Forest Habitat Management Plan

Prepared for:

DeKalb Wildlife Management Area

Long Creek Township Sections 19, 20, 27, 28, 29, and 30
Decatur County, Iowa

Prepared by: Lindsey Barney - District Forester
August 15, 2022

Introduction

DeKalb WMA is a 2,170-acre land complex in northwest Decatur County Iowa. DeKalb WMA started out with the acquisition of two tracts in 1976. In 1986, two additional tracts were purchased, that formed the now westernmost part of the now larger complex. The most recent acquisition occurred in 2001, when two tracts were purchased near existing land in the central and east subunits of the complex.

The first forest management plan was written by Steven Swinconos in 1983 (covering 570 forested areas). Steven did extensive stand mapping and provided detailed forest descriptions in the first plan. In 1986 District Forester Randy Goerndt created a fire protection plan for the forested areas too. This plan is the second Forest Management Plan written for DeKalb, nearly 40 years after the original. This new plan covers all forested land found on the WMA complex.

This Wildlife Management Area (WMA) is found on the forested hill ground adjacent to Short Creek, Long Creek, and Redman's Creek. This WMA falls within the Southern Iowa Drift plain landscape area, where windblown loess soils were deposited on rolling glacial till deposits. In this region, rugged terrain near rivers and creeks is commonly forested. This WMA offers early successional/brushy habitat, intermediate-aged hardwood timber, and also mixed aged/old growth timber. Grasslands, crop fields, and hay fields on DeKalb, in combination with diverse forest cover, create a variety of habitats suitable to wildlife requiring forested or transitional cover. Dekalb WMA falls within the state recognized Sand Creek Bird Conservation Area (BCA). More information on this 30,000 acre BCA and its importance to savanna and woodland bird species be found at: https://www.iowadnr.gov/Portals/idnr/uploads/wildlife/bca/Sand%20Creek.pdf .

Forest Management Objectives (Chad Paup - DNR Grand River Unit Biologist)

The primary management objectives for Dekalb WMA are to improve wildlife habitat for a variety of wildlife species, to provide recreational opportunities, to provide clean water, and to protect endangered wildlife species and "species of greatest conservation needs". Keeping and improving the health and vigor of a diverse (tree species diversity) forest ecosystem is the key to optimizing benefits for the widest variety of wildlife species.

Due to the diverse oak resource and primary recreational needs of the Dekalb WMA, white-tailed deer, squirrels, turkeys, bobwhite quail, and American woodcock are targeted as primary game management species. Non-game birds such as the broad-winged, red- headed woodpecker, and northern flicker, are also targeted as primary management species. **Additional non-game species of concern at Dekalb WMA are the: Hickory hairstreak, Acadian Hairstreak, Zabulon Skipper, Wild Indigo Duskywing, Indiana Bat, Northern Long-eared Bat, Cope's Gray Treefrog, and Eastern Gray Treefrog.**

Maintaining healthy, diverse oak- dominated stands with good reproductive potential is essential to the successful management of the Dekalb WMA. Management targeted to keeping forested stands at proper tree stocking levels will improve and maintain forest health and sustained, long-term wildlife mast (nuts, acorns) production. In addition, structural habitat features such as coarse woody debris and snags will be retained in as much as possible throughout all management units.

Management Considerations

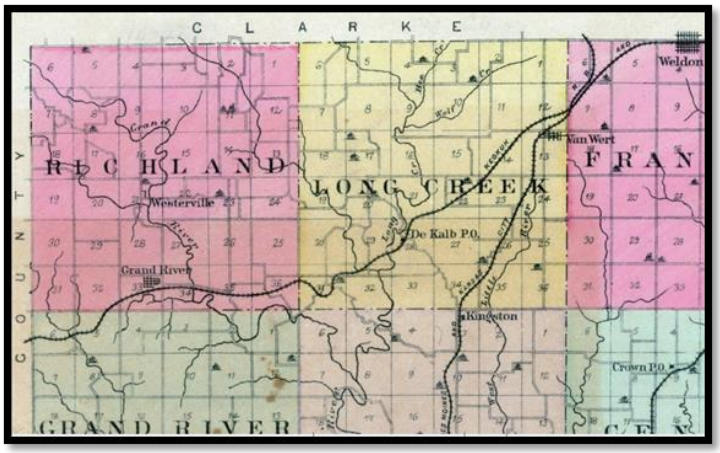
Soil and Water Considerations

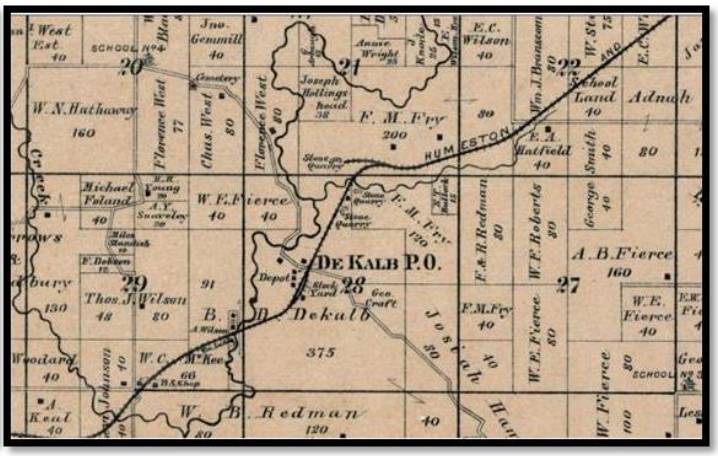
The silt loam and silty clay loam soils of the Southern Iowa drift plain are fragile and very prone to erosion. If and when these soils are disturbed, they should be re-vegetated as quickly as possible to reduce the erosion hazard and to reduce invasive species colonization potential. The soils found in the forested areas of DeKalb WMA are generally stable at this time.

Forest management actions can have a big impact on soil and water quality. Machinery used for forest management activities should only be operated when soil conditions are frozen or dry. This will avoid the detrimental effects of compaction and erosion. Iowa Forestry Best Management Practices for logging roads, access roads, and associated soil work should be followed at all times. In addition, machinery used on site should follow a cleaning protocol before and after leaving DeKalb WMA (to prevent the transportation of invasive plant seeds). In addition, herbicides used in the management of DeKalb WMA should be mixed, handled, and applied according to the specific herbicide's labeled instructions. Improper use of these chemicals can lead to surface and ground water contamination, as well as collateral

damage to desirable plants and wildlife.

Historical and Cultural Considerations:
Efforts must be made before and during forest management work to identify historical or cultural sites that may be present on the landscape. If discovered, these "special sites" will be preserved, with a plan in place to protect the site from disturbance or avoid the area completely during management. One notable historic feature on DeKalb was the presence of the small settlement of DeKalb, and the associated Humeston and Shenandoah Railroad (shown as the CB & Q on the 1930's map). This railway passed through Grand River, then DeKalb, and then Van Wert (as shown on portion of the 1894 map of Long Creek Township). More information on DeKalb's history can be found at: http://iagenweb.org/decatur/historyDocs/LongCreek/DeKalb_History.html.





Biological Diversity Considerations
Native tree, shrub, and plant species should be retained wherever feasible. DeKalb WMA is unique in the fact that many beneficial native shrubs (hazelnut, silky dogwood, choke cherry, elderberry, bladdernut, prickly ash, coralberry, and gooseberry) are naturally found throughout different areas of the WMA complex. The forests of DeKalb WMA are also diverse in terms of overstory species, age classes (young through mature), and canopy structure (one age or multi-age). Future management practices should work to preserve and expand native forest components, while actively managing against non-native woody components. DeKalb WMA should also be managed to maintain as much structural and age-class diversity as possible (a map of average stand diameters is found later in this document). Promoting diversity in all of these elements while maintaining healthy forest densities will improve forest vigor and wildlife diversity. Promoting forest vigor is one of our only preventative treatments against biological forest health issues, and also natural disasters (drought, windstorms, etc.). Managing for stand vigor will also improve all the ecological services that these forests are meant to provide (soil and water protection, habitat, food production, etc.).

Aesthetic Quality and Recreation Considerations
There are several treatments recommended throughout this plan that can negatively impact the recreational use of portions of this WMA. Aesthetic considerations are less of a concern, as treatments recommended in this plan serve to improve the appearance and health of the woodlands. Any negative impacts that may arise in the future may be mitigated by varying the timing and intensity or scope of work, if needed.

Endangered Species Considerations
The Iowa DNR's Iowa Wildlife Action Plan (IWAP) identifies certain wildlife species as species of "greatest conservation need". Species for the Dekalb WMA are listed in Appendix 1 at the end of this plan (Chad Paup - Grand River Wildlife Unit Biologist).

Threatened and endangered plant and wildlife species and their habitats should be protected when conducting woodland management activities. The Northern Long-eared Bat is a federally endangered species that is found throughout the state of Iowa, and the Indiana Bat is both state and federally endangered and occurs in southern Iowa. Dekalb WMA contains mature timber areas that could benefit these bat species, especially where there are dead or

dying trees with flaking bark. Nursery colonies of these bats exist primarily between the months of April and October beneath the loose or peeling bark of certain trees located along streams and rivers and in adjacent upland forest areas. Timber management work that could impact potential roost trees should be excluded for the months of April through October. Or in other words, forest management activities should be performed during the dormant season as much as possible, to limit disturbance to potential bat habitat.

Dekalb WMA has suitable habitat for the following state endangered (SE) and state special concern (SC) species: Bald Eagle (SC), Red Shouldered Hawk (SE), Peregrine Falcon (SC), Barn Owl (SE), Hickory Hairstreak (SC), and Zebra Swallowtail (SC). Dekalb WMA may also support Northern Harriers and Long-eared Owl's during migration and/or during winter months.

Many common and endangered/threatened wildlife species rely on dead trees or trees with cavities. Other species may rely upon coarse woody debris in the forest understory. These forest components should be retained, where feasible, for wildlife habitat. Prior to implementation, forest management activities described here will be reviewed internally to assess potential impacts to both state and federal species of concern. Site records from the DNR's Natural Areas Inventory Program (NAI) and access to the online database are provided to management biologists for use in project activity planning. When protected species are known to occur in the management area or if suitable habitat for these species is present, management biologists implement conservation measures as described in the Operation and Maintenance Plan for Wildlife Management Areas in the State along with recommendations from NAI staff. Management activities are not initiated until this review has been completed and T/E comments/concerns have been addressed.

Timber Harvest Considerations

The focus for this plan is to treat stands with substantial forest health issues. Harvesting in the short term will be considered where it can help improve the long-term health of a stand (such as in stand with hypoxylon canker). Healthy stands with potential future timber sales should be routinely monitored to make sure their condition does not degrade. These healthy, potential timber sale stands will be prioritized for harvest/management if their conditions change within the 10 to 20-year scope of this plan.

If timber removals are considered in the future, the harvesting/removals must be done in accordance to current state-owned-land harvesting/removal policies. The harvesting/removal work must be done under the supervision of the DNR District Forester and also DNR Wildlife Biologist.

Forest Health and Invasive Species Considerations

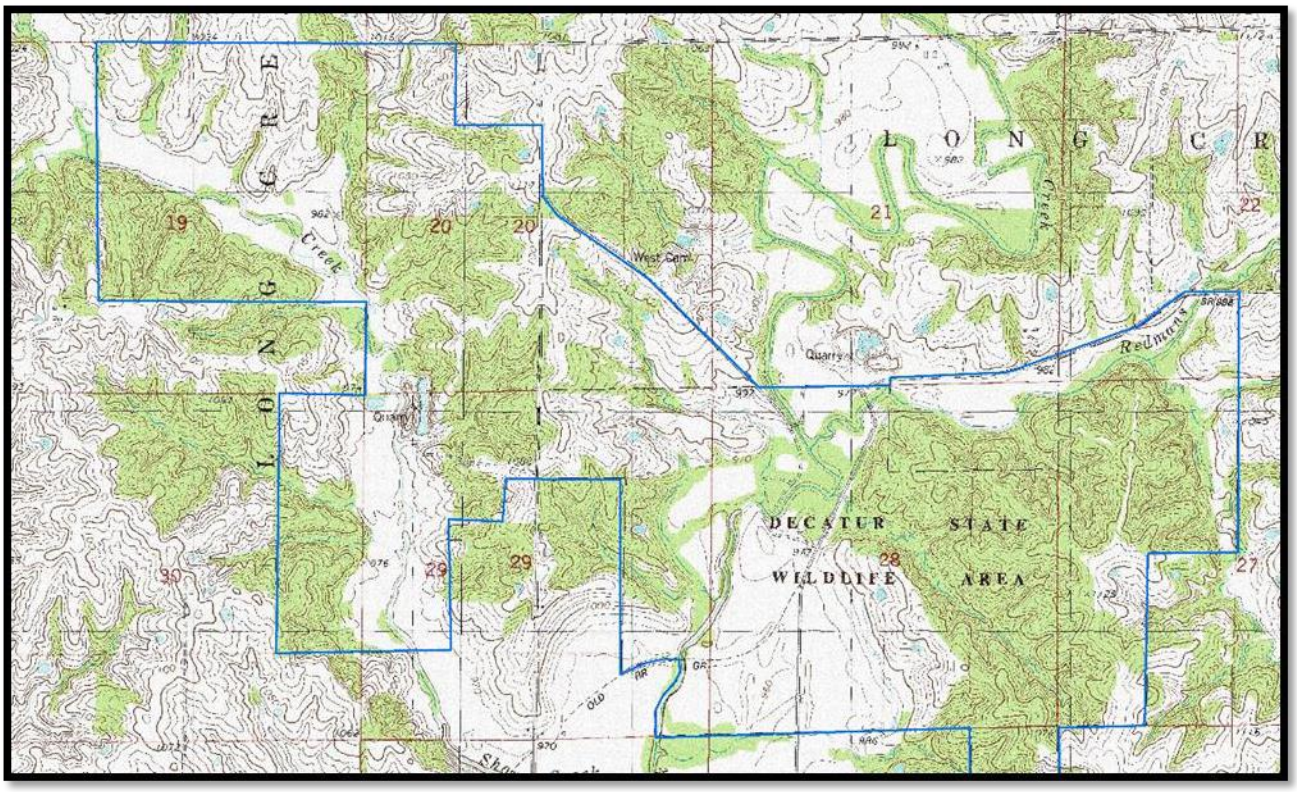
Numerous insects, diseases, and invasive plants impact the forest lands of southern Iowa. DeKalb WMA should be monitored yearly for new or unusual impacts to forest health. As mentioned in the biological diversity section, forest stands at DeKalb will be managed to promote forest vigor, with an emphasis on improving current forest conditions. Managing for forest health and invasive species now will also help managers in the future have more effective and more efficient outcomes. The following forest health concerns were identified at DeKalb WMA during the summer of 2022:

- *Amur Honeysuckle* - invasive shrub (found throughout the entire WMA)
- *Autumn Olive* - invasive shrub (found in forest openings and along forest edges)
- *Multiflora rose* - invasive briar (found throughout entire WMA)
- *Black Locust* - invasive tree (found in the western and eastern subunits)
- *Siberian elm* - invasive tree found in early successional forest, forest edges, right of ways
- *Oak Wilt* - disease of oak species - could be present within oak-hickory stands
- *Bur Oak Blight* -disease of upland bur oaks - could be within oak-hickory stands
- *Hypoxylon canker* - disease of oaks within overstocked upland areas
- *Emerald Ash Borer* - invasive insect that targets green and white ash in all stands

The forest stand management matrix at the end of this document summarizes the invasive plants found in each stand, and assigns a priority rating based on the severity of the infestation. Additional forest health threats at DeKalb include Emerald Ash Borer (EAB) and oak decline (oak wilt, hypoxylon canker, generalized oak decline). The most common invasive plant threats in each stand are displayed on a map later in this plan.

Description of DeKalb WMA

Topography: The USGS map displays the topographic features and drainage patterns of DeKalb WMA. Short Creek drains the western subunit of the complex. Long Creek receives drainage from the middle and east segments of the complex. Redman's Creek receives drainage from the north ½ of the east segment. Terrain throughout DeKalb WMA is generally moderately steep.



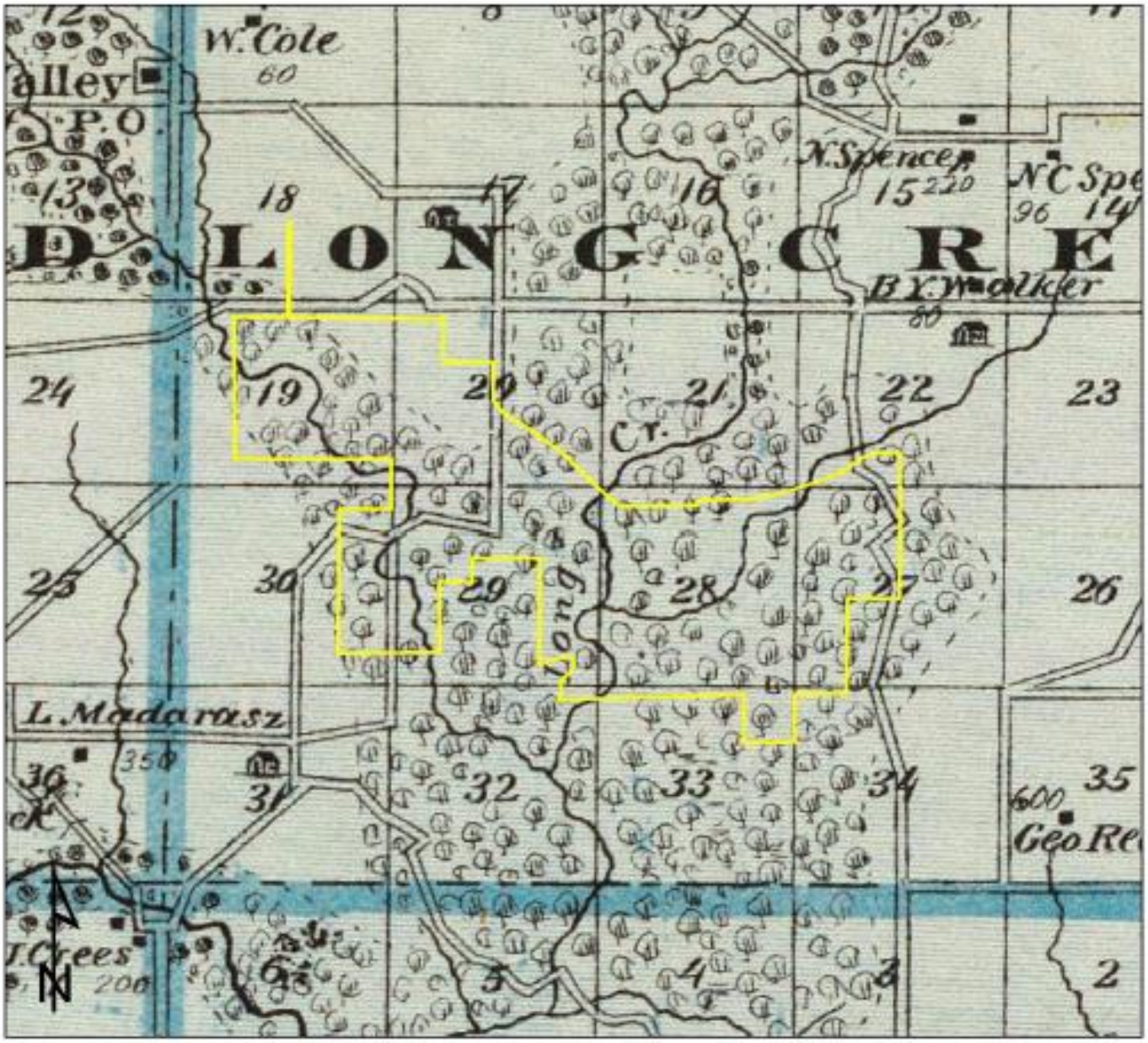
Soils: Soils that formed under forest cover or transitional cover (savanna) make up most of the 2,170 acres of DeKalb WMA. Most of the soils at DeKalb WMA are loams, clay loams, silt loams, and silty- clay loams, and clays (in order of descending prevalence). The top soils found on DeKalb WMA, by total acreage, are: Lindley Loam (upland forest soil), Cantril-Coppock-Nodaway Complex (transitional), Keswick Loam (upland forest), Armstrong Clay Loam (transitional), and Nodaway- Lawson-Klum Complex (transitional). These soils are displayed on the following map.

Historic Maps and Stand Information: Aerial imagery from the 1930's, 1960's, and 1980's is very useful for verifying areas of unusual forest structure or health (as in the case of past logging or grazing), areas of forest loss, and also areas of forest gain. The 1875 Andreas Atlas map is also included to show how early surveyors mapped the vicinity, and their course delineation of vegetation types across the pioneer landscape.

DeKalb WMA has been divided into 12 main forest types based on average overstory diameter, forest species composition, and prior land use. On the following DeKalb Stand Maps, the Forest Type is indicated with the Letter, and the unit or "stand" number is indicated with the proceeding digit. The following maps outline DeKalb WMA's stands as they were mapped in the summer of 2022.

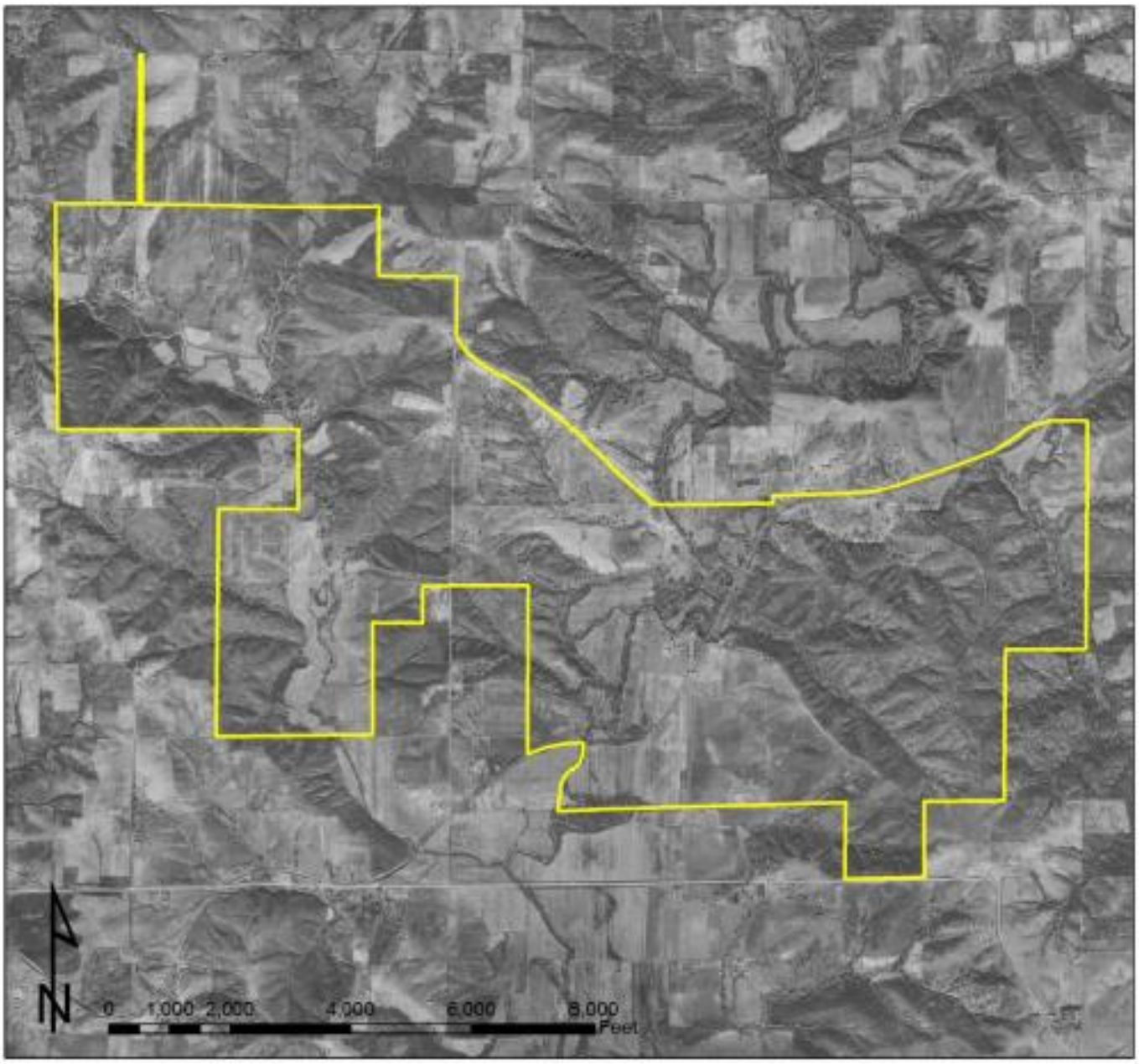
The following maps display information relating to historic landscape uses and conditions, landscape features, and current forest type delineation.

Dekalb WMA 1875 Andreas Atlas
Created 10/25/2022



Created by Lindsey Barney
DNR District Forester

Dekalb WMA 1930's Imagery
Created 10/25/2022



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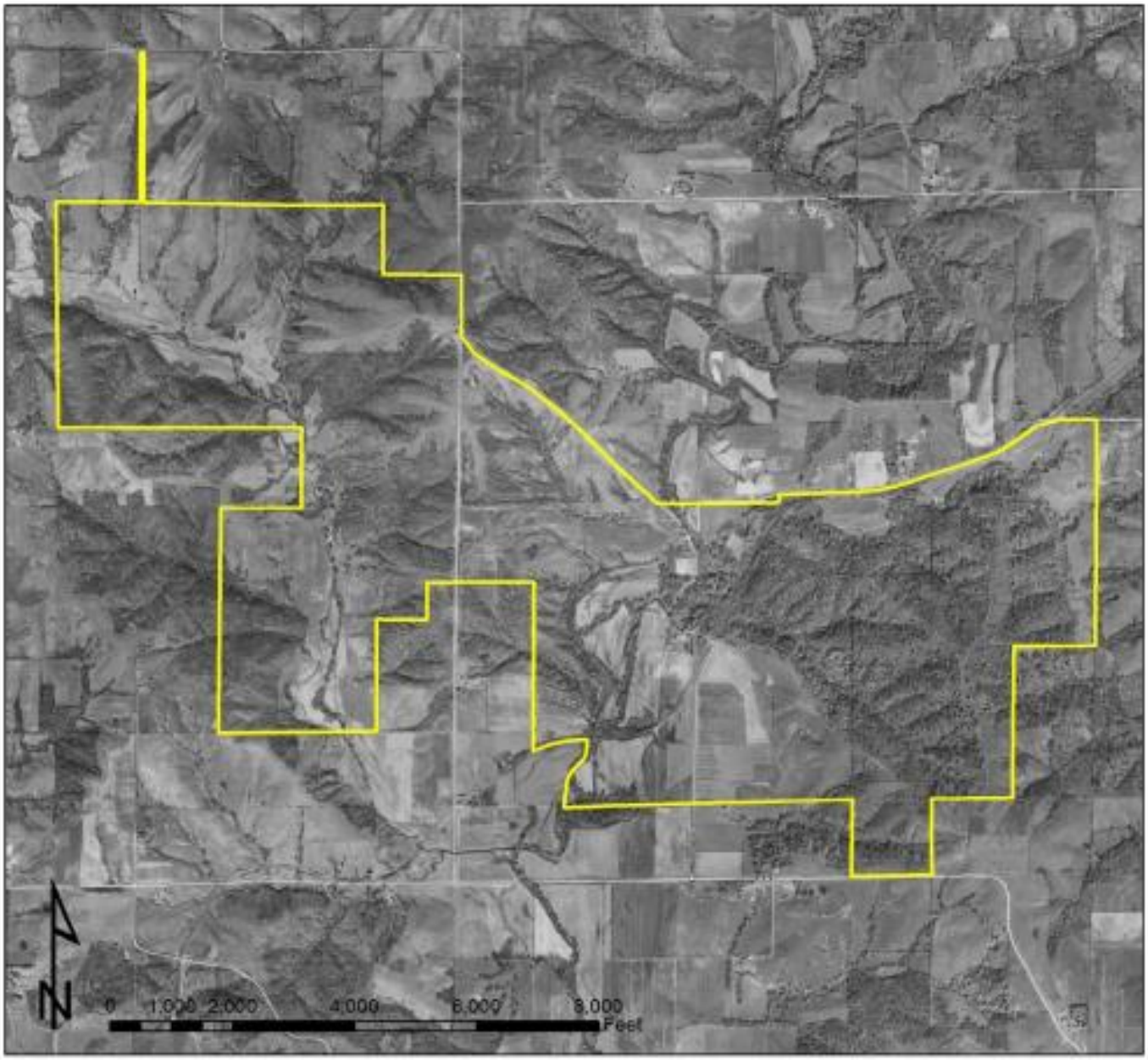
Dekalb WMA 1960's Imagery
Created 10/25/2022



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Dekalb WMA 1980's CIR Imagery
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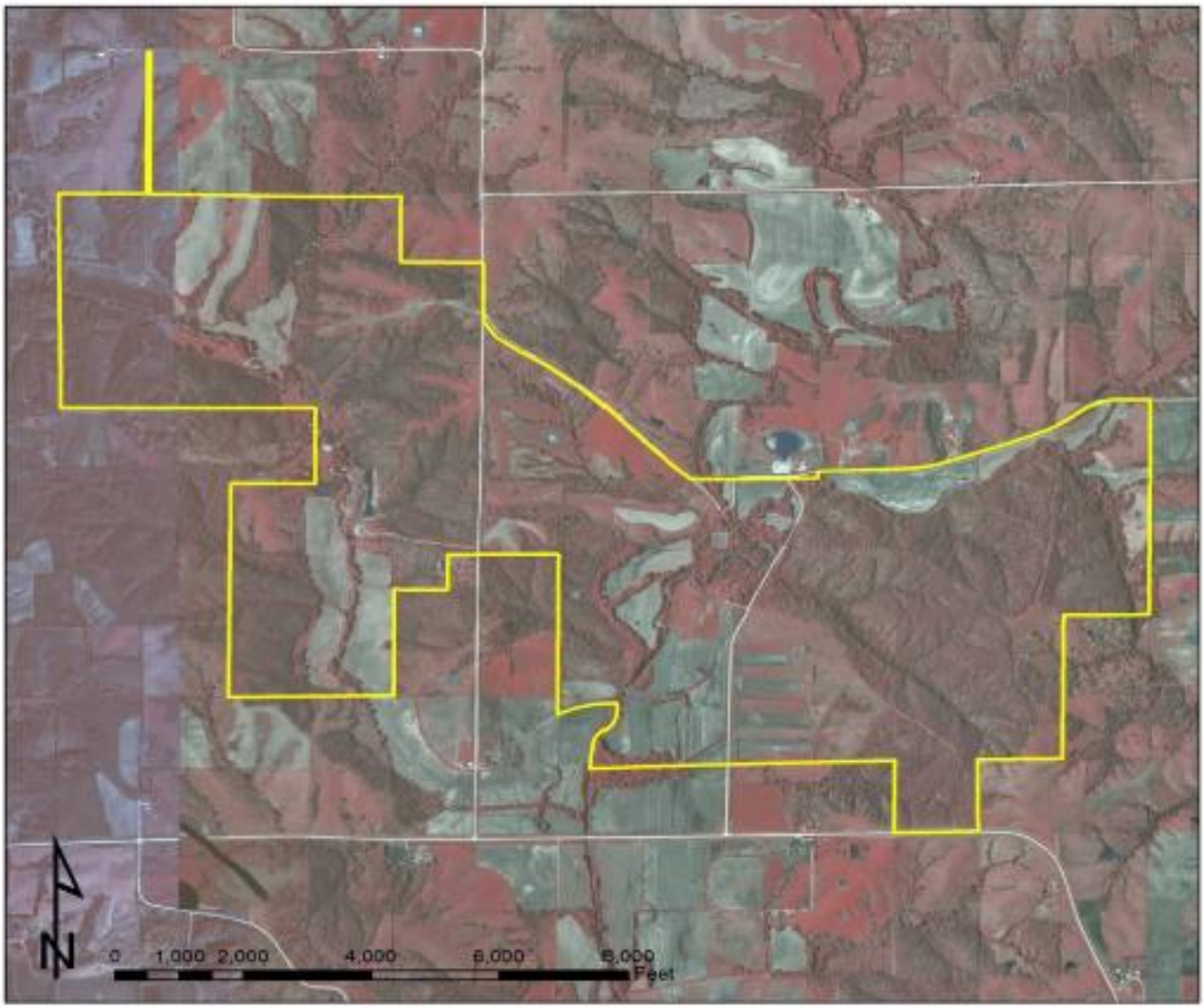

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Dekalb WMA 2009 CIR Imagery
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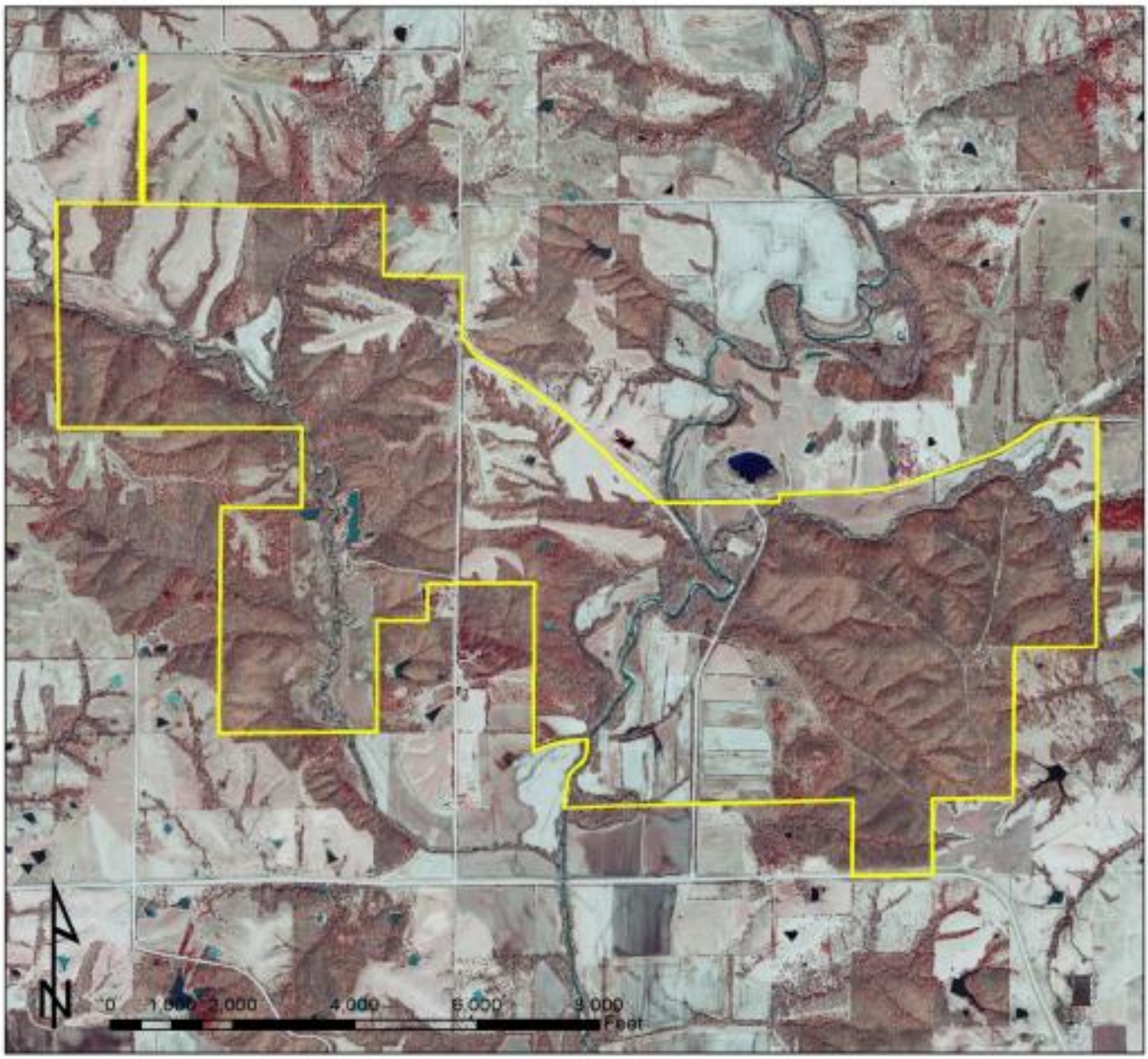

Created by Lindsey Barney
DNR District Forester

Dekalb WMA Stand Overview Map
2016-2018 CIR Imagery
Created 10/25/2022

Legend

Dekalb_Stands_2022

Created by Lindsey Barney
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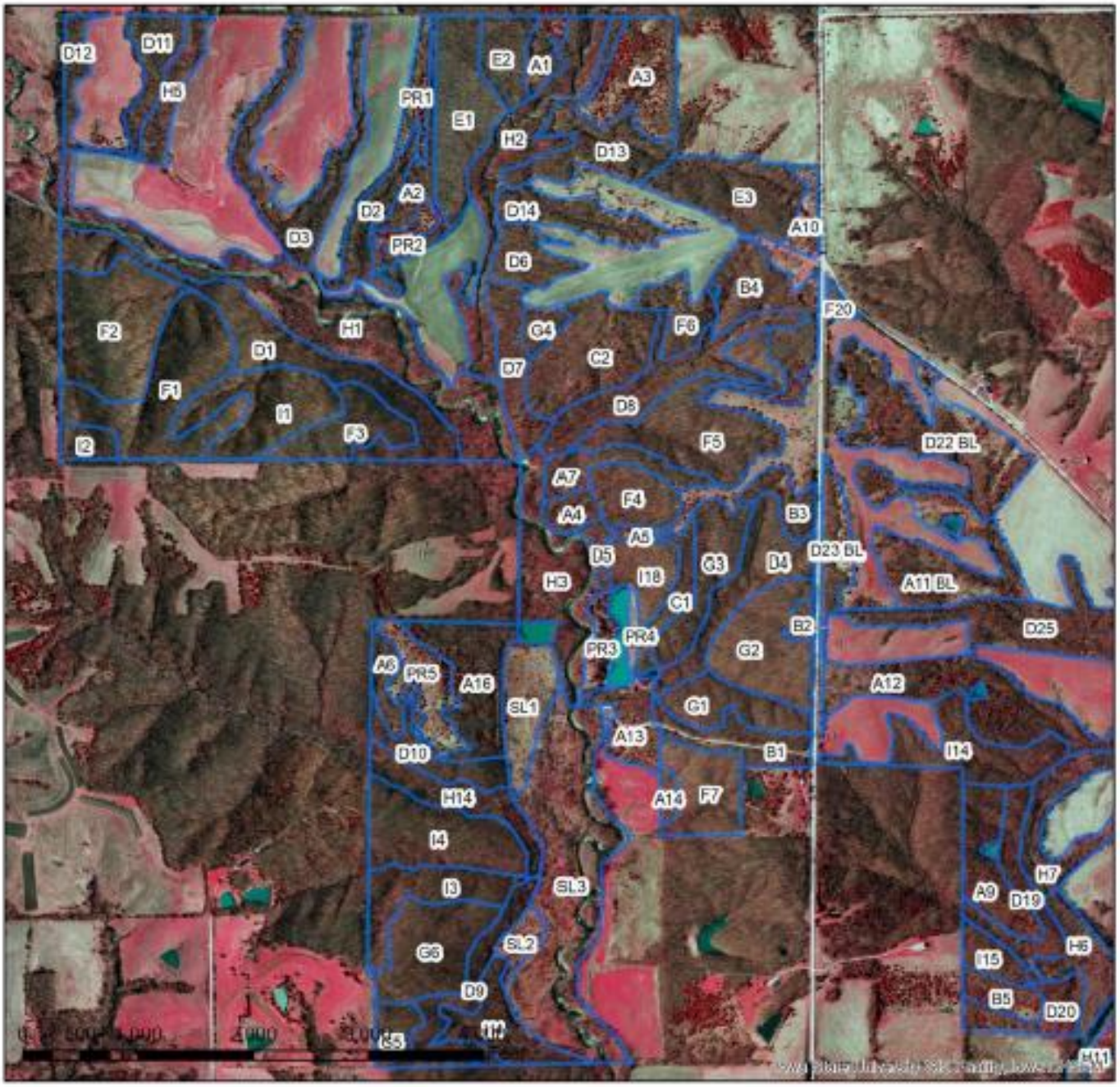
Dekalb WMA West
2016-2018 CIR Imagery
Created 10/25/2022



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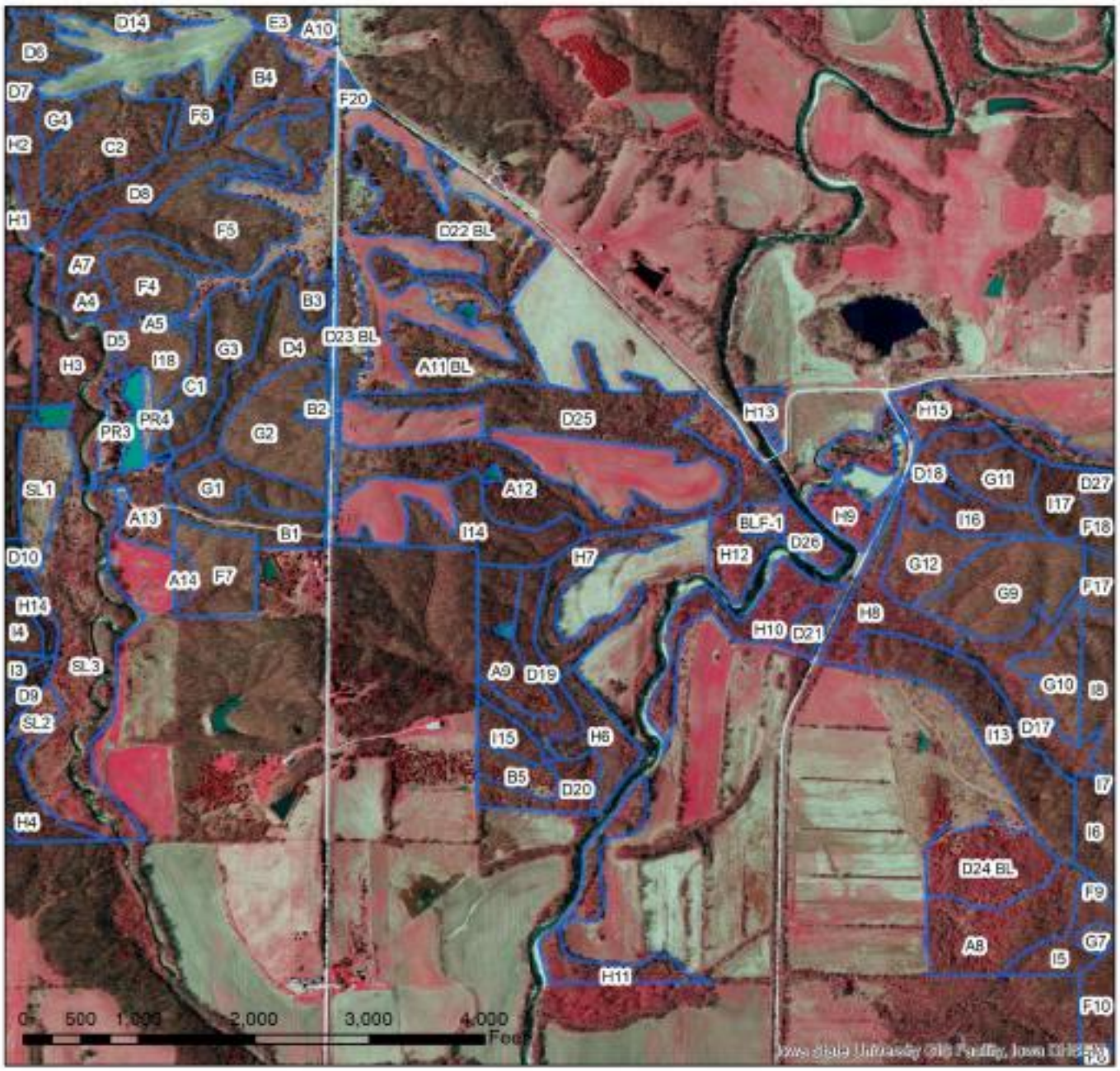
Dekalb_Stands_2022

Created by Lindsey Barney
DNR District Forester

Dekalb WMA Central
2016-2018 CIR Imagery
Created 10/25/2022



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Dekalb_Stands_2022

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Dekalb WMA East
2016-2018 CIR Imagery
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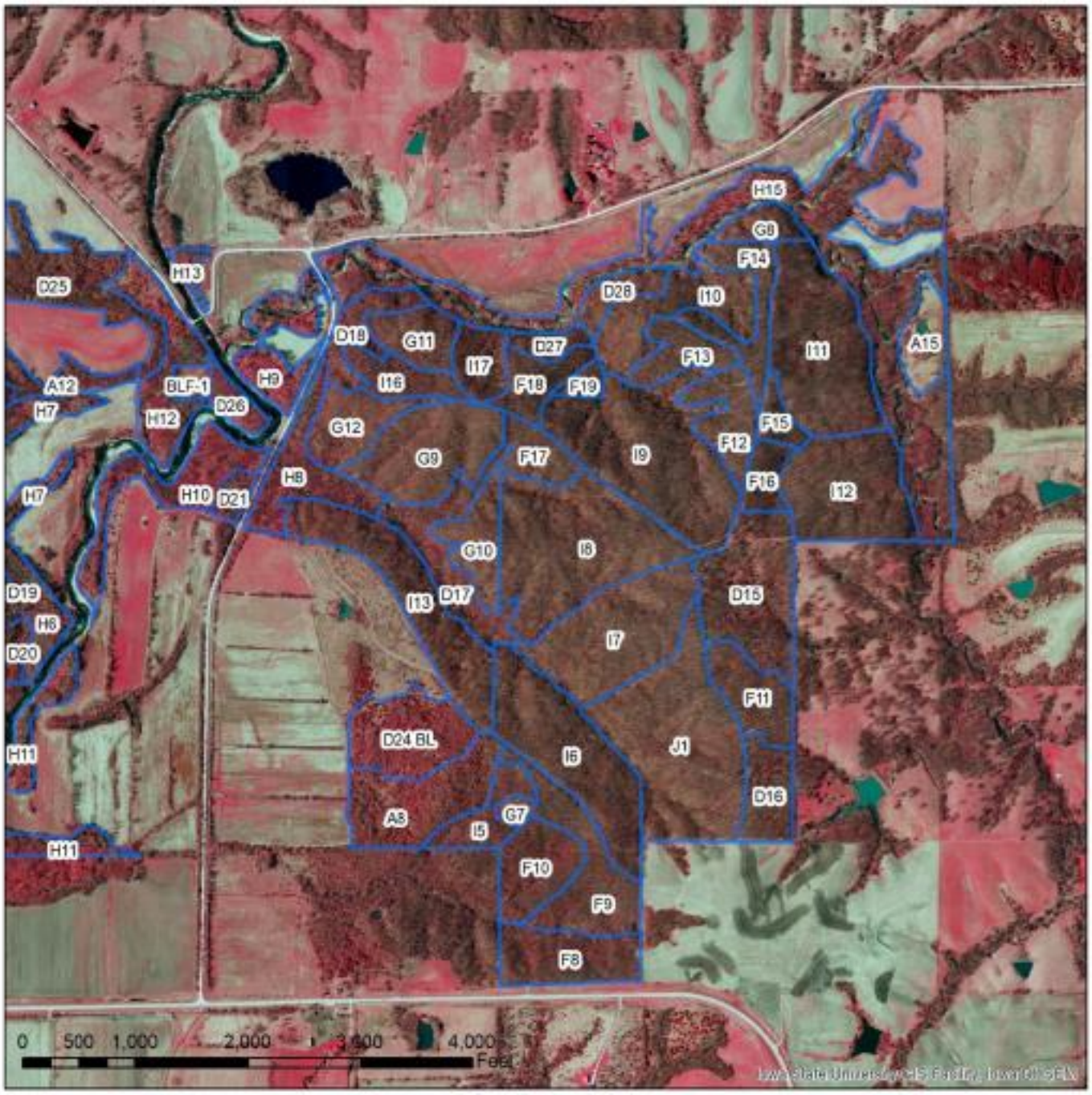

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Dekalb_Stands_2022

Created by Lindsey Barney
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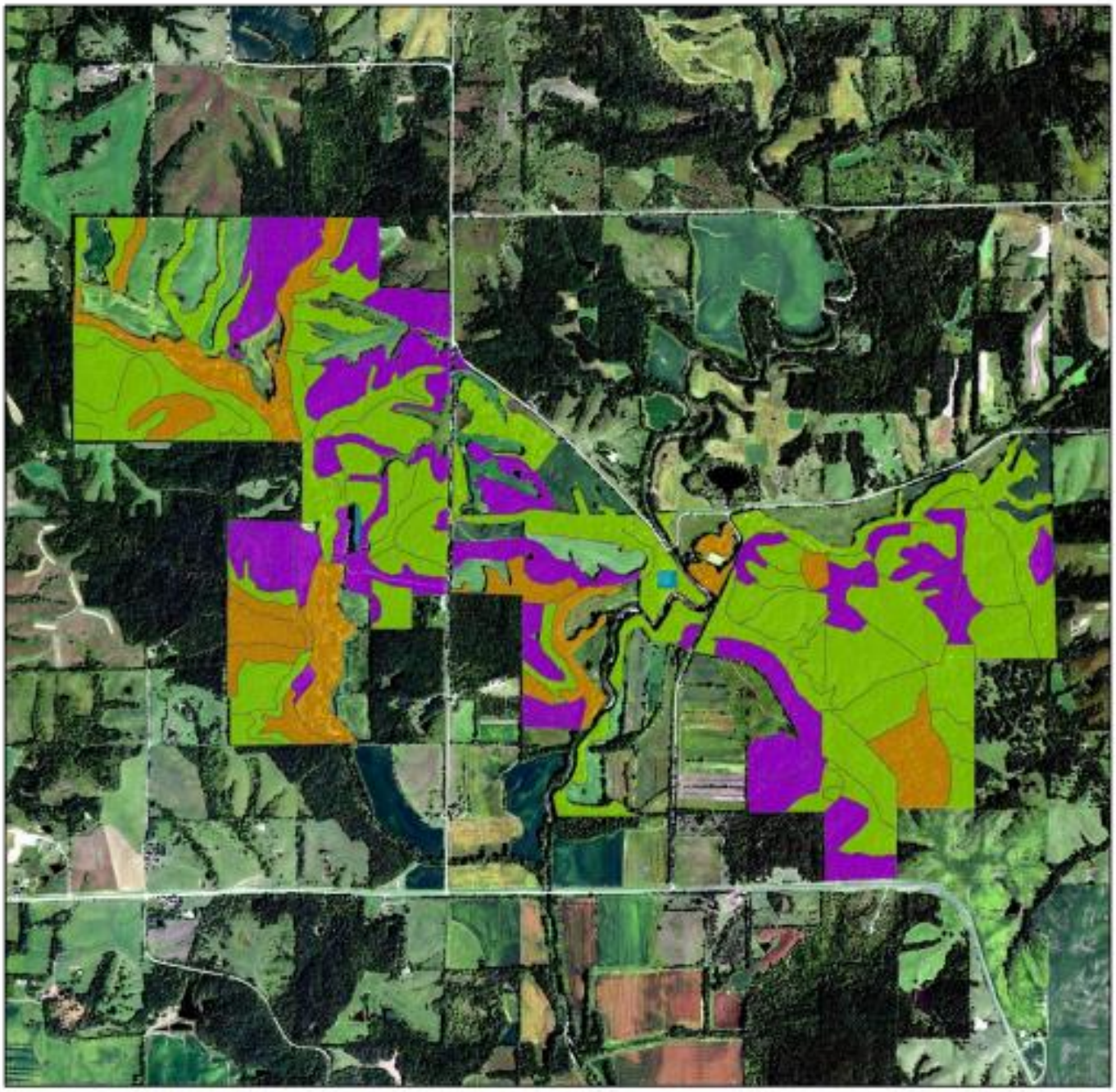
Dekalb WMA by Average Stand Diameter
2021 NAIP Imagery
Created 10/25/2022



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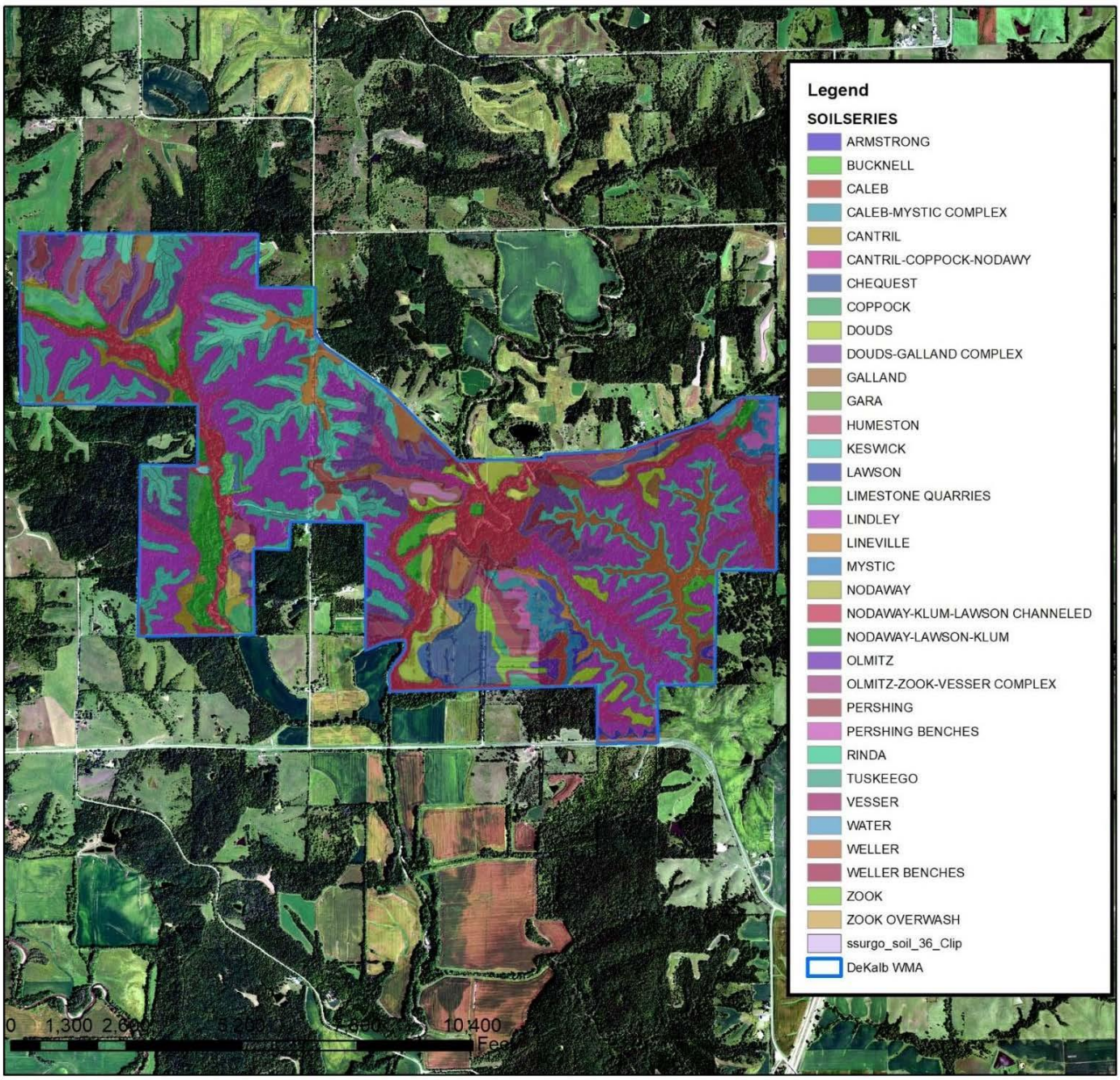
Dekalb WMA Soils
2021 Imagery



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Created by Lindsey Barney
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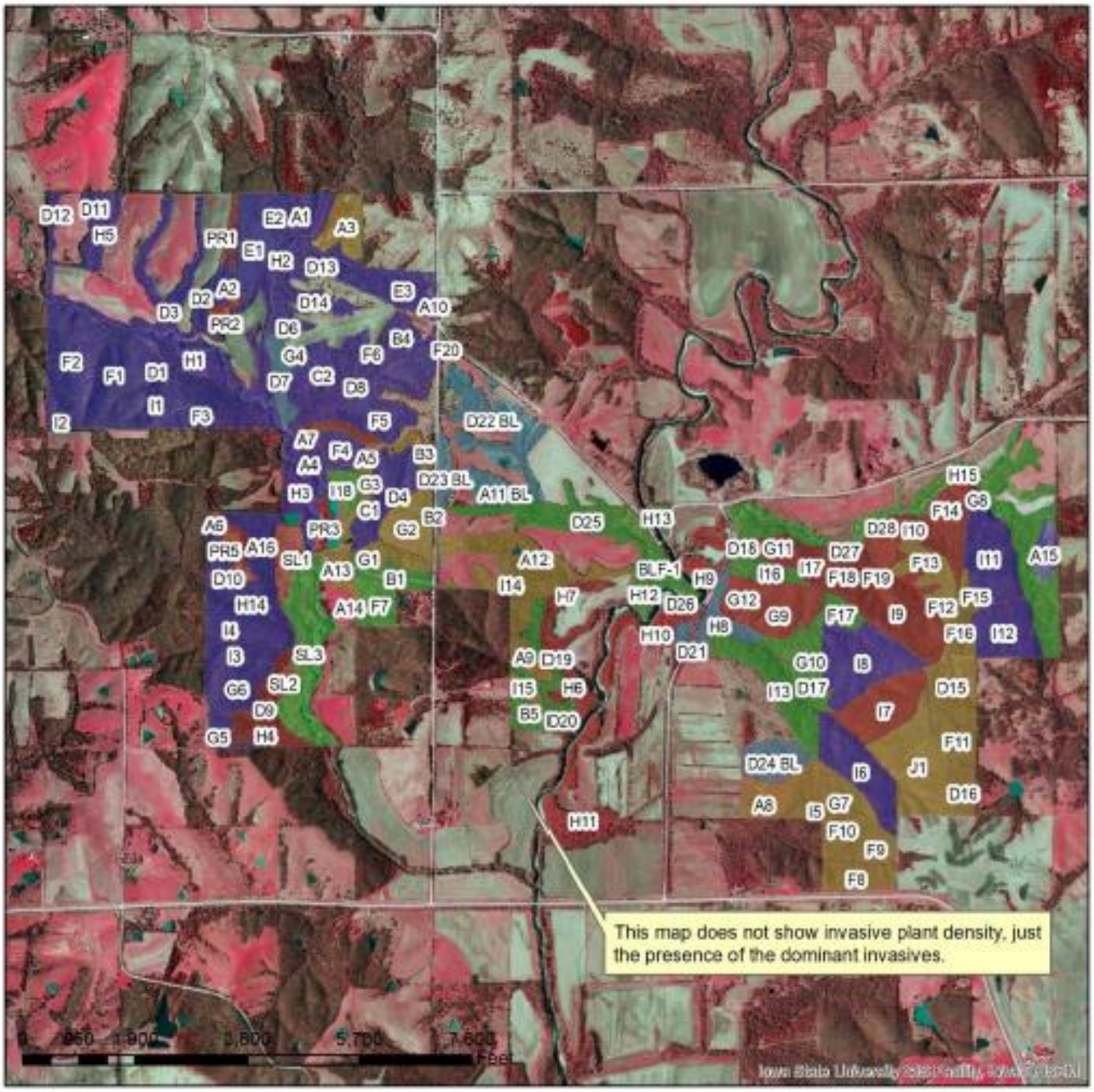
Dominant Invasive Plants by Stand
2016-2018 CIR Imagery
Created 10/25/2022



Created by Lindsey Barney
DNR District Forester

Management Recommendations for DeKalb WMA:

This plan outlines the current forest conditions at DeKalb WMA, as they were mapped in August 2022. Again, DeKalb WMA has been classified into different forest types, which are then divided into units which will be referred to as stands. Detailed stand data is summarized in a table at the end of this document. The stands are not assigned a year for management, as timelines and budgets constantly change. Instead, the stands are prioritized for management based on their priority forest health needs (with issues such as invasive plants, disease, stagnant stand structure, etc.).

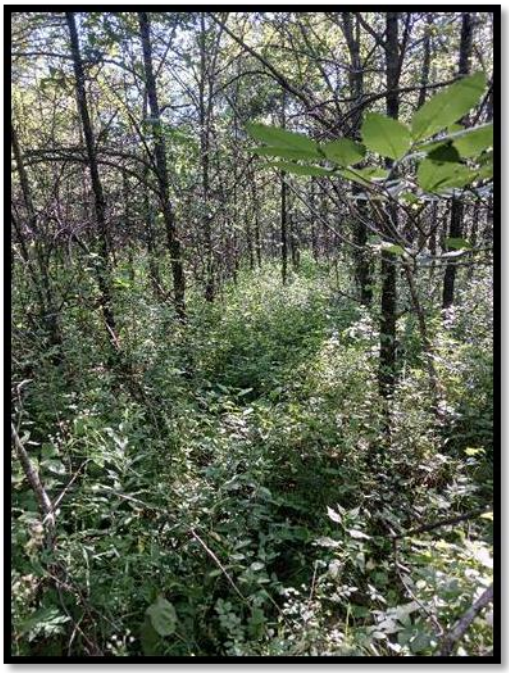
Individual stands should be thoroughly scouted (and relevant plant and wildlife data collected) prior to the stand being officially scheduled for management. In the case of invasive species management, adjacent stands should be scouted for issues, so they can be managed concurrent with the scheduled stand. A similar, and also desirable approach, may be to manage groups of stands in close proximity to each other, especially if they have similar forest health and/or silvicultural needs.

Specific management actions will be decided in the future planning processes of each unit/stand. These specific actions are not outlined in this plan in order to give future on-the-ground treatments more flexibility as logistical and biological conditions change.

There will be a lot of discussion about invasive plant control needs. Without repeating the treatments needed in each section, please know the following: In general, invasive shrubs can be treated using the following means: grinding with follow-up herbicide treatment, basal bark herbicide application, cut stump herbicide application, or foliar herbicide application (least preferred for applicator safety and non-target damage). Invasive suckering trees (black locust) should be controlled using methods that kill the roots of the plant first (basal bark application and/or hack and squirt herbicide application). Non-suckering invasive trees, such as Siberian elm and white mulberry, can be girdled or felled and treated with an appropriate herbicide.

Unless otherwise noted, a light basal area thinning means the stocking will be reduced to between the A and B line on the stocking chart (or ~70-90% stocking).

Forest Type A - Young Second Bench Hardwoods



Stands (acres): A1 (3.9), A2 (8.1), A3 (14), A4 (3.1), A5 (1.1), A6 (5.1), A7 (6.8), A8 (18), A9 (11), A10 (3.4), A11 (19.6), A12 (24.5), A13 (7.4), A14 (1.6), A15 (7), and A16 (15)

Site Description: This forest type is found along creeks and in upper drainages that have been fallowed over the past 40 years.

Forest Description: This forest type is used to describe the youngest age-class of trees at DeKalb WMA. On average, trees are sapling sized (1-5" dbh) and pole-sized (5-12" dbh), but there may also be small sawlog-sized trees (12-18" dbh) scattered among these stands. In most cases, these stands were previously pastured, and since fallowing have grown into a predictable mix of the following species: shingle oak, black walnut, bitternut hickory, shagbark hickory (some stands), American elm, eastern red cedar, black cherry, honey locust, and Osage orange. The midstory consists of smaller eastern red cedar, American elm, and mixed shrubs. The understory layer consists of the following: stickseed trefoil, hog peanut, snakeroot, black snakeroot, agrimony, black raspberry, and young tree seedlings (hickory, walnut, shingle oak, and elm).

Young stands are at highest risk for invasive species colonization, due to their limited canopy development (and shading capacity). The invasive woody plants (especially in the case of multiflora rose and black locust) were already present nearby on on-site when the stands were fallowed.

Management Recommendations: Management in these stands will basically be: 1. Control invasive plants, 2. Keep as much shade on site as possible to limit the growth of invasive plants, and 3. Release beneficial trees in stands where they are found. Prescribed fire should be limited or excluded from this stand until overstory trees (on average) are at least 10-12" in DBH. If used, prescribed fire should be of low intensity, with a focus on setting back multiflora rose (MFR).

Highest Priority Stands: *A8, A11, A13, A14:* A8 and A11 are large units that have been heavily invaded by black locust and invasive shrubs (autumn olive, Amur honeysuckle, multiflora rose). These units should be managed to promote shade and limit disturbance (such as earthwork or fire), or converted to a more beneficial cover (which would entail intensive mechanical and chemical treatments). At minimum, encroachment should be managed at the edges of these fields (using methods such as basal bark treatment), and adjacent stands should not be thinned until the black locust/invasive shrub population is under control.

A13 and A14 are stands infested with autumn olive, Amur honeysuckle, multiflora rose, and Siberian elm. These stands are prioritized for control, so that beneficial work to the adjacent oak-hickory stands can take place. Treatments for these two stands would revolve around invasive tree and shrub control, which could be done by mechanical/chemical means (machine grinding with follow-up treatment). Native trees should be flagged and retained within these units.

Medium Priority Stands: *A3, A15, A16:* These stands would benefit from invasive shrub control.

Lower Priority Stands: *A1, A2, A3, A4, A5, A6, A7, A9, A10, A12:* These stands would benefit from a light crop tree release thinning, to promote mast tree diversity (besides shingle oak). Species to release include: black walnut, black cherry, hickory, and oak. These stands also contain invasive shrubs (autumn olive, Amur honeysuckle, and/or multiflora rose) that will need to be controlled as these stands are lightly thinned as well.

Forest Type B - Young Upland Hardwoods

Stands (acres): B1 (8.7), B2 (1.5), B3 (4.8), B4 (15.7), B5 (4.4)

Site Description: This forest type is found between old growth forest areas and field edges in uplands.

Forest Description: This forest type is also used to describe the youngest age-class of trees at DeKalb WMA. On average, trees are sapling sized (1-5" dbh) and pole-sized (5-12" dbh), but there may also be scattered small sawlog-sized trees (12-18" dbh) scattered among these stands. In most cases, these stands were previously pastured, and since fallowing have grown into a predictable mix of early successional species: shingle oak, shagbark hickory, bitternut hickory, black walnut, black cherry, honey locust, Osage orange, and scattered bur oak, black oak, red oak, and white oak. The midstory consists of smaller eastern red cedar, American elm, ironwood (occasional), and buckeye (occasional). The understory layer consists of the following: Black raspberry, blackberry, Virginia Creeper, nettles, bellflower, bottlebrush grass, and tree regeneration (oak, walnut, hickory, and ironwood).

Again, these young stands are at highest risk for invasive species colonization, due to their limited canopy development (and shading capacity). The invasive shrubs (especially in the case of multiflora rose) were already present nearby on on-site when the stands were fallowed.

Management Recommendations: Management is these stands will basically be: 1. Control invasive plants, and 2. Use thinning to release oak. Prescribed fire should be limited or excluded from this stand until the average overstory diameter is 10-12" DBH. If used, prescribed fire should be of low intensity, with a focus on setting back multiflora rose.

Highest Priority Stands: *B1, B2, and B3.* These stands are prioritized for invasive shrub management, based on their proximity to high quality, mature, oak-hickory forests. Stand B1 would benefit from invasive shrub control and also light basal area thinning (70-80% stocking) to promote stand vigor, especially in oaks. No additional midstory thinning is desired, in order to keep invasive plants at bay. Similarly, Stands B2 and B3 would also benefit from invasive shrub control with thinning to promote oak and other beneficial hardwoods (without midstory removal thinning). B2 and B3 could be thinned either using Crop Tree Release (CTR) or through Basal Area Thinning (BAT).

Lower Priority Stands: *B4, B5:* Both B4 and B5 would benefit from invasive shrub control prior to thinning. Stand B4 could be additionally thinned with either a light basal area thinning, or by using a light crop tree release (prioritizing mast trees). B5 should be thinned using crop tree release around bur oak (and other beneficial mast trees).

Stands specified for CTR thinning only are done so to keep shade on site to reduce invasive plant pressure.

Forest Type BLF-1: Bottomland Hardwood Field
(2.1 acres): This small area consists of an abandoned field in the floodplain of Long Creek. The area is growing up into an excellent mixture of native bottomland hardwood saplings (cottonwood, black willow, silver maple). This stand should be managed for dense early successional forest cover. The only recommendation for management at this point is to spot treat invasives ASAP, before they become established within the field.

Forest Type C - Young Hardwoods with Second Growth Bur Oak

Stands (acres): C1 (5.1), C2 (17.8)

Site/Forest Description: This forest type is similar in structure to forest type B, however, second growth, pole-sized bur oak are scattered throughout the overstory. The overstory is dominated by pole-sized trees of the following species: shingle oak, black cherry, shagbark hickory, honey locust, hackberry, 2nd growth bur oak (multi-stemmed stump sprouted trees), and American elm. There are occasional Osage Orange trees within the midstory layer. The understory is similar to forest type B and contains the following: coralberry, gooseberry, black raspberry, blackberry, bellflower, stickseed trefoil, agrimony, Virginia creeper, and oak regeneration. Muliflora rose is the most common invasive plant in these stands.

Management Recommendations: The objective of management in these two stands is to correctively prune and release suppressed bur oak trees. Stand C1 would benefit from invasive shrub control first, followed by a light crop tree release thinning for bur oak. If possible, small and stunted bur oak should be correctively pruned to one leader to increase growth rates. If trees are larger than 4" in diameter, corrective pruning should be avoided. Stand C2 would also benefit from invasive shrub control, followed by basal area thinning to 70-80% for bur oak and black oak (and beneficial cohorts).

Forest Type D - Intermediate Second Bench Hardwoods

Stands (acres): D1 (25.1), D2 (7.2), D3 (18.8), D4 (13.2), D5 (2), D6 (6.7), D7 (8.9), D8 (16), D9 (9.5), D10 (6.8), D11 (7.1), D12 (4.8), D13 (14.5), D14 (9.6), D15 (22.1), D16 (8.6), D17 (13.8), D18 (7.3), D19 (9.7), D20 (7), D21 (2.4), D22 BL (24.7),

D23 BL (6.5), D24 BL (15.3), D25 (28.3), D26 (3.6), D27 (3.3), D28 (4.8)

Site Description: This forest type is found next to creeks and in upland drainages.

Forest Description: This forest type is also used to describe forests dominated by small sawlog- sized trees (though the stands have trees from pole sized through sawlog (18" + DBH) sized. Common overstory species include: bur oak, hackberry, black walnut, shagbark hickory, bitternut hickory, red oak, green ash, American elm, shingle oak, and American linden (aka basswood). The midstory layer varies in density from stand to stand. Midstory tree species found in this forest type consist of: hackberry, American elm, Ohio buckeye, ironwood, bitternut hickory, Osage orange, downy hawthorn (rare), red mulberry (rare). The understory layer consists of the following: coralberry, gooseberry, black raspberry, American hazelnut, bladdernut (rare), wingstem, jumpseed, bellflower, hog-peanut, jack-in-the-pulpit, nodding fescue, May apple, Indian plantain, and tree regeneration (hickory, hackberry, buckeye, and ironwood). Multiflora rose, black locust, and Amur honeysuckle are the biggest invasive species threats to these stands. Emerald ash borer has also had an effect on the green ash components of these stands, sometimes leaving large canopy gaps.

Management Recommendations: Management in both stands will focus on invasive plant control and/or keeping the sites shaded. Most of these sites are difficult to access, and are very prone to invasive species colonization (due to fertile soil and moisture availability). Multiflora rose and honeysuckle are notoriously bad along drainages and ravines like these in the region. For these reasons, unless there is a dire need to manage the stand, most stands are okay to be left as they are for this management cycle. Fire should be limited or excluded from these sites, as the trees are not adapted to the effects of fire. If fire is used, the intensity should be regulated to limit damage to tree trunks.

Highest Priority Stands: *D1, D17, D18, D20, D21, D22BL, D23BL, D24BL:* These stands are elevated in priority, because there are invasive species that are widespread and actively degrading the stand. D1 would benefit from multiflora rose control (ideally using basal bark herbicide application). D17 requires invasive shrub control (primarily honeysuckle), rehabilitation of Emerald Ash Borer death pockets (by hand planting new trees), and light basal area thinning without midstory removal. If feasible, dead ash trees within replanting areas should be retained for habitat. D18 simply requires spot treatments for honeysuckle (by hand means), so that the native bladdernut understory is not harmed. D20 requires invasive shrub control, followed by crop tree release for swamp white oak (which is very rare within DeKalb!) D7 and D21 have black locust (and other invasive shrubs), and should either be left shaded, or treated for black locust using basal bark or injection. Stands D22-D24 have massive black locust and invasive shrub infestations. D22 and D23 have black locust infestations in stands dominated by second bench hardwoods. These stands should be kept shaded, while the forest edge is treated to prevent spread into the adjacent fields (using basal bark, injection, or mowing/spraying). D24 is almost exclusively pole to small sawlog- sized black locust, with lesser quantities of other hardwoods. This stand could be considered for conversion, but the song-bird use in this stand was strangely high. An alternative would be to allow the stand to keep maturing, which will eventually leading to tree decline via *Phelinus* heart rot. The stand could then be planted with semi-shade tolerant upland hardwoods (which is what happens in black locust's native range).

Medium Priority Stands: D2, D4, D8, D10, D11, D12, D13, D14, D19: All stands listed would benefit from invasive species control prior to thinning (most are dominated by multiflora rose). D2 and D4 would benefit from crop tree release thinning to promote oak. D8 would benefit from a light basal area thinning with a partial midstory removal (to keep some shade in place). D10, D11, and D12 would benefit from a light basal area thinning without a midstory removal (as more shade is needed to suppress invasives). D13 and D14 are in need of multiflora rose control only. D25 would benefit from a light basal area thinning, and D25 would benefit from crop tree release for walnut and oak species.

Lower Priority Stands: *D3, D5, D6, D9, D15, D16, D27, D28:* Stands D3 and D5 will need invasive shrub control, but

should not be thinned (due to invasive plant pressure). D6 would benefit from basal area thinning after invasive shrub control, but this stand would also be okay if it isn't thinned for a while. D9 and D15 would benefit from crop tree release, while D16 would benefit from a light basal area thinning. D27 should be thinned via crop tree release or by light basal area thinning, focusing on promoting walnut and oak. D28 should be thinned using crop tree release, and additional midstory removal thinning is not desired.

Forest Type E - Intermediate Old Pasture Second Bench Hardwoods

Stands (acres): E1 (16.4), E2 (6.8), E3 (15.5)

Site Description: These three stands are found in the western 1/3 of DeKalb WMA, and generally reside on north/east-facing hillsides adjacent to major creeks.

Forest Description: Unlike forest type D, forest type E is dominated by sapling through small sawlog-sized trees, and most of the trees are pole-sized shagbark hickory. Within this mix, there are scattered small sawlog-sized shingle oak and bur oak (some are old growth and some are second growth). This stand is called "old pasture" based on the appearance of the understory (compacted), and the prevalence of multiflora rose. The midstory, where present, consists of suppressed hickory, and scattered Osage orange. The midstory is also unusually absent over most parts of these stands. The understory consists of: blackberry, prickly ash, multiflora rose, and bellflower (among others). Multiflora rose is the greatest current threat to these stands.

Management Recommendations: All three stands are of moderate priority for management. E1 would benefit from a spring prescribed fire (to set back MFR), followed by foliar or basal bark spot treatments for multiflora rose, followed by a light basal area thinning. E2 would also benefit from prescribed fire and spot treatments for multiflora rose, but the thinning is not recommended, due to the density of multiflora rose. D3 should be prioritized for crop tree release, focusing on oaks, after multiflora rose and Osage orange have been controlled.

Forest Type F - Intermediate Oak-Hickory

Stands (acres): F1 (24.8), F2 (22.2), F3 (10), F4 (8.2), F5 (22), F6 (6.4), F7 (10.9), F8 (13), F9 (16.5), F10 (11.2), F11 (9.9), F12 (9.1), F13 (7.1), F14 (10.3), F15 (3.5), F16 (4.9), F17 (6.4), F18 (7.2), F19 (2.1), F20 (1.1)

Site Description: This forest type is found on hill- sides and ridge tops throughout DeKalb WMA.

Forest Description: This forest type is dominated by pole to small sawlog-sized trees of the following species: shagbark hickory, white oak, bur oak, black oak, red oak, black cherry, black walnut, hackberry, red elm, and occasional basswood and American elm. There are occasional sawlog-sized trees within these stands. The midstory layer ranges from light to dense, depending on the stand. The common midstory trees include: ironwood, American elm, hackberry, gray dogwood, buckeye (lower on slopes, or in ravines), and occasional downy hawthorn. Common understory plants include: coralberry, Allegheny blackberry, sedges, bottlebrush grass, silky wild rye, Canada brome, nodding fescue, Indian plantain, dogbane, prickly ash, agrimony, anise root, and Virginia creeper. Many of these stands also have tree regeneration in the understory, which typically includes the following species: mixed oak, hickory, elm, ironwood, and black cherry. Many of these stands started developing after the Great

Depression. The biggest forest health threats to these stands are: invasive plant colonization (multiflora rose, Amur honeysuckle, and autumn olive in order of dominance), followed by forest disease (hypoxylon, oak wilt, oak decline).

Management Recommendations: All stands will require some form of understory invasive plant control prior to or in conjunction with prescribed thinning. Most stands will benefit from light basal area thinning. Some stands could use midstory removal thinning to increase understory plant diversity and tree regeneration. Other stands should have limited midstory removal, or none at all, in order to keep the site from exploding with additional invasives. A small number of the stands are indicated for crop tree release. Prescribed fire may be used as a mechanism to reduce the size of invasive shrubs prior to herbicide treatment, while also helping to promote oak regeneration.

Highest Priority Stands: *F9, F10, F13.* Stands F9 and F10 are currently within the fully stocked range and do not need additional thinning. Due to the open stand nature, the understory is becoming riddled with multiflora rose, Amur honeysuckle, and autumn olive. F13 also requires invasive species control, and is prioritized for crop tree release in order to free the limited number of oaks from the more numerous hickory trees.

Medium Priority Stands: *F1, F2, F4, F5, F6, F7, F8, F15, F16, F17, F19:* Stands F1, F2, F4, and F5 would benefit from invasive species control and a light basal area thinning. Stand F6 would benefit from basal area thinning, especially to promote stagnating second growth oak. Stands F7 and F8 would benefit from invasive species control, and basal area thinning (without midstory removal). Stands F15 and F16 require invasive species control with light basal area thinning and a midstory removal (to promote oak regeneration). Stand F17 has a honeysuckle infestation, which needs control. In addition, the only oak and cherry trees should be thinned around using a light crop tree release (no midstory removal - to limit invasive species response). Stand F19 would benefit from invasive species control and light basal area thinning, but should not have a midstory removal (again to suppress invasive species response).

Lower Priority Stands: *F3, F11, F12, F18, F10:* Stand F3 would benefit from multiflora rose control. In addition, there are understocked openings (possibly from a previous timber sale) that should be addressed by planting or ongoing multiflora rose control. Stand F11 would benefit from invasive species control, light basal area thinning, and a 50% removal of the midstory trees. The 50% removal is proposed as a means to moderate light levels within the stand for invasive plants. Stand F12 would benefit from either crop tree release thinning or basal area thinning, prioritizing oak. This stand, due to invasives, should not receive any midstory removal thinning. F18 needs invasive plant control, and would benefit from releasing groups of existing small oak regeneration to full sun (by felling patches of hickory). Finally, F20 should not be thinned at this time (due to proximity to black locust and invasive shrubs), and the focus instead should be on invasive plant control within the stand and the vicinity.

Forest Type G - Second Growth Intermediate- Aged White Oak

Stands (acres): G1 (9.1), G2 (15.9), G3 (10.6), G4 (2.7), G5 (5.5), G6 (15.6), G7 (1.5), G8 (4.5), G9 (19.2), G10 (8.5), G11 (9.9), G12 (7.4)

Site Description: This forest type is found on hill sides and ridge tops throughout DeKalb WMA.

Forest Description: This forest type is dominated by an overstory of second growth pole and small sawlog-sized white oak. Unlike forest type F (which is dominated by shagbark hickory), this stand is dominated by white oak with limited quantities of shagbark hickory. Other overstory trees in these stands may include: bur oak, black oak, red oak, shagbark hickory, and black walnut. These stands were separated from forest type F based on the dominance of white oak, and the obvious prior harvest history. The trees in forest type G are larger (small sawlog-sized), than the pole-sized hickory dominated forest type F. The midstory in this forest type is generally ironwood and American elm. The understory layer is generally sparse to light in density (due to dense overstory shading). Understory plants consist of: tree regeneration (white oak, red oak, ironwood, elm, ash, black cherry), scattered prickly ash, sedges, nodding fescue, Canada brome, bottlebrush grass, stickseed trefoil, anise root, and Virginia creeper.

Management Recommendations: Management in these stands will revolve around: invasive species control (primarily multiflora rose, Amur honeysuckle, and autumn olive) and thinning to improve forest stand health and regeneration. Thinning residues generated in these stands may be large enough to consider for "commercial thinning". This means that trees slated for thinning could be removed for harvest. Potential uses for harvested wood could include: firewood, pallet, staves, or other low grade oak wood products. **Even with a commercial thinning, at least 7 snags per acre should be created/retained in each stand for habitat.** In addition, certain stands may benefit from the use of prescribed fire to set back invasive shrubs, prior to herbicide spot treatments. Burning in oak stands should be moderated, so injury to the bole doesn't lead to additional stress, decay, or disease (oak wilt). Burning should not occur in the fall or spring following a heavy mast drop (as a way to prevent damaging seed resources for regeneration and wildlife). Finally, when thinning in this forest type (and all others) midstory removal should be excluded from ravines and upland drainages. These areas are usually the first areas to be colonized by invasive plants, and controlling the invasive shrubs in these steep areas is an ongoing management challenge.

High Priority Stands: *G1, G2, G3, G4, G9, G10, G11:* Stands G1 and G2 would benefit from immediate Amur honeysuckle and autumn olive control. After invasives are controlled within the stand and surrounding stands, the areas should be considered for a light basal area thinning and midstory removal thinning. These projects could be set up as commercial thinnings. Stand G3 will have a similar course of action, but the dominant invasive shrub is multiflora rose. Stand G4 should be prioritized for black locust and Amur honeysuckle control. Due to the aggressive nature of black locust, this stand should not be thinned until black locust is under control. Stands G9, G10, and G11 all will require pre-treatment of invasive shrubs prior to thinning. Stand G9 has pockets of oak wilt, some of which would benefit from interplanting to make sure they capture the site before less desirable trees do. Stand G10 is suited to low intensity prescribed fire use prior to invasive shrub control. Light basal area thinning (commercial thinning) and midstory removal should be used, and prioritized for areas with existing oak regeneration. G11 would also benefit from light basal area thinning/commercial thinning in combination with a midstory removal. The use of prescribed fire in these stands could be considered if the risk to regeneration and mature tree health is low. Areas with oak decline, hypoxylon canker, and young oak regeneration should be excluded from prescribed fire units.

Moderate Priority Stands: *G5, G6, G7, G8, and G12:* Stands G5, G6, and G8 should be considered for light basal area thinning/commercial thinning after appropriate spot treatments of invasive plants have been made. Stand G7, due to location, should be spot treated for invasives and lightly thinned by basal area thinning without commercial harvest. Stand G12 has many pockets of oak wilt/decline along the main drainage-way. The standing dead oaks will remain for habitat, and less susceptible tree species will be planted within the oak wilt gaps. In addition, adjacent stands are heavily infested with Amur honeysuckle and black locust. For this reason, oak wilt pocket replanting/rehabilitation is of highest priority. If basal area thinning is performed in this stand, it should be done <u>without</u> a midstory removal thinning (to limit invasive shrub colonization potential).

Forest Type H - Mixed-age Second Bench Hardwoods

Stands (acres): H1 (38.3), H2 (21.9), H3 (18.4), H4 (9.5), H5 (6.5), H6 (8.9), H7 (11.7), H8 (12.2), H9 (10.5), H10 (13.8), H11 (12.6), H12 (13.8), H13 (1.8), H14 (9.5), H15 (71)

Site Description: This forest type is found along creeks and major drainages within DeKalb WMA.

Forest Description: These forests are dominated by pole through sawlog-sized trees of the following species: cottonwood, silver maple, black willow, black walnut, American elm, hackberry, and honey locust. Green ash should also be common in these stands, but EAB has killed a large proportion of the adults. The midstory layer consists of sapling to pole-sized: American elm, box elder, Ohio buckeye, hackberry, and black walnut. The understory in most stands is dense, and consists of: nettles, golden glow, wingstem, black snakeroot, greenbrier, wild

grape, elderberry, coralberry, and gooseberry. This forest type is the most mature of all the bottomland forest types.

Management Recommendations: Harvesting is not a top priority in these stands due to the intensity of work required post-harvest to guarantee suitable regeneration. In addition, some of the stands of this forest type are currently inaccessible due to property boundaries or creek crossings. If these circumstances change, many of these stands could be prepared for harvest by controlling invasive plants and doing pre-harvest midstory and weed tree thinning. Post-harvest work would entail spot treating any residual invasive plants and weed trees, correctively pruning and protecting suitable stump sprouted trees, and interplanting additional native trees.

For the time being, most stands of this forest type have been classified as low priority, because they should remain in good condition (without intervention) for the next 10 years. There are a few stands that have been indicated as "high" priority, based on the presence of a specific invasive plant (black locust), or due to an active forest decline (EAB infestation areas).

High and Moderate Priority Stands: *H8, H9, H10, H12, H13:* Stand H8, H9, H10, H10, and H13 would benefit from immediate spot treatments for black locust, honeysuckle, and multiflora rose. These stands should be monitored over the next 10 years, and prepared for harvest if forest health conditions permit. Stand H5 would benefit from multiflora rose control, followed by a light basal area thinning. In addition, there is a large opening within this stand that needs to be rehabilitated due to EAB mortality.

Low Priority Stands: *H1, H2, H3, H4, H6, H7, H11, H14, H15:* Stands H1, H2, H12, and 13 would benefit from all around invasive shrub removal, and ongoing monitoring for future timber sales. Stand H3 also would benefit from invasive shrub control, in addition to monitoring for black locust invasion, and crop tree release thinning specifically for black walnut. Stand H4 could be considered for harvest, however, access to this stand is currently non-existent. Stand H6 requires no action, except monitoring. Stand H7 would benefit from invasive shrub control primarily on the forest edges. Stand H11 would also benefit from invasive species control, but in general should be kept shaded (unthinned).

Forest Type I - Mixed-age Upland Hardwoods

Stands (acres): I1 (16.2), I2 (3.2), I3 (11.4), I4 (17.1), I5 (6.9), I6 (26.3), I7 (24.9), I8 (34.9), I9 (35.8), I10 (15.6), I11 (28.4), I12 (21.9), I13 (23.1), I14 (14.6), I15 (4.1), I16 (6.8), I17 (6.3), I18 (7.1)

Site Description: This forest type is found upland and adjacent to major creeks and upland drainages.

Forest Description - These stands are likely the oldest of all the stands in DeKalb. The stand structure consists of scattered old growth and second growth small sawlog to sawlog-sized trees. The overstory is dominated by small sawlog and sawlog-sized: white oak, bur oak, red oak, and black walnuts. Pole-sized hickory contributes to a lot of stem density in the overstory. This cohort of hickory trees may have developed after grazing ceased in the past 60-80 years. The midstory consists of: American elm, shagbark hickory, mixed oak, Ohio buckeye (certain stands), hackberry (certain stands), black cherry (certain stands), and red mulberry (rare). The understory is similar to Forest Types F & G.

Management Recommendations: Management will be focused on: controlling invasive plants, promoting existing pockets of regeneration, and creating conditions necessary to promote new forest regeneration. There is also a handful of stands struggling with oak wilt, and these areas will need to be rehabilitated in order to retain control of the site. Like other forest types, heavy thinning and midstory removal thinnings should be avoided in drainages and ravines. In addition, prescribed fire should be used judiciously to set back invasive shrubs in a non-mast year.

High Priority Stands: *I10, I11, I12, I13, I14, I15:* Stands I10, I14, and I15 would benefit from prescribed fire, prior to invasive shrub control. These stands also need basal area thinning (to promote regeneration), and the

rehabilitation/replanting of oak wilt gaps. The location and scale of oak wilt gaps will need to be mapped prior to project initiation. I11 and I12 also require prescribed fire, invasive plant control, and basal area thinning. Stand I13 just requires invasive shrub control.

Moderate Priority Stands: *I1, I2, I3, I4, I5, I8, I9, I18:* All stands in this moderate classification will need invasive shrub control prior to thinning. Stand I1 would benefit from prescribed fire, basal area thinning, and a midstory removal. Stand I2 would also benefit from basal area thinning and midstory removal, and the thinning residues may be usable in a harvest. Stands I3 and I4 will also need basal area thinning/commercial thinning with a midstory removal to promote regeneration (except for the western ½ of stand I3, where honeysuckle is present). Stands I8, I9, and I18 would benefit from targeted basal area thinning and midstory removal to promote the oak regeneration that already exists.

Low Priority Stands: *I6, I7, I16, I17:* Stand I6 would benefit from basal area thinning and midstory removal to promote regeneration, but only after adjacent stands have been treated for invasive plants. Stand I7 is well stocked, and is in need of a partial midstory removal. Stand I16 should be left unthinned to protect an isolated colony of bladdernut shrubs, and stand I17 should be left shaded (not thinned).

Forest Type J - Savanna Unit - 37.4 acres

Site Description: This large stand is found in the eastern half of the eastern 1/3 of DeKalb (along the property boundary).

Forest Description: This stand was managed for savanna structure within the past 10 years. The understory has responded nicely with native shrubs (prickly ash, black raspberry, blackberry), native grasses (silky wild rye and bottlebrush), and tree regeneration (mixed oak, ash, ironwood, black cherry, and hickory). The overstory consists of widely spaced white oak and shagbark hickory. The midstory layer does not exist at this time.

Management Recommendations: This savanna project has basically mimicked the shelterwood harvest system, which is used to recruit oak seedlings. If establishing another generation of oaks is of importance, then the site could be allowed to regrow while suppressing non-desirable trees. This stand could also be maintained as savanna using ongoing thinning and prescribed fire. The most urgent thing to address in this stand are the sapling-sized invasive shrubs (autumn olive, Amur honeysuckle, and multiflora rose). If these shrubs are treated ASAP, the control work will be easy. If this management is delayed 5-10 years, the entire site might re-establish a midstory of invasive shrubs.

Forest Type SL - Bottomland Slough Units

Stands (acres): SL1 (10), SL2 (3.2), SL3 (41.5)

Site Description: These stands are found along the southern portion of DeKalb's segment of Short Creek.

Forest Description: SL1 and SL2 are old field areas that are succeeding into early successional forest cover (similar to BLF-1 or Forest Type A), and are also occupied by grasses. The dense forest portions of SL3 are essentially the same as Stand H. However, the forest density is naturally scattered, and savanna-like in areas (as the photo shows). Overstory trees in SL3 include: silver maple, cottonwood, black willow, box elder, American elm, green ash, hackberry, and occasional eastern red cedar and black walnut. The understory consists of: elderberry, golden glow, hog peanut, black snakeroot, wild grape, and large areas of reed canary grass.

Management Recommendations: A determination needs to be made on if SL1 and SL2 will be managed for grassland, or allowed to grow into bottomland forest cover (like BLF-1). Alternatively, these areas could be managed periodically to maintain early successional habitat, by using forestry mowing/mulching in late winter. In the short term, these fields should be scouted and treated for invasive shrubs, especially autumn olive (which is common in openings at DeKalb). No thinning-type management is needed at this time for SL3. However, the entire stand would benefit from invasive species control for the following species (in order of importance): black locust, Siberian elm (river banks), Amur honeysuckle (understory and river banks), and autumn olive (openings, and forest edge).

PR Units - Prairie Remnants in need of Restoration

There are small prairie fragments found amongst the forest of DeKalb, and these remnants are indicated on the previous forest stand map. If possible, invasive shrub removal in prairies and adjacent forest stands should be done at the same time, so the prairie management actions last longer. Examples of this would be: managing stands A6, A16, and D10 in conjunction with prairie restoration in PR5, or managing E1, A2, and D2 in conjunction with PR1.

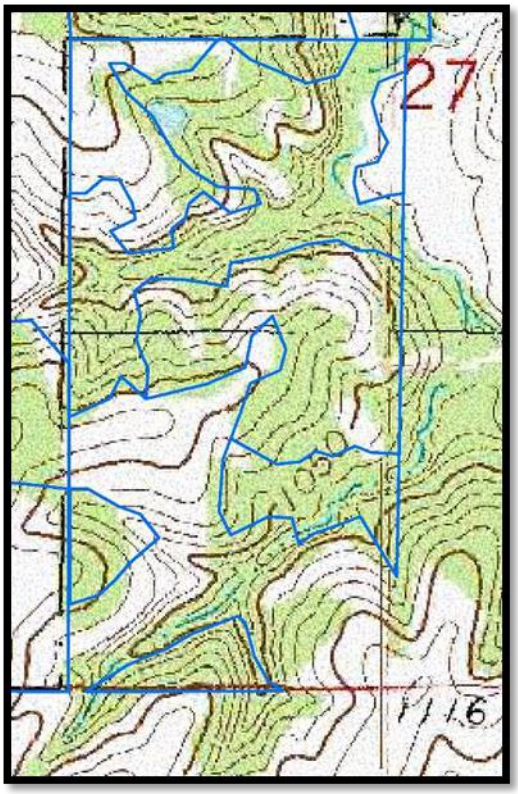
DeKalb Wildlife Management Area

Bethards Tract Addendum

Long Creek Township Section 27 Decatur County, Iowa

Prepared by: Lindsey Barney - District Forester
February 16, 2023

This 80-acre tract is currently owned by INHF, with plans for purchase by the Iowa DNR (to be added to Dekalb WMA). Please see the 2022 Dekalb Forest Habitat Management Plan for maps, stand descriptions, and special feature considerations (as they will apply to this area in the future as well).



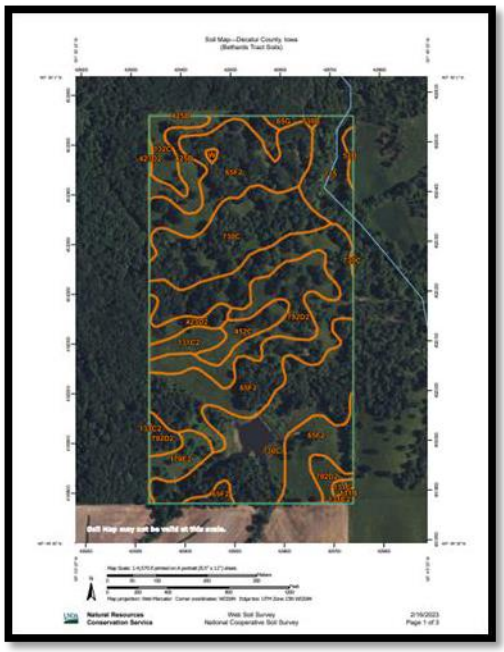
This 80-acre parcel has most recently served as pasture. Historic aerial photos are included to show the transition of this property from a closed canopied stand (in the 1930's) to its current structure (drainage woodlands with upland savanna/cool season grassland).

Description of Bethards Tract

Topography: The Bethards tract consists of moderately steep hill sides and steep ravines. The tract is drained by an unnamed perennial creek that flows north before entering Redman's creek.

Soils: Lindley clay loam (65F2 and 65G) fall on 38% of the Bethards tract. These soils are found on upland side slopes where forest cover is or was prominent. The Cantril-Coppock- Nodaway (730C) soil association makes up 28.5% of the tract, and is found in the broad drainage bottoms. The third most common soil type on this tract is Armstrong clay loam (792D2), and it is found throughout the property on shoulder slopes.

Historic Maps and Stand Information: Aerial imagery from the 1930's and 1950's is very useful for verifying areas of unusual forest structure or health (as in the case of past logging or grazing), areas of forest loss, and also areas of forest gain.



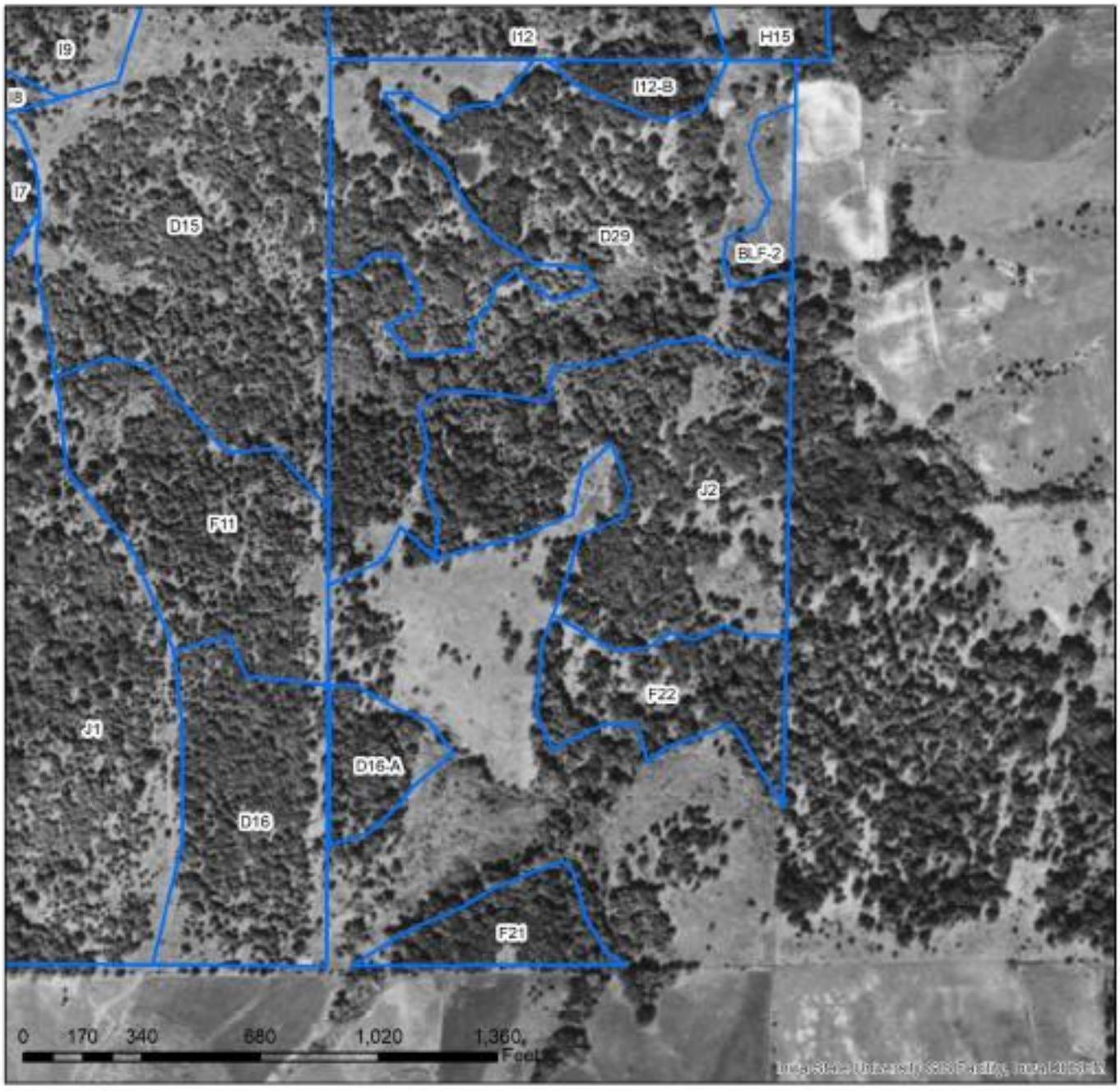
The Bethards tract has been mapped to reflect the variance in on-site forest features. Forest areas (stands) that are the same as their adjacent Dekalb WMA counterpart, will be classified as a sub-stand of the Dekalb WMA stand. For instance, Dekalb stand D16 is next to a similar, adjacent stand in the Bethards tract, so the Bethards tract stand will be referred to as D16-A (until the two plans are merged).

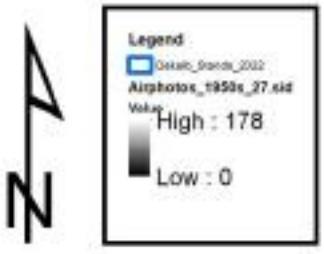
The following maps display information relating to historic landscape uses and conditions, landscape features, and current forest type delineation.

Dekalb - Future Land Purchase Addendum
1930's Imagery
Created: 2/16/2023

Created by Lindsey Barney
DNR District Forester

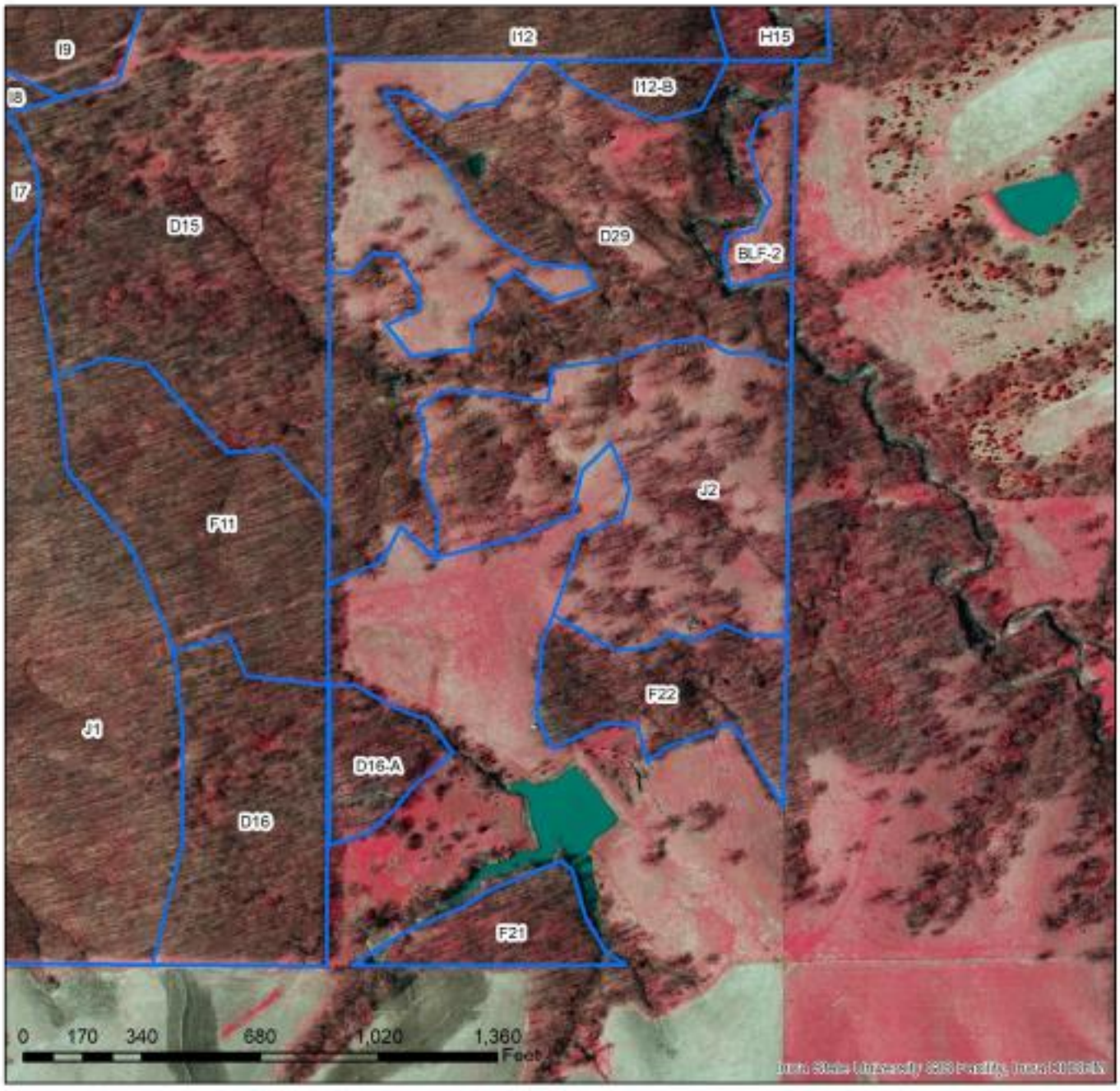
Dekalb - Future Land Purchase Addendum
1950's Imagery
Created: 2/16/2023





Created by Lindsey Barney
DNR District Forester

Dekalb - Future Land Purchase Addendum
2016-2018 CIR Imagery
Created: 2/16/2023



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Legend

Dekalb_Stands_2022

Created by Lindsey Barney
DNR District Forester

Management Recommendations for Bethards Tract

This plan outlines the current forest conditions found at the Bethards Tract, as they were mapped in January of 2023. The forest type descriptions used for Dekalb WMA's FHMP will be used to describe the forest stands on the Bethards Tract. Detailed stand data is summarized in a table at the end of this document. The stands are not assigned a year for management, as timelines and budgets constantly change. Instead, the stands are prioritized for management based on their priority forest health needs (with issues such as invasive plants, disease, stagnant stand structure, etc.).

Individual stands should be thoroughly scouted (and relevant data collected) prior to the stand being officially scheduled for management. In the case of invasive species management, adjacent stands should be scouted for issues, so they can be managed concurrent with the scheduled stand. A similar, and also desirable approach, may be to manage groups of stands in close proximity to each other, especially if they have similar forest health and/or silvicultural needs.

Specific management actions will be decided in the future planning processes of each unit/stand. These specific actions are not outlined in this plan in order to give future on-the-ground treatments more flexibility as logistical and biological conditions change.

There will be a lot of discussion about invasive plant control needs. Without repeating the treatments needed in each section, please know the following: In general, invasive shrubs can be treated using the following means: grinding with follow-up herbicide treatment, basal bark herbicide application, cut stump herbicide application, or foliar herbicide application (least preferred for applicator safety and non-target damage). Invasive suckering trees (black locust) should be controlled using methods that kill the roots of the plant first (basal bark application and/or hack and squirt herbicide application). Non-suckering invasive trees, such as Siberian elm and white mulberry, can be girdled or felled and treated with an appropriate herbicide.

Unless otherwise noted, a light basal area thinning means the stocking will be reduced to between the A and B line on the stocking chart (or ~70-90% stocking).

Forest Type BLF: Bottomland Hardwood Field (BLF-2, 2.1 acres)

This small area consists of an abandoned field in the floodplain of Bethard Tract's main drainage. The current cover, at the time of mapping, appeared to be cool season pasture grasses.

Management Recommendations: An early to mid-spring prescribed fire is recommended to set back cool season grasses and also invasive shrubs. Any invasive shrubs that remain after the fire should be spot treated from August through October/November, if possible. This area could be improved by planting dense shrubs. Dense shrub cover would help this small field serve: as a better travel corridor, as a buffer from the adjacent neighbor, as creekside water/soil protection, and for food production (browse and soft mast).

Forest Type D - Intermediate Second Bench Hardwoods

Stands (acres): D16-A (2.3 acres), and D29 (20.8) acres.

Site and Forest Description (see Dekalb FHMP): This forest type is found next to creeks and in upland drainages.

Management Recommendations: Like many other stands of this forest type, Stand D16-A would benefit from immediate invasive shrub control. While Amur honeysuckle and Autumn olive are found throughout the complex, most of the invasive shrubs in this stand are multiflora rose (and they are light/scattered).

Stand D29 covers the main drainage area of the entire Bethards tract. The midstory consists of: ironwood, buckeye, Osage orange, and eastern red cedar. Multiflora rose and amur honeysuckle should be controlled, as soon as feasible (at least from the assessable edges). Osage orange should be girdled for felled and treated with herbicide, at the same time.

The adjacent uplands will likely be managed with fire which should help set back invasive shrub and ironwood/buckeye encroachment out onto the grassland. **Ironwood and buckeye** should be retained in the midstory of this stand, as a way to naturally suppress invasive shrubs. These drainages will be extremely challenging to manage, if invasive shrub cover became more widespread.

Forest Type F - Intermediate Oak-Hickory

Stands (acres): F21 (2.8), and F22 (4.9)

Site and Forest Description (see Dekalb FHMP): This forest type is found on hill sides.

Management Recommendations: Stand F21 would benefit from an early spring prescribed fire (to set back multiflora rose), followed by spot treating any residual invasive shrubs. This stand would also benefit from a light basal area thinning, with a focus on promoting oak in the residual stand. If rose can be controlled prior to thinning, a midstory removal may also be incorporated into the thinning regimen.

Stand F22 has a heavy multiflora rose infestation. This stand would benefit from: early spring prescribed fire, followed by basal bark treatment of invasive shrubs from August through October/November. After the first round of invasive shrub control, the stand could be considered for a light basal area thinning, **without** a midstory removal.

Forest Type I - Mixed Age Upland Hardwoods

Stands (acres): I12-A (1.3 acres)

Site and Forest Description (see Dekalb FHMP): This forest type is found upland and adjacent to major creeks and upland drainages.

Management Recommendations: Use the same prescription given to Dekalb Stand I12, which is: prescribed fire to set back invasive shrubs, followed by spot treating invasive shrubs (which are worst in openings and along the forest edge), followed by basal area thinning with or without midstory removal.

Forest Type J - Savanna - Stand J2 (15.1 acres):

Site and Forest Description: This large stand is found in the core of the Bethards tract. This stand consists of widely scattered “wolf” or open grown bur oak, white oak, and shagbark hickory. The understory consists of cool season grasses (fescue), and pockets of prickly ash and multiflora rose.

Management Recommendations: Most of the work in this stand will focus on converting cool season grasses to native warm season grasses (which Biologist Chad Paup will be directing/prescribing). As for invasive plant (and non-desirable woody plant) control, early to mid-spring prescribed fire should again be used, followed by spot treatments for invasive shrubs. The terrain on this stand may also be suitable to forestry mowers/mulchers for invasive shrub control, so long as follow-up sprout spraying can be implemented at the same time or within the same year. Summer invasive shrub control work should be avoided, as a way to limit disturbance to nesting birds (especially wild turkey).

Summary of All Forest Stands:
Stands are prioritized based on management need. In general, stands with severe forest health issues will be prioritized as needing treatment in the short term (high priority). Stands that are relatively healthy, as is, are ranked as low priority. In general, High priority stands should be addressed as soon as possible (within 10 years). Stands highlighted in yellow are specific to Bethards Tract Addition.

Key to Acronyms: BAT = Basal Area Thinning, CT = Commercial Thinning, CTR = Crop Tree Release Thinning, RXF - Prescribed Fire, IUS = Invasive Understory Shrub Control, MSR = Mid Story Removal, PR = Prairie Restoration, OW = Oak Wilt, EAB = replant EAB loss areas, AH = Amur Honeysuckle, AO = Autumn Olive, MFR = Multiflora Rose, BL = Black Locust, SE = Siberian elm

Forest Type	Stand ID	Acres	Management	Priority
A - Young Second Bench Hardwoods	A1	3.9	IUS, CTR on walnut & cherry	Low
	A2	8.1		
	A3	14	IUS	
	A4	3.1	IUS, CTR, Limit RXF	
	A5	1.1		
	A6	5.1	CTR for bur oak w/o MSR	
	A7	6.8	No thinning or light CTR	
	A8	18	IUS/Conversion (grassland site)	High
	A9	11	IUS, CTR for Oak	Moderate
	A10	3.4	IUS, light CTR	Low
	A11	19.6	IUS, Conversion (forest site)	High
	A12	24.5	IUS, light CTR for oaks	Low
	A13	7.4	IUS (AO, AH, MFR, SE)	High
	A14	1.6	IUS (AO, AH, MFR, SE)	
	A15	7	IUS	Low
	A16	15	IUS, no thinning	Moderate
Abandoned field with bottomland Hardwoods	BLF-1	2.1	IUS & no thinning	Moderate
	BLF-2	1.4	RXF, IUS, plant shrubs	Low
B - Young Upland Hardwoods	B1	8.7	IUS, light BAT w/o MSR	High
	B2	1.5	IUS with BAT or CTR w/o MSR	
	B3	4.8		
	B4	15.7	IUS with BAT or CTR for mast trees	Moderate
	B5	4.4	IUS & CTR for oak	
C - Young Second Growth Bur Oak	C1	5.1	IUS & CTR for bur oak	
	C2	17.8	IUS & BAT for bur & black oak	
D - Intermediate Second Bench Hardwoods	D1	25.1	IUS (MFR), no thinning	High
	D2	7.2	IUS (MFR) & light CTR for oak	Moderate
	D3	18.8	IUS (forest edge)	Low
	D4	13.4	IUS (MFR) & CTR for bur oak	Moderate
	D5	2	No thinning - keep shaded	Low
	D6	6.7	IUS with BAT or keep shaded	
	D7	8.9	IUS (MFR, BL) - keep shaded	High
	D8	16	IUS (MFR) with BAT & 50% MSR	Moderate
	D9	9.5	IUS & CTR for oak w/o MSR	Low
	D10	6.8	IUS (MFR) & BAT w/o MSR	Moderate

Forest Type	Stand ID	Acres	Management	Priority
	D11	7.1	IUS (MFR) & BAT w/o MSR	
	D12	4.8	IUS (MFR) & BAT w/o MSR	
	D13	14.5	IUS (MFR)	
	D14	9.6		
	D15	22.1	IUS (MFR) & CTR	Low
	D16	8.6	IUS & light BAT	Low
	D16-A	2.3		
	D17	13.8	IUS (AH), replant EAB GAPS, BAT w/o MSR,	High
	D18	7.3	IUS (AH), preserve bladdernut	
	D19	9.7	IUS & light BAT	Moderate
	D20	7	IUS & CTR for swamp white oak	High
	D21	2.4	BL Control, or no thinning	
	D22BL	24.7	IUS (BL & others) & keep shaded	
	D23BL	6.5		
	D24BL	15.3	IUS (BL & others) & consider conversion	
	D25	28.2	IUS, light BAT	Moderate
	D26	3.6	IUS (AH/MFR), CTR for walnut & oak	
	D27	3.3	IUS (AH/MFR) & CTR/BAT for walnut & oak	Low
	D28	4.8	IUS & CTR w/o MSR	
	D29	20.8	IUS, no MSR	
E - Intermediate Old Pasture Hardwoods	E1	16.4	RXF, IUS (MFR), light BAT	Moderate
	E2	6.8	RXF, IUS (MFR)	
	E3	15.5	IUS (MFR & Osage orange), CTR for oak	
F - Intermediate Oak-Hickory	F1	24.8	IUS (MFR) & BAT	Moderate
	F2	22.2		
	F3	10	IUS (MFR) and address understocked openings	Low
	F4	8.2	IUS, reduce RXF use, light BAT	Moderate
	F5	22	IUS (BAT) with light BAT	
	F6	6.4		
	F7	10.9	IUS, light BAT w/o MSR - reduce hypoxylon	
	F8	13	IUS and light BAT w/o MSR	
	F9	16.5	IUS	High
	F10	11.2		
	F11	9.9	IUS, BAT with 50% MSR	Low
	F12	9.1	IUS, CTR or BAT for oak, no MSR	
	F13	7.1	IUS, CTR for oak	High
	F14	10.3	IUS, light BAT with 50% MSR	Low
	F15	3.5	IUS, light BAT with MSR to increase regeneration	Moderate
	F16	4.9	IUS, light BAT with MSR to increase regeneration	
	F17	6.4	IUS (AH), CTR for oak & cherry w/o MSR	Moderate
	F18	7.2	IUS & identify pockets of oak regen & release to sun	Low
	F19	2.1	IUS, BAT for oak w/o MSR	Moderate
	F20	1.1	IUS (AH), no thinning	Low

Forest Type	Stand ID	Acres	Management	Priority
	F21	2.8	RXF, IUS, light BAT with MSR	Low
	F22	4.9	RXF, IUS, light BAT w/o MSR	Moderate
G - Second Growth White Oak	G1	9.1	IUS (AH/AO) with light BAT/CT to reduce hypoxylon	High
	G2	15.9		
	G3	10.6	IUS (MFR) & BAT/CT	High
	G4	2.7	IUS (BL & AH) before BAT	
	G5	5.5	IUS (MFR) & BAT/CT	Moderate
	G6	15.6	IUS (MFR) & BAT/CT	Moderate
	G7	1.5	IUS & BAT only	
	G8	4.5	IUS with CT/BAT on ridges only	
	G9	19.2	IUS, OW replanting, and BAT/CT with MSR	High
	G10	8.5	IUS with RXF & BAT/CT where regen is present	High
	G11	9.9	IUS, BAT/CT with MSR outside of drainages	High
	G12	7.4	IUS, OW replanting, BAT/CT w/o MSR	Moderate
H - Mixed Age Second Bench Hardwoods	H1	38.3	IUS, monitor for future TS	Low
	H2	21.9	IUS, monitor for BL & future TS	
	H3	18.4	IUS, keep shaded, monitor for BL, CTR for walnut later	
	H4	9.5	Prep for future TS	
	H5	6.5	IUS (MFR), light BAT, EAB gaps	Moderate
	H6	8.9	Monitor, no action needed	Low
	H7	11.7	IUS on forest edge	
	H8	12.2	IUS for BL/AH/MFR & monitor for future TS	High
	H9	10.5		
	H10	13.8		
	H11	12.6	IUS & no thinning	Low
	H12	13.8	IUS for BL/AH/MFR & monitor for future TS	High
	H13	1.8		High
	H14	9.5	IUS & monitor for future TS	Low
	H15	71		
I - Mixed Aged Upland Hardwoods	I1	16.2	IUS with RXF, BAT with MSR	Moderate
	I2	3.2	BAT/CT with MSR for regen	
	I3	11.4	IUS (MFR), BAT/CT with MSR except in west ½ of I3	
	I4	17.1		
	I5	6.9	IUS	
	I6	26.3	IUS, BAT with MSR	Low
	I7	24.9	IUS, partial MSR	
	I8	34.9	IUS, BAT with MSR to release oak regen	Moderate
	I9	35.8		
	I10	15.6	IUS & RXF, BAT with MSR, OW replanting	High
	I11	28.4	IUS, RXF, BAT with MSR on ridges	
	I12	21.9		
	I12-A	1.3	RXF, IUS, BAT with MSR on ridges	
	I13	23.1	IUS	

Forest Type	Stand ID	Acres	Management	Priority
	I14	14.6	IUS, BAT with OW replanting	
	I15	4.1		
	I16	6.8	IUS, leave shady for bladdernut	Low
	I17	6.3	No thinning	
	I18	7.1	IUS, BAT with MSR to release oak regen	Moderate
J - Savanna Restoration	J	37.4	IUS	High
	J2	15.1	RXF, IUS	High
SL - Bottomland Slough	SL1	10	IUS, decide long-term vegetation plan for site	Moderate
	SL2	3.2		
	SL3	41.5	IUS, Limit fire to allow tree growth, scout for AH & BL	High

Appendix 1 - Woodland Species of Greatest Conservation Need at DeKalb WMA based on MSIM and NAI data]

Submitted by Katy Fullin - State Wildlife Action Plan Manager:

Taxa	Forest Associated SGCN	Open Woodland Associated SGCN	Shrubland Associated SGCN
Amphibian	Eastern Gray Treefrog	Cope's Gray Treefrog	
Amphibian	Woodhouse's Toad		
Bird	Bald Eagle	Swainson's Hawk	Northern Bobwhite
Bird	Red-shouldered Hawk	Barn Owl	Brown Thrasher
Bird	American Woodcock	American Woodcock	Field Sparrow
Bird	Yellow-billed Cuckoo	Yellow-billed Cuckoo	Yellow-billed Cuckoo
Bird	Black-billed Cuckoo	Black-billed Cuckoo	Black-billed Cuckoo
Bird	Whip-poor-will	Whip-poor-will	Harris's Sparrow
Bird	Red-headed Woodpecker	Red-headed Woodpecker	American Tree Sparrow
Bird	Northern Flicker	Northern Flicker	Golden-winged Warbler
Bird	Peregrine Falcon	Eastern Kingbird	Eastern Kingbird
Bird	Eastern Wood-pewee	Bell's Vireo	Bell's Vireo
Bird	Olive-sided Flycatcher	Eastern Meadowlark	
Bird	Acadian Flycatcher	Baltimore Oriole	
Bird	Golden-winged Warbler	Golden-winged Warbler	
Bird	Wood Thrush		
Bird	Canada Warbler		
Bird	Prothonotary Warbler		
Bird	Kentucky Warbler		
Bird	Cerulean Warbler		
Bird	Broad-winged Hawk		
Bird	American Kestrel		
Butterfly	Hickory Hairstreak	Hickory Hairstreak	
Butterfly	Hayhurst's Scallopwing	Hayhurst's Scallopwing	
Butterfly		Northern Broken-dash	
Mammal	Northern Long-eared Bat	Northern Long-eared Bat	
Mammal	Indiana Bat		
Mammal	Silver-haired Bat		
Mammal	Evening Bat		
Mammal	Gray Fox		
Reptile	Smooth Earth Snake	Prairie Kingsnake	