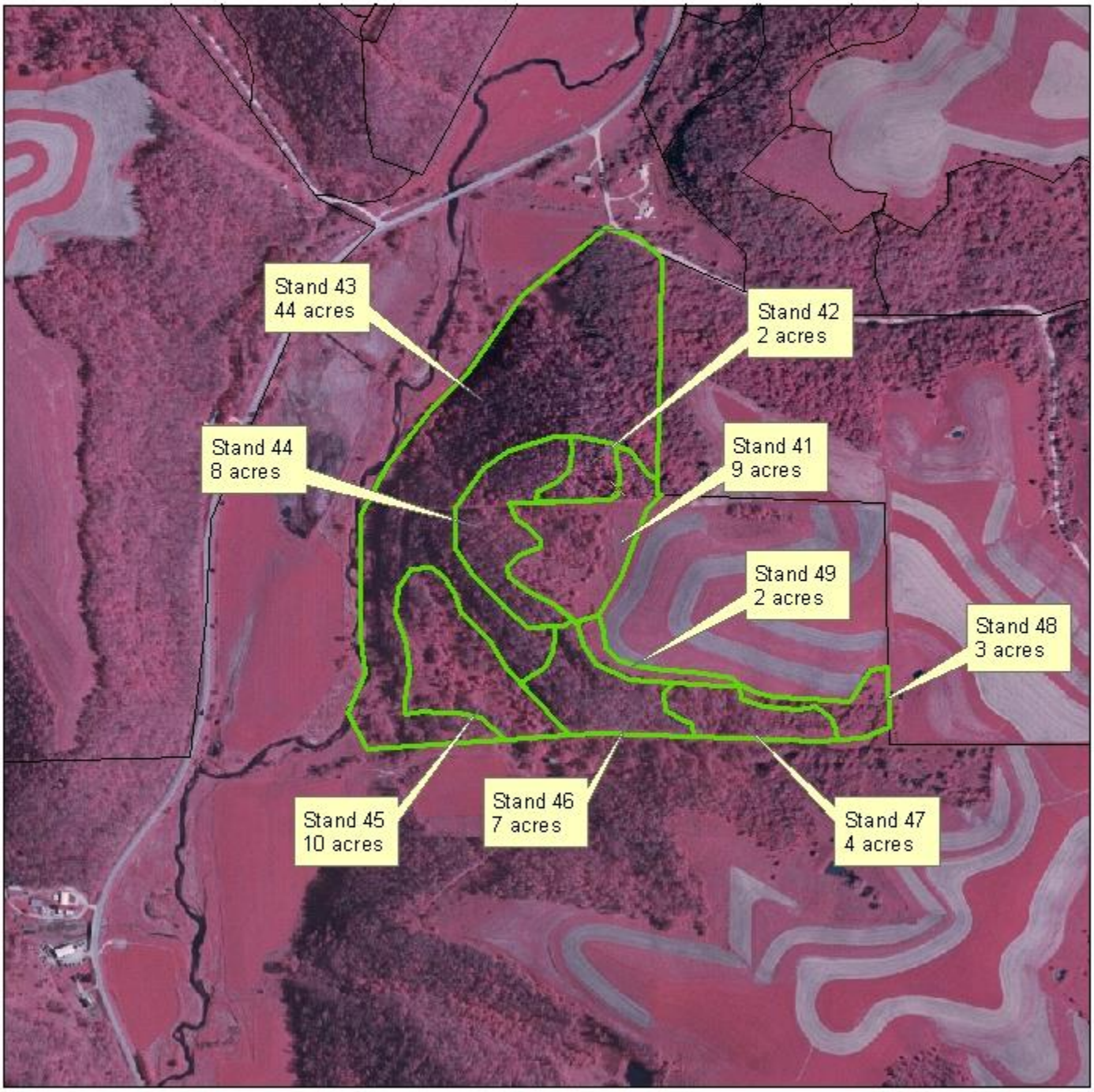


Sec. 24,25,36 Waterloo Twsp., T100N-R6W, and Sec. 19, 30 Union City Twsp., T100N-R5W, Allamakee County

N

0 370 740 1,480 2,220 2,960 Feet

WATERLOO CREEK
Stands 41-49



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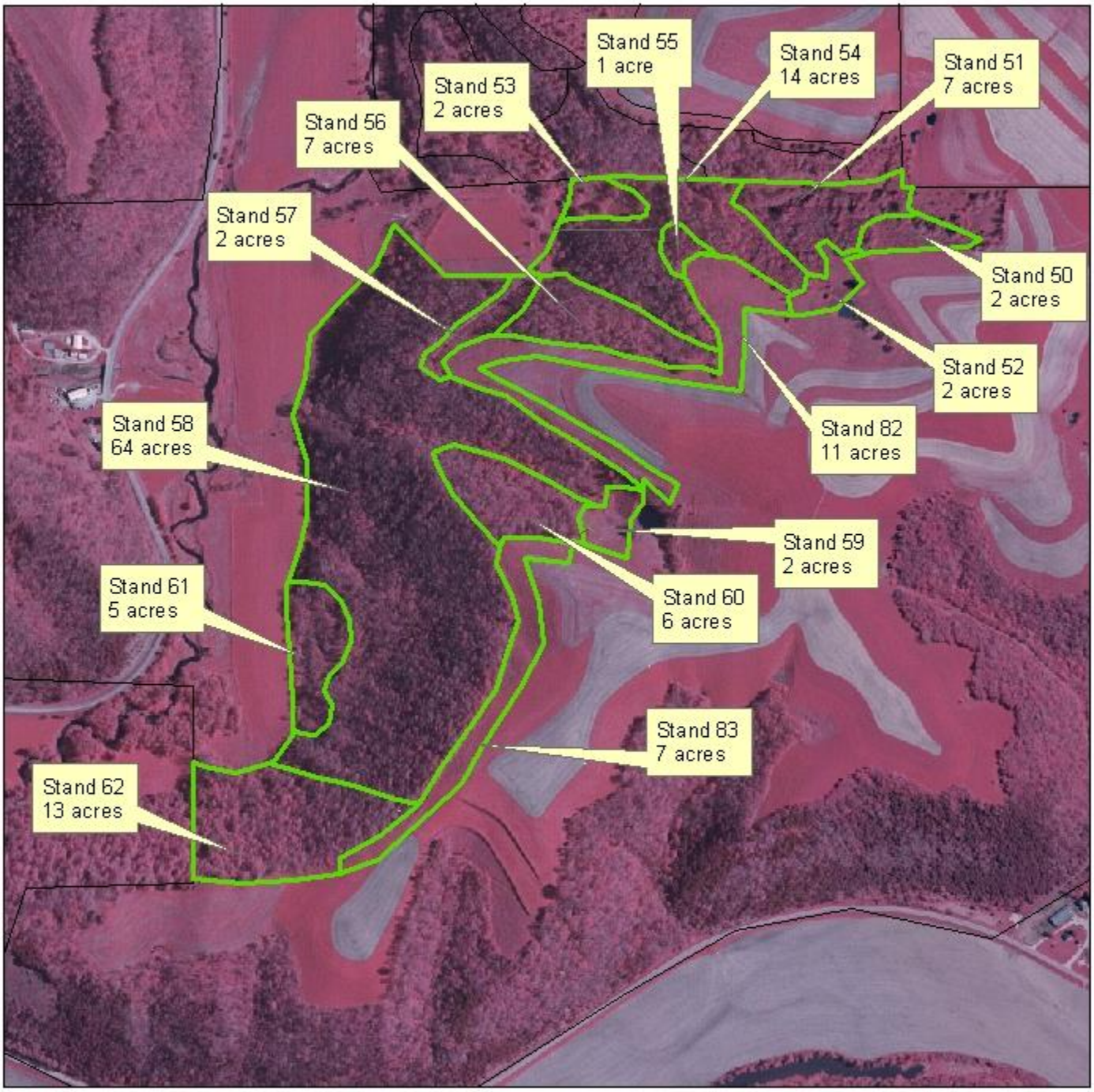
N

0 370 740 1,480 2,220 2,960 Feet

WATERLOO CREEK
Stands 50-62, 82,83



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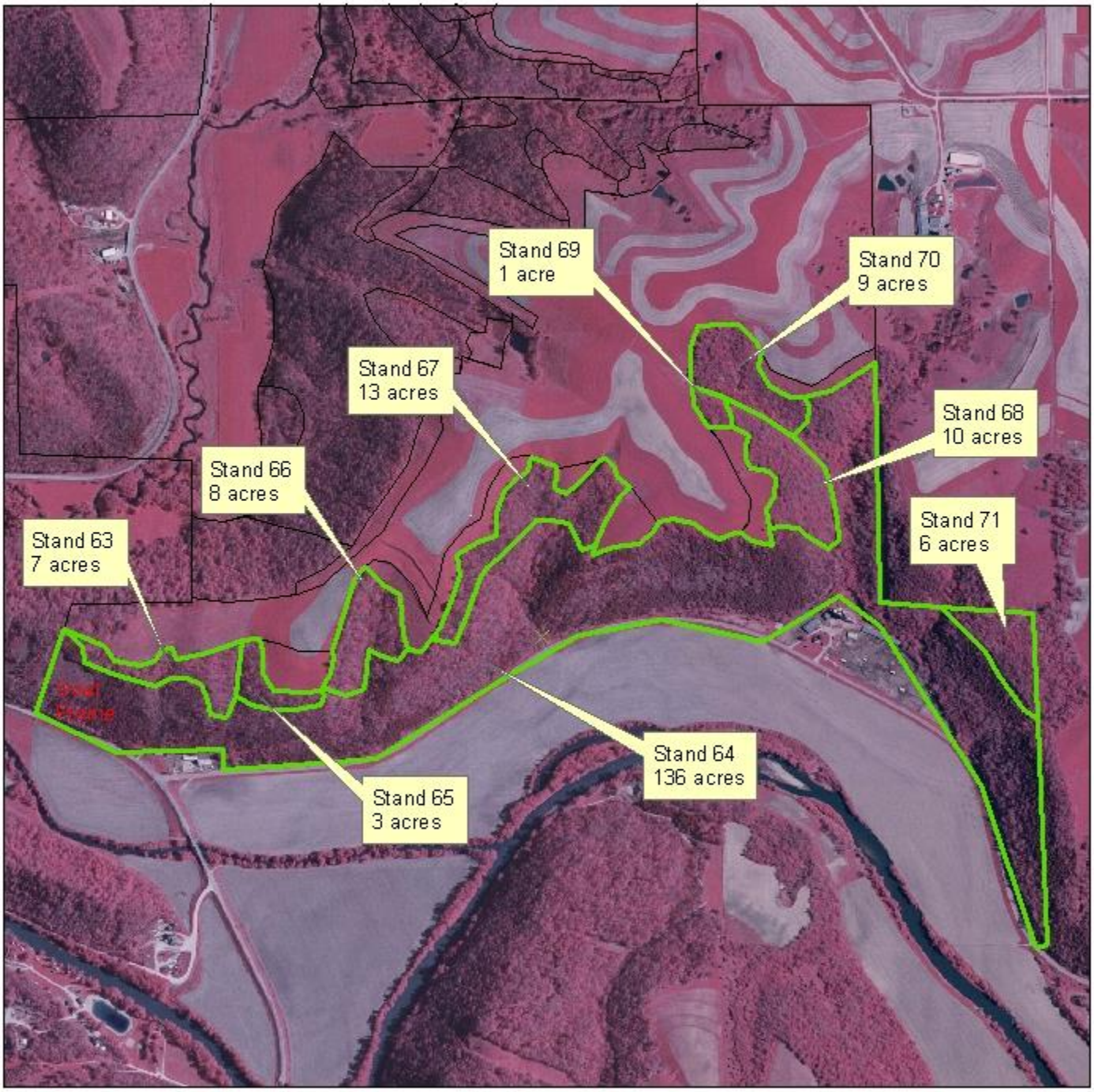
WATERLOO CREEK
Stands 63-71



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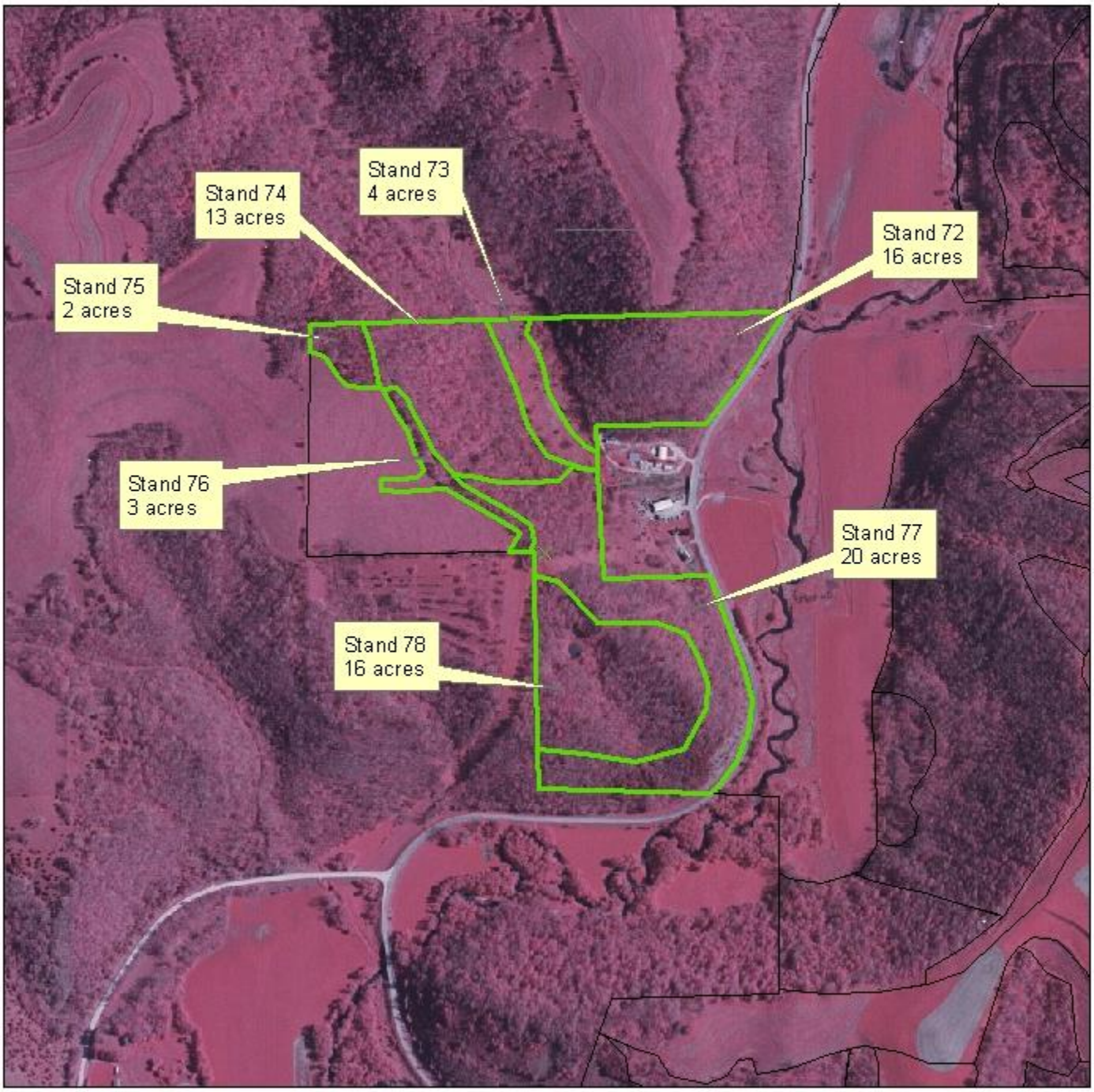
WATERLOO CREEK
Stands 72-78



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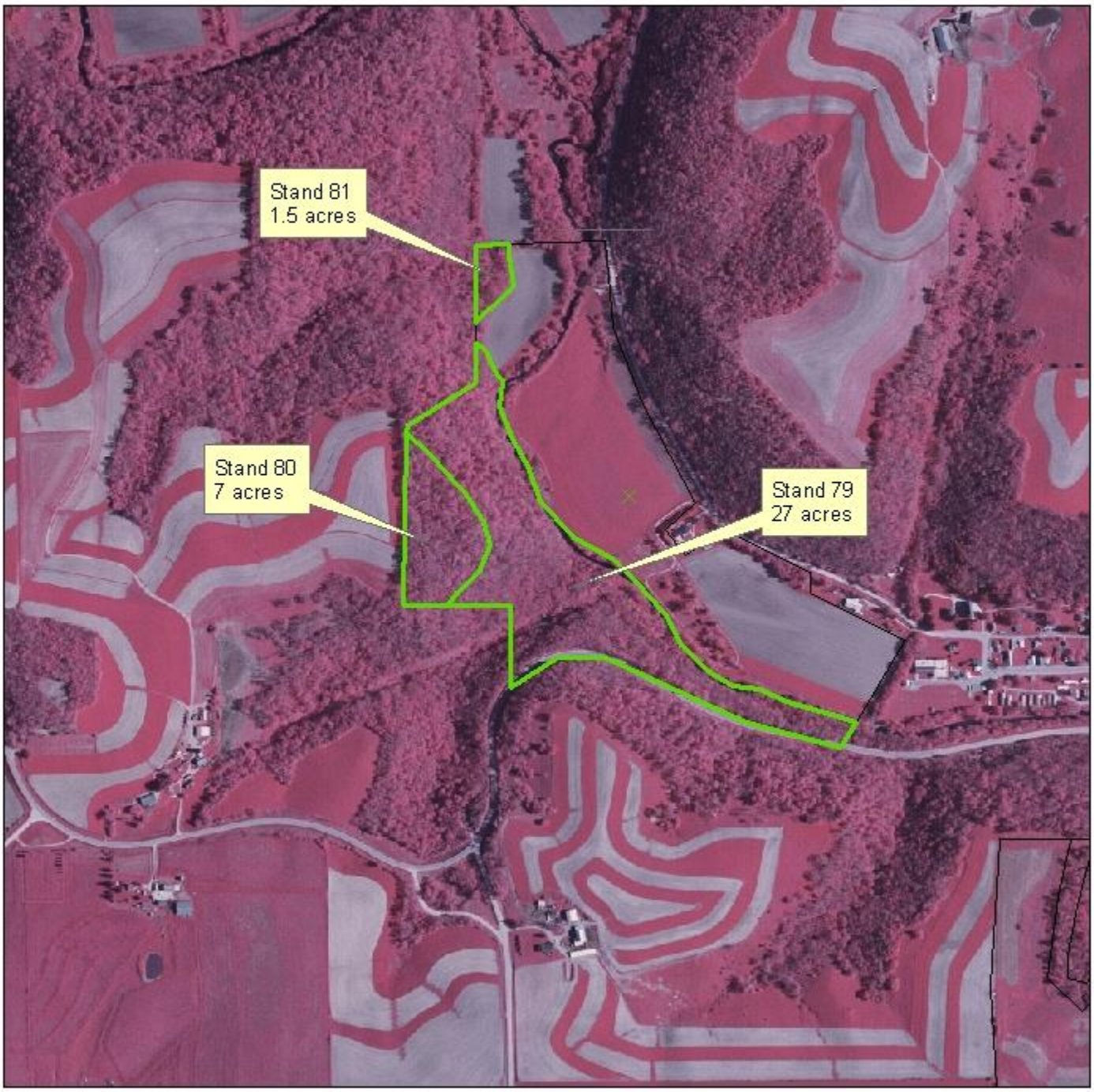
WATERLOO CREEK
Stands 79-81

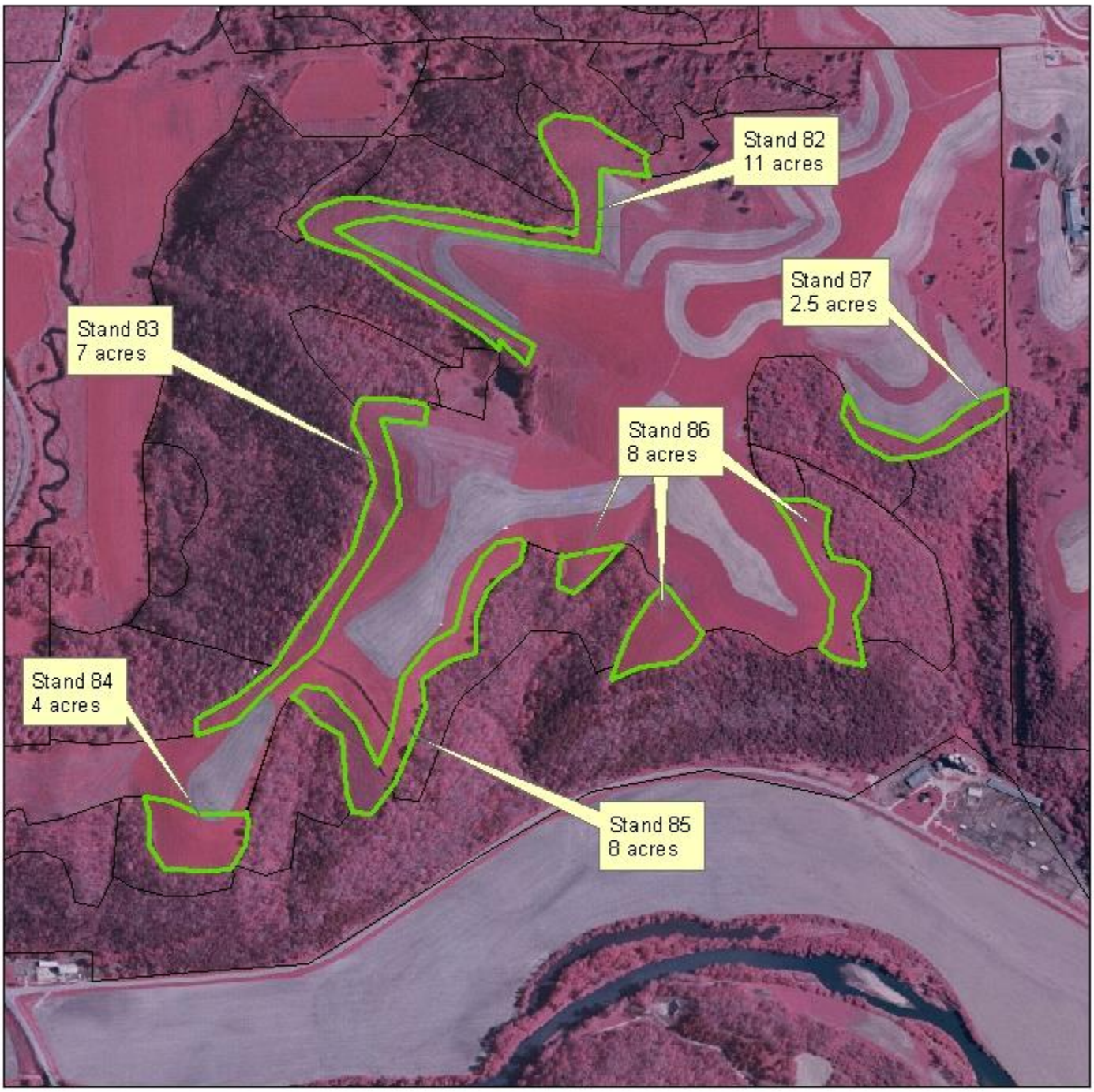


Sec. 24,25,36 Waterloo Twsp.,
T100N-R6W, and Sec. 19, 30
Union City Twsp., T100N-R5W,
Allamakee County

N

0 370 740 1,480 2,220 2,960
Feet

WATERLOO CREEK
Stands 82-87



Sec. 24,25,36 Waterloo Twsp., T100N-R6W, and Sec. 19, 30 Union City Twsp., T100N-R5W, Allamakee County

N

0 370 740 1,480 2,220 2,960 Feet

DESCRIPTION AND RECOMMENDATIONS FOR INDIVIDUAL STANDS

Stand 1: 5 acres

Site Description -

Upland along the field edge with Paint Creek soils.

Woodland Description-

The area is sapling sized (1-4" dia.) boxelder, walnut, basswood, ash, aspen, and bitternut hickory. The area was clearcut in 2001 to create early successional habitat.

Management Recommendations – Early Successional

The stand could be clearcut again in 2019 to maintain dense, high stem density.

Stand 2: 12 acres

Site Description –

Northeast facing slope with a ravine running through the area.

Woodland Descripton -

Medium sized (12-18" dia.) white oak, red oak, basswood, and hard maple. The understory consists of hard maple, basswood, ironwood, elm, and bitternut hickory.

Management Recommendations – Uneven Age

The timber was logged 15-20 years ago, removing the majority of large trees. At this point, the undesirable species such as elm, ironwood, bitternut hickory, and boxelder could be killed to encourage the development of young hard maple and basswood. In addition, desirable species that are damaged or poor formed should be coppiced.

The stand could be selectively harvested in 20 years. The timber stand improvement work will insure there are desirable trees present to replace the older trees.

Stand 3: 4 acres

Site Description –

Small drainage along the south edge of the woods.

Woodland Description -

The area is pole sized (5-10" dia.) elm, basswood, bitternut hickory, aspen, birch, ash, and boxelder.

Management Recommendations – Early Successional

The stand could be clearcut in 2014 to feather the edge and create dense, sapling growth for early successional species. The aspen will root sprout out into the field, expanding the edge. The stumps of undesirable species should be treated with Pathfinder II to prevent sprouting.

Stand 4: 18 acres

Site Description –

Ridge top with Fayette, Paint Creek, and LaCrescent soils.

Woodland Description -

Medium (12-18" dia.) white oak, red oak, shagbark hickory, hard maple, cherry, and a few good quality walnut.

Management Recommendations – Even Age

The stand was selectively harvested and timber stand improvement work completed 4-5 years ago. The stand could be clearcut harvested and planted with oak and walnut in approximately 15 years.

Stand 5: 24 acres

Site Description -

Steep, north and east facing slopes.

Woodland Description -

Medium sized (12-18" dia.) hard maple, basswood, red oak and white oak. The understory is bitternut hickory, ironwood, hard maple, and elm.

Management Recommendations – Viewshed

This area could be left as is to provide a buffer for the eagle nest, and control erosion into Waterloo Creek.

Stand 6: 7 acres

Site Description -

Upland along the edge of the field.

Woodland Description –

Pole sized (5-10" dia.) aspen, black oak, shagbark hickory, white oak, elm, cherry, and red oak. The area has a good component of aspen.

Management Recommendations – Early Successional

In approximately 5 years, clearcut the area to increase the aspen component, and create dense, young growth for early successional species.

Stand 7: 5 acres

Site Description -

Gentle south facing slope.

Woodland Description –

Pole sized (5-10" dia.) aspen, red oak, white oak, shagbark hickory, black oak, and cherry.

Management Recommendations – Even Age

The stand could be thinned to increase the health, growth, and seed production of the most desirable species.

Timber Stand Improvement (Crop Tree Release) -

In pole-sized stands (4-10" dia.), potential crop trees can be selected and released. At maturity, there is room for 35-50 trees per acre. You can select the trees you want to comprise your future stand of mature trees and thin around them to give them more growing space. Select a crop tree every 30-35 ft. apart. Remove trees with crowns that are touching or overtopping the crowns of your crop trees. Crop trees can be selected based on criteria that meets your objectives. Normally, the crop trees will be a desirable species, show good form without large side limbs, and be free of major defects. Species normally favored are black walnut, red oak, white oak, basswood, cherry, and hard maple.

Locate your good quality trees. Do not waste your time and money on poor quality trees. If there are no high quality trees present on an area, go on to an area with good trees. You can not create high quality trees. Either they are present or not. Be selective and work with only your best trees. Trees to be removed can be felled or double girdled. No herbicide is necessary on the stumps.

Stand 8: 15 acres

Site Description -

East facing slope with LaCrescent soils.

Woodland Description –

Medium sized (12-18" dia.) basswood, bitternut hickory, white oak, red oak, shagbark hickory, cherry, and a few hard maple. The understory is ironwood, elm, bitternut hickory, basswood, and hard maple. There are scattered, buckthorn.

Management Recommendations – Even Age

I recommend clearcutting **5 acres every 10 years**. Following the harvest, all trees 1 inch and larger in diameter should be felled. Treat the stumps of unwanted species with Pathfinder II to prevent sprouting. Plant the area with large seedlings. The seedlings should be a minimum of 24 inches in height and 3/8 inch in caliper. Plant the trees in the open areas 30 ft. apart, or 50 trees per acre. Suitable species are red oak, white oak, and walnut. The trees should be planted in mid to late April.

Protect each tree with a 4-5 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control the competition around each tree by spot spraying a combination of Roundup and Princep 4L herbicides. In the spring, after the vegetation is actively growing, spray a 4 ft. diameter circle around each tree with 2 quarts of Roundup plus 4 quarts of Princep 4L per acre treated. You must protect the seedling from the Roundup while spraying with a shield.

Stand 9: 10 acres

Site Description –

Stand 9 is an upland bench with sandy soils. The area is semi open.

Woodland Description -

The area is scattered, pole sized walnut and bitternut hickory.

Management Recommendations – Even Age

The area could be planted with oak. Plant the area with large seedlings. The seedlings should be a minimum of 24 inches in height and 3/8 inch in caliper. Plant the trees in the open areas 30 ft. apart, or 50 trees per acre. Suitable species are red oak, white oak, and bur oak. The trees should be planted in mid to late April.

Protect each tree with a 4-5 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Mix in clumps of red cedar. Plant the red cedar 10 ft. apart in clumps of 6-10 trees. Scatter clumps of gray dogwood, hawthorne, hazelnut, and wild plum. Plant the shrubs 4-6 ft. apart of clumps of 10-15 plants.

Control the competition around each tree by spot spraying a combination of Roundup and Princep 4L herbicides. In the spring, after the vegetation is actively growing, spray a 4 ft. diameter circle around each tree with 2 quarts of Roundup plus 2 quarts of Princep 4L per acre treated. You must protect the seedling from the Roundup while spraying with a shield.

Stand 10: 47 acres

Site Description –

Steep, east facing slope with LaCrescent soils.

Woodland Description -

Medium sized (12-18" dia.) basswood, white oak, and bur oak. The understory is ironwood, elm, bitternut hickory, hard maple, basswood, and buckthorn.

Management Recommendations – Viewshed

Stand 10 is a steep slope that is not conducive to management.

Stand 11: 5 acres

Site Description –

Ridge top and east facing slope.

Woodland Description -

Medium sized white oak, bur oak, shagbark hickory, and red oak. The understory is elm, bitternut hickory, and shagbark hickory.

Management Recommendations – Even Age

In **20 years**, clearcut the area and plant oak.

Stand 12: 8 acres

Site Description -

Narrow band along the edge of the woods.

Woodland Description –

Sapling (1-4" dia.) aspen, elm, and black oak. The area was clearcut in 2008 to feather the edge of the woods and create early successional habitat.

Management Recommendations – Early Successional

Clearcut the area in 2025 to maintain early successional habitat.

Stand 13: 5 acres

Site Description -

East facing slope with Paint Creek soils.

Woodland Description -

Medium sized (12-18" dia.) black oak, white oak, shagbark hickory, red oak, and hard maple. The understory is elm, bitternut hickory, ironwood, hard maple, and hackberry.

Management Recommendations – Even Age

Clearcut the stand in **2035** and plant oak.

Stand 14: 16 acres

Site Description -

Steep, rocky, south facing slope.

Woodland Description -

Medium sized bur oak, black oak, and shagbark hickory. The understory is ironwood, elm, hard maple, shagbark hickory, basswood, and buckthorn. The buckthorn is dense in areas.

Management Recommendations – Viewshed

Due to the buckthorn and steep slopes, I suggest leaving this area as is.

Stand 15: 5 acres

Site Description -

Upland edge along the woods.

Woodland Description -

Pole sized (5-10" dia.) aspen, shagbark hickory, elm, black oak, and boxelder. There are scattered, merchantable elm, black oak, and bur oak.

Management Recommendations – Early Successional

In 10 years, fell all trees 1 inch and larger in diameter. Treat the stumps of the elm and boxelder to prevent sprouting. The merchantable trees can be sold along with trees in Stand 17.

Stand 16: 2 acres

Site Description -

Gentle, east facing slope.

Woodland Description -

Sapling (1-4" dia.) aspen. The area was clearcut in 2002 to create early successional habitat.

Management Recommendations – Early Successional

Clearcut the area in **10 years** to create habitat for early successional species. This area has a good component of aspen.

Stand 17: 3 acres

Site Description -

South facing slope with LaCrescent soils.

Woodland Description -

Medium sized (12-18" dia.) red oak, white oak, shagbark hickory, and cherry. The understory is elm, ironwood, and hard maple.

Management Recommendations – Even Age

In **10 years**, clearcut the stand and plant oak seedlings. Plant 50 large oak seedlings per acre. Protect each tree with a 4 ft. tall, vented tree shelter.

Stand 18: 3 acres

Site Description -

Ridge top with Fayette soils.

Woodland Description -

Sapling (1-4" dia.) walnut and red oak. The site was direct seeded 5 years ago. The walnut are doing well, but the oak are being browsed heavily by deer.

Management Recommendations – Even Age

Protect 25-30 oak per acre to insure an oak component in the stand. Locate an oak every 40 ft. apart. Place a 4-5 ft. tall, vented tree shelter over the tree to protect it from deer. Cut competing walnut trees around the oak and treat the stumps with Roundup herbicide to prevent sprouting.

Control the competition around each tree by spot spraying a combination of Roundup and Princep 4L herbicides. In the spring, after the vegetation is actively growing, spray a 4 ft. diameter circle around each tree with 2 quarts of Roundup plus 4 quarts of Princep 4L per acre treated.

Stand 19: 2 acres

Site Description -

South facing slope.

Woodland Description -

Sapling sized red cedar. The trees were planted 5 years ago.

Management Recommendations – Early Successional

Nothing is needed at this time. When the cedars begin touching, they should be thinned to maintain low branches.

Stand 20: 14 acres

Site Description -

West facing slope with LaCrescent soils.

Woodland Description -

Medium sized (12-18" dia.) white oak, shagbark hickory, elm, bur oak, and hard maple. The understory is basswood, hard maple, elm, cherry, shagbark hickory, bitternut hickory, and pockets of pole sized red oak, black oak, and white oak.

Management Recommendations – Even Age

The undesirable species could be killed to release the existing young oak, and encourage additional oak regeneration. The stand could clearcut in 20 years.

Timber Stand Improvement (Weed Tree Removal) -

The undesirable species can be killed to encourage the natural reseeding of desirable species. The removal of the "weed" trees allows sunlight to reach the ground so that seedlings can become established. The undesirable species can be killed standing by cutting flaps in the trunk and applying Pathfinder II into the cuts. The cuts must be in a circle around the trunk and overlapping. The trees can also be cut off and the stumps treated with Tordon RTU or Pathway to prevent resprouting. Wet the outer rim of freshly cut stumps. The work can be done anytime except spring during heavy sap flow.

Desirable trees that are poor formed or damaged should also be removed. These trees should not be treated with herbicide. The stumps will resprout and produce another tree. Cut the stumps close to the ground so that the sprout will originate near the ground.

Stand 21: 4 acres

Site Description -

Ridge top with Fayette and Village silt loam soils.

Area Description -

Crop land that is currently in hay.

Management Recommendations – Even Age

The area could be direct seeded to establish an upland mixed hardwood woodland.

The area can be established with trees using seed. Seed has several advantages. The seed can be broadcasted, so the area will have a more natural appearance. More trees per acre can be established with seed, so the site will be captured by tree growth sooner. This minimizes the amount of mowing and herbicide that is needed for maintenance.

Site Preparation

Mow the hay in August. After the vegetation has grown 4-6 inches, broadcast the site with Roundup and 2,4-D to kill all vegetation. In September, plow and disk the site. The area should look ready to plant corn.

Seeding Rates

The following amounts are recommended of green, uncleaned seed. In other words as the seeds can be collected from the ground, or directly off the tree.

Species	**Bushels Per Acre**
Black Cherry	¼ to ½ lb.
Black Walnut	7

Leave a 20-30 ft. wide strip around the planting for a fire break and travel lane.

Seeding Steps

The following steps are suggested:

1. Broadcast the walnut seed over the entire area. Disk the seed into the ground so that the majority of the seed is buried 1 inch deep.

2. Broadcast the cherry seed and lightly harrow the area. Cherry seed should be buried

approximately 1/4 inch deep.

3. Roll the entire field with a cultipacker so that all seed is firmly packed in.

Oak Planting -

The following spring, plant the area with large seedlings. The seedlings should be a minimum of 24 inches in height and 3/8 inch in caliper. Plant the trees 30 ft. apart, or 50 trees per acre. Suitable species are red oak, white oak, and bur oak. The trees should be planted in mid to late April.

Protect each tree with a 4-5 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Weed Control -

It is important to have good control of the competition for the first 2-3 years of the seeding. The first two growing season are critical as the seed germinates and the seedlings begin to grow. The herbicides to use will depend on what weeds and/or grasses cause you problems.

Preemergent Herbicides -

In the spring before any vegetation begins to grow, broadcast spray the field with Pendulum herbicide. Apply 2 quarts of Pendulum per acre. Pendulum is a preemergent that will inhibit the germination of grasses and some broadleaves. If you have weeds and grasses already growing in the spring, add Roundup to the Pendulum to kill the existing plants. Apply 1 1/2 to 2 quarts of Roundup per acre. Be sure that no seedlings are up when you apply the Roundup, because Roundup will kill the seedlings.

You will need to scout your direct seeding in early June to determine what weed and grass problems are beginning to develop. You will almost always have a grass problem or weed problem, or both.

If broadleaf weeds become a problem during the first year, mow the area high, so that you are mowing above seedling height.

Stand 22: 26 acre

Site Description -

Southwest facing slope with LaCrescent soils.

Woodland Description -

Medium sized (12-18" dia.) shagbark hickory, elm, white oak, red oak, and hard maple. The understory is sapling to pole sized white oak, bur oak, red oak, shagbark hickory, bitternut hickory, and elm.

Management Recommendations – Even Age

This site currently has oak in the understory. The undesirable species could be killed to provide more growing space for the young oak and encourage additional oak seeding. In 15 years, areas 5-6 acres in size can be clearcut to provide full sunlight for the young oak.

Stand 23: 5 acres

Site Description -

North facing slope with Fayette silt loam soils.

Area Description -

Old pasture with brome grass.

Management Recommendations – Early Successional

The area can be planted with shrubs and cedar to provide early successional and winter habitat.

Plant 3 rows of shrubs along the field edge. The remainder of the site can be planted with red cedar.

Stand 24: 5 acres

Site Description -

Gentle, north facing slope.

Woodland Description -

Sapling (1-4" dia.) aspen, cherry, buckthorn, shagbark hickory, and walnut. The area was cut 5-6 years ago to establish dense cover.

Management Recommendations – Early Successional

Clearcut the area again in 10 years to maintain dense, young growth.

Stand 25: 9 acres

Site Description -

Ridge top with Village silt loam soils.

Woodland Description -

Medium sized (12-18" dia.) red oak, white oak, basswood, shagbark hickory, and hard maple. The understory is hard maple, elm, and ironwood.

Management Recommendations – Even Age

In 15 years, the stand could be clearcut and planted with large oak seedlings to maintain an oak component.

Stand 26: 38 acres

Site Description -

Predominantly north facing slopes with LaCrescent soils.

Woodland Description -

Medium sized red oak, white oak, shagbark hickory, basswood, and hard maple. The understory is elm, ironwood, and hard maple.

Management Recommendations – Uneven Age

The stand could be selectively harvested in 15 years. After the harvest, the undesirable species and damaged trees should be removed so that hard maple and basswood will fill in the openings created by the harvest. The harvest should concentrate on removing the mature and damaged hard maple and basswood. Healthy oak and hickory should be left.

Stand 27: 30 acres

Site Description –

Steep, west and south facing slopes. Much of the area borders Highway 76.

Woodland Description –

Medium sized (12-18" dia.) bur oak, black oak, shagbark hickory, and elm. The understory is ironwood, elm, bitternut hickory, hackberry, and buckthorn. Buckthorn is thick in areas.

Management Recommendations – Viewshed

The area is very steep and is best left as is to provide a good buffer along the highway.

Stand 28: 7 acres

Site Description -

Ridge top along the crop field.

Woodland Description -

Pole sized (5-10" dia.) aspen, elm, birch, cherry, and bitternut hickory. There is hazelnut in the understory.

Management Recommendations – Early Successional

The stand could be clearcut to feather the edge and provide early successional habitat. This would be a noncommercial cut.

Stand 29: 12 acres

Site Description –

Steep, rocky north facing slope.

Woodland Description -

Medium sized hard maple, red oak, basswood, and shagbark hickory. The understory is hard maple, ironwood, elm, and basswood.

Management Recommendations – Viewshed

This area borders the highway and is very visible. Due to this and the steepness of the site, I suggest leaving this stand as is.

Stand 30: 3 acres

Site Description -

Ridge top along edge of crop field.

Woodland Description –

Pole sized (5-10" dia.) aspen and elm.

Management Recommendations – Early Successional

In 5 years, the area could be clearcut to feather the edge and create dense, young growth. The cut would be noncommercial.

Stand 31: 2 acres

Site Description –

North facing slope.

Woodland Description -

Sapling (1-4" dia.) aspen, ironwood, and hard maple. The area was clearcut in 2002 to promote the aspen and create dense, young growth.

Management Recommendations – Early Successional

Clearcut the area again in 2020 to maintain early successional habitat.

Stand 32: 14 acres

Site Description –

Steep, north facing slope.

Woodland Description -

Medium sized (12-18" dia.) red oak, elm, white oak, hard maple, and shagbark hickory. The understory is hard maple, ironwood, and elm. The area was logged heavy 30 years ago.

Management Recommendations – Uneven Age

The stand could be selectively harvested again in 2030. Following the harvest, the undesirable species should be removed.

Stand 33: 7 acres

Site Description -

Bench with sandy soils.

Woodland Description -

Brome grass with scattered, sapling red cedar, elm, apple trees, bitternut hickory, shagbark hickory, and multiflora rose.

Management Recommendations – Even Age

Plant the open areas with large, oak seedlings. The seedlings should be a minimum of 24 inches in height and 3/8 inch in caliper. Plant the trees in the open areas 30 ft. apart, or 50 trees per acre. Suitable species are red oak, white oak, and bur oak. The trees should be planted in mid to late April.

Protect each tree with a 4-5 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control the competition around each tree by spot spraying a combination of Roundup and Princep 4L herbicides. In the spring, after the vegetation is actively

growing, spray a 4 ft. diameter circle around each tree with 2 quarts of Roundup plus 4 quarts of Princep 4L per acre treated. You must protect the seedling from the Roundup while spraying with a shield.

200 oak trees can be planted on the site.

Stand 34: 6 acres

Site Description -

Bench and west facing slope with sandy soils.

Woodland Description -

Sapling aspen, ironwood, shagbark hickory, and buckthorn. The site was clearcut in 2002 to create early successional habitat.

Management Recommendations – Early Successional

Clearcut the area again in 2020 to maintain early successional habitat.

Stand 35: 35 acres

Site Description -

` Steep, west and south facing slopes with shallow soils.

Woodland Description -

Medium sized (12-18" dia.) bur oak, red oak, shagbark hickory, and red cedar on the south end. The understory is ironwood, elm, buckthorn, and a few hard maple. There are pockets of dense buckthorn.

Management Recommendations – Viewshed

Leave Stand 35 as is due to the steep slopes and buckthorn understory.

Stand 36: 3 acres

Site Description –

Gentle, west facing slope.

Woodland Description -

Medium sized (12-18" dia.) shagbark hickory and red oak. The understory is ironwood, elm, and boxelder.

Management Recommendations – Even Age

Clearcut the area and plant seedlings. Following the harvest, fell all remaining trees 1 inch and larger in diameter. Treat the stumps of elm, boxelder, ironwood, and bitternut hickory with Pathfinder II to prevent sprouting. Plant the area with large seedlings. The seedlings should be a minimum of 24 inches in height and 3/8 inch in caliper. Plant the trees in the open areas 30 ft. apart, or 50 trees per acre. Suitable species are red oak, white oak, and walnut. The trees should be planted in mid to late April.

Protect each tree with a 4-5 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control the competition around each tree by spot spraying a combination of Roundup and Princep 4L herbicides. In the spring, after the vegetation is actively growing, spray a 4 ft. diameter circle around each tree with 2 quarts of Roundup plus 4 quarts of Princep 4L per acre treated. You must protect the seedling from the Roundup while spraying with a shield.

Stand 37: 5 acres

Site Description -

Cropland with Fayette and Village silt loam soils.

Area Description -

Cropland that is currently in row crop.

Management Recommendations – Early Successional

Plant seedlings to establish early successional cover. Plant 3 rows of shrubs along the field edge. Suitable species are hazelnut, ninebark, wild plum, gray dogwood.

Plant the remainder of the area with a combination of trembling and bigtooth aspen.

Broadcast Pendulum herbicide at a rate of 3-4 quarts per acre to control the competing vegetation.

Stand 38: 23 acres

Site Description -

South facing slope with LaCrescent soils.

Woodland Description -

Medium sized red oak, shagbark hickory, white oak, and bur oak. The understory is elm, ironwood, hard maple, basswood, and buckthorn.

Management Recommendations – Even Age

Stand 38 can be managed as a "Shelterwood" with prescribed burning. Prescribed burning will eliminate the brushy species and make the site more suitable for natural oak regeneration. It will take several burns to change the understory.

The site should be burned 4-5 times over the next 8-9 years. Once there is a good regeneration of oak, the undesirable species in the understory should be killed to allow more sunlight to reach the ground. Once the oak seedlings are 3-5 ft. tall, areas 5-6 acres in size should be clearcut to create full sunlight so the oak will develop.

Stand 39: 3 acres

Site Description –

South facing slope with Village silt loam soils.

Woodland Description -

Pole sized (5-10" dia.) aspen, elm, and shagbark hickory.

Management Recommendations – Early Successional

Clearcut the area now to expand the aspen, and create dense, young growth. The cut will be noncommercial.

Stand 40: 2 acres

Site Description -

Gentle south facing slope.

Woodland Description -

Sapling (1-4" dia.) aspen and boxelder. The area was clearcut 6-7 years ago to create early successional habitat.

Management Recommendations – Early Successional

Clearcut the area again in 2020 to maintain early successional habitat.

Stand 41: 9 acres

Site Description -

Gentle, west facing slope with Village and Paint Creek silt loam soils.

Woodland Description -

Sapling (1-4" dia.) aspen, wild plum, red cedar, elm, apple trees, black oak, and a few buckthorn. The understory is raspberry, multiflora rose, and prickly ash.

Management Recommendations – Early Successional

Stand 41 has a good mixture of shrubs, red cedar and aspen. The area should be clearcut in 2020 to increase the aspen component. The cedar should be left for winter cover.

Stand 42: 2 acres

Site Description -

Upland with silt loam soils.

Woodland Description -

Pole sized (5-10" dia.) aspen and shagbark hickory.

Management Recommendations – Early Successional

The area has a good component of aspen. Clearcut the are in 2015 to create dense, young growth.

Stand 43: 44 acres

Site Description -

Steep, north and northwest facing slopes above the trout stream.

Woodland Description -

Medium sized red oak, shagbark hickory, hard maple, bur oak, and black oak. The understory is ironwood, musclewood, hard maple, basswood, nannyberry, and buckthorn.

Management Recommendations – Viewshed

Leave this area as is due to the steep slopes. The area will provide a good buffer along Waterloo Creek.

Stand 44: 8 acre

Site Description -

Ridge top and west facing slope with silt loam soils.

Area Description -

Medium sized (12-18" dia.) shagbark hickory, bur oak, and black oak. The understory is ironwood, elm, buckthorn, and cherry.

Management Recommendations – Even Age

In approximately 10 years, clearcut the stand and plant oak. Plant 50 large oak seedlings per acre. Protect each tree with a 4-5 ft. tall, vented shelter.

Stand 45: 10 acres

Site Description -

Soutwest facing slope.

Woodland Description -

Pole sized (5-10" dia.) red cedar, elm, black oak, shagbark hickory, walnut, and boxelder. The understory is prickly ash, honeysuckle, buckthorn, sumac, multiflora rose, and wild plum. There are scattered, large bur oak.

Management Recommendations – Even Age

The majority of the trees are unwanted species such as elm, honeysuckle, buckthorn, and boxelder. These undesirable species could be killed. Cut all undesirable species 1 inch and larger in diameter. Treat the stumps with Pathfinder II to prevent sprouting. Plant the open areas created by the thinning with red oak, white oak, and bur oak. Plant the trees 30 ft. apart. Protect each tree with a 4-5 ft. tall, vented tree shelter.

Control the competition around each tree by spot spraying a combination of Roundup and Princep 4L herbicides. In the spring, after the vegetation is actively growing, spray a 4 ft. diameter circle around each tree with 2 quarts of Roundup plus 4 quarts of Princep 4L per acre treated. You must protect the seedling from the Roundup while spraying with a shield.

Stand 46: 7 acres

Site Description -

South facing slope.

Woodland Description -

Medium sized (12-18" dia.) bur oak, white oak, black oak, red oak, and shagbark hickory. The understory is elm, ironwood, cherry, and basswood.

Management Recommendations – Even Age

Stand 46 can be regenerated with oak utilizing the shelterwood system of management with prescribed burning. Burn the site 4-5 times to remove the brushy species and litter layer. Once there is a good stocking of oak seedlings, kill the undesirable species in the understory to increase the amount of sunlight reaching the ground. When the young oak are 3-5 ft. tall, clearcut the stand to provide full sunlight.

Stand 47: 4 acres

Site Description -

South facing slope with Village silt loam soils.

Woodland Description -

Pole sized (5-10" dia.) bitternut hickory, elm, cherry, shagbark hickory, red oak, and black oak.

Management Recommendations – Even Age

The stand could be thinned to provide more growing space for the oak and hickory. Select the best tree every 30 ft. apart, or 50 trees per acre. Remove trees with crowns that are touching or overtopping the crowns of the crop tree.

The trees to remove can be felled or double girdled. There is no need to use herbicide on the stumps or girdle.

Stand 48 3 acres

Site Description -
Gentle, south facing slope.

Woodland Description -
Pole sized elm, bitternut hickory, and scattered aspen.

Management Recommendations – Early Successional
Clearcut the area now to expand the aspen and create early successional habitat for grouse, woodcock, and eastern towhees.

Stand 49: 2 acres

Site Description -
Crop land with Paint Creek and Fayette silt loam soils.

Area Description -
Crop land.

Management Recommendations – Early Successional
Plant the area with 1 row of hazelnut, 1 row of wild plum, and 3 rows of aspen. Plant the rows 10 ft. apart. The shrubs should be planted 3-4 ft. apart within the row, and the aspen should be planted 6 ft. apart in the row. Broadcast the area with 4 quarts of Pendulum to control the competition.

Stand 50: 2 acres

Site Description -
North facing slope.

Woodland Description -
Sapling (1-4" dia.) aspen, elm, cherry, and cottonwood. The area was clearcut 8-9 years ago.

Management Recommendations – Early Successional
Clearcut the area in 2015 to maintain early successional habitat.

Stand 51: 7 acres

Site Description –

North facing slope.

Woodland Description -

Pole sized (5-10" dia.) bitternut hickory, birch, aspen, red oak, black oak, cherry, elm, and shagbark hickory. There are scattered, large white oak and red oak.

Management Recommendations – Even Age

There is a good stocking of young red oak. The stand could be thinned to favor the growth of the most desirable trees.

Timber Stand Improvement (Crop Tree Release) -

In pole-sized stands (4-10" dia.), potential crop trees can be selected and released. At maturity, there is room for 35-50 trees per acre. Select a crop tree every 30-35 ft. apart. Remove trees with crowns that are touching or overtopping the crowns of the crop trees.

Locate the most desirable trees for wildlife. Favor the oaks and shagbark hickory. Work around the large, scattered oak trees. Trees to be removed can be felled or double girdled. No herbicide is necessary on the stumps.

Stand 52: 2 acres

Site Description –

North facing slope.

Woodland Description -

Pole sized elm and aspen.

Management Recommendations – Early Successional

Clearcut the area now to expand the aspen and create dense, young growth.

Stand 53: 2 acres

Site Description -

North facing slope with LaCrescent soils.

Woodland Description -

Sapling (1-4" dia.) ironwood, birch, aspen, and boxelder.

Management Recommendations – Early Successional

Clearcut the area in 2015 to provide early successional cover. Treat the stumps of ironwood and boxelder with Pathfinder II to prevent sprouting.

Stand 54: 14 acres

Site Description -

Steep slopes with LaCrescent soils.

Woodland Description -

Medium sized (12-18" dia.) red oak, white oak, bur oak, and shagbark hickory. The understory is elm, ironwood, bitternut hickory, shagbark hickory, and hard maple.

Management Recommendations – Even Age

Clearcut the north 7 acres now. Plant the area with large oak seedlings. Protect each tree with a 4-5 ft. tall, vented tree shelter.

Clearcut the south 7 acres in 15-20 years.

Stand 55: 1 acre

Site Description -

Narrow ridge top.

Woodland Description -

Pole sized (5-10" dia.) aspen, elm, and red cedar. There is a small goat prairie on the west end of the area.

Management Recommendations – Early Successional

Clearcut the area now. Leave the red cedar for winter cover.

Stand 56: 7 acres

Site Description -

North facing slope with rock outcrops.

Woodland Description -

Medium sized (12-18" dia.) red oak, white oak, and shagbark hickory. The understory is elm, ironwood, bitternut hickory, and basswood.

Management Recommendations – Even Age

The stand could be clearcut and planted with oak in 30 years.

Stand 57: 2 acres

Site Description -

North facing slope along the woods trail.

Woodland Description -

Sapling aspen, ironwood, and bitternut hickory. The area was clearcut to make early successional habitat 5-6 years ago.

Management Recommendations – Early Successional

Clearcut the stand in 10 years to maintain early successional cover.

Stand 58: 64 acres

Site Description –

Steep, west facing slope.

Woodland Description –

Medium sized (12-18" dia.) white oak, bur oak, black oak, red oak, shagbark hickory, and a few walnut. The understory is elm, ironwood, hard maple, basswood, and buckthorn. There is a good goat prairie on the north end of the area.

Management Recommendations – Viewshed

Leave this area for watershed protection and scenic beauty. The buckthorn will explode if the overstory is thinned or removed.

Stand 59: 2 acres

Site Description –

North facing slope with Paint Creek silt loam soils.

Woodland Description –

Pole sized (5-10" dia.) walnut and boxelder. The walnut is scattered and poor formed.

Management Recommendations – Even Age

Cut the boxelder and elm and treat the stumps with Pathfinder II herbicide to prevent sprouting. Coppice the poor formed walnut.

Plant the open areas with large red oak and white oak seedlings. The seedlings should be a minimum of 24 inches in height and 3/8 inch in caliper. Plant the trees 30 ft. apart, or 50 trees per acre. The trees should be planted in mid to late April.

Protect each tree with a 4-5 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control the competition around each tree by spot spraying a combination of Roundup and Princep 4L herbicides. In the spring, after the vegetation is actively growing, spray a 4 ft. diameter circle around each tree with 2 quarts of Roundup plus 4 quarts of Princep 4L per acre treated. You must protect the seedling from the Roundup while spraying with a shield.

Stand 60: 6 acres

Site Description –

North facing slope with LaCrescent soils.

Woodland Description –

Medium sized red oak, black oak, white oak, hard maple, basswood, shagbark hickory, and a few walnut. The understory is elm, ironwood, and hard maple.

Management Recommendations – Even Age

Clearcut the stand in 2015 and plant the area with large oak seedlings. Plant 50 trees per acre and protect each tree with a shelter.

Stand 61: 5 acres

Site Description –

West facing slope with Chelsea soils.

Woodland Description –

Sapling (1-4" dia.) aspen, boxelder, and cherry. The area was clearcut 6-7 years ago to expand the aspen and create dense, young growth.

Management Recommendations – Early Successional

Clearcut the area in 2020 to maintain early successional habitat.

Stand 62: 13 acres

Site Description –

Steep, north facing slope.

Woodland Description –

Medium sized (12-18" dia.) red oak, bur oak, white oak, and basswood. The understory is hard maple, bitternut hickory, and ironwood.

Management Recommendations – Uneven Age

The stand could be selectively harvested in 20 years. Following the harvest, kill the undesirable species and coppice the damaged, desirable species.

Stand 63: 7 acres

Site Description –

Ridge and south facing slopes.

Woodland Description –

Pole to small sawtimber (6-16" dia.) walnut, bitternut hickory, elm, cherry, shagbark hickory, and a few black oak. The understory is mainly prickly ash.

Management Recommendations – Even Age

Thin the stand to release the oak, shagbark hickory, and good quality walnut.

Stand 64: 136 acres

Site Description –

Steep, south facing slope with LaCrescent soils.

Woodland Description –

Medium sized bur oak, black oak, walnut, and red cedar. The understory is prickly ash, elm, hackberry, and buckthorn. There is a high quality goat prairie on the west end of the area. The goat prairie has been cleared and burned to promote prairie species.

Management Recommendations – Viewshed

The stand is steep and borders the road. I suggest leaving the area as it is. The goat prairie could be expanded by removing the trees and periodic burning.

Stand 65: 3 acres

Site Description –

West facing slope.

Woodland Description –

Medium sized (12-18" dia.) bur oak, black oak, elm, and shagbark hickory. The understory is shagbark hickory, elm, hackberry, ironwood, and bitternut hickory.

Management Recommendations – Even Age

Clearcut the stand to regenerate oak. Plant the area with large oak seedlings. Plant the trees 30 ft. apart, or 50 trees per acre. Protect each tree with a 4 ft. tall, vented tree shelter.

Control the competition around each tree by spot spraying a combination of Roundup and Princep 4L herbicides. In the spring, after the vegetation is actively growing, spray a 4 ft. diameter circle around each tree with 2 quarts of Roundup plus 4 quarts of Pendulum per acre treated.

Stand 66: 8 acres

Site Description –

East facing slope.

Woodland Description –

Medium sized (12-18" dia.) bur oak, black oak, shagbark hickory, white oak, and walnut. The understory is elm, ironwood, shagbark hickory, hard maple, and basswood.

Management Recommendations – Even Age

In 20 years, clearcut the stand and replant the area with oak.

Stand 67: 13 acres

Site Description –

East facing slope with Village and Paint Creek silt loam soils.

Woodland Description –

Medium sized (12-18" dia.) white oak, shagbark hickory, black oak, and elm. The understory is ironwood, elm, boxelder, shagbark hickory, basswood, and bitternut hickory.

Management Recommendations – Even Age

Clearcut 6-7 acres now and replant oak. Plant 50 oak seedlings per acre and protect each tree with a vented tree shelter.

Clearcut the remainder of the stand in 15 years.

Stand 68: 10 acres

Site Description –

Steep, east facing slope.

Woodland Description –

Pole sized (5-10" dia.) ironwood, bitternut hickory, basswood, birch, elm, shagbark hickory, and scattered red oak, hard maple, and cherry. There are scattered, medium sized white oak, red oak, shagbark hickory, and bur oak.

Management Recommendations – Even Age

Select up to 50 crop trees per acre. Remove trees with crowns that are touching or overtopping the crowns of the crop trees. Oak and shagbark hickory should be favored as crop trees.

Leave the scattered, larger trees for mast production.

Stand 69: 1 acre

Site Description –

Gentle, southeast facing slope.

Woodland Description –

Pole sized (5-10" dia.) elm, boxelder, and aspen. Most of the elm are dying.

Management Recommendations – Early Successioal

Clearcut the area to promote the aspen and create dense, young growth. Treat the stumps of elm and boxelder to prevent sprouting.

Stand 70: 9 acres

Site Description –

South facing slopes.

Woodland Description –

Medium sized (12-18" dia.) red oak, white oak, and shagbark hickory. The understory is bitternut hickory, elm, and shagbark hickory.

Management Recommendations – Even Age

Clearcut the area in 30 years and regenerate oak.

Stand 71: 6 acres

Site Description -

Ridge top and north facing slope with Fayette silt loam soils.

Woodland Description -

Medium sized (12-18" dia.) white oak, elm, shagbark hickory, and basswood. The understory is ironwood, bitternut hickory, elm, and basswood.

Management Recommendations – Even Age

In 10-15 years, clearcut the stand and plant oak. This is low priority because the area is difficult to access.

Stand 72: 16 acres

Site Description -

Steep, south and west facing slopes with rock outcrops.

Woodland Description -

Medium sized (12-18" dia.) bur oak, white oak, and shagbark hickory. The understory is elm, hackberry, ironwood, and buckthorn.

Management Recommendations – Viewshed

This area is above the neighbor's house and has buckthorn in the understory. Stand 72 is best left as it is.

Stand 73: 4 acres

Site Description -

Drainage and bench with Arenzvil-Volney soils on the lower ground, and Bertrand-Chelsea soils on the higher ground.

Woodland Description -

Open grass and weeds with scattered boxelder.

Management Recommendations – Even Age

Cut the boxelder and treat the stumps with Pathfinder II to prevent sprouting. Plant the area with large oak seedlings. The seedlings should be a minimum of 24 inches in height and 3/8 inch in caliper. Plant the trees in the open areas 30 ft. apart, or 50 trees per acre. Plant red and white oak on the higher ground, and bur and swamp white oak on the lower ground. The trees should be planted in mid to late April.

Protect each tree with a 4-5 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control the competition around each tree by spot spraying a combination of Roundup and Princep 4L herbicides. In the spring, after the vegetation is actively growing, spray a 4 ft. diameter circle around each tree with 2 quarts of Roundup plus 4 quarts of Princep 4L per acre treated. You must protect the seedling from the Roundup while spraying with a shield.

Stand 74: 13 acres

Site Description -

East facing slope with LaCrescent soils.

Woodland Description -

Medium sized (12-18" dia.) red oak, white oak, elm, and shagbark hickory. The understory is elm, ironwood, bitternut hickory, basswood, and hard maple.

Management Recommendations – Even Age

Clearcut 6-7 acres now. Following the harvest, fell all trees 1 inch and larger in diameter. Treat the stumps of undesirable species with Pathfinder II to prevent sprouting. Plant the area with large seedlings. The seedlings should be a minimum of 24 inches in height and 3/8 inch in caliper. Plant the trees in the open areas 30 ft. apart, or 50 trees per acre. Suitable species are red oak, white oak, and walnut. The trees should be planted in mid to late April.

Protect each tree with a 4-5 ft. tall, vented tree shelter. Support the shelter with a 1 inch diameter bamboo stake.

Control the competition around each tree by spot spraying a combination of Roundup and Princep 4L herbicides. In the spring, after the vegetation is actively growing, spray a 4 ft. diameter circle around each tree with 2 quarts of Roundup plus 4 quarts of Princep 4L per acre treated. You must protect the seedling from the Roundup while spraying with a shield.

Clearcut the remainder of the stand in 15-20 years.

Stand 75: 2 acres

Site Description -

Ridge top with Village silt loam soils.

Woodland Description -

Pole sized (5-10" dia.) elm and bitternut hickory. The elm are dying.

Management Recommendations – Even Age

Fell all trees 1 inch and larger in diameter. Treat the stumps of ironwood, elm, bitternut hickory, and boxelder with Pathfinder II to prevent sprouting. Plant the area with large oak and walnut seedlings. Plant the trees 30 ft. apart, or 50 trees per acre. Protect each tree with a 4-5 ft. tall, vented shelter. There are no harvestable trees in the stand.

Stand 76: 3 acres

Site Description -

Ridge along field edge.

Woodland Description -

Medium sized (12-18" dia.) red oak, white oak, elm, and shagbark hickory. The understory is elm, ironwood, bitternut hickory, and a few aspen along the edge.

Management Recommendations – Early Successional

Clearcut the stand along with the harvest in Stand 74. Following the harvest, fell all trees 1 inch and larger in diameter and treat the stumps of unwanted species. This will feather the edge of the woods and create early successional habitat.

Stand 77: 20 acres

Site Description -

Steep south and east facing slopes along the road.

Woodland Description -

Medium sized red oak, white oak, elm, and basswood. The understory is elm, ironwood, and bitternut hickory.

Management Recommendations - Viewshed

Leave this area as is to serve as a wooded buffer along the road.

Stand 78: 16 acres

Site Description –

Ridge tops and side slopes with LaCrescent soils.

Woodland Description -

Medium sized (12-18" dia.) white oak, elm, shagbark hickory, bur oak, black oak, and basswood. The understory is prickly ash, elm, hazel, hard maple, and basswood.

Management Recommendations – Even Age

Stand 78 has a good shrub layer and is excellent for a variety of wildlife species. In 30 years, the canapy will close and the understory will be more sparse. At that time, the area could be clearcut and planted with oak.

Stand 79: 27 acres

Site Description -

Steep, east facing slope above the trout stream.

Woodland Description -

Medium sized (12-18" dia.) hard maple, basswood, red oak, and white pine. The understory is hard maple, elm, and bitternut hickory.

Management Recommendations – Viewshed

Leave Stand 79 as is to provide a effective, wooded buffer above the trout stream.

Stand 80: 7 acres

Site Description -

Ridge top with Village and Paint Creek soils.

Woodland Description -

Medium sized (12-18" dia.) white oak, red oak, and shagbark hickory.

Management Recommendations – Even Age

In 2015, clearcut the stand and replant oak and walnut. Plant 50 trees per acre with tree shelters.

Stand 81: 1.5 acres

Site Description -

Bottomland with Volney soils. Volney soils are shallow to gravel and subject to flooding.

Woodland Description -

Medium sized elm and walnut. The understory is boxelder, elm, and honeysuckle.

Management Recommendations – Even Age

In 20 years, the walnut will be mature. At that time, the area can be clearcut and planted with bur oak and swamp white oak.

Stand 82, 83, 85, 86, and 87: 36.5 acres

Site Description -

Ridge tops along the edge of the woodland with Fayette, Village, and Paint Creek silt loam soils.

Area Description -

All of the sites are currently in cropland.

Management Recommendations – Early Successional

Plant the areas with a combination of shrubs, red cedar, and aspen. Two to three rows of shrubs could be planted along the field edge. Suitable species are hazelnut, ninebark, gray dogwood, nannyberry, and wild plum. Two to three rows of red cedar could be planted adjacent to the shrub rows. The cedars should be planted on a 12 X 12 ft. spacing. The remainder of the sites could be planted with aspen on a 6 X 10 ft. spacing.

The sites should be prepared for planting by broadcast spraying with Roundup to kill all existing vegetation. After the trees are planted, spray a 4 ft. wide band down each row with 4 quarts of Pendulum herbicide.

Stand 84: 4 acres

Site Description –

Upland with Fayette silt loam soils.

Area Description -

Cropland.

Management Recommendations – Even Age

Direct seed the area to establish a mixture of upland hardwood species. Spray the area in August with Roundup to kill all vegetation, then plow and disk the site to prepare a good seed bed. Seed 7 bushels of walnut, 3-4 bushels of oak, and ¼ lb. of cherry per acre.

SUSTAINABLE FORESTRY GUIDELINES

Sustainable forestry is managing a forest to maximize the distribution of age classes on the property, and insure there is a balanced distribution of tree sizes. With even age management, the acres of even age management divided by the rotation age is the allowable cut per year. The target rotation age for the area is 125 years. This insures that large oaks will always be present on the area.

Early Successional Management – 15 year rotation

The early successional areas will be managed on a 15 year rotation. There are 141.5 acres designated for early successional management. The allowable cut is 9.4 acres per year (141.5 acres divided by 15 yrs.). With a working cycle of 5 years, approximately **47 acres could be cut every 5 years**.

Even Age Management Area – 125 year rotation

There are 318.5 acres under even age management. Dividing 318.5 acres by 125 years, yields an allowable cut of 2.5 acres per year, or **12-13 acres every 5 years**.

Uneven Age Management Area – 20 year cutting cycle

Stands can be selectively harvested every 20 years to remove mature and defective trees. There are 77 acres under uneven age management. The allowable harvest is **19 acres of selective harvest every 5 years.**

HIGH PRIORITY PROJECTS
First 5 year work cycle

Tree Planting –

Stand #	Acres	Comments
8	5	Clearcut and plant
9	10	Plant oak, cedar, and shrubs
21	4	Direct Seed
23	5	Plant shrubs and cedar
33	7	Plant oak with shelters
36	3	Clearcut and plant
37	5	Plant shrubs and aspen
45	10	Kill weed trees and plant oak
49	2	Plant shrubs and aspen
54	7	Clearcut and plant oak
59	2	Kill boxelder and plant oak
65	3	Clearcut and plant oak
67	6	Clearcut and plant oak
73	4	Plant oak and walnut
74	6	Clearcut and plant oak
75	2	Kill weed trees and plant oak and walnut
82	11	Plant shrubs, aspen, and cedar
83	7	Plant shrubs, aspen, and cedar
84	4	Direct Seed
85	8	Plant shrubs, aspen, and cedar
86	8	Plant shrubs, aspen, and cedar
87	2.5	Plant shrubs, aspen, and red cedar
Total	121.5	

Early Successional Clearcuts – 15 yr. rotation (Non Commercial)

Stand	**Acres**
28	7
39	3
48	3
52	2
55	1
69	1
Totals	17

Early Successional Clearcuts – 15 yr. rotation (Commercial Sales)

Stand	**Acres**	**Comments**
76	3	Fell all trees following harvest

Even Age Clearcuts – 125 yr. rotation

Stand #	**Acres**	**Prescription**
8	5	Clearcut and plant oak
36	3	Clearcut and plant oak
65	3	Clearcut and plant oak
67	6	Clearcut and plant oak
74	6	Clearcut and plant oak
Total	23	

Timber Stand Improvement – Crop Tree Release

Stand	**Acres**
7	5
47	4
51	7
63	7
68	10
Total	33

Timber Stand Improvement – Weed Tree Removal

Stand	**Acres**	**Prescription**
2	12	Uneven Age
20	14	Shelterwood
22	16	Shelterwood
Total	52	

Prescribed Burning for Oak Regeneration -

Stand	**Acres**
38	23
46	7
Total	30

APPENDIX

WATERLOO CREEK WILDLIFE AREA

SUMMARY OF WOODLAND STANDS

No.	Acres	Timber Type	TreeSize	Mngt. System	Prescription	Priority	Year Complete	Comments
1	5	Boxelder Walnut Aspen	Sapling	Early Successional	Clearcut	High	2020	Non Commercial
2	12	White Oak Red Oak Basswood	Medium	Uneven Age	TSI – Weed tree removal	Medium	2010	Selective harvest In 20 yrs.
3	4	Elm Aspen Boxelder	Pole	Early Successional	Clearcut	High	2015	Non Commercial
4	18	White Oak Red Oak Shagbark Hickory	Medium	Even Age	Clearcut and plant	High	2025	Commercial Sale
5	24	Oak Maple Basswood	Medium	View shed				Eagle Nest
6	7	Aspen Oak Cherry	Pole	Early Successional	Clearcut	High	2015	Non Commercial
7	5	Red Oak White Oak Aspen	Pole	Even Age	TSI – Crop Tree Release	High	2010	
8	15	White Oak Red Oak Shagbark Hickory	Medium	Even Age	Clearcut and Plant	Medium	2010	5 acres every 10-15 years
9	10	Open Grass		Even Age	Plant oak, cedar, and shrubs	High	2010	
10	47	White Oak Bur Oak Basswood	Medium	View Shed				
11	5	White Oak Bur Oak Shagbark Hickory	Medium	Even Age	Clearcut and plant	Medium	2030	
12	8	Aspen Elm Black Oak	Sapling	Early Successional	Clearcut	High	2025	

	Acres	Timber Type	Tree Size	Mngt. System	Prescription	Priority	Year Complete	Comments
13	5	Black Oak White Oak Shagbark Hickory	Medium	Even Age	Clearcut and plant	Medium	2035	
14	16	Bur Oak Black Oak Shagbark Hickory	Medium	View Shed				
15	5	Aspen Oak Boxelder	Pole	Early Successional	Clearcut	High	2020	Scattered, Merchantable trees
16	2	Aspen	Sapling	Early Successional	Clearcut	High	2020	Non Commercial
17	3	White Oak Red Oak Shagbark Hickory	Medium	Even Age	Clearcut and plant	Medium	2020	
18	3	Red Oak Walnut	Sapling	Even Age	Shelter 25 oak per acre	High	2010	
19	2	Red Cedar	Sapling	Early Successional				Nothing Needed
20	14	White Oak Bur Oak Shagbark Hickory	Medium	Even Age	Shelterwood – kill weed trees	High	2010	Clearcut In 20 yrs.
21	4	Open Field		Even Age	Direct Seed	High	2010	
22	26	White Oak Red Oak Shagbark Hickory	Medium	Even Age	Shelterwood – kill undesirable species	High	2010	Clearcut in 10-15 yrs.
23	5	Brome Grass		Early Successional	Plant shrubs and cedar	High	2010	
24	5	Aspen Bitternut Hickory	Sapling	Early Successional	Clearcut	High	2020	Non Commercial
25	9	Oak Hard Maple Basswood	Medium	Even Age	Clearcut and plant	High	2025	Commercial Sale
26	38	Oak Basswood H. Maple	Medium	Uneven Age	Selective cut and TSI	Medium	2025	Commercial Sale

SUMMARY OF WOODLAND STANDS

No.	Acres	Timber Type	TreeSize	Mngt. System	Prescription	Priority	Year Complete	Comments
27	30	Bur Oak Black Oak Shagbark Hickory	Medium	View shed				
28	7	Aspen Elm Birch	Pole	Early Successional	Clearcut	High	2010	Non Commercial
29	12	Red Oak H. Maple Basswood	Medium	View Shed				
30	2	Aspen Ironwood	Sapling	Early Successional	Clearcut	High	2020	Non Commercial
31	4	Bur Oak Red Oak Basswood	Medium	View Shed				
32	14	Red Oak White Oak H. Maple	Medium	Uneven Age	Selective harvest and TSI	Medium	2030	Commercial Sale
33	7	Red Cedar Apple B. Hickory	Sapling	Even Age	Plant oak	Medium	2010	
34	6	Aspen Ironwood	Sapling	Early Success	Clearcut	High	2020	Non Commercial
35	35	Bur Oak Red Oak Shagbark Hickory	Medium	View Shed				
36	3	Red Oak Shagbark Hickory	Medium	Even Age	Clearcut and Plant	Medium	2010	
37	5	Crop Land		Early Successional	Plant shrubs and aspen	High	2010	
38	23	Red Oak White Oak Shagbark Hickory	Medium	Even Age	Shelterwood with prescribed burning	Medium	2010	Burn for 3-5 years
39	3	Aspen Elm Bitternut Hickory	Pole	Early Successional	Clearcut	High	2010	Non Commercial
40	2	Aspen Boxelder	Sapling	Early Successional	Clearcut	High	2020	Non Commercial

SUMMARY OF WOODLAND STANDS

No.	Acres	Timber Type	TreeSize	Mngt. System	Prescription	Priority	Year Complete	Comments
41	9	Aspen Red Cedar Wild Plum	Sapling	Early Successional	Clearcut	High	2020	Non Commercial
42	2	Aspen Shagbark Hickory	Pole	Early Successional	Clearcut	High	2015	Non Commercial
43	44	Oak Shagbark Hickory H. Maple	Medium	View Shed				
44	8	Bur Oak Black Oak Shagbark Hickory	Medium	Even Age	Clearcut and plant	Medium	2020	Commercial Sale
45	10	Cedar Elm Boxelder	Pole	Even Age	Kill boxelder and elm and plant oak	Medium	2010	
46	7	Mixed oak Shagbark hickory	Medium	Even Age	Shelterwood with prescribed burning	Medium	2015	
47	4	Bitternut Hickory Red Oak Black Oak	Pole	Even Age	TSI – Crop Tree Release	Medium	2010	
48	3	Elm Bitternut Hickory Aspen	Pole	Early Success	Clearcut	High	2010	Non Commercial
49	2	Crop Land		Early Success	Plant shrubs and aspen	High	2010	
50	2	Aspen Elm	Sapling	Early Successional	Clearcut	High	2015	Non Commercial
51	7	Bitternut Hickory Red Oak Black Oak	Pole	Even Age	TSI – Crop Tree Release	High	2010	
52	2	Elm Aspen	Pole	Early Success	Clearcut	High	2010	Non Commercial
53	2	Ironwood Birch Aspen	Sapling	Early Successional	Clearcut	High	2015	Non Commercial

No.	Acres	Timber Type	TreeSize	Mngt. System	Prescription	Priority	Year Complete	Comments
54	14	Red Oak White Oak Bur Oak	Medium	Even Age	Clearcut and plant	Medium	2010	Commercial Sale North 7 acres
55	1	Aspen Elm Cedar	Pole	Early Successional	Clearcut	Medium	2010	Non Commercial
56	7	Red Oak White Oak Shagbark Hickory	Medium	Even Age	Clearcut and plant	Medium	2040	
57	2	Aspen Ironwood Bitternut Hickory	Sapling	Early Success	Clearcut	High	2020	
58	64	White Oak Bur Oak Red Oak	Medium	View Shed				
59	2	Boxelder Walnut	Pole	Even Age	Kill boxelder and plant oak	Medium	2010	
60	6	Red Oak White Oak Basswood	Medium	Even Age	Clearcut and Plant	High	2015	Commercial Sale
61	5	Aspen Boxelder	Sapling	Early Successional	Clearcut	High	2020	Non Commercial
62	13	Red Oak White Oak Basswood	Medium	Uneven Age	Selective harvest and TSI	Low	2030	Commercial
63	7	Walnut Bitternut Hickory Cherry	Pole	Even Age	TSI – Crop Tree Release	High	2010	
64	136	Bur Oak Black Oak Walnut	Medium	View Shed				
65	3	Bur Oak Black Oak Shagbark Hickory	Medium	Even Age	Clearcut and plant	High	2010	Commercial Sale Low volume
66	8	Bur Oak Black Oak Shagbark Hickory	Medium	Even Age	Clearcut and plant	Medium	2030	
67	13	White Oak Black Oak Shagbark Hickory	Medium	Even Age	Clearcut and plant	High	2010	Cut ½ of stand Now and the Remainder in 15 years
68	10	B. Hickory Basswood Red Oak	Pole	Even Age	TSI – Crop Tree Release	High	2010	

SUMMARY OF WOODLAND STANDS

No.	Acres	Timber Type	TreeSize	Mngt. System	Prescription	Priority	Year Complete	Comments
69	1	Boxelder Aspen	Pole	Early Successional	Clearcut	High	2010	Non Commercial
70	9	Red Oak White Oak Shagbark Hickory	Medium	Even Age	Clearcut	High	2040	Commercial
71	6	White Oak Shagbark Hickory Basswood	Medium	Even Age	Clearcut and plant	Low	2020	Commercial Difficult Access
72	16	Bur Oak White Oak Shagbark Hickory	Medium	View Shed				
73	4	Open Grassland		Even Age	Kill boxelder and plant oak and walnut	Medium	2010	
74	13	Red Oak White Oak Shagbark Hickory	Medium	Even Age	Clearcut and plant	High	2010	Cut ½ now and Remainder in 15-20 yrs.
75	2	Elm Bitternut Hickory	Pole	Even Age	Clearcut and plant oak and walnut	High	2010	Non Commercial
76	3	Red Oak White Oak Shagbark Hickory	Medium	Early Successional	Clearcut	High	2010	Commercial Sale with Stand 74
77	20	Red Oak White Oak Basswood	Medium	View Shed				
78	16	White Oak Bur Oak Shagbark Hickory	Medium	Even Age	Clearcut and Plant	Medium	2040	
79	27	Red Oak H. Maple Basswood	Medium	View Shed				

SUMMARY OF WOODLAND STANDS

No.	Acres	Timber Type	TreeSize	Mngt. System	Prescription	Priority	Year Complete	Comments
80	7	White Oak Red Oak Shagbark Hickory	Medium	Even Age	Clearcut and plant	Medium	2015	
81	1.5	Elm Walnut	Medium	Even Age	Clearcut and plant	Medium	2030	Walnut Sale
82	11	Field		Early Successional	Plant shrubs, aspen, and cedar	High	2010	
83	7	Field		Early Successional	Plant shrubs, aspen, and cedar	High	2010	
84	4	Field		Even Age	Direct seed oak and walnut	High	2010	
85	8	Field		Early Successional	Plant shrubs, aspen, and cedar	High	2010	
86	8	Field		Early Successional	Plant shrubs, aspen, and cedar	High	2010	
87	2.5	Field		Early Successional	Plant shrubs and aspen	High	2010	

Table 1. Forest Breeding Birds of Greatest Conservation Need in NE Iowa

Common Name	Scientific Name
Bald eagle	*Haliaeetus leucocephalus*
Red-shouldered hawk	*Buteo lineatus*
Broad-winged hawk	*Buteo platypterus*
Peregrine falcon	*Falco peregrinus*
Ruffed grouse	*Bonasa umbellus*
American woodcock	*Scolopax minor*
Black-billed cuckoo	*Coccyzus erythropthalmus*
Yellow-billed cuckoo	*Coccyzus americanus*
Long-eared owl	*Asio otus*
Whip-poor-will	*Caprimulgus vociferus*
Red-headed woodpecker	*Melanerpes erythrocephalus*
Acadian flycatcher	*Empidonax virescens*
Willow flycatcher	*Empidonax traillii*
Least flycatcher	*Empidonax minimus*
Brown creeper	*Certhia americana*
Veery	*Catharus fuscescens*
Wood thrush	*Hylocichla mustelina*
Blue-winged warbler	*Vermivora pinus*
Cerulean warbler	*Dendroica cerulea*
Black-and-white warbler	*Mniotilta varia*
Prothonotary warbler	*Protonotaria citrea*
Worm-eating warbler	*Helmitheros vermivorus*
Louisiana waterthrush	*Seiurus motacilla*
Kentucky warbler	*Oporornis formosus*
Hooded warbler	*Wilsonia citrina*
Eastern towhee	*Pipilo erythrophthalmus*

Table 2. Forest Migratory Birds of Greatest Conservation Need in NE Iowa

Common Name	Scientific Name
Golden-winged warbler	*Vermivora chrysoptera*
Canada warbler	*Wilsonia canadensis*

Table 3. Forest Mammals of Greatest Conservation Need in NE Iowa

Common Name	Scientific Name
Northern myotis	*Myotis septentrionalis*
Red squirrel	*Tamiasciurus hudsonicus*
Woodland vole	*Microtus pinetorum*
Spotted skunk	*Spilogale putorius*
Southern Flying Squirrel	*Glaucomys volans*

Table 4. Forest Reptiles and Amphibians of Greatest Conservation Need in NE Iowa

Common Name	Scientific Name
Cricket Frog	*Acris crepitans*
Northern Prairie Skink	*Eumeces septentrionalis*
Bullsnake	*Pituophis catenifer sayi*
Timber Rattlesnake	*Crotalus horridus*

Table 5. Forest Land Snails of Greatest Conservation Need in NE Iowa (Restricted to Algific Talus Slopes and Maderate Slopes)

Common Name	Scientific Name
Iowa Pleistocene Snail	*Discus macclintocki*
Frigid Ambersnail	*Catinella gelida*
Minnesota Pleistocene Succinea	*Novasuccinea n. Sp. Minnesota a*
Iowa Pleistocene Succinea	*Novasuccinea n. Sp. Minnesota b*
Briarton Pleistocene Snail	*Vertigo brierensis*
Hubricht's Vertigo	*Vertigo hubrichti*
Iowa Pleistocene Vertigo	*Vertigo iowaensis*
Bluff Vertigo	*Vertigo occulta*

Table 6. Forest Butterflies of Greatest Conservation Need in NE Iowa

Common Name	Scientific Name
Pepper and Salt Skipper	*Amblyscirtes hegon*
Sleepy Duskywing	*Erynnis brizo*
Dreamy Duskywing	*Erynnis icelus*
Columbine Duskywing	*Erynnis lucilius*
Silvery Blue	*Glaucopsyche lygdamus*
Hickory Hairstreak	*Satyrium caryaevorum*
Edward's Hairstreak	*Satyrium edwardsii*
Striped Hairstreak	*Satyrium liparops*

FWSP DEFINITIONS AND GUIDING FACTORS

Upland Forest Wildlife – Representative tree species include oak, hickory, hard maple, cherry, elm, walnut, ash, and red cedar. This habitat factor will provide habitat for wildlife such as ruffed grouse, woodcock, songbirds and woodpeckers, deer, turkey, raptors, owls, squirrels, and associated furbearing predators.

Floodplain Forest Wildlife –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 from time to time.

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.

Conifer/Wildlife Plantation – A conifer or tree/shrub planting designed for wildlife habitat. This habitat factor will provide nesting sites, food and cover for wildlife. Conifers are also important to wildlife during the winter providing thermal benefits and areas of decreased snow depths.

Restoration – A new planting of seedlings, direct seeding, or regeneration of roots. This habitat factor will create new forest habitat that will be of higher quality for wildlife.

Conversion – An existing shade tolerant forest stand converted to nut and fruit bearing species of trees and shrubs to provide more food and cover. This habitat factor is a timber stand improvement increasing the forest quality. It will begin forest succession from early stages to old growth.

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.

Old Growth – Natural forests that have developed over a long period of time, generally at least 120 years, without experiencing severe, stand-replacing disturbance---a fire, windstorm, or logging. This habitat factor will provide necessary wildlife habitat for species requiring mature woodlands.

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.

Unique Natural Sites – Sites that contain unusual or rare natural components that should be preserved for their unique characteristics, such as algific slopes. This habitat factor will identify these uncommon sites for management considerations.

Preserve Status – An area of land or water formally dedicated for maintenance as nearly as possible in its natural condition though it need not be completely primeval in character at the time of dedication or an area which has floral, fauna, geological, archeological, scenic, or historic features of scientific or educational value. This habitat factor will recognize the quality of preserve sites and apply proper maintenance to protect its integrity.

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.

Special Restrictions – Certain limitations or conditions on the use or enjoyment of a natural resource area. This habitat factor will take into consideration these limitations or conditions to select proper management.

EXPLANATION OF TIMBER MANAGEMENT PRACTICES:

Timber Stand Improvement:

Timber stand improvement (TSI) is the removal of undesirable or low value trees. Removing these unwanted trees will provide more space and sunlight for desirable trees to grow. Timber stand improvement is a "weeding" to increase the growth of your forest.

Weed Tree Removal-

In older timber, the undesirable species can be killed to encourage the natural reseeding of desirable species. The removal of the "weed" trees allows sunlight to reach the ground so that seedlings can become established. The undesirable species can be killed standing by cutting flaps in the trunk and applying Tordon RTU or Pathway into the cuts. The cuts must be in a circle around the trunk and overlapping. The trees can also be cut off and the stumps treated with Tordon RTU or Pathway to prevent resprouting. Wet the outer rim of freshly cut stumps. The work can be done anytime except spring during heavy sap flow.

Desirable trees that are poor formed or damaged should also be removed. These trees should not be treated with herbicide. The stumps will resprout and produce another tree. Cut the stumps close to the ground so that the sprout will originate near the ground.

Crop-Tree Release-

In pole-sized stands (4-10" dia.), potential crop trees can be selected and released. At maturity, there is room for 35-50 trees per acre. Now you can select the trees you want to comprise your future stand of mature trees and thin around them to give them more growing space. Select a crop tree every 30-35 ft. apart. Remove trees with crowns that are touching or overtopping the crowns of your crop trees. Crop trees can be selected based on criteria that meets your objectives. Normally, the crop trees will be a desirable species, show good form without large side limbs, and be free of major defects. Species normally favored are black walnut, red oak, white oak, white ash, basswood, cherry, and hard maple.

Walnut Pruning-

Walnut trees that are 2-12" in diameter can be pruned to promote veneer quality trees. You should prune during the dormant season. Limbs less than 1 inch in diameter are providing foliage which produces food for the tree and should be left. When the limbs approach 1 1/2 to 2" in diameter, they should be removed. Do not remove over 1/3 of the live crown in any one year. At least 50% of the total height of the tree should be maintained in live crown.

Harvest:

Uneven-Age Management:

Uneven-age management can be implemented to manage shade tolerant species. The timber is selectively harvested to remove mature, damaged, and defective trees. Because large trees are always present in the timber, only species that can grow in the shade can reproduce. Hard maple and basswood can be managed on an uneven-age system of management. Uneven-age management involves maintaining a good distribution of all tree sizes in your timber. It is critical that following a selective harvest, the smaller trees are thinned to remove the trees damaged by logging, poor formed trees, and low value species. The thinning following the harvest insures that you have high quality trees ready to replace the older trees as they are harvested.

Even-Age Management:

Even-age management involves a clearcut at some point in the stands rotation. Clearcutting creates full sunlight to the ground. All trees 2" and larger in diameter are felled. Oak, ash, hickory, and walnut require full sunlight to grow. Even-age management must be applied to successively manage these species. Clearcutting creates stands of trees all the same age. The trees compete equally for sunlight and are forced to grow straight and tall, resulting in high quality timber. Clearcutting also provides excellent browse and cover for wildlife.

Shelterwood:

Shelterwood is a form of even-age management. The final cut is a clearcut, but several thinnings are done prior to the final cut. The large, healthy trees are left to provide seed for naturally reseeding the stand, and to create partial shade to inhibit the growth of weeds and brush until the desirable seedlings are well established. The final cut or clearcut is normally done when there are a sufficient number of desirable trees that are 3-5 ft. tall.

The first thinning can be a killing of the undesirable species such as ironwood, elm, bitternut hickory, and boxelder. This removes the seed source for the undesirable species and opens up the ground to sunlight.

The mature and defective trees can be harvested if additional sunlight is needed for the development of desirable seedlings. The harvest should be light, removing the trees that are deteriorating and leaving the high quality trees for seed.

The shelterwood system can take many years to develop a good stocking of desirable young trees. You may have to kill the undesirable species several times to favor the species you want. The final clearcut should not be made until you are satisfied with the stocking of desirable young trees.