FOREST WILDLIFE STEWARDSHIP PLAN

FOR

INDIAN BLUFFS WILDLIFE AREA

A plan that will increase the diversity of forest wildlife and prioritize species of greatest concern

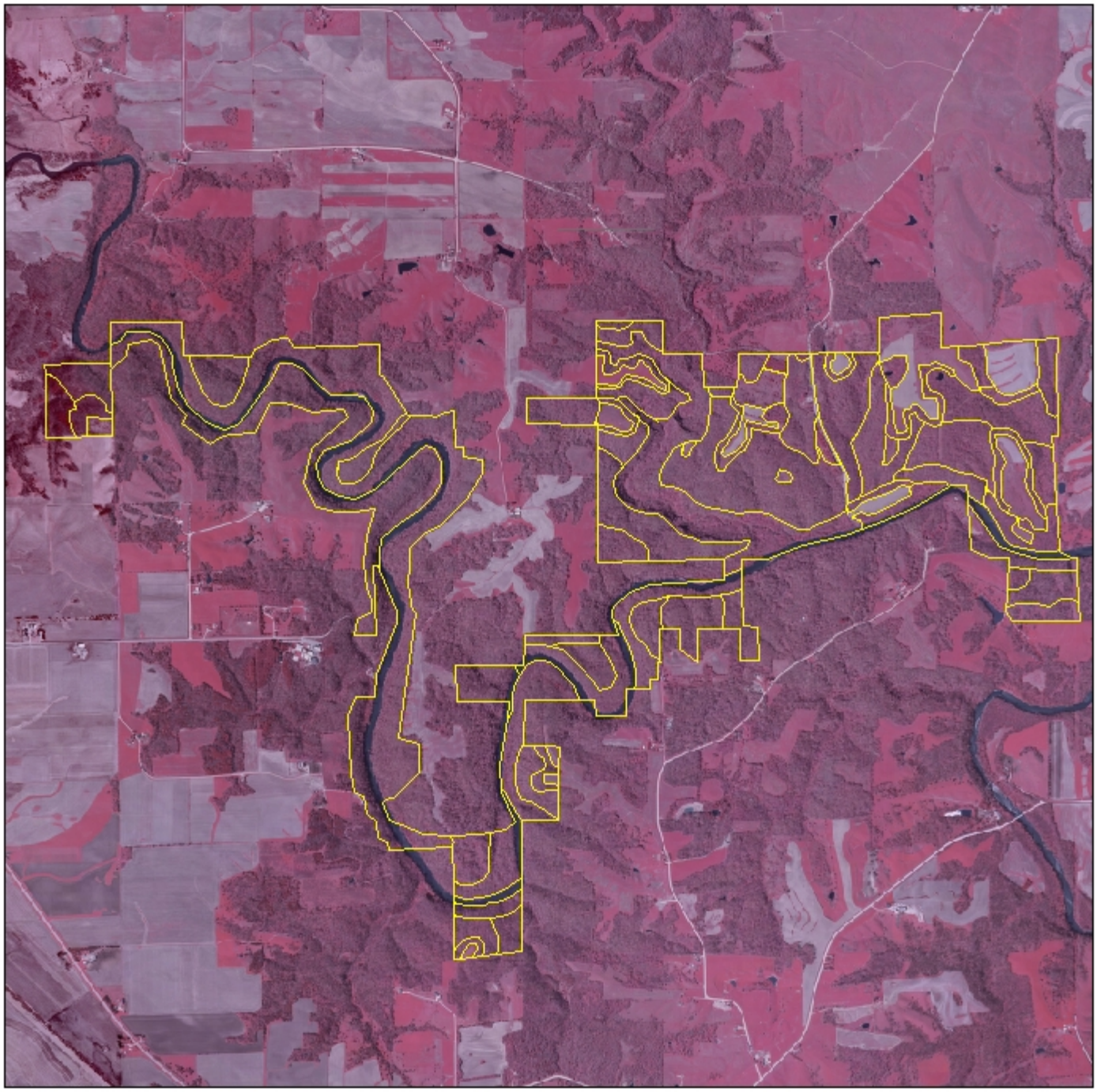
Developed by

Gary Beyer
District Forester

And

Steve Swinconos
District Forester

FOREST STEWARDSHIP WILDLIFE PLAN
FOR INDIAN BLUFFS WILDLIFE AREA
1,400 acres woodland



Sec. 29, 30, 31, 32, 33, 34 Richland Twsp.,
Sec. 3, 4, 5, 6, 8, Scotch Grove Twsp.,
Jones County

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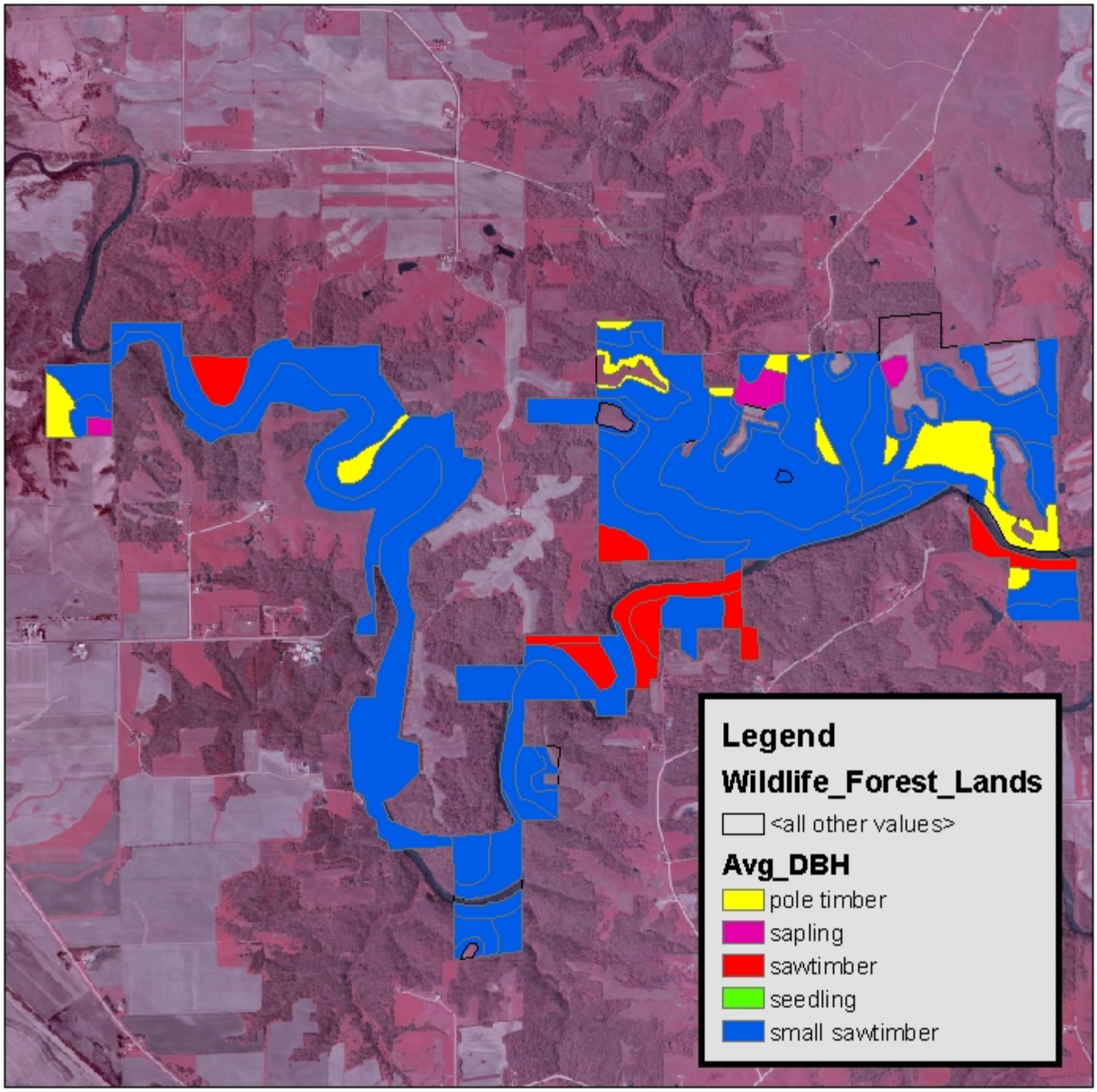
0 1,250 2,500 5,000 7,500 10,000
Feet

INDIAN BLUFFS WILDLIFE AREA
AVERAGE TREE SIZES



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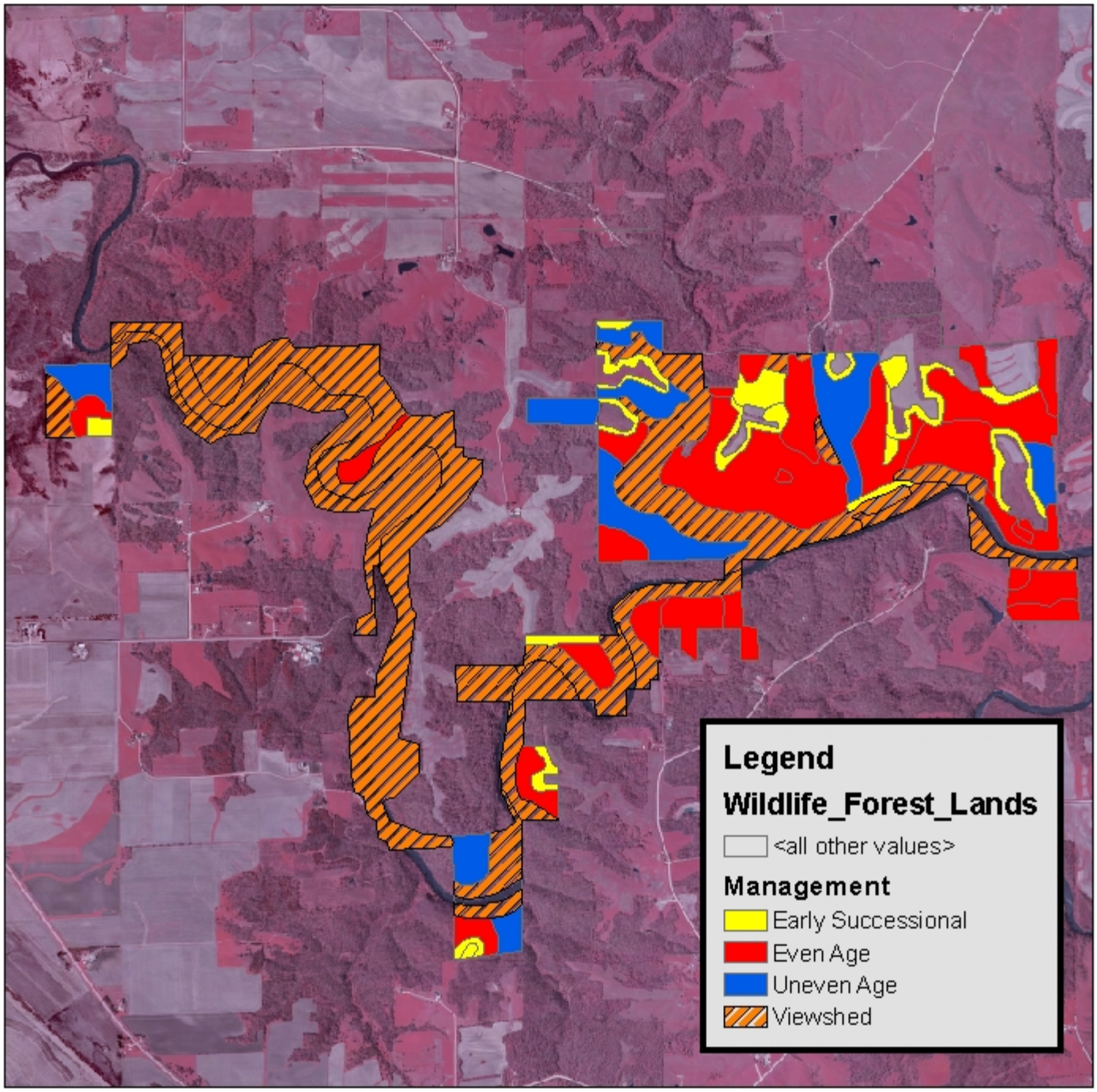
INDIAN BLUFFS WILDLIFE AREA
FOREST MANAGEMENT SYSTEMS



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Feet

FOREST WILDLIFE STEWARDSHIP PLAN
FOR
INDIAN BLUFFS WILDLIFE AREA

MANAGER:

Jeff Glaw
Wildlife Biologist
18670 63rd St.
Maquoketa, Iowa 52060
(563) 652-3132

LOCATION: Sec. 29, 30, 31, 32, 33, & 34 Richland Twsp., Sec. 3, 4, 5, 6, & 8 Scotch Grove Twsp., Jones County

TOTAL ACRES: 1,405

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.

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 proper 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 indigenous game bird, the ruffed grouse and the migratory game bird 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 population 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, State Comprehensive Wildlife Conservation 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. Forest and 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. The primary goal will be to maintain or increase populations of wildlife species of greatest conservation needs.

DESCRIPTION OF AREA

The 1,405 acres addressed in this plan are outlined on the attached aerial photos. The area is divided into 61 different areas or stands, labeled 1-61 on the maps. Each area is described in this plan and recommendations outlined for woodland management.

Indian Bluffs Wildlife Area is 1,993 total acres in size. With 1,400 acres of woodland, Indian Bluffs is 70% forested. The Maquoketa River runs through the center of the area, and Jurdan Creeks cuts through the Northeast main block of woods. There are spectacular limestone bluffs along the river and Jurdan Creek.

The area is used extensively by hunters, hikers, canoeist, and rock climbers. The majority of the western half of the area consists of steep slopes along the Maquoketa River.

The woodland has a good diversity of woodland species. The major overstory species are red oak, white oak, basswood, hard maple, ash, cherry, and black walnut. Common understory species include ironwood, elm, bitternut hickory, hard maple, and basswood. The majority of the area was logged before the state acquired the land. The large trees were harvested at that time. 83% of the woodland is in the medium size class, which is 12-18 inches in diameter. Often, removing the largest, highest quality trees results in a woodland with stagnated, poor quality trees. Many of the medium sized trees are actually slow growing, old trees. Because the trees have low vigor, oak wilt is prevalent throughout the area. Oak wilt fungus often infects trees that are declining. Proper forest management will improve the species composition and health of the woodland.

Objectives -

The primary objectives for the area are improving wildlife habitat for a variety of wildlife species, recreation, water quality, and protecting endangered species. Because the Maquoketa River is very popular for canoeing, the majority of the woodland along the river will be managed as "Viewshed", where no forest management will take place. 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, woodcock, and Eastern Towhee 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. Because much of Indian Bluffs is very steep, the field edges and ridge tops conducive to intensive management will be managed for early successional habitat or oak. The steep slopes are not conducive to intensive forest management. These areas will slowly convert from oak to hard maple and basswood because of the lack of disturbance.

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, and convert areas to more desirable species, and cut the early successional cuts. 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)	22	2
Pole size (5-12" dbh.)	98	7
Medium Size (14-18" dbh.)	1,167	83
Large (>20" dbh)	113	8
Totals	1,400	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 the trout stream, and increase the acres of early successional growth.

Based on my recommendations for Indian Creek Wildlife Area, the acres under each management system are as follows -

Management System	**Acres**	**% of Total Area**
Early Successional	101	7
Even Age	420	30
Uneven Age	174	12
Viewshed	710	51
Total	1,405	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 woody 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.

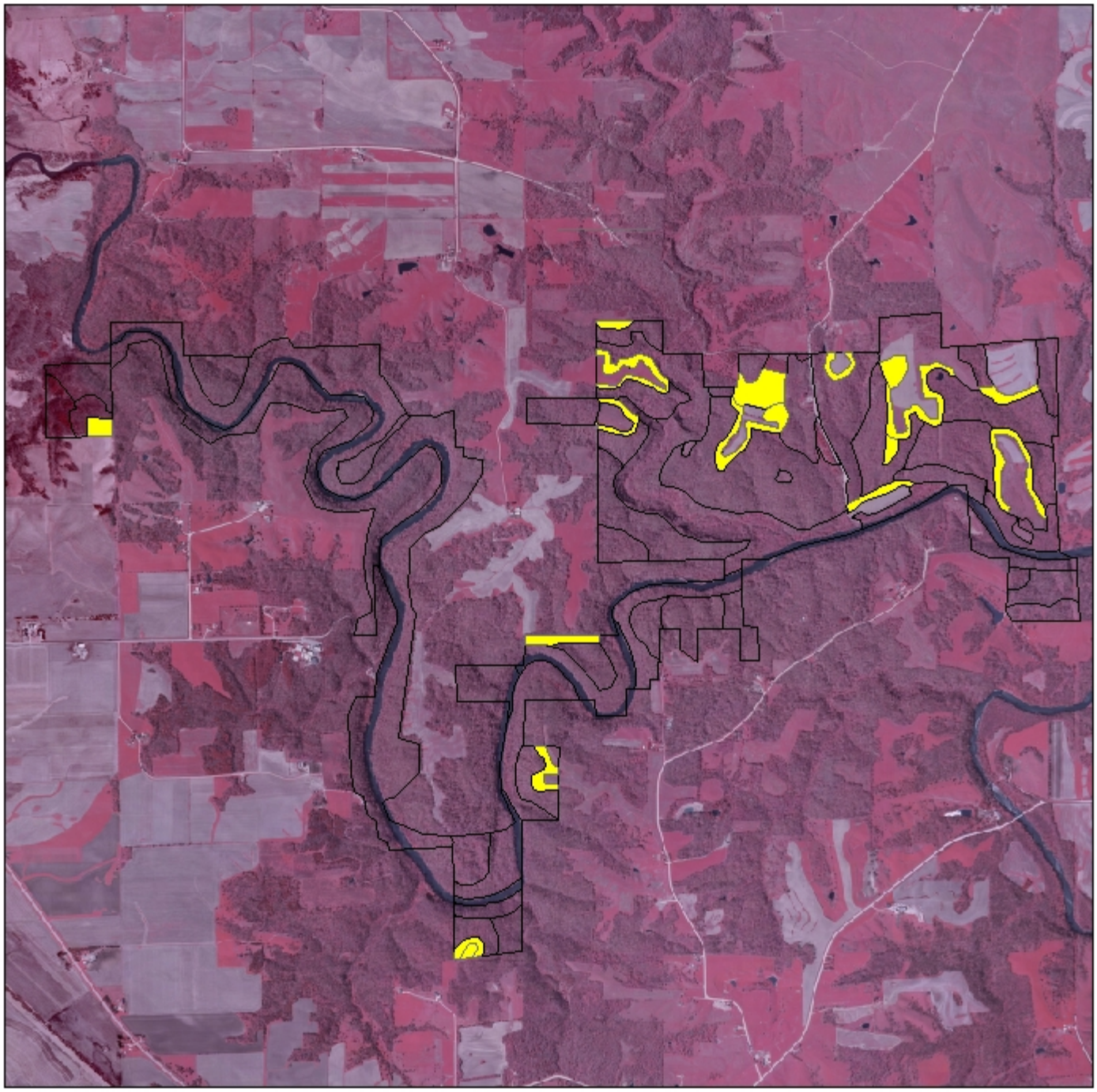
The majority of early successional management is on the woodland edges and aspen stands. This work will "feather" the edges and make a gradual transition from the field edges to the larger trees. Feathering or softening the edges results in less nest parasitism of interior forest bird species by brown-headed 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. Ideally, 1/3 of the aspen would be sapling size (1-4" dia.), 1/3 pole sized (5-10" dia.), and 1/3 medium sized (12-16" dia.). Big tooth aspen will grow to 16-20" in diameter, but small tooth aspen generally begins to die at 14-16" in diameter.

The early successional management areas will be managed on a 15-20 year rotation. In other words, every 15-20 years the area will be cut to rejuvenate the aspen and create areas with high stem density.

Indian Bluffs has 101 acres scheduled for early successional management. Applying sustainable forestry guidelines, 35 acres could be cut every 5 years.

INDIAN BLUFFS WILDLIFE AREA
EARLY SUCCESSIONAL MANAGEMENT - 101 ACRES



Sec. 29, 30, 31, 32, 33, 34 Richland Twsp.,
Sec. 3, 4, 5, 6, 8, Scotch Grove Twsp.,
Jones County

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. 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 (1-10 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 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.

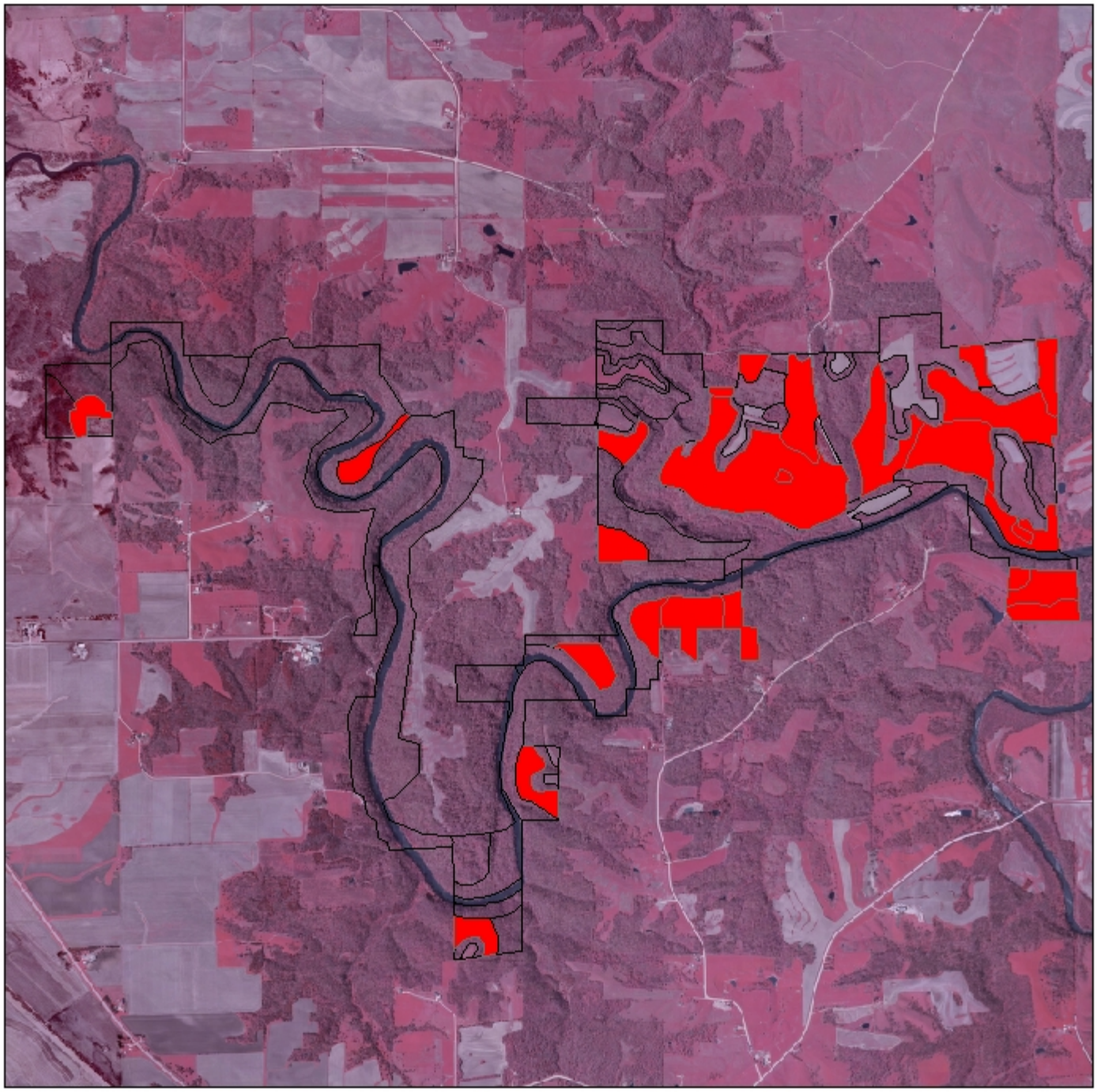
Shelterwood is a form of even-age management. The final cut is a clearcut, but several thinnings are done prior to the final cut. The large, healthy trees are left to provide seed for naturally reseeding the stand, and to create partial shade to inhibit the growth of weeds and brush until the desirable 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 420 acres that will be managed as even aged woodlands to regenerate oak. Approximately 17 acres will be clearcut every 5 years.

INDIAN BLUFFS WILDLIFE AREA
EVEN AGE MANAGEMENT - 420 ACRES



Sec. 29, 30, 31, 32, 33, 34 Richland Twsp.,
Sec. 3, 4, 5, 6, 8, Scotch Grove Twsp.,
Jones County

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

Uneven Age Management -

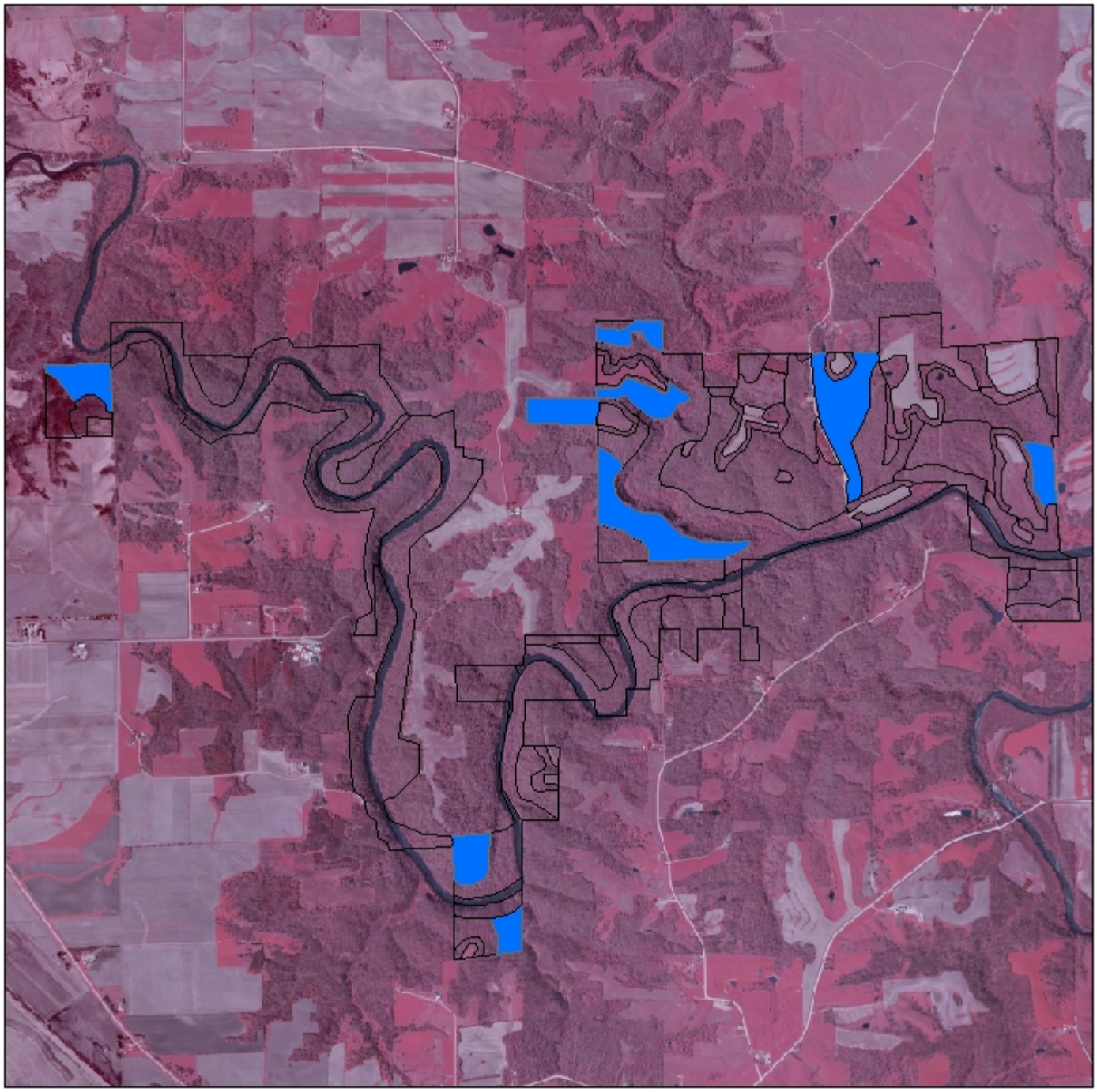
Uneven age management develops a stand of trees with all tree sizes represented. The stand structure is developed by selectively harvesting mature and defective trees, and removing unwanted small trees that are damaged or defective. Because uneven age stands always have large trees present, this system 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 minimal 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, including the Northern myotis and red squirrel, species of greatest conservation need. Timber stand improvement and selective harvesting will create woody debris on the forest floor for reptiles and amphibians.

There are 174 acres that will be managed as uneven aged forests. 45 acres could be selectively harvested every 5 years under sustainable forestry guidelines.

INDIAN BLUFFS WILDLIFE AREA
UNEVEN AGE MANAGEMENT - 174 ACRES



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Jones County

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Feet

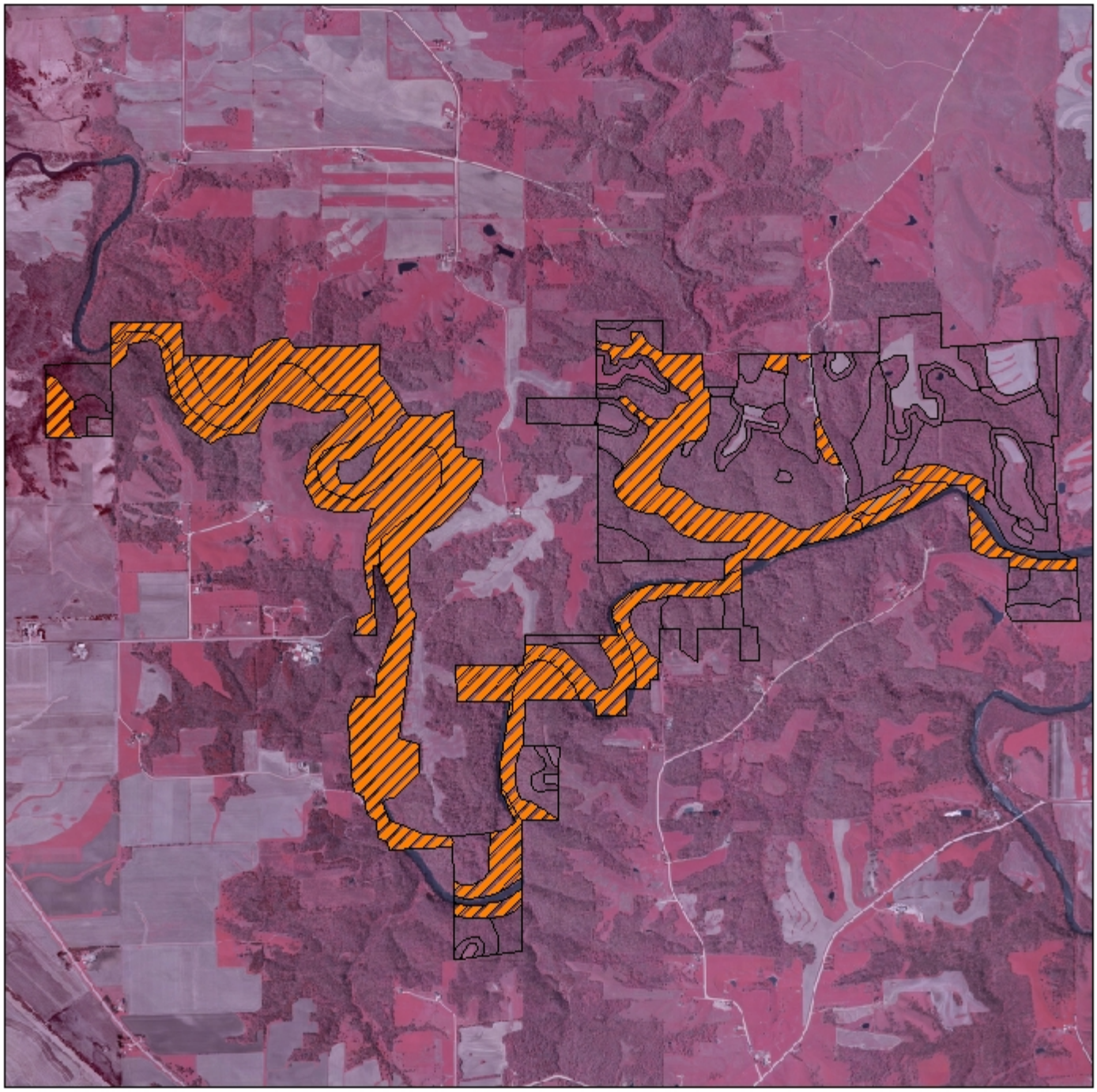
Viewshed Management -

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, but the major objective is to have very minor disturbance if any.

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.

Viewshed management is designated for 710 acres on the area, or 51% of the forest resource.

INDIAN BLUFFS WILDLIFE AREA
VIEWSHED MANAGEMENT - 710 ACRES



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Jones County

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Feet

SOILS

The upland ridges and gentle slopes have Fayette silt loam soils. Fayette soils are among the best soils in the state for growing trees. Fayette soils are well drained, fertile loams. There are no restrictions for tree growth.

The steep slopes have Nordness silt loam soils with limestone outcroppings. These soils are shallow to bedrock. The north and east facing slopes are cooler, while the south and west facing slopes are hot and dry. Much of the area with Nordness soils is not conducive to woodland management.

WORK PLAN

FOR

INDIAN BLUFFS WILDLIFE AREA

This is the "working plan" for Indian Bluffs Wildlife Area 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.

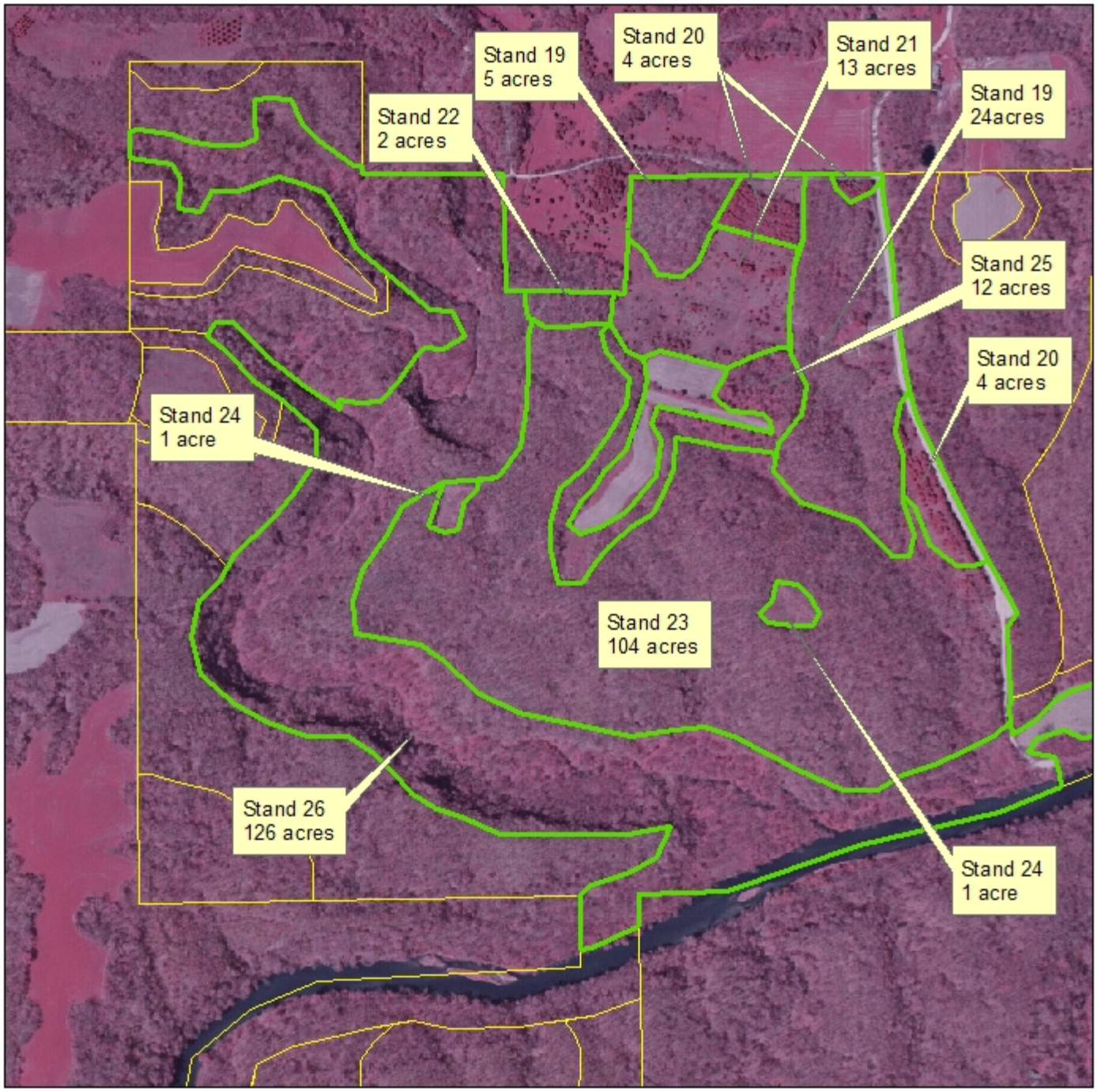
INDIAN BLUFFS WILDLIFE AREA
Stands 1-18

Sec. 34 Richland Twsp.,
T86N-R2W, Jones Co.

0 345 690 1,380 2,070 2,760
Feet

N

INDIAN BLUFFS WILDLIFE AREA
Stands 19 - 26



Sec. 29 Jackson Twsp.,
T91N-R13W, Bremer Co.

0 345 690 1,380 2,070 2,760
Feet

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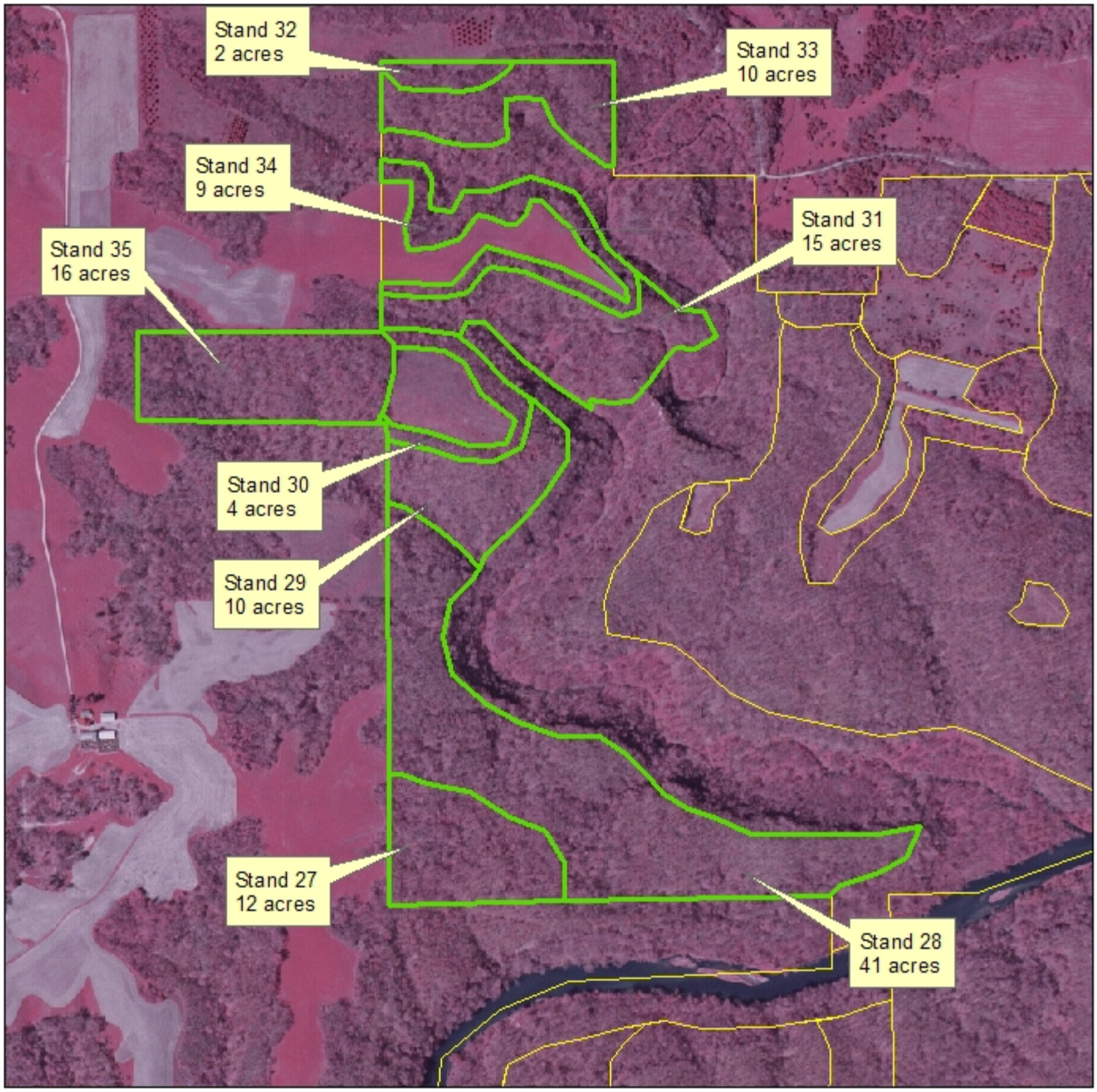
INDIAN BLUFFS WILDLIFE AREA
Stands 27-35



Sec. 29 Jackson Twsp.,
T91N-R13W, Bremer Co.

0 345 690 1,380 2,070 2,760 Feet

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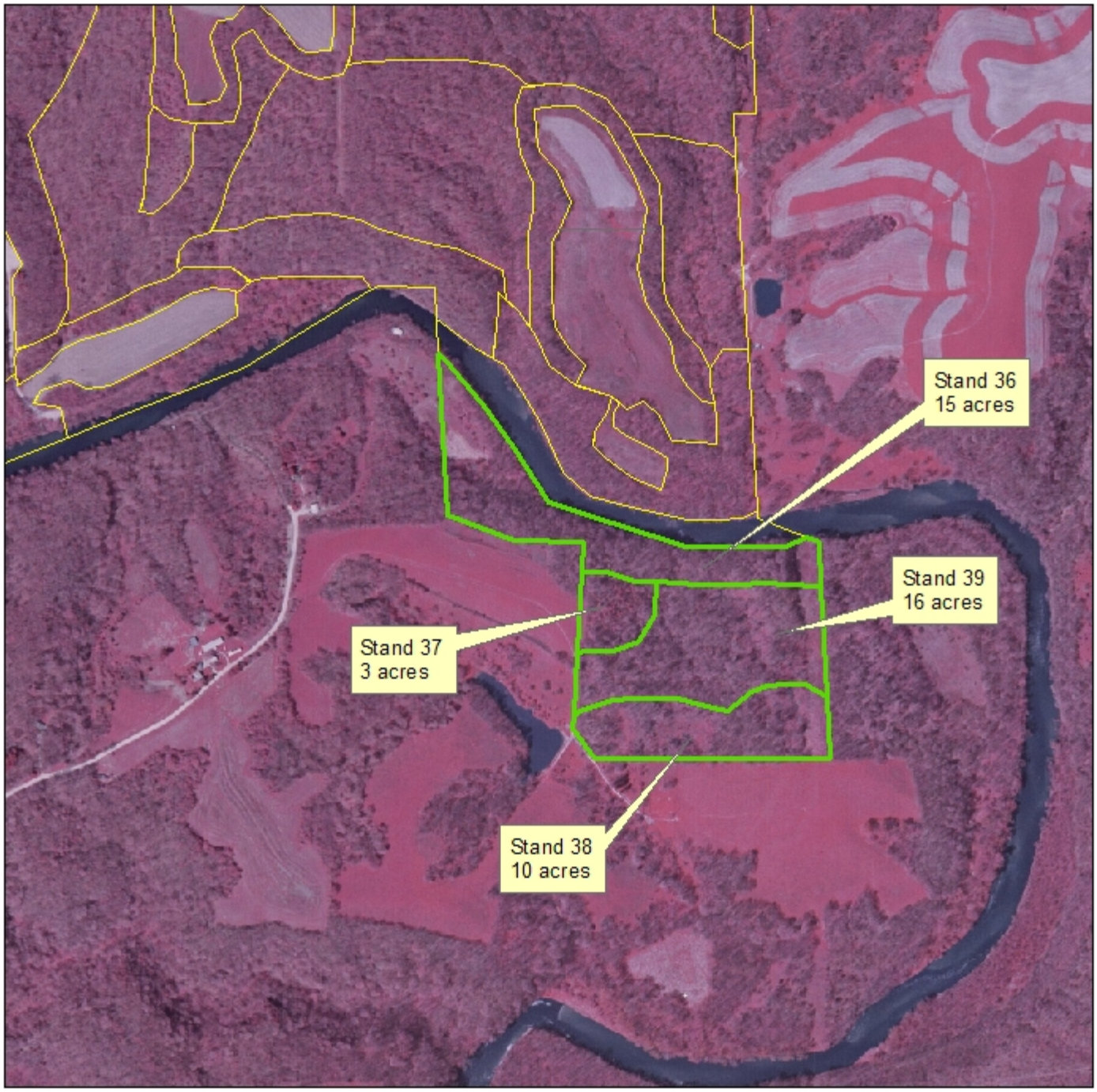
INDIAN BLUFFS WILDLIFE AREA
Stands 36-39



Sec. 34 Richland Twsp.,
T86N-R2W, Jones County

0 345 690 1,380 2,070 2,760
Feet

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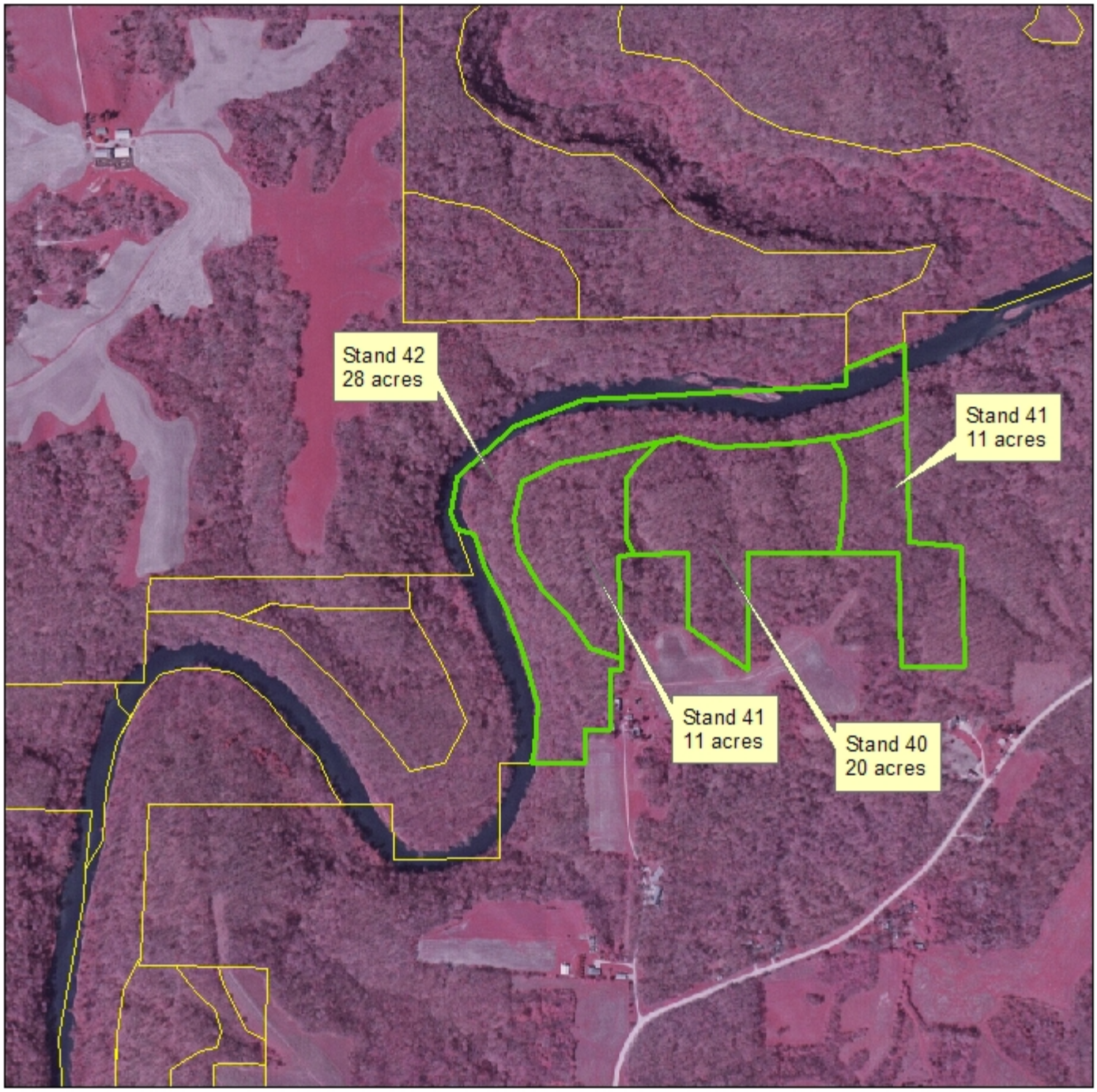
INDIAN BLUFFS WILDLIFE AREA
Stands 40-42



Sec. 33 Richland Twsp.,
T86N-R2W, Jones Co.

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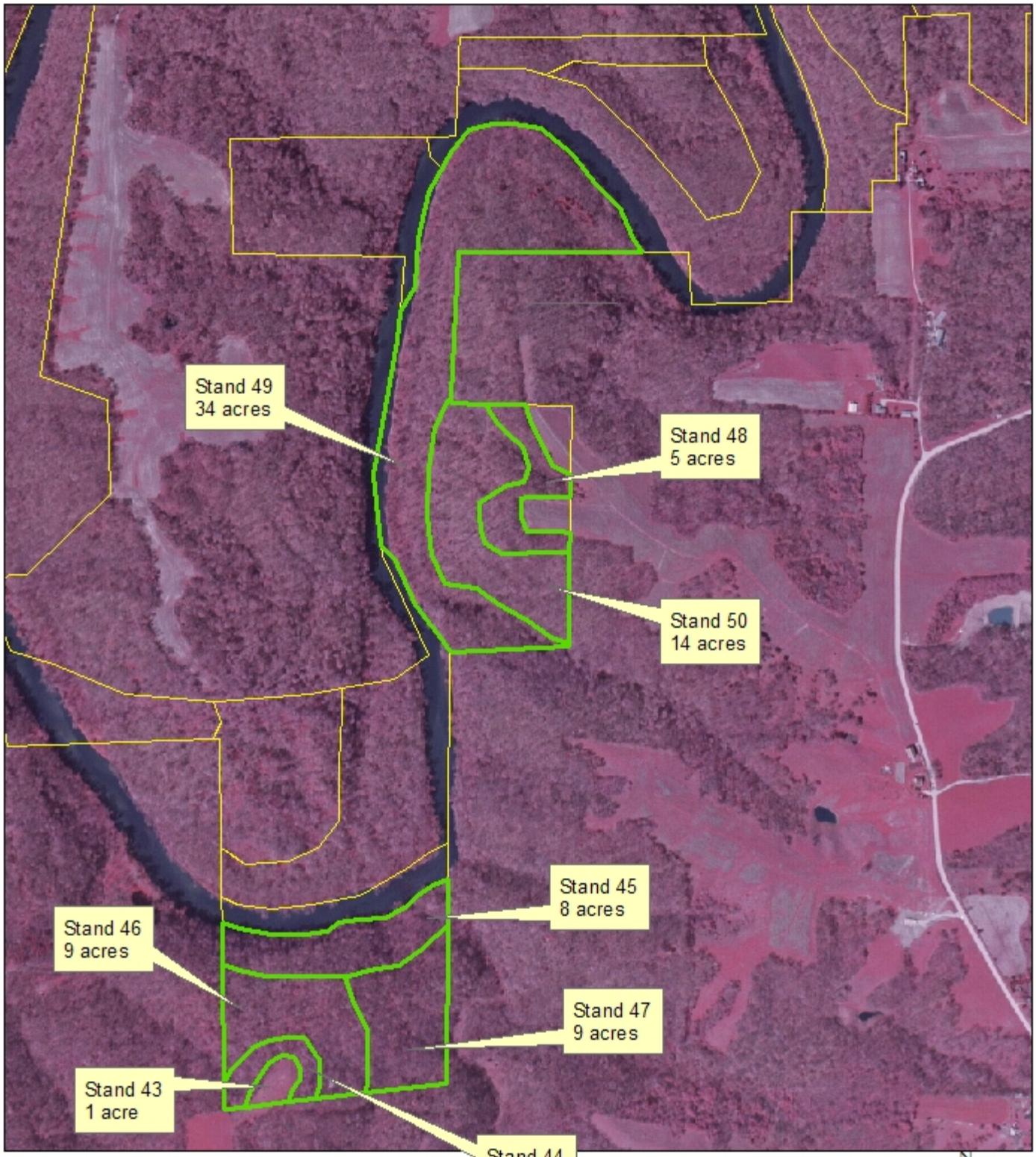
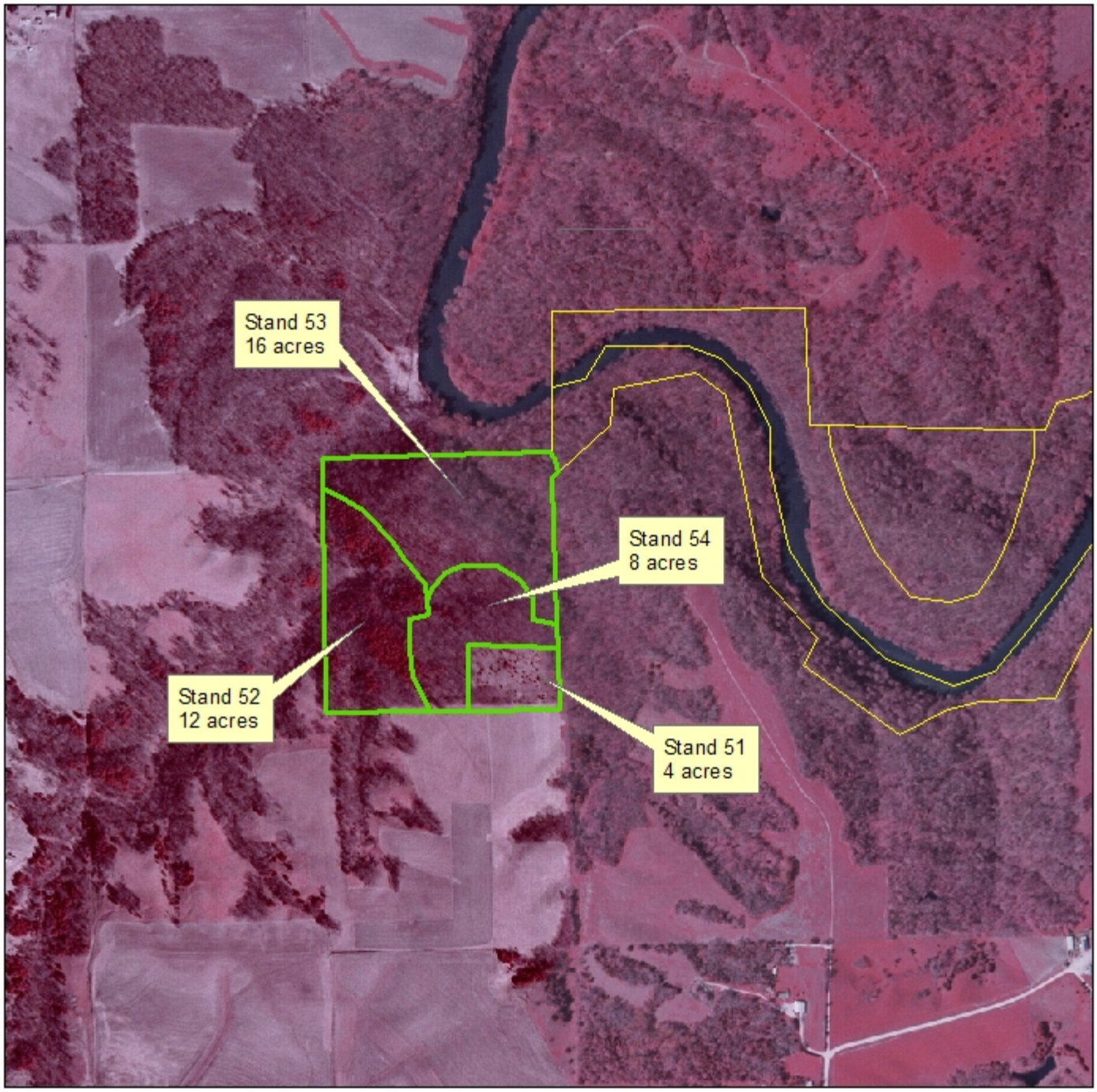
Feet

INDIAN BLUFFS WILDILFE AREA
Stands 43-50



Sec. 5 & 8 Scotch Twsp.,
T85N-R2W, Jones Co.

INDIAN BLUFFS WILDLIFE AREA
Stands 51-54



Sec. 31 Richland Twsp.,
T86N-R2W, Jones Co.

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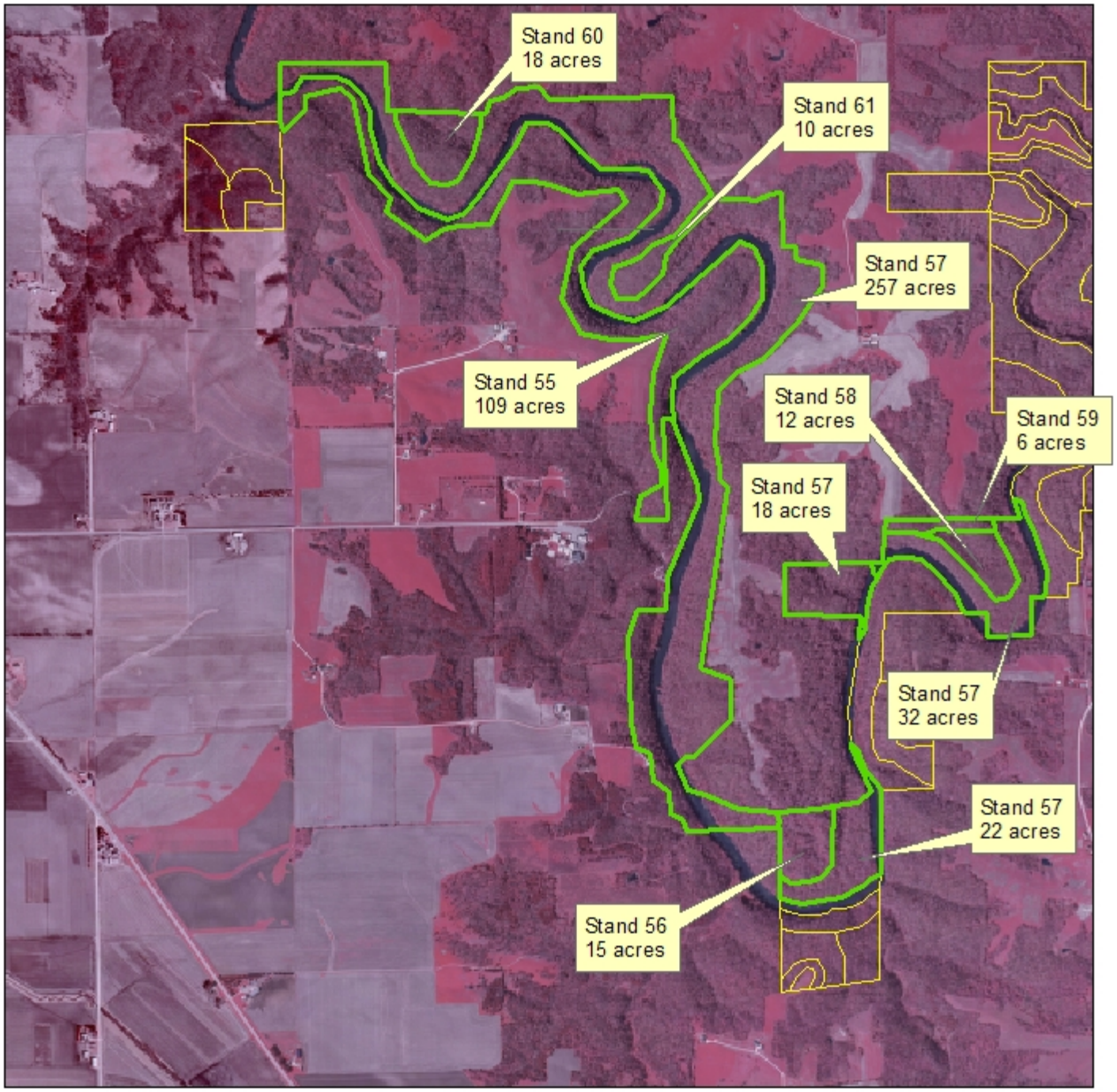
Feet

INDIAN BLUFFS WILDLIFE AREA
Stands 57 - 61



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Jones County

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Feet

DESCRIPTION AND RECOMMENDATIONS FOR INDIVIDUAL STANDS

Stand 1: 41 acres

Site Description -

East facing slope bordering gravel road.

Woodland Description-

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

Management Recommendations – Uneven Age

The undesirable species could be killed now to encourage the natural regeneration of hard maple and hackberry. The undesirable species such as ironwood, elm, and bitternut hickory can be killed by cutting the trees or girdling them. Pathfinder II must be applied to the cut surface to prevent sprouting. The stand can be selectively harvested in 10-15 years to harvest the mature and defective trees.

Stand 2: 3 acres

Site Description -

Ridge top bordering grass field.

Woodland Descripton -

Medium sized (14-18" dia.) white oak, black oak, red oak, and walnut. The understory is ironwood, elm, bitternut hickory, and cherry.

Management Recommendations – Early Successional

In 10-15 years, the stand could be clearcut to establish dense, young growth along the woodland edge. All merchantable trees would be sold. Following the harvest, all remaining trees 1 inch and larger in diameter should be felled. The stumps of undesirable species such as ironwood, elm, and bitternut hickory should be treated with Pathfinder II to prevent sprouting.

Stand 3: 5 acres

Site Description –

Ridge top and gentle slopes around shallow pond.

Woodland Description -

Sapling (1-4" dia.) gray dogwood, wild plum, autumn olive, and hawthorne. There are scattered pole sized (5-10" dia.) walnut, cherry, and aspen.

Management Recommendations –Early Successional

In approximately 10 years, the area could be clearcut to maintain dense, young growth. The undesirable species should be treated with Pathfinder II to prevent sprouting.

Stand 4: 31 acres

Site Description –

Gentle east and west facing slopes.

Woodland Description -

Medium sized (12-18" dia.) white oak, black oak, red oak, hard maple, cherry, elm, walnut, and aspen. The understory consists of ironwood, hard maple, elm, and bitternut hickory. The hard maple is dense in areas.

Management Recommendations – Even Age

Areas 5-6 acres in size can be clearcut harvested and planted to regenerate oak. All merchantable trees would be sold. Following the harvest, all remaining trees over 1 inch in diameter would be felled. The stumps of ironwood, elm, and bitternut hickory should be treated with Pathfinder II to prevent sprouting. The area should be planted with 30 large oak seedlings per acre. Each seedling should be protected with a 4 ft. tall, vented tree shelter.

Stand 5: 3 acres

Site Description -

Ridge top and slight west facing slope.

Woodland Description -

Pole sized (5-10" dia.) elm, boxelder, black oak, walnut, and aspen.

Management Recommendations – Early Successional

There is a good aspen component in Stand 5. The area could be clearcut in 5 years to create early successional habitat. This would be a noncommercial cut.

Stand 6: 12 acres

Site Description -

Ridge along crop field.

Woodland Description –

Medium sized white oak, black oak, cherry, and walnut. There are clumps of pole sized aspen.

Management Recommendations – Early Successional

This area could be clearcut to feather the woodland edge and create dense, young growth along the transition area from the crop field to the older woods. This would be a commercial harvest.

Stand 7: 33 acres

Site Description -

Ridge top and slight south facing slopes.

Woodland Description –

Pole sized (5-10" dia.) red oak, black oak, walnut, cherry, white oak, hackberry, elm, aspen, and hard maple. Stand 7 has a good component of young oak.

Management Recommendations – Even Age

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.

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.

The trees to be removed can be felled or double girdled. No herbicide is necessary.

Stand 8: 13 acres

Site Description -

Stand 8 is a steep, south facing bluff along the river.

Woodland Description –

Medium sized white oak, bur oak, and red cedar.

Management Recommendations – Viewshed

This area is providing a nice buffer along the river. No woodland management is recommended.

Stand 9: 37 acres

Site Description –

East facing slopes with sandy soils.

Woodland Description -

Medium sized (14-18" dia.) black oak, walnut, white oak, and elm. The understory is elm, hackberry, and a few hard maple. The understory is brushy with prickly ash, gooseberry, raspberry, and hazelnut. The east side of the area has pockets of oak wilt.

Management Recommendations – Even Age

Clearcut areas 5-6 acres in size. Plant the harvest area with 30 large oak seedlings per acre. Protect each seedling with a 4 ft. tall, vented tree shelter. Harvest the east side first where the oak wilt is prevalent.

Stand 10: 4 acres

Site Description –

Gentle south facing slope along the edge of a crop field.

Woodland Description -

Medium sized walnut, red oak, white oak, elm, and cottonwood. The understory is elm and ironwood.

Management Recommendations – Early Successional

Clearcut the area to feather the woodland edge and create early successional habitat. This will be a commercial sale with several walnut.

Stand 11: 10 acres

Site Description –

Bottomland along the Maquoketa River.

Woodland Description -

Medium size (14-18" dia.) cottonwood and walnut.

Management Recommendations – Viewshed

This area is adjacent to the parking lot and provides a buffer along the river. No forest management is recommended. The mature and damaged walnut could be harvested in 15-20 years.

Stand 12: 7 acres

Site Description -

East facing slope.

Woodland Description –

Medium sized black locust with a few scattered walnut.

Management Recommendations – Even Age

The black locust are very difficult to control. Cutting them will result in root suckering, making the problem worse. I suggest doing nothing with this area. The locust will gradually die from locust borer. At that time, the area can be converted to oak and walnut.

Stand 13: 4 acre

Site Description -

Ridge bordering crop field.

Woodland Description -

Medium sized (12-18" dia.) black walnut and black oak. The understory is hazelnut, prickly ash, gooseberry, and elm.

Management Recommendations – Early Successional

Clearcut this area in 10 years to create early successional habitat. This will be a commercial sale.

Stand 14: 11 acres

Site Description -

East facing slope with a small ravine.

Woodland Description -

Medium sized (12-18" dia.) white oak, walnut, and hackberry. The stand is mainly white oak. The understory consists of hackberry, bitternut hickory, elm, and basswood.

Management Description – Even Age

Stand 14 will mature in approximately 20 years. At that time the stand can be clearcut and regenerated with oak.

Stand 15: 11 acres

Site Description –

Edge of woods along field.

Woodland Description –

Medium sized (12-18" dia.) walnut, black oak, white oak, and clumps of pole sized aspen.

Management Recommendations – Early Successional

Clearcut the stand to feather the edge and create dense, young, growth. The scattered, merchantable trees could be sold prior to the cutting of the smaller trees.

Stand 16: 11 acres

Site Description -

East facing slope and bottom land.

Woodland Description -

Medium sized (12-18" dbh) red oak, black oak, walnut, white oak, hackberry, and green ash. The understory is hackberry, hard maple, and elm.

Management Recommendations – Uneven Age

Stand 16 could be managed as an uneven age forest. In approximately 20 years, the mature and defective trees can be selectively harvested. Following the harvest, the undesirable species and damaged trees should be removed. This will move this stand to hard maple, hackberry, and basswood.

Stand 17: 16 acres

Site Description –

Bottomland along the river.

Woodland Description -

Pole sized (5-10" dia.) walnut, elm, hackberry, green ash, and honey locust.

Management Recommendations – Even Age

This stand could be thinned to provide more growing space for the best trees. Select a crop tree every 30 ft. apart or 50 trees per acre. Remove trees with crowns that are touching or overtopping the crowns of the crop trees. The thinning will improve the health of the stand and increase the ground cover on the area. Trees that are girdled will provide habitat for small cavity nesters.

Stand 18: 2 acres

Site Description -

Open grass field.

Woodland Description -

This area is open grassland.

Management Recommendations – Even Age

Plant the area with bur oak, swamp white oak, and northern pin oak. Plant the trees 30 ft. apart, or 50 trees per acre. 100 trees could be planted on the site. Protect each tree with a 4 ft. tall, vented tree shelter.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing. Competing vegetation should be controlled for a minimum of 3 years.

Stand 19: 29 acres

Site Description -

Rolling hills with gentle slopes.

Woodland Description –

Medium sized (14-18" dia.) red oak, white oak, black oak, cherry, elm, aspen, and a few hard maple. The understory is elm, ash, boxelder, and ironwood. There are several patches of oak wilt.

Management Recommendations – Even Age

In 10 years, the area will be ready for the first harvest. Cut areas 5-6 acres in size. Clearcut the areas and replant with large oak seedlings to regenerate oak.

Stand 20: 8 acres

Site Description -

Ridges with two of the sites bordering the gravel road.

Woodland Description -

Pole sized white pine. Areas were planted 35 years ago.

Management Recommendations – Viewshed

The white pine can be maintained for their scenic value and wildlife winter habitat. The areas are overstocked and need thinning to improve the health of the trees. Remove every 3rd row. Fell the trees and leave the trees on the ground to create habitat. Remove all of the deciduous trees. Treat the stumps of deciduous trees with Pathfinder II to prevent sprouting. No herbicide is needed on the pine stumps. They will not sprout.

Stand 21: 13 acres

Site Description -

North and south facing slopes along a valley.

Woodland Description –

This area is semi open. It is naturally regenerating with sumac, boxelder, elm, ash, red cedar, and clumps of aspen.

Management Recommendations – Early Successional

There is a nice mixture of shrubs, cedar, and aspen in this area. The area could be improved by killing the boxelder, elm, and ash. Cut the trees and treat the stumps with Pathfinder II. This will maintain the shrubs on the area. In addition, clearcut the aspen clumps so that they sprout and expand the aspen.

Stand 22: 2 acres

Site Description -

Ridge top.

Woodland Description -

Pole sized aspen, red oak, cherry, and hard maple. There is a nice stocking of oak in this stand.

Management Recommendations – Even Age

Thin the stand to release the crop trees. Select 50 crop trees per acre or a crop tree every 30 ft. apart. Remove trees with crowns that are touching or overtopping the crowns of the crop trees.

Stand 23: 104 acres

Site Description -

Ridge tops and gentle slopes.

Woodland Description –

Medium sized (14-18" dia.) red oak, white oak, aspen, basswood, cherry, hard maple, ash, and walnut. The understory is elm, ironwood, hard maple, and bitternut hickory. The hard maple is dense in areas.

Management Recommendations – Even Age

Stand 23 can be managed to regenerate oak. Areas can be clearcut and planted with large oak seedlings. 30 oak seedlings would be planted per acre with each tree protected by a 4 ft. tall, vented tree shelter.

An alternative would be to use a "Shelterwood" system and prescribed burning to establish oak in the understory prior to the harvest. Future harvest sites should be burned 2-3 times to destroy the elm, ironwood, hard maple, and bitternut hickory in the understory. Once oak seedlings are present, additional sunlight can be created by felling poor formed trees and undesirable species. When the oak is 3-4 ft. tall, the area should be clearcut harvested to provide full sunlight for the young oak. This system may take 10-15 years to establish advanced oak regeneration.

Stand 24: 2 acres

Site Description -

Open grass fields on ridge tops.

Woodland Description -

Two small grass openings in the middle of a large block of woods.

Management Recommendations – Even Age

These two small areas could be planted to reduce fragmentation in this large block of woods. Plant the areas with red oak, bur oak, and white oak. Plant the areas with large oak seedlings. Planting large stock is essential for the trees to compete with the competition and grow above deer browsing height. The trees should be a minimum of 18-24" in height and 3/8" in caliper. Plant the trees 30 ft. apart, or 50 trees per acre.

Deer and rabbits will heavily browse oak seedlings. It is nearly impossible to establish oak without protection. You can protect the seedlings with a 4 ft. tall, vented, plastic shelter.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 25: 12 acres

Site Description -

Woodland edge around small crop field.

Woodland Description -

Medium sized (14-18" dia.) red oak, hard maple, white oak, aspen, cherry, and walnut. The understory is ironwood, hard maple, and elm.

Management Recommendations – Early Successional

An area approximately 100 feet wide could be clearcut along the edge to feather the edge and create early successional habitat. The scattered aspen will increase the aspen component in the stand. This will be a commercial timber sale.

Stand 26: 126 acres

Site Description -

Jurdan Creek bottom and steep slopes with limestone bluffs. Some of the most spectacular bluffs on the property are located in this area.

Woodland Description -

Medium sized (12-18" dia.) white oak, red oak, basswood, hard maple, walnut, and elm. There is a good stocking of walnut on the stream bottom.

Management Recommendations – Viewshed

Due to the steep slopes and stream, this area should be managed as viewshed. Mature and damaged trees can be harvested as needed, but no forest management work is recommended.

Stand 27: 12 acres

Site Description -

Ridge top and east facing slope.

Woodland Description -

Large (20"+ dia.) red oak, white oak, black cherry, basswood, and a few walnut. The undesirable species in the understory were killed 3-4 years ago. There are bitternut hickory, ash, and walnut seedlings present.

Management Recommendations – Even Age

Clearcut this area and replant with large oak seedlings. Protect each seedling with a 4 ft. tall, vented tree shelter. Access to this area is difficult. The trees were sold once, but the adjoining landowner would not allow access. A road could be built through the area from the east to allow access for management activities.

Stand 28: 41 acres

Site Description -

Steep, north and east facing slopes.

Woodland Description -

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

Management Recommendations – Uneven Age

In approximately 10 years, the stand could be selectively harvested to remove the mature and defective trees. Following the harvest, the undesirable species and damaged trees should be removed. This will provide small openings for hard maple and basswood to develop. This area is difficult to access without road construction.

Stand 29: 10 acres

Site Description -

South facing slope.

Woodland Description -

Medium sized white oak, red oak, and black cherry. The stand is 80% white oak. The understory is elm, ironwood, and hard maple.

Management Recommendations – Even Age

Stand 29 can be managed on a "Shelterwood" system to establish young oak under the large trees. Prescribed burning could be used to eliminate the thin barked species and dry the site to favor oak development. I suggest burning the site for two successive years. Once oak seedlings are present, remove the undesirable species in the understory not controlled by fire. When the young oak and 3-4 ft. tall, clearcut harvest the stand to provide full sunlight. The process will take 10-15 years.

Stand 30: 4 acres

Site Description -

Ridge top bordering crop field.

Woodland Description -

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

Management Recommendations – Early Successional

Clearcut this area to create early successional habitat. There are scattered, large trees that can be sold.

Stand 31: 15 acres

Site Description -

Steep, north facing slope with shallow soils.

Woodland Description -

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

Management Recommendations – Uneven Age

In 15-20 years, the stand could be selectively harvested.

Stand 32: 2 acres

Site Description -

Ridge top bordering field which is on private land.

Woodland Description -

Pole sized (5-10" dia.) aspen, bitternut hickory, ironwood, elm, ash, and hard maple. There is a good aspen component.

Management Recommendations – Early Successional

Clearcut this area to provide dense, young growth along the edge.

Stand 33: 10 acres

Site Description -

South facing slopes and ridges.

Woodland Description -

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

Management Recommendations – Uneven Age

The undesirable species and poor formed trees could be removed now to encourage the development of young hard maple. This will also increase the ground cover and add more layers to the stand. The area could be selectively harvested in 15-20 years.

Stand 34: 9 acres

Site Description -

Narrow strip of woods bordering a field which is on the ridge.

Woodland Description -

Pole sized (5-10" dia.) cherry, elm, red oak, ironwood, hard maple, and aspen.

Management Recommendations – Early Successional

Stand 34 can be managed on a 15 year rotation to maintain dense, young growth along the field edge. This area can be clearcut every 15 years. The aspen component will increase after every cut through root sprouting.

Stand 35: 16 acres

Site Description -

Ravine with north and south facing slopes.

Woodland Description -

Medium sized white oak, cherry, hard maple, walnut, aspen, and red oak. The understory is hard maple and bitternut hickory. This area was cut heavy 20 years ago.

Management Recommendations – Uneven Age

In 15-20 years, the area could be selectively harvested.

Stand 36: 15 acres

Site Description -

North facing slope along the Maquoketa River.

Woodland Description -

Large (20" and larger in dia.) red oak, hard maple, white oak, and basswood. The understory is hard maple and bitternut hickory.

Management Recommendations – Viewshed

Stand 36 can be left as is to provide a wooded buffer along the river. There are several large oak in this area.

Stand 37: 3 acres

Site Description -

Ridge top and east facing slope.

Woodland Description -

Pole sized hard maple, black cherry, aspen, and a few red oak. The stand was clearcut in 1986.

Management Recommendations – Even Age

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 to favor are red oak, black 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.

The trees to be removed can be felled or double girdled. No herbicide is necessary.

Stand 38: 10 acres

Site Description –

South facing slope. There was a "Shelterwood" harvest and weed tree removal completed in 1990.

Woodland Description -

Medium sized red oak, hard maple, and white oak. The undesirable species were killed in the understory in 1990. The understory is now sapling hard maple, elm, cherry, bitternut hickory, walnut, red oak, and ironwood.

Management Recommendations – Even Age

Stand 38 should be clearcut now to provide full sunlight for the young oak and walnut that are present. Following the harvest, additional oak could be planted in the areas lacking desirable saplings. Plant large oak seedlings and protect each tree with a 4 ft. tall, vented tree shelter.

Stand 39: 16 acres

Site Description –

Ridge top with good, loam soils.

Woodland Description –

Medium sized hard maple, red oak, basswood, and walnut. The understory is hard maple and bitternut hickory. The hard maple is dense in areas.

Management Recommendations – Even Age

The area can be managed on a "Shelterwood" system with prescribed burning to establish oak regeneration. The area should be burned for two successive years to kill the small hard maple, elm, and ironwood. The burning will expose mineral soil and dry out the site, which will favor the natural reseeding of oak. Once oak seedlings are present, all of the undesirable species in the understory should be killed. The trees can be felled or girdled. The cut surface should be treated with Pathfinder II to prevent sprouting. Remove stunted and poor formed trees so that 50% of the sunlight reaches the forest floor.

When the young oaks are 3-4 ft. in height, clearcut the stand to provide full sunlight for the oak seedlings. Young oak will persist in partial shade for a few years, but must have full sunlight to develop.

Stand 40: 20 acres

Site Description -

Ridges and gentle north facing slopes with good, silt loam soils.

Woodland Description -

Medium sized (12-18" dia.) white oak, red oak, aspen, cherry, and a few walnut. The understory is hard maple, ironwood, elm, and bitternut hickory. This area is a nice stand of second growth red and white oak.

Management Recommendations – Even Age

In 15-20 years, the stand could be clearcut and replanted to establish oak.

Stand 41: 22 acres

Site Description –

Ridge tops and gentle slopes with good loam soils.

Woodland Description -

Large (20" and larger in dia.) white oak, red oak, and hard maple. The understory is hard maple, ironwood, elm, and bitternut hickory. This area has oak wilt pockets and considerable storm damage.

Management Recommendations – Even Age

Clearcut harvest the stand. Following the harvest, all remaining trees larger than 1 inch in diameter should be felled. The stumps of the desirable species should be treated with Pathfinder II to prevent sprouting. Plant the area with large oak seedlings. Planting large stock is essential for the trees to compete with the competition and grow above deer browsing height. The trees should be a minimum of 18-24" in height and 3/8" in caliper. Plant the trees 30 ft. apart, or 50 trees per acre.

Protect each tree with a 4 ft. tall, vented tree shelter.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 42: 28 acres

Site Description -

Steep west and north facing slope, and bench along the river.

Woodland Description -

Large red oak, white oak, hard maple, and basswood. There are scattered red cedar on the west facing slopes.

Management Recommendations – Viewshed

This area can be left as it is to provide a buffer along the river. The large oak adjacent to the river also provide excellent cerulean warbler habitat.

Stand 43: 1 acre

Site Description –

Small grass field on ridge top.

Woodland Description -

Open grass field with raspberry and shrubs.

Management Recommendations – Early Successional

This area could be planted with red cedar to provide good winter habitat. Plant red cedars on a 15 X 15 ft. spacing. 150 trees can be planted on the area.

Control competing vegetation by spot spraying a combination of Roundup and Princep 4L herbicides. Protect the seedling from the spray and spray an area 4 ft in diameter around each tree. Apply 2 quarts of Roundup and 4 quarts of Princep 4L per acre treated. The herbicides must be applied when the vegetation is actively growing.

Stand 44: 3 acres

Site Description –

Woodland edge around the open field listed as Stand 43.

Woodland Description –

Medium sized (12-18" dia.) black oak, walnut, basswood, and black cherry. The understory is bitternut hickory, mulberry, elm, hazel, and clumps of aspen along the edge.

Management Recommendations – Early Successional

Clearcut a 100-150 ft. wide strip along the field edge to create early successional habitat and feather the edge of the woods. This will be a commercial sale with several walnut.

Stand 45: 8 acres

Site Description -

Steep, north facing slope along the river.

Woodland Description -

Medium sized black oak, white oak, red oak, and basswood. The understory is elm, bitternut hickory, hackberry, and hard maple.

Management Recommendations – Viewshed

Stand 45 should be left as is to provide a buffer along the river.

Stand 46: 9 acres

Site Description -

Gentle, north facing slope.

Woodland Description -

Medium size (14-18" dia.) black oak, white oak, cherry, bitternut hickory, and elm. Understory is elm, ironwood, bitternut hickory, and hard maple.

Management Recommendations – Even Age

Clearcut and plant with large oak seedlings. Plant 30 oaks per acre and protect each tree with a 4 ft. tall, vented tree shelter.

Stand 47: 9 acres

Site Description -

Steep north and east facing slopes with shallow soils.

Woodland Description -

Medium sized red oak, white oak, black oak, and walnut. The understory is elm, hackberry, bitternut hickory, and hard maple.

Management Recommendations – Uneven Age

Kill the undesirable species now to encourage the development of young hard maple. This will also increase the ground cover in the woods. In addition, coppice desirable species that are poor formed or damaged. The stand can be selectively harvested in 10-15 years.

Stand 48: 5 acres

Site Description -

Ridge along open field on private land.

Woodland Description -

Medium sized (12-18" dia.) black oak, white oak, basswood, aspen, and walnut. There is a good aspen component.

Management Recommendations – Early Successional

Clearcut this area every 15 years to maintain dense, young growth. Treat the stumps of the boxelder, ironwood, bitternut hickory, and elm with Pathfinder II to prevent sprouting. The cutting will encourage the aspen to expand throughout the bottom.

Stand 49: 34 acres

Site Description –

West facing slope and bench along the river.

Woodland Description -

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

Management Recommendations – Viewshed

Stand 49 provides a nice buffer along the river and good habitat for migratory bird species such as the Cerulean warbler. Leave this area as is.

Stand 50: 14 acres

Site Description -

West facing slope.

Woodland Description -

Medium size (12-18" dia.) red oak, white oak, cherry, aspen, and a few walnut. The understory is hard maple, elm, basswood, ironwood, and hazel.

Management Recommendations – Even Age

This area could be clearcut to regenerate oak. Following the harvest, all remaining trees 1 inch and larger in diameter should be felled. Treat the stumps of aspen, elm, and ironwood with Pathfinder II to prevent sprouting. Plant the area with 30 large oak seedlings per acre. Protect each tree with a 4 ft. tall, vented tree shelter.

Stand 51: 4 acres

Site Description -

Abandoned crop field on the ridge top.

Woodland Description -

Sapling (1-4" dia.) boxelder, red cedar, cherry, walnut, and black oak. The understory is mainly gray dogwood. This area is a heavy deer bedding area.

Management Recommendations – Early Successional

Remove all of the deciduous trees except oak to maintain the area as a mixture of red cedar and shrubs. Cut the boxelder, cherry, and walnut. Treat the stumps with Pathfinder II to prevent sprouting.

Stand 52: 12 acres

Site Description -

Steep west facing slope with rock outcrops.

Woodland Description -

Pole sized red cedar, shagbark hickory, and black oak.

Management Recommendations – Viewshed

Leave this area like it is for erosion control and winter habitat.

Stand 53: 16 acres

Site Description -

North facing slope and ridge tops.

Woodland Description -

Medium sized (12-18" dia.) white oak, red oak, black cherry, shagbark hickory, basswood, hard maple, and walnut. There are nice quality walnut, 18-22 inches in diameter. The understory is ironwood, bitternut hickory, hard maple, elm, and hackberry.

Management Recommendations – Uneven Age

The undesirable species could be killed now to encourage the development of young hard maple and basswood. The stand could be selectively harvested in 15-20 years.

Stand 54: 8 acres

Site Description -

Ridge and gentle north facing slopes.

Woodland Description -

Medium sized (12-18" dbh) walnut, basswood, shagbark hickory, elm, black oak, and black cherry. There is a nice stocking of walnut. The understory is elm, bitternut hickory, and hackberry.

Management Recommendations – Even Age

Nothing is needed now. In 15-20 years, the stand can be clearcut and planted along with the harvest in Stand 53.

Stand 55: 109 acres

Site Description –

Steep east facing slopes bordering the Maquoketa River.

Woodland Description -

Medium sized white oak, black oak, red oak, basswood, hard maple, and walnut. There are scattered red cedar on the bluffs. The understory is hard maple, ironwood, basswood, and elm.

Management Recommendations – Viewshed

Leave this area as is to protect the bluffs along the river and provide scenery for the canoeist.

Stand 56: 15 acres

Site Description -

Southeast and southwest facing slopes.

Woodland Description -

Medium sized (12-18" dia.) hard maple, white oak, basswood, and red oak. There are pockets of oak wilt in the red oak. The understory is hard maple, ironwood, cherry, and basswood. The area was logged heavily 30 years ago and again 15 years ago. Most of the large, high quality trees were removed at that time.

Management Recommendations – Uneven Age

The undesirable species should be killed to develop a good understory of hard maple and basswood. The stand could be selectively harvested in 10-15 years. Access for logging is difficult.

Stand 57: 329 acres

Site Description -

Steep slopes and bluffs along the Maquoketa River.

Woodland Description -

Medium sized hard maple, basswood, red oak, white oak, and bur oak. There are walnut on the bottoms and benches along the river.

Management Recommendations – Viewshed

No management is recommended for the steep slopes along the river. Leave this area as is to control erosion and provide esthetics.

Stand 58: 12 acres

Site Description -

Gentle, south facing slope.

Woodland Description -

Large (20"+ dia.) white oak, red oak, and hard maple. This area has high quality red and white oak. The understory is hard maple and ironwood.

Management Recommendations – Even Age

Stand 58 could be clearcut and replanted with red and white oak. This would create early successional habitat and establish young oak on the area. Plant 30 large oak trees per acre. Protect each tree with a 4 ft. tall, vented shelter. Access for logging is difficult.

Stand 59: 6 acres

Site Description -

Ravine and side slopes.

Woodland Description -

Large white oak and red oak. There is an oak wilt pocket on the east end of the area. The understory is ironwood and hard maple.

Management Recommendations – Early Successional

Stand 59 borders a fence line shared with the adjoining private landowner. This area could be clearcut, then cut every 15 years to maintain the area in dense, young growth. This would provide needed early successional habitat and keep trees from overtopping the neighbors' fence.

Stand 60: 18 acres

Site Description -

West, south, and east facing slopes with rock outcrops.

Woodland Description -

Large white oak, red oak, shagbark hickory, walnut, hard maple, and ash. The understory is hard maple, ironwood, and ash.

Management Recommendations – Viewshed

Access to this area for management is difficult. Leave this area as is to provide an area with large oak and provide a buffer along the river.

Stand 61: 10 acres

Site Description -

Southeast facing slope and ridge top.

Woodland Description -

Pole sized white oak, red oak, ash, cherry, black oak, walnut, basswood, hard maple, and aspen.

Management Recommendations – Even Age

This area has a good oak component. This is a high priority area to thin to provide optimum growing space for the young oak. 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 the crop trees.

Species to favor are red oak, white oak, black oak, walnut, and cherry.

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 -

The early successional areas will be managed on a 15 year rotation. There are 101 acres designated for early successional management. The allowable cut is 7 acres per year (101 acres divided by 15 yrs.). With a working cycle of 5 years, approximately **35 acres could be cut every 5 years**.

Even Age Management Area –

There are 420 acres under even age management. Dividing 420 acres by 125 years, yields an allowable cut of 3.4 acres per year, or **17 acres every 5 years**.

Uneven Age Management Area –

Stands can be selectively harvested every 20 years to remove mature and defective trees. There are 174 acres under uneven age management. The allowable harvest is **45 acres of selective harvest every 5 years**.

HIGH PRIORITY PROJECTS
First 5 Year Work Cycle

Open Tree Planting -

Stand #	Acres	Prescription
18	2	Plant oak with tree shelters
24	2	Plant oak with tree shelters
43	1	Plant red cedar
Total	5	

Timber Stand Improvement – Crop Tree Release

Stand #	Acres
7	33
17	16
22	2
37	3
61	10
Total	64

Timber Stand Improvement – Weed Tree Removal

Stand #	Acres
1	41
33	10
35	16
51	4
53	16
Total	87

Early Successional Clearcuts – 15 yr. rotation

Stand #	Acres	Comments
6	6	Commercial timber sale
15	6	Commercial timber sale
25	6	Commercial timber sale
32	2	Non commercial
34	9	Non commercial
44	3	Commercial timber sale
Total	32	

Even Age Clearcuts – 125 yr. rotation

Stand #	Acres	Prescription
4	5	Clearcut and plant
23	6	Clearcut and plant
41	11	Clearcut and plant
Total	22	

Selective Harvest – 20 yr. cycle

The selective harvests should be adjacent to clearcuts to feather the woodland edges and increase ground cover over a larger area. There are no uneven age management areas adjacent to clearcuts for the first work cycle on the area. In 2018, Stand 41, 41 acres will be ready for a selective harvest.

Prescribed Burning to Encourage Oak Regeneration -

Stand	Acres
23	98
29	10
39	16
Total	124

APPENDIX

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 Concern" and the woodland condition of each area. Seventy five per cent of the total area managed by the Wildlife Bureau 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.

INDIAN BLUFFS WILDLIFE AREA

SUMMARY OF WOODLAND STANDS

No.	Acres	Timber Type	TreeSize	Mngt. System	Prescription	Priority	Year Complete	Comments
1	41	Oak Basswood Walnut	Medium	Uneven Age	TSI – Kill weed trees Selective Harvest	Medium	2008 2018	Good walnut component
2	3	Oak Walnut	Medium	Early Successional	Clearcut	High	2018	Commercial Sale
3	5	Walnut Cherry Aspen	Sapling	Early Successional	Clearcut	High	2018	
4	31	Oak Maple Walnut	Medium	Even Age	Clearcut and plant	High	2008	5-6 acres for 1st work cycle
5	3	Black Oak Walnut Aspen	Pole	Early Successional	Clearcut	Medium	2013	
6	12	Oak Cherry Walnut	Medium	Early Successional	Clearcut	High	2008	Commercial Sale
7	33	Oak Cherry Walnut	Pole	Even Age	TSI – Crop Tree Release	High	2008	
8	13	Oak Cedar	Medium	View Shed				
9	37	Oak Walnut	Medium	Even Age	Clearcut and Plant	Medium	2018	Clearcut 5-6 acres Oak wilt on east end of stand
10	4	Oak Walnut Elm	Medium	Early Successional	Clearcut	High	2008	Commercial Sale
11	10	Cotton Wood Walnut	Medium	View Shed				
12	7	Black Locust Walnut	Medium	Even Age	Leave alone until locust die.	Low		

No.	Acres	Timber Type	TreeSize	Mngt. System	Prescription	Priority	Year Complete	Comments
13	4	Oak Walnut	Medium	Early Successional	Clearcut	High	2018	Commercial Sale
14	11	White Oak Walnut	Medium	Even Age	Clearcut	High	2028	
15	11	Black Oak White Oak Walnut	Medium	Early Successional	Clearcut	High	2008	Commercial Sale
16	11	Oak Walnut	Medium	Uneven Age	Selective Harvest	Low	2028	
17	16	Walnut Hackberry Ash	Pole	Even Age	TSI – Crop Tree Release	Medium	2008	
18	2	Open Grass		Even Age	Plant oak with tree shelters	Medium	2008	
19	29	Oak Cherry Elm	Medium	Even Age	Clearcut and plant	High	2018	Oak Wilt pockets present
20	8	White Pine	Pole	View Shed	Thin pines to improve tree vigor	Low	2008	
21	13	Ash Boxelder Elm	Sapling	Early Successional	Kill weed trees to maintain shrub component	High	2018	
22	2	Oak Maple Cherry	Pole	Even Age	TSI – Crop Tree Release	High	2008	
23	104	Oak Basswood Maple	Medium	Even Age	Clearcut & Plant Shelterwood with prescribed burning	High	2008	Clearcut 5-6 acres and plant. Prescribed burn remainder of area.
24	2	Open Ground		Even Age	Plant oak with tree shelters	High	2008	
25	12	Oak Walnut Maple	Medium	Early Successional	Clearcut	High	2008	Commercial Sale
26	126	Oak Basswood Maple	Medium	View Shed				
27	12	Oak Basswood Cherry	Large	Even Age	Clearcut & Plant	High	2013	
28	41	Oak Hard Maple	Medium	Uneven Age	Selective Harvest	Low	2018	

No.	Acres	Timber Type	TreeSize	Mngt. System	Prescription	Priority	Year Complete	Comments
29	10	White Oak Red Oak	Medium	Even Age	Shelterwood with prescribed burning	Medium	2008	Kill weed trees after 2nd burn.
30	4	White Oak Red Oak	Medium	Early Succesional	Clearcut	High	2018	Commercial Sale
31	15	Oak Maple	Medium	Uneven Age	Selective Harvest	Low	2028	
32	2	Aspen Hickory Elm	Pole	Early Successional	Clearcut	High	2008	Non commercial
33	10	Red Oak White Oak Maple	Medium	Uneven Age	TSI – Kill weed trees Selective Harvest	Medium	2008 2028	
34	9	Aspen Elm Ironwood	Pole	Early Successional	Clearcut	High	2008	Commercial Sale Cut 4-5 acres in first work cycle
35	16	Oak Maple Walnut	Medium	Uneven Age	TSI – Kill weed trees Selective Harvest	Medium	2008 2023	
36	15	Oak Maple Basswood	Large	View Shed				
37	3	Maple Cherry Oak	Pole	Even Age	TSI – Crop Tree Release	High	2008	
38	10	Red Oak White Oak Maple	Medium	Even Age	Clearcut & Plant	High	2013	
39	16	Maple Red Oak Basswood	Medium	Even Age	Shelterwood with prescribed burning	High	2008	
40	20	Oak Aspen Cherry	Medium	Even Age	Clearcut	High	2023	
41	22	Red Oak White Oak	Large	Even Age	Clearcut and plant	High	2008	Harvest 11 acres on the west side.
42	28	Red Oak White Oak Maple	Large	View Shed				
43	1	Open		Early Successional	Plant red cedar	High	2008	
44	3	Black Oak Walnut Basswood	Medium	Early Successional	Clearcut	High	2008	

No.	Acres	Timber Type	Tree Size	Mngt. System	Prescription	Priority	Year Complete	Comments
45	8	Oak Basswood	Medium	View Shed				
46	9	Black Oak White Oak Cherry	Medium	Even Age	Clearcut and Plant	High	2013	
47	9	Red Oak White Oak Walnut	Medium	Uneven Age	TSI – Kill weed trees Selective Harvest	Medium	2008 2023	
48	5	Oak Basswood Aspen	Medium	Early Successional	Clearcut	High	2013	Commercial Sale
49	34	Red Oak White Oak Maple	Medium	View Shed				
50	14	Oak Walnut Cherry	Medium	Even Age	Clearcut and plant	High	2013	
51	4	Cedar Black Oak Walnut	Sapling	Early Successional	TSI – Kill undesirable species	Medium	2008	
52	12	Cedar Black Oak Hickory	Pole	View Shed				
53	16	White Oak Red Oak Walnut	Medium	Uneven Age	TSI – Kill weed trees Selective Harvest	Medium	2008 2023	
54	8	Walnut Basswood Black Oak	Medium	Even Age	Clearcut	Medium	2028	
55	109	Oak Basswood Maple	Medium	View Shed				
56	15	Oak Basswood Maple	Medium	Uneven Age	TSI – Kill undesirable species	Low	2018	Difficult Access
57	329	Oak Maple Basswood	Medium	View Shed				
58	12	Red Oak White Oak Maple	Large	Even Age	Clearcut and Plant	Medium	2018	Difficult Access
59	6	White Oak Red Oak	Large	Early Successional	Clearcut	Medium	2008	Difficult Access
60	18	White Oak Red Oak Hickory	Large	View Shed				

No.	Acres	Timber Type	Tree Size	Mngt. System	Prescription	Priority	Year Complete	Comments
61	10	White Oak Red Oak Walnut	Pole	Even Age	TSI – Crop Tree Release	High	2008	

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.