Tyrone Forest Wildlife Stewardship Plan

March 20

2020

Actively managing the forestlands owned by the Iowa DNR Wildlife Bureau are critical to improving habitat for a variety of wildlife species and improving the forest ecosystem structure and function. Stand maps and prescriptions are provided to direct the forest management across 969 acres at Tyrone Wildlife Management Area. Plan developed by Jeremy Cochran, District Forester, and Heath Van Waus, Wildlife Biologist.

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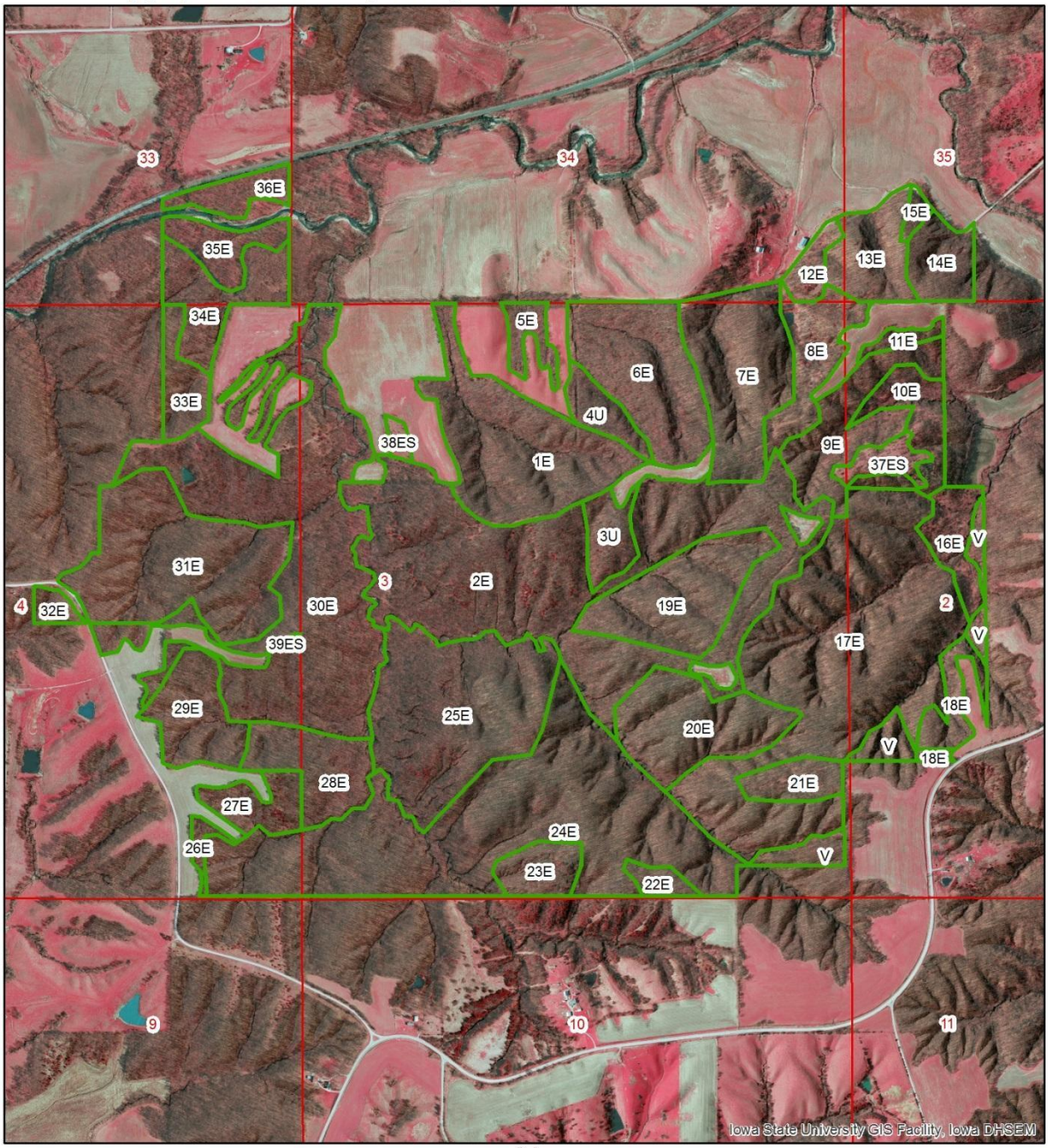
Forest Stand Map of Tyrone Wildlife Management Area

Tyrone WMA Forest Stand Map
2016 CIR Imagery
Location: Iowa Monroe Guillford 33,34,35 and Franklin 2,3,4
Map prepared: 2/26/2020 by Jeremy Cochran



Legend
forest stands
section lines

N

1 inch = 1,250 feet

How the Forest Wildlife Stewardship Plan Was Developed

The wildlife biologist is the manager of the Tyrone Wildlife Management Area (WMA) and determines the objectives to address the habitat needs for Species of Greatest Conservation Need (SGCN) as determined by the wildlife action plan and the forestland condition of each area. Tyrone WMA includes 1,080 acres and more than 88% is forestland. Managing forests are essential to improve the areas for wildlife and recreation.

This plan is the result of forest cruising and stand mapping by the district forester. Stands are identified by tree species, tree size, relative stand density, 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. The forester's prescriptions are designed to manage the stand to reach the established goals and objectives for the property.

The wildlife biologist and technicians are responsible for the day to day operations of the WMA. The forester will implement the forest wildlife stewardship plan in coordination with the wildlife biologist.

One of four management systems is 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.

Proposed management recommendations for each stand are based on whether the area will be managed to create an even age system, uneven age system, viewshed, or early successional habitat. The decision on what system will be used was based on the objectives for the area to maintain an oak component where feasible, develop a diverse forested landscape, protect fragile sites, and improve water quality through soil conservation.

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 or continuation of normal timber stand improvement activities to the field edges.

Even Age - Shade intolerant species such as oak 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 105-125 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 hackberry, maple and basswood, creating an all age or uneven age forest.

Viewshed - These are steep slopes, high recreational use areas, and/or buffers along the streams and rivers where management will be minimal. Management activities are not entirely excluded from these areas but are rare in occurrence.

Introduction to Tyrone WMA

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The Department of Natural Resources (DNR) Wildlife Bureau is divided into 16 management units statewide. Within these wildlife management units, a wildlife management biologist and his/her staff are responsible for the maintenance and operation of these WMAs. The species composition of both flora and fauna can vary greatly within these WMA's. Most WMA's encompass an array of habitat types: row crop, woodland, native prairie, wetlands, lake or ponds and some areas of non-native grasses and forbs. State-owned lands which are administered by the Iowa DNR receive direct management efforts for wildlife, wood production, woodland health, recreation, soil conservation, and plant and animal species of special concern.

The Wildlife Bureau has recognized and acted on the need for forest wildlife stewardship plans (FWSP's) to properly manage the forest resources on state owned lands. Although forests change over a long period of time, we understand that a hands-off approach will ensure that these forests a 100 years from now will be much different than the forests of today. Not all forest stands are the same, some may take more than 120 years to mature, while others, depending on species composition, can mature at a much quicker rate. This slower change requires managers to plan over the long-term period of time and leave a written record of these plans in the form of FWSP's.

Tyrone (WMA) is located in Sections 2, 3 and 4 of Franklin Township and Sections 33, 34 and 35 of Guilford Township, in Monroe County, Iowa. According to 2012 land and

canopy cover data, the Tyrone WMA is comprised of 1,080 total acres with 953 of those acres being forested (88%). Tyrone cover type acreages consist of Woodland (945), Shrubland (23.7), Agricultural (94), Wetland/Pond (4.6) and Grassland (12.7).

Tyrone WMA was purchased in five separate tracts. The largest and first tract was purchased in 1978 totaling 814 acres; the most recent tract was purchased in 2006 bringing the total acreage to 1080 acres.

Purchased in five tracts –

1st tract – 814 acres – Joseph Judge – 1978 - $244,000

2nd tract – 52 acres - Luttrel – 1990 - $9259.95

3rd tract – 150 acres - Summer – 1991 - $35,310

4th tract – 37.4 acres – Morgan Lloyd – 1995 - $10,745.40

5th tract – 35 acres – Rathbun farms – 2006 - Unknown

Tyrone WMA Forest Wildlife Stewardship Plan (FWSP) is the result of forest inventory data collection, forest stand mapping, and data analysis. This is a cooperative work between the Iowa DNR Forester and Wildlife Biologist within the Iowa DNR Wildlife Bureau.

GOALS

The Tyrone WMA FWSP is an ecologically based forest management plan. Management goals are focused toward improving forest health and maintaining the forest ecosystem structure and function, with all other forest uses being considered, but not being the primary management goal. With Tyrone WMA being classified as a wildlife management area, work conducted on this site will be geared towards plant and animal species that utilize this area. "Species of greatest conservation need" will be important for consideration as well as common species, other game and/or nongame wildlife.

Funding for the acquisition and management of Tyrone WMA has been almost exclusively hunter generated monies, i.e. license fees and excise taxes on sporting equipment. A primary objective for management of the area is to improve habitat for game species such as White-tailed deer, wild turkey, squirrels and bobwhite quail. On the other hand the IDNR recognizes the effects of its management actions on nongame species as well, particularly those that are threatened, endangered or species of greatest conservation need. The Iowa DNR's Iowa Wildlife Action Plan (IWAP) identifies certain wildlife species as species of "greatest conservation need"(pages 32-36)

Other stewardship considerations that are incorporated into forest management decisions are the protection of identified threatened and endangered plant and wildlife species, best management practices (BMP's) to protect soil and water quality, forest health considerations, and the protection of any identified "special sites".

The Tyrone FWSP is a guideline for recommended wildlife management work. Detailed prescriptions will be developed prior to scheduled or recommended management practices in order to take into account the unique stand conditions and more specific targeted wildlife habitat needs. These specific prescriptions will be in the form of detailed practice project plans, developed with collaboration between the DNR District Forester and DNR Wildlife Biologist. A record of the completed management activities will be kept on file at both the area manager's and district forester's office so that evaluations can be made and compared to determine if management objectives are being met of the FWSP.

Current Distribution of Tree Size on Tyrone WMA

The forest stands were cruised and mapped according to average tree size classes. Refer to the map on the following page.

Tree Size Class	***Acres***	***% of Total Area***
Seedlings (<1" DBH)	2	**0**
Saplings (2" DBH)	22	**2%**
Pole size (4-12" DBH)	418	**43%**
Small sawlog size(14-16"DBH)	378	**39%**
Sawlog size (≥18" DBH)	149	**15%**
Total	**969**	**100**

Proposed Management Systems for Tyrone WMA

Recommendations for each stand were based on whether the area will be managed to create early successional growth, 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, develop a diverse woodland landscape, protect fragile sites, improve water quality and increase the acres of early successional growth.

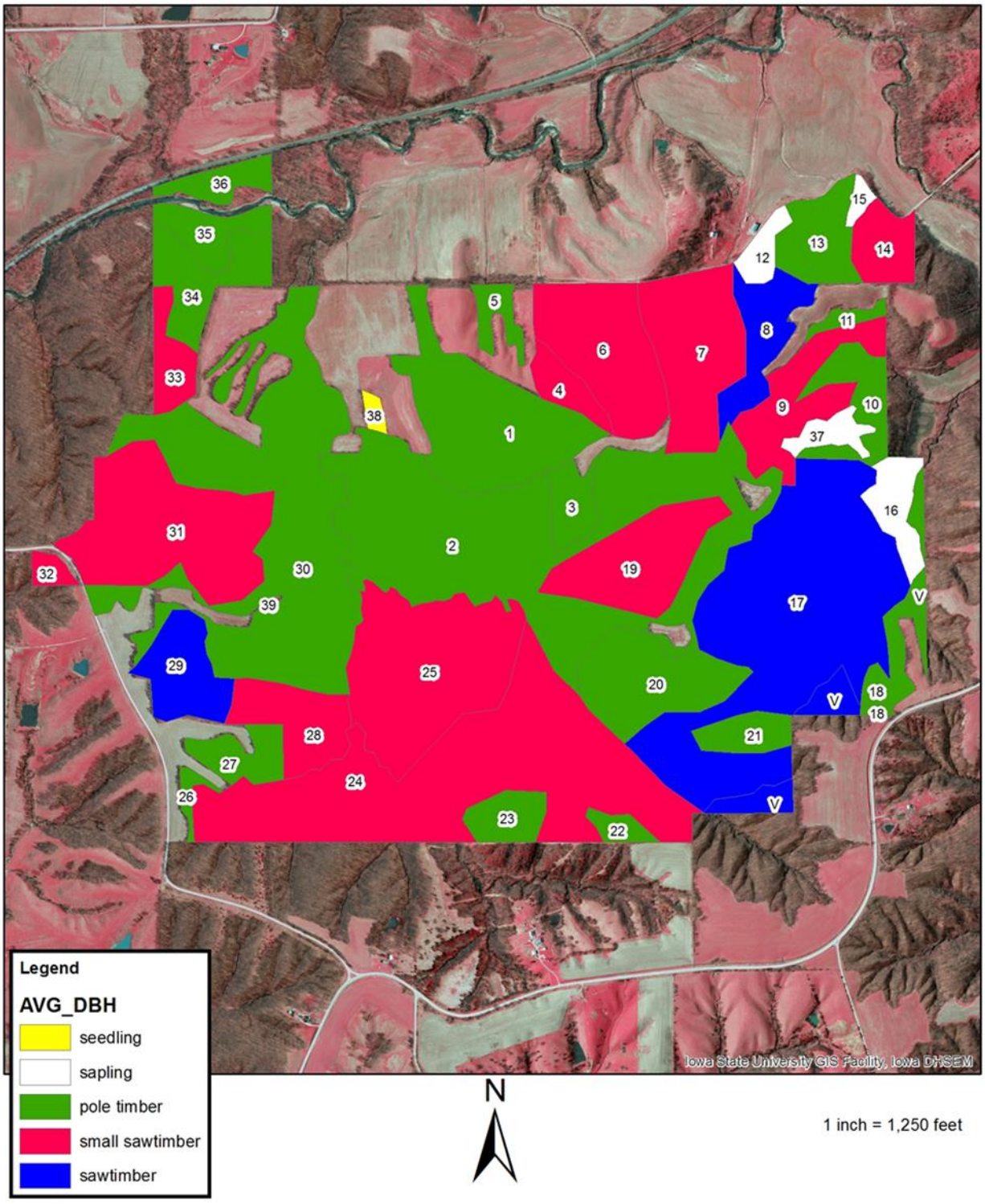
Based on recommendations for the areas, the acres under each management system are as follows. Refer to the map on the following pages.

Management System	***Acres***	***% of Total Area***
Early Successional	7	**<1%**

Even Age	934	**96%**
Uneven Age	15	**2%**
Viewshed	12	**1%**
Total	**969**	**100**

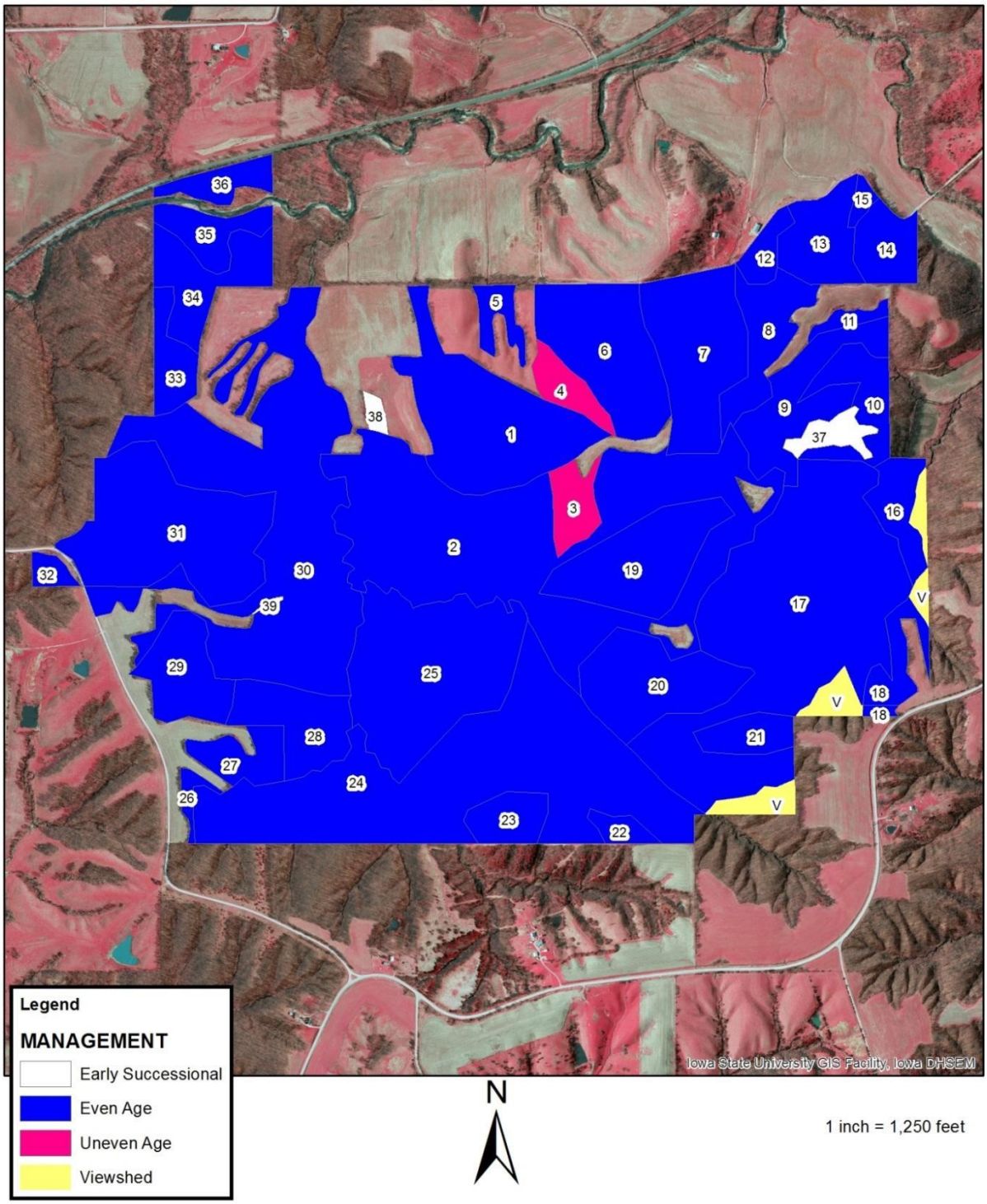
Map of Average Tree Sizes for Tyrone WMA

Tyrone WMA Tree Size Classes
2016 CIR Imagery
Location: Iowa Monroe Guillford 33,34,35 and Franklin 2,3,4
Map prepared: 1/29/2020 by Jeremy Cochran



Map of Management Systems for Tyrone WMA

Tyrone WMA Management Systems
2016 CIR Imagery
Location: Iowa Monroe Guillford 33,34,35 and Franklin 2,3,4
Map prepared: 1/29/2020 by Jeremy Cochran



Even Age Management

Even Age Management involves growing a stand of trees which are close to the same age. At some point in a stand's life, the area is clearcut which results in the even age structure. This type of management creates excellent habitat for deer, turkey, squirrels and other game and nongame wildlife species. It is essential for regeneration of oak, which requires full sunlight. The only way that oak can be maintained as a component of the forest over the long run is by practicing some form of even age management.

Each stage or age class of an even age stand provides habitat for a suite of wildlife species. For example, regenerating stands (1-10 years old) benefit the same species as do early succession stands, i.e. blue-winged warblers, black-billed cuckoo, yellow-billed cuckoo, eastern towhee, as well as bobwhite quail and American woodcock.

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

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

As woodland stands age, they constantly lose trees to competition, insects, disease, etc. The dead and dying trees provide habitat for cavity nesters such as woodpeckers, nuthatches, titmice, and creepers. The federally endangered Indiana bat uses loose barked live trees such as shagbark hickory as well as the sloughing bark from dying trees for their maternity colonies.

Thus, even age management has the potential to provide a large variety of age classes that can meet the needs of a variety of wildlife species.

While there are many methods to open a stand to sunlight, clearcutting and shelterwood harvesting are the most common. Clearcutting is a practice that opens the stand all at once. Clearcutting also provides highly desired early successional habitat for the first 15-20 years until the tree canopy closes. Regeneration via clearcutting requires there be sufficient oak seedlings or advanced regeneration present. Minus these seedlings, bare root planting may be necessary following clearcutting.

Shelterwood harvests are one way of recruiting seedling production prior to a clearcut. Shelterwood harvests include several thinnings done prior to the final clearcut. If the shelterwood is done correctly, the trees left after the thinnings will provide seed and the forest will be open enough to allow sunlight to reach the forest floor. The trees left will also help provide shade that limits the growth of undesirable or invasive plant species. This method can take 15-20 years to create the next oak stand and may need

mechanical or fire disturbance to keep out undesirable species. After sufficient seedling or advanced regeneration is present, the stand needs to be clearcut to successfully regenerate the oak stand.

Crop tree release is discussed in this plan as a type of timber stand improvement. This practice is done most frequently when the trees are pole sized. The goal of the practice is to choose up to 50 trees per acre that are considered to have the best genetics. These trees are typically tallied and marked with paint, and then the trees that touch the canopy of the crop tree are killed to allow the crop tree to reach maximum growth potential, increase mast production, and improve forest health.

Thinning the understory or weed tree removal is a practice also used in even age management. This practice involves removing trees that are below the main canopy to allow more sunlight to get to the forest floor. Ironwood, bitternut hickory, buckeye, elm, hackberry, and other shade tolerant species warrant this practice when species like oak are wanted in the future.

Prescribed fire is an effective and relatively inexpensive tool that has a long history of use and continues to be studied in managing oak stands. Occasional burning of the leaf layer in the woods will kill thin barked species that are less than two inches diameter such as hackberry, hard maple, buckeye, 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. Depending on the extent of root system development, some oak seedlings will tolerate fire better than others, but as a whole, oaks tolerate fire better than other tree species. The top of an oak seedling often will die back following fire, but the roots will send up new growth soon thereafter. Oak has a superior competitive advantage thanks to their strong root collar and ability to sprout. Most shade tolerant trees, such as, elm, bitternut, ironwood, and hackberry do not possess strong resprout capabilities.

Uneven Age Management

Uneven age management develops a stand of trees with all DBH size classes. 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 hackberry, hickory, hard maple and basswood. Sustainable harvest guidelines dictate the ability to selectively harvest mature and defective trees every 20 to 25 years in these stands.

Uneven age management will maintain blocks of woodland that will always have larger trees. This system is desirable at Tyrone where the overstory is mainly black locust, 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.

Early Successional Management

Many bird species such as bobwhite quail, American woodcock, blue-winged warbler, black-billed cuckoo, yellow-billed cuckoo, and eastern towhee are dependent on the early successional stages of woody growth. The high stem density of both trees and shrubs provides suitable nesting habitat and protection from predators. The majority of early succession management prescribed in this plan is on the woodland edges during timber stand improvements. This work will “feather” the edges and make a gradual transition from the field edges to the larger trees. Feathering and softening the edges may lessen nest parasitism of interior forest bird species by brown-headed cowbirds. The early succession management areas will be managed on a 15 year rotation. In other words, every 15 years the stands will be cut to create areas with high stem density. Shelterwood and clearcut harvesting will also increase the early successional acreage over time.

Viewshed Management

Viewshed areas are typically areas with poor access, steep fragile slopes and areas along streams that are best left to naturally progress through succession. Viewsheds may also be used to protect areas for endangered species or be used to protect certain public use facilities. Management can take place in these areas where desirable, but the major objective is to have minimal disturbance. Certain Neotropical migrants will benefit from the areas designated as viewshed.

Income from Timber Harvests

Income generated from timber harvesting operations must be reinvested into the area to thin young stands, remove weeds trees and understory to promote oak regeneration, convert areas to more desirable species and otherwise manage the forest for wildlife. Without this reinvestment, there is little chance that the WMA annual budget will allow the recommendations in this plan to be implemented. Harvesting is a significant portion of this plan. The majority of work recommended is directed at thinning young stands so the oak is not shaded by other trees and at removing undesirable species to encourage regeneration of desirable trees.

Work Plan for Tyrone WMA

The work plan for Tyrone WMA is designed to aid foresters and natural resource managers in the implementation of forest management practices. It is written with the presumption that these professionals have 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.

The letter following each stand number indicates the recommended Management System (i.e. **E**-even age, **U**-uneven age, **ES**-early succession)

Stand 1E: 44.8 ac

The overstory includes pole size bur oak, black oak, shingle oak, shagbark hickory, honey locust, elm, and Osage-orange. Relative stocking is 89%. A few large oaks trees are widely scattered throughout. The area was somewhat cleared and resulting trees are approximately 45-55 years old. This was the location of a farm and home site prior to 1950 and some rubble is present. Honeysuckle, multiflora rose, and garlic mustard are widespread but the worst along the edges.

Prescription: This is a high priority stand. Timber Stand Improvement in the form of Crop Tree Release (CTR) is recommended. Crop trees will be desirable species with good form and lack of significant defects. Trees with crowns touching or over topping the crown of the crop trees will be killed by felling or double girdling. Species normally selected as crop trees are walnut, white oak, and red oak. Species diversity is encouraged in selecting crop trees.

Periodic prescribed fire is recommended to minimize multiflora rose, honeysuckle, autumn olive, and garlic mustard.

Stand 2E: 115.7 ac

The overstory includes pole size black oak, bur oak, shingle oak, black walnut, honey locust, and Osage-orange. Relative stocking rate is 78%. The area was completely cleared of forest and resulting trees are approximately 45-55 years old. Honeysuckle, garlic mustard and multiflora rose are widespread but mostly knee-high. Black locust is encroaching from nearby areas. The stand includes a large area and crosses several drainages and ridges with access lanes.

Prescription: This is a high priority stand to conserve young oaks. Timber Stand Improvement in the form of Crop Tree Release (CTR) is recommended. Black locust trees must be removed. Crop trees will be desirable species with good form and lack of significant defect.

Periodic prescribed fire is recommended to minimize multiflora rose, honeysuckle, autumn olive, and garlic mustard.

Stand 3U: 8.2 ac and Stand 4U: 7.1 ac

Stand 3 and 4 are similar species composition and size class. The sites were highly disturbed and previously cleared of forest. Black locust dominates the overstory. Trees range from 10-20" DBH and average 14". Understory includes hackberry and American elm seedlings and advanced regeneration. Garlic mustard and multiflora rose infestations are severe as is typical with stands of exotic trees. Both stands are located in proximity to old building sites.

Prescription: These are low priority and may be expensive stands to manage. The most important aspect of management is to prevent the black locust from spreading into surrounding forest stands. Black locust eradication is nearly impossible. Uneven age management should be implemented to reduce the black locust and grow the existing shade tolerant regeneration. This may be difficult and require future seedlings to be planted for diversity and increased success. First step will be timber stand improvement to reduce approximately one third of the black locust canopy. Larger black locusts should be utilized for fuelwood and posts when possible, if damage to regeneration can be minimized.

Stand 5E: 5.5 ac

These are timbered draws that are protecting soil and healing the old gullies. Again the trees are pole size, mid-rotation age. Mixed hardwoods include oaks, hickory, elm, and others.

Prescription: This is a high priority stand. Timber Stand Improvement in the form of Crop Tree Release (CTR) is recommended.

Periodic prescribed fire is recommended to minimize multiflora rose, honeysuckle, autumn olive, and garlic mustard.

Stand 6E: 32.8 ac

Timber stand improvement was completed in 1999 by Steve Hamilton, Forest Consulting Service Inc. Crop tree release and honey locust removals were implemented. The current stand has 73% relative stocking and is primarily pole size black oak, black cherry, shagbark hickory, red oak, and black locust. The emerald ash borer has significantly reduced the stocking by killing the ash component. Black locust and garlic mustard are present. Coralberry shrubs are plentiful when multiflora rose is absent.

Prescription: This is a low priority stand. Stocking rate is adequate but black locust should be removed. This form of timber stand improvement is a weed tree removal. Periodic prescribed fire is recommended to minimize multiflora rose, honeysuckle, autumn olive, and garlic mustard. Fire may be difficult due to less oak leaf litter.

Stand 7E: 33.4 ac

The healthy forest and great species composition was not by accident. Timber stand improvement was completed in 1999 by Steve Hamilton, Forest Consulting Service Inc. Crop tree release and honey locust removal was implemented. The overstory is small sawtimber and sawtimber size white oak, red oak, shagbark hickory, and black walnut. Sawlog quality is high; Average DBH 15” and 95% relative stocking. Understory includes 2-4” DBH ironwood, buckeye, bitternut, elm, and hackberry. Regeneration includes mixed oaks, ash, hickory and ironwood.

Prescription: Shelterwood harvest and timber stand improvement in the form of weed tree removal to remove the understory and undesirable trees. The understory removal should be done at least 5 years prior to shelterwood harvest or immediately following. Periodic prescribed fire is recommended to minimize weed trees less than 2” DBH, multiflora rose, honeysuckle, autumn olive, and garlic mustard. Once oak regeneration is adequate fire should be stopped until trees are pole size.

Stand 8E: 16.2 ac

The overstory includes white oak, red oak, shagbark hickory, and hackberry. Tree sizes and density vary including widely scattered large oak wolf trees and nice sapling-pole size trees. Oak regeneration is excellent and fully stocked. Invasive Japanese dewberry (*Rubus parvifolius*) and tree of heaven *(Ailanthus altissima)* were discovered and treated during May 2019.

Prescription: This is a medium priority area. Mature trees could be harvested to release the oak regeneration when harvesting in adjacent stands. The harvest will even the age class but is likely not enough volume to be its own timber sale. Protect the stand from fire until oaks have grown past 6" diameter. Monitor the eradication of Japanese dewberry and tree of heaven, treat again as needed.

Stand 9E: 22.2 ac

The overstory includes small sawtimber size white oak, red oak, and hickory. Average DBH 17", 110 square feet basal area per acre. Buckeye trees have formed a thick canopy along the deep drainage. Understory trees include oaks, hickory, and ironwood. Regeneration seedlings are ash, oaks, and basswood.

Buckeye

Prescription: This is a medium priority area. Shelterwood harvest and timber stand improvement in the form of weed tree removal to remove the understory and undesirable trees. The understory removal should be done at least 5 years prior to shelterwood harvest or immediately following. Periodic prescribed fire is recommended to minimize weed trees less than 2" DBH, multiflora rose, honeysuckle, autumn olive, and garlic mustard. Once oak regeneration is adequate fire should be stopped until trees are pole size.

Stand 10E: 12.9 ac

The overstory includes pole size mixed oaks, hickory, and honey locust. There are a few scattered mature trees. The forest was previously cleared until the 1960's.

Prescription: This is a high priority stand. Timber Stand Improvement in the form of Crop Tree Release (CTR) is recommended. Mature trees could be selectively harvested to even the age class when harvesting in adjacent stands. Periodic prescribed fire is recommended to minimize multiflora rose, honeysuckle, and autumn olive.

Stand 11 E: 2.7 ac

The overstory includes pole size mixed oaks, hickory, and honey locust. The trees and field edge were previously cleared until the 1980's.

Prescription: This is a high priority stand. Timber Stand Improvement in the form of Crop Tree Release (CTR) is recommended. Heavy tree thinning and/or prescribed fire would be beneficial for edge/early successional type habitat. Periodic prescribed fire is recommended to minimize multiflora rose.

Stand 12E: 5.1 ac

The overstory is fully stocked with sapling size mixed oaks and Eastern redcedar. The forest was cleared and relatively open land until the 1980's. Autumn olive is present. There are fire scars on sapling oaks indicating that portions of the stand near the public road have burned when conditions were unfavorable.

Prescription: This is a low priority stand. The overstory is likely 10-15 years from timber stand improvements. It would be beneficial to control the invasive species with herbicide using basal bark, hack and squirt, cut stump, or foliar applications.

Stand 13E: 15.1 ac

The overstory includes large poles and mostly small sawtimber size white oak, red oak, shagbark hickory, and American basswood. Trees average 15" DBH and 92% relative stocking. Understory includes elm, hickory, buckeye, hackberry, prickly ash, and ironwood. Regeneration is mixed oaks, ash, and buckeye. Garlic mustard and multiflora rose are present.

Prescription: This is a medium priority stand. Timber stand improvement in the form of basal area thinning (area wide thinning) and understory removal would be beneficial to reduce overall stocking and promote oak regeneration. Basal area thinning will reduce the overall stocking of the entire stand by removing undesirable species and poorly formed desirable species until ideal relative stocking is achieved. Periodic prescribed fire is recommended to minimize invasive species and understory trees less than 2" diameter.

Stand 14E: 10.6 ac

The overstory is mature sawtimber size white oak, red oak, black walnut, and shagbark hickory. AVE DBH 18",

AVE basal area 140 square feet per acre. Understory includes buckeye, elm, and mixed shrubs. Regeneration is made up of hickory, ash, basswood, hackberry, and mixed oaks. Multiflora rose and garlic mustard are present.

Prescription: This is a medium priority stand for management. Shelterwood harvest and weed tree removal to eliminate the understory and undesirable trees. The understory removal should be done at least 5 years prior to shelterwood harvest or immediately following. Periodic prescribed fire is recommended to minimize weed trees less than 2" DBH, multiflora rose, and garlic mustard. Once oak regeneration is adequate fire should be stopped until trees are pole size.

Stand 15E: 1.9 ac

The overstory is small pole size bitternut hickory, elm, and mixed oaks. At least 3 invasive Tree-of-heaven trees were found. The stand was cut during the 1980's and result is now 4" DBH trees.

Prescription: This is a high priority stand to reduce undesirable trees and increase oak composition. Timber Stand Improvement in the form of Crop Tree Release (CTR) is recommended. Tree of heaven must be removed.

Stand 16E: 9.8 ac

The stand has variable tree density. The overstory is shingle oak, bur oak, black walnut, Osage-orange, honey locust, and many native shrubs. Multiflora rose is dense where the tree canopy has not closed. The lower meadow is understocked with trees; open canopy and many hazelnut thickets.

Prescription: Timber stand improvement should be medium priority. Timber Stand Improvement in the form of Crop Tree Release (CTR) is recommended. Consider mechanical removal or spot spraying multiflora rose throughout the lower meadow. Care must be taken to avoid damaging hazelnuts.

Stand 17E: 106.8 ac

Sawtimber size white oak, red oak, black oak, and shagbark hickory make up the fully stocked overstory. AVE DBH 19", AVE basal area 133 square feet per acre. Understory includes 1-2" DBH ironwood, hickory and ash; often dense. Regeneration is ash, ironwood, hickory, and a little mixed oak. Oak wilt mortality was observed. Stumps and tree tops were found in portions of this stand from harvests that took place approximately 30-40 years ago.

Prescription: Shelterwood harvest. The stand would benefit from timber stand improvement in the form of weed tree removal to remove the understory and

undesirable trees. The understory removal should be done at least 5 years prior to shelterwood harvest or immediately following. Periodic prescribed fire is recommended to minimize shade tolerant trees less than 2" DBH. Once oak regeneration is adequate fire should be stopped until trees are pole size.

Stand 18E: 8.9 ac

The overstory includes pole size mixed oaks, hickory, basswood, and elm.

Prescription: This is a high priority stand. Timber Stand Improvement in the form of Crop Tree Release (CTR) is recommended. Periodic prescribed fire is recommended to minimize multiflora rose, honeysuckle, and autumn olive.

Stand 19E: 28.3 ac

The overstory is dominantly small sawtimber size white oak, shagbark hickory, and red oak. One pocket of oak wilt was found. AVE DBH 15" and 88% relative stocking. The understory is ash, hickory, hackberry, and elm. Regeneration is nearly absent or minor amounts of ash and ironwood seedlings.

Prescription: The stand is medium priority and would benefit from timber stand improvement in the form of understory removal and area wide thinning. Periodic prescribed fire is recommended to minimize weed trees less than 2" DBH and multiflora rose. Once oak regeneration is adequate fire should be stopped until trees are pole size. The timber stand improvement (pre- or post-harvest) must be part of the shelterwood system. Oak wilt may require harvesting sooner than expected.

Stand 20E: 27.3 ac

Overstory trees include large pole size black oak, bur oak, shagbark hickory, honey locust, and black walnut. Relative stocking is 75%. Oak wilt mortality was found during the cruise. Understory trees include shagbark hickory, elm, hackberry, and ironwood. Regeneration is ironwood, hickory, and hackberry. One shelf along the creek bottom still has stumps and skid trail from a black walnut harvest.

Prescription: This is a medium priority stand to reduce undesirable trees and improve oak and walnut composition. Timber Stand Improvement in the form of Crop Tree Release (CTR) is recommended.

Stand 21E: 7.9 ac

The old field was cleared of trees until the end of the 1970's. The overstory includes pole size shingle oak, shagbark hickory, black oak, honey locust, blackjack oak, elm, and white oak. Relative stocking is 85%. Oak decline was observed during the cruise. Understory includes small ironwood and hazelnut shrubs.

Prescription: Timber Stand Improvement in the form of Crop Tree Release (CTR) is recommended. This is a high priority stand to increase oak composition and remove honey locust.

Stand 22E: 3.5 ac

The old field was cleared of trees until the end of the 1970's. The overstory includes pole size mixed oak-hickory, and others. Access is difficult.

Prescription: Timber Stand Improvement in the form of Crop Tree Release (CTR) is recommended. Periodic prescribed fire is recommended to minimize weed trees less than 2" DBH and invasives. This is a medium priority stand due to difficult access.

Stand 23E: 8.5 ac

The old field was cleared of trees until the end of the 1970's. The overstory includes pole size mixed oak-hickory, and others. Access is difficult.

Prescription: Timber Stand Improvement in the form of Crop Tree Release (CTR) is recommended. Periodic prescribed fire is recommended to minimize weed trees less than 2" DBH and invasives. This is a medium priority stand due to difficult access.

Stand 24E: 107.3 ac

The overstory is fully stocked small sawtimber size white oak, black oak, shagbark hickory, and red oak. Average DBH 16" and approximately 68% relative stocking. Minor amounts of black locust were found and are coming from surrounding areas, primarily stand 25E. The understory includes 2-3" DBH elm, hackberry, and ironwood. Shagbark hickory is also common in the understory up to 6" DBH. Regeneration is shaded and nearly absent. Large stumps were observed indicating tree harvests about 40-50 years ago. The eastern portion has difficult access.

Prescription: This will be a low priority area due to difficult access and lower stocking. Further evaluations will be needed, if access is improved, to monitor black locust. The stand would benefit from timber stand improvement in the form of weed tree removal to remove the understory and undesirable trees. All black locust must be eradicated. Periodic prescribed fire is recommended to minimize shade tolerant trees

less than 2” DBH. Once oak regeneration is adequate fire should be stopped until trees are pole size.

Stand 25E: 55 ac

Again, this center area has difficult access. The stand was mostly cleared of trees until the 1960’s. Many gullies formed up until that time. Black locust captured a majority of the overstory. Other species include mixed oaks, hickory, elm and cottonwood. The overstory is similar to #24E except it has higher black locust composition.

Prescription: This will be a low priority area due to difficult access and the amount of black locust. Further evaluations will be needed, if access is improved, to monitor black locust. The stand would benefit from timber stand improvement in the form of weed tree removal to eliminate black locust. Periodic prescribed fire is recommended to minimize shade tolerant trees less than 2” DBH. Less oak overstory equates to less oak litter; thus fire may not be feasible.

Stand 26E: 2.3 ac

The overstory includes pole size mixed oaks, hickory, and honey locust. The trees and field edge were previously cleared until the 1980’s.

Prescription: This is a high priority stand. Timber Stand Improvement in the form of Crop Tree Release (CTR) is recommended. Heavy tree thinning and/or prescribed fire would be beneficial for edge/early successional type habitat. Periodic prescribed fire is recommended to minimize multiflora rose.

Stand 27E: 9.5 ac

The overstory includes pole size mixed oaks, hickory, and honey locust. The trees and field edge were previously cleared until the 1980’s.

Prescription: This is a high priority stand. Timber Stand Improvement in the form of Crop Tree Release (CTR) is recommended. Heavy tree thinning and/or prescribed fire would be beneficial for edge/early successional type habitat. Periodic prescribed fire is recommended to minimize multiflora rose.

Stand 28E: 17.9 ac

The overstory includes small sawlog size shagbark hickory, shingle oak, honey locust, bur oak, cherry, and silver maple. The trees are adequately spaced. Understory and regeneration includes hackberry, elm, bitternut hickory, and hazelnuts. No timber stand improvement is needed at this time. Re-evaluate in 15 years. Periodic prescribed fire is recommended to minimize multiflora rose.

Stand 29E: 17 ac

The overstory is fully stocked with sawtimber size white oak, black oak, and shagbark hickory. Understory includes ironwood, elm, shagbark hickory, hackberry, and dogwoods. Regeneration contains elm, ironwood, bitternut hickory, ash, and limited oak seedlings.

Prescription: The stand would benefit from timber stand improvement in the form of weed tree removal to remove the understory and undesirable trees. The TSI should be part of the shelterwood system. The understory removal should be done at least 5 years prior to shelterwood harvest or immediately following. Periodic prescribed fire is recommended to minimize shade tolerant trees less than 2" DBH. Once oak regeneration is adequate fire should be stopped until trees are pole size.

Stand 30E:107.3 ac

The overstory contains pole size shingle oak, black oak, honey locust, black walnut, hackberry, red oak, bur oak, and Osage-orange. Relative stocking rate averages 84%. Understory and regeneration are nearly absent. The area was cleared of trees until the 1970's; portions were even row cropped.

Prescription: This is a high priority stand. Timber Stand Improvement in the form of Crop Tree Release (CTR) is recommended. Periodic prescribed fire is recommended to minimize multiflora rose and honeysuckle. Some areas may not have enough leaf litter to adequately carry fire.

Stand 31E:51.6 ac

The canopy is overstocked with small sawtimber size white, red, and black oaks, and shagbark hickory. Most trees are 16-18" DBH. The understory contains ironwood, shagbark hickory, ash, and prickly ash. Most understory trees are less than 1" DBH. Regeneration includes ash, cherry, hickory, hackberry, and limited mixed oaks.

Prescription: The stand would benefit from shelterwood harvest and timber stand improvement in the form of weed tree removal to remove the understory and undesirable trees. Non-merchantable intermediate and suppressed trees should be removed to lightly thin the overstory (area wide thinning). The understory removal should be done at least 5 years prior to shelterwood harvest or immediately following. Periodic prescribed fire is recommended to minimize shade tolerant trees less than 2" DBH and invasives. Once oak regeneration is adequate fire should be stopped until trees are pole size.

Stand 32E: 2.9 ac

The stand in located on the west side the public road. The overstory includes pole size white, red, and black oaks.

Prescription: This is a medium priority stand. Timber Stand Improvement in the form of Crop Tree Release (CTR) is recommended.

Stand 33E: 8.9 ac

The overstory includes small sawtimber size red oak, honey locust, bitternut hickory, white oak, and hackberry. Average DBH 15" and relative stocking 80%. Understory trees include elm, hackberry, and ironwood. Regeneration is mixed oak, hickory, ash, and black walnut.

Prescription: The stand would benefit from timber stand improvement in the form of weed tree removal to remove the understory and undesirable trees. Non-merchantable intermediate and suppressed trees should be removed to lightly thin the overstory. The TSI should be part of the shelterwood system. Periodic prescribed fire is recommended to minimize shade tolerant trees less than 2" DBH and invasives. This is a medium priority stand.

Stand 34E: 17.3 ac

The overstory contains pole size shingle oak, black walnut, bur oak, cherry, and black oak. Average DBH 6" and 85% relative stocking. Understory and regeneration are nearly absent, although some bur oaks are intermediate and suppressed. Large oak and walnut trees are scattered around the edges of this stand adjacent to the bottomland. This area was cleared of forest and used for ag purposes until the 1980's.

Prescription: This is a high priority stand. Timber Stand Improvement in the form of Crop Tree Release (CTR) is recommended. The mature trees could be selectively harvested to even the age class when harvesting in adjacent stands.

Stand 35E: 9.7 ac

The area is bottomland forest that is occasionally flooded by Cedar Creek. This area was cleared of forest and used for ag purposes until the 1980's. The overstory includes pole size soft maple. honey locust, elm, black walnut, and bitternut hickory. Trees range from 10-18" DBH. Average DBH 13" and 74% relative stocking. Understory is variable but includes swamp white oak, hackberry, black walnut, and honey locust. Regeneration is absent due to flooding.

Prescription: This is a medium priority stand. Timber Stand Improvement in the form of Crop Tree Release (CTR) is recommended.

Stand 36E: 7.4 ac

The stand is occasionally flooded and lies between the railroad and Cedar Creek. This area was cleared of forest and used for ag purposes until the 1980's. The bottomland forest includes pole size black walnut, honey locust, elm, shingle oak, and hackberry. Average DBH 9" and 92% relative stocking. Understory is relatively light or nearly absent. Garlic mustard is present in this stand.

Prescription: This is a high priority stand but access is difficult. Timber Stand Improvement in the form of Crop Tree Release (CTR) is recommended.

Stand 37 ES: 5.5 ac

The old ag field was cleared of forest. Current cover includes brome grass and widely scattered trees, primarily honey locust, oak, and walnut. Some desirable natural regeneration is present around the field edges. Weller and Keswick soils are present.

Prescription: Deaden all undesirable trees. Spray or disk the brome grass. The field may be left as early succession until ready to reforest. When funds and/or grants are available the field should be reforested. Machine-plant 600 trees per acre. The most desirable species to plant include white, red, bur, and swamp white oaks. Five percent native shrubs would also be desirable. Perennial grass control will be very important for the first 5 years after planting seedlings. If the reforestation does not occur within 10 years then recut all undesirable trees and kill the brome grass to retain early successional habitat. Periodic fire may be used until new seedlings are planted.

Stand 38 ES: 1.7 ac

Fell all trees greater than 2" DBH to maintain early successional habitat. Spray or disk the brome grass. Adding native shrubs would be desirable via hand-planting.

Stand 39 ES: 0.3 ac

This is a narrow strip that has encroached with trees but could be widened. Fell all trees greater than 2" DBH to maintain early successional habitat.

Stands V: 12 ac

Viewsheds-No prescription at this time due to steep areas and/or inaccessibility.

Sustainable Forestry Guidelines for Tyrone WMA

Sustainable timber harvesting guidelines should be implemented on 7-8 acres annually or 35-40 acres every five years at Tyrone WMA. These are *average* guidelines and will vary depending on several factors including stand location, access, and nearby management needs. This assumes 934 acres of even age management and 125 year rotation age for upland hardwoods (oak-hickory). Shelterwood harvest requires one entry for commercial thinning and weed tree removal to promote oak regeneration near 105 years. And finally clearcut near 125 years to release the oak seedlings and/or advanced regeneration. Up to 20 years may be allowed or needed to establish desirable oak regeneration before the final clearcut.

High Priority Projects

Shelterwood harvest (following sustainable guidelines) and weed tree removal:

Stand 14E 10.6 ac

Stand 17E 106.8 ac

Stand 9E 22.2 ac

Stand 7E 33.4 ac

Timber Stand Improvement-crop tree release:

1E	44.8 ac	21E	7.9 ac
2E	115.7 ac	26E	2.3 ac
10E	12.9 ac	27E	9.5 ac
11E	2.7 ac	30E	107.3 ac
15E	1.9 ac	34E	17.3 ac
18E	8.9 ac	36E	7.4 ac

Early Successional Cutting:

37ES 5.5 ac

38ES 1.7 ac

39ES 0.3 ac

Summary of Stands

STAND #	ACRES	OVERSTORY	SIZE CLASS	MANAGEMENT	PRESCRIPTION	PRIORITY
1E	44.8	Oak-Hickory	pole timber	Even Age	crop tree release	H
2E	115.7	Oak-Hickory	pole timber	Even Age	crop tree release	H
3U	8.2	Exotics	pole timber	Uneven Age	weed tree removal	L
4U	7.1	Exotics	small sawtimber	Uneven Age	crop tree release	L
5E	5.5	Central Hdwds	pole timber	Even Age	crop tree release	M
6E	32.8	Oak-Hickory	small sawtimber	Even Age	WTR black locust	L
7E	33.4	Oak-Hickory	small sawtimber	Even Age	WTR-shelterwood	M
8E	16.2	Oak-Hickory	sawtimber	Even Age	harvest	M
9E	22.2	Oak-Hickory	small sawtimber	Even Age	WTR-shelterwood	M
10E	12.9	Oak-Hickory	pole timber	Even Age	crop tree release	H
11E	2.7	Oak-Hickory	pole timber	Even Age	crop tree release	H
12E	5.1	Oak-Hickory	sapling	Even Age	invasives control	L
13E	15.1	Oak-Hickory	pole timber	Even Age	area wide thin	M
14E	10.6	Oak-Hickory	sawtimber	Even Age	WTR-shelterwood	M
15E	1.9	Oak-Hickory	sapling	Even Age	crop tree release	H
16E	9.8	Oak-Hickory	sapling	Even Age	crop tree release	M
17E	106.8	Oak-Hickory	sawtimber	Even Age	WTR-shelterwood	M
18E	8.9	Oak-Hickory	pole timber	Even Age	crop tree release	H
19E	28.3	Oak-Hickory	small sawtimber	Even Age	area wide thin	M
20E	27.3	Oak-Hickory	pole timber	Even Age	crop tree release	M
21E	7.9	Oak-Hickory	pole timber	Even Age	crop tree release	H
22E	3.5	Oak-Hickory	pole timber	Even Age	crop tree release	M
23E	8.5	Oak-Hickory	pole timber	Even Age	crop tree release	M
24E	107.3	Oak-Hickory	small sawtimber	Even Age	weed tree removal	L
25E	55	Central Hdwds	small sawtimber	Even Age	weed tree removal	L
26E	2.3	Oak-Hickory	pole timber	Even Age	crop tree release	H

27E	9.5	Oak-Hickory	pole timber	Even Age	crop tree release	H
28E	17.9	Oak-Hickory	small sawtimber	Even Age	prescribed fire	L
29E	17.0	Oak-Hickory	sawtimber	Even Age	WTR-shelterwood	L
30E	107.3	Oak-Hickory	pole timber	Even Age	crop tree release	H
31E	51.6	Oak-Hickory	small sawtimber	Even Age	WTR shelterwood	L
32E	2.9	Oak-Hickory	small sawtimber	Even Age	crop tree release	M
33E	8.9	Oak-Hickory	small sawtimber	Even Age	WTR shelterwood	M
34E	17.3	Oak-Hickory	pole timber	Even Age	crop tree release	H
35E	9.7	Bottomland Hdwds	pole timber	Even Age	crop tree release	M
36E	7.4	Bottomland Hdwds	pole timber	Even Age	crop tree release	H
37ES	5.5	Central Hdwds	sapling	Early Successional	cutting/planting	L
38ES	1.7	Central Hdwds	seedling	Early Successional	cutting	L
39ES	0.3	Central Hdwds	sapling	Early Successional	cutting	L
V	4.5	Oak-Hickory	sawtimber	Viewshed		
V	1.5	Oak-Hickory	pole timber	Viewshed		
V	2.1	Oak-Hickory	pole timber	Viewshed		
V	4.2	Oak-Hickory	sawtimber	Viewshed		

Wildlife Species of Greatest Conservation Need by the Iowa Department of Natural Resources MSIM Program and INAI database.

Iowa Natural Areas Inventory Species found on Tyrone WMA

Broom sedge -2007-Pearson

Slender glass lizard – 2015 Pearson

Smooth earth snake – 2015- Pearson

Lined Snake- Unknown

Oval Ladies-tresses – 2009 – Pearson

Bush Sedge – 2016 – Loeschke

Winged Monkey flower – 2011 – Pearson

Table 1. Birds of Greatest Conservation Need found on Tyrone WMA

Common Name	**Scientific Name**
Bald eagle	*Haliaeetus leucocephalus*
Red-shouldered hawk	*Buteo lineatus*
Broad-winged hawk	*Buteo platypterus*
Northern Bobwhite	*Colinus virginianus*
American woodcock	*Scolopax minor*
Black-billed cuckoo	*Coccyzus erythropthalmus*
Yellow-billed cuckoo	*Coccyzus americanus*
Upland Sandpiper	*Bartramia longicauda*
Whip-poor-will	*Caprimulgus vociferus*
Red-headed woodpecker	*Melanerpes erythrocephalus*
Acadian flycatcher	*Empidonax virescens*
Common Nighthawk	*Chordeiles minor*
Northern Flicker	*Colaptes auratus*
Eatern Wood Pewee	*Contopus virens*
Brown creeper	*Certhia americana*
Veery	*Catharus fuscescens*
Wood thrush	*Hylocichla mustelina*
Eastern Kingbird	*Tyrannus tyrannus*
American White Pelican	*Pelecasnus erythrorhynchos*

Bell's Vireo	*Vireo bellii*
Purple Martin	*Progne subis*
Worm-eating warbler	*Helmitheros vermivorus*
Sedge Wren	*Cistothorus platensis*
Kentucky warbler	*Oporornis formosus*
Golden-Winged Warbler	*Vermivora chrysoptera*
Common Yellowthroat	*Geothlypis formosus*
Grasshopper Sprarrow	*Ammodramus savannarum*
Henslow's Sparrow	*Ammodramus henslowii*
Dickcissel	*Spiza Americana*
Bobolink	*Dolichonyx oryzivorus*
Eastern Meadowlark	*Sturnella magna*
Baltimore Oriole	*Icterus galbula*
Eastern towhee	*Pipilo erythrophthalmus*
Golden-winged warbler	*Vermivora chrysoptera*
Canada warbler	*Wilsonia canadensis*
American Tree Sparrow	*Spizella arborea*
Olive-sided Flycatcher	*Contopus cooperi*
Harris's Sparrow	*Zonotrichia querula*
Rusty Blackbird	*Euphagus carolinus*

Table 3. Forest Mammals of Greatest Conservation Need found on Tyrone WMA

Common Name	Scientific Name

Northern myotis	*Myotis septentrionalis*
Evening bat	*Nycticeius humeralis*
Indiana bat	*Myotis sodalis*
Silver haired bat	*Lasionycteris noctivagans*
Ermine	*Mustela ermine*

Table 4. Forest Reptiles and Amphibians of Greatest Conservation Need found on Tyrone WMA

Common Name	**Scientific Name**
Smallmouth salamander	*Ambystoma texanum*
Cope's Gray Treefrog	*Hyla chrysoscelis*
Eastern Gray Treefrog	*Hyla versicolor*
Slender glass Lizard	*Ophisaurus attenuatus*
Northern Leopard Frog	*Lithobates pipiens*
Snapping Turtle	*Chelydra serpentine*
Smooth earth snake	*Virginia valeriae*
Prairie Ringneck Snake	*Diadophis punctatus*
Western Hognose Snake	*Heterodon nasicus*
Prairie kingsnake	*Lampropeltis calligaster*
Eastern Hognose Snake	*Heterodon platirhinos*
Northern Redbelly Snake	*Storeria occipitomaculata*
Western Ribbon Snake	*Thamnophis proximus*
Plains Garter Snake	*Thamnophis radix*

Table 5. Forest Dragonflies & Butterflies of Greatest Conservation Need found on Tyrone WMA

Common Name	Scientific Name
Spotted Spreadwing	*Lestes congener*
Amber-winged Spreadwing	*Lestes eurinus*
Sedge Sprite	*Nehalennia Irene*
Canada Darter	*Aeshna Canadensis*
Variable Darter	*Aeshna interrupta*
Spicebrush Swallowtail	*Papilio Troilus*
Henry's Elfin	*Callophrys henrici*
Gorgone Checkerspot	*Chlosyne gorgone*
Monarch	*Danaus plexippus*
Juvenal's Duskywing	*Erynnis juvenalis*
Northern Broken-dash	*Wallengrenia egeremet*
Little Glassywing	*Pomperius verna*

Guidelines for Protecting Indiana Bat Summer Habitat

Indiana bats have been documented at Tyrone WMA. These guidelines were prepared to provide information about the Indiana bat and its summer habitat requirements in Iowa and to prevent inadvertent harm to the species through various human activities. This update of the guidelines is in response to changes in the US Fish and Wildlife Service requirements for protecting this endangered species. The changes include:

- No cut dates changed to April 1through September 30
- Updated US Fish and Wildlife Service guidelines for mist net surveys

The Indiana bat is a federal (50CFR Part 17) and state (Code of Iowa, Chapter 481B) endangered species that occurs in southern Iowa from April through September.

Female Indiana bats *(Myotis sodalis)* have their young beneath loose or peeling tree bark. Most nursery colonies have been found on the trunk or large branches beneath

the bark of standing dead trees. The nursery colonies are located along streams and rivers or in upland forest areas.

Trees that retain sheets or plates of bark that provide space beneath the bark when dead, such as red oak, post oak, and cottonwood, are potential roost trees. Live trees such as shagbark and shellbark hickory are also occasionally used as roosts.

Indiana bats have also been captured on the edge of urban areas. It is likely that the bats would use areas on the edge of urban areas only if there is suitable habitat such as a greenbelt or a large park with a natural forest component. This would exclude city parks that are maintained as mowed areas.

In Iowa, records for the Indiana bat have occurred in areas of 10% or greater forest cover and near permanent water. Trees with slabs or plates of loose bark are considered suitable as summer roosts.

Suitable summer habitat in Iowa is considered to have the following within a one-half or one mile radius of a location:

- Forest cover of 10% or greater within one-half mile.
- Permanent water within one-half mile.
- The potential roost trees ranked as moderate or high for peeling or loose bark within one mile.

Do not cut down potential roost trees between April 1 and September 30. Such trees can be left standing live or dead, during that time period.

Special Note on Northern Long-eared Bat

The Northern Long-eared Bat (NLEB) is a federally Threatened Species that can occur in any county of Iowa. To protect summer habitat for NLEB, tree removal should not occur within 0.25 miles of a known hibernaculum, and no trees within a 150-foot radius of a known, occupied maternity roost tree may be cut nor destroyed during the pup season (June 1 through July 31). Please contact the U.S. Fish and Wildlife Service (USFWS) for maps of known hibernacula and the most up-to-date information pertaining to the NLEB. Visit the USFWS Midwest Region Endangered Species webpage at: https://www.fws.gov/midwest/endangered/index.html