Woodland Stewardship Plan

Prepared for:
Wade Kallhoff & Nicole Evans
1035 Smith Ave.
Owatonna, MN 55060
507-530-7507
wade@wmk.io

Plan Date: August 8, 2024

Legal Description:
E 30 acres SW 1/4 NE 1/4 Section 7
Township 106 Range 21
Steele County

County	PID#	Deeded Acres*	Stewardship Acres	Non- Stew. Acres	2C Acres Estimated	SFIA Acres Estimated
Steele	06-007-1300	30	30	0	30	30
	Total	**30**	**30**	**0**	**30**	**30**

**Rounded by parcel.*

Prepared by:
Jaden Bjorklund- #3061
Northland Habitat LLC
1056 Tamarack Lane
Lino Lakes, Minnesota 55014

Phone: 651-315-3435
E-mail: *jaden@northlandhabitat.com*

The forest stewardship goals for this property are:

- Maintain forest health while managing optimal habitat for wildlife and biodiversity.
- Remove invasive species and encourage young oak and walnut growth.
- Harvest and/or thin mature timber to increase forest health, wildlife habitat, and/or create regeneration for more natural forage.
- Maintain open areas and restore oak savanna for early successional habitat and forage for wildlife.
- Provide a diverse area for wildlife including forest cover, lowland, and open areas.

Table of Contents

Property Description 3
Location & Access 3
Surrounding Area 3
Rare Species & Cultural Features 4
Covertypes Delineated 4
Forest Health 4
Soils 5
Ecological Classification System 6
Native Plant Communities 8
Explanation of Timber Summary Chart 10
Type #1 Harvested Hardwoods 11
Type #2 Ash Lowlands 19
Type #3 Open/ Brush Area 22
Incentive Programs 28
The Sustainable Forestry Incentive Act (SFIA) 28
2c Managed Forest Land 28
Cost Sharing Opportunities 28
Timber Sale Overview 28
Project Summary 29
Map of Stewardship Parcel 31

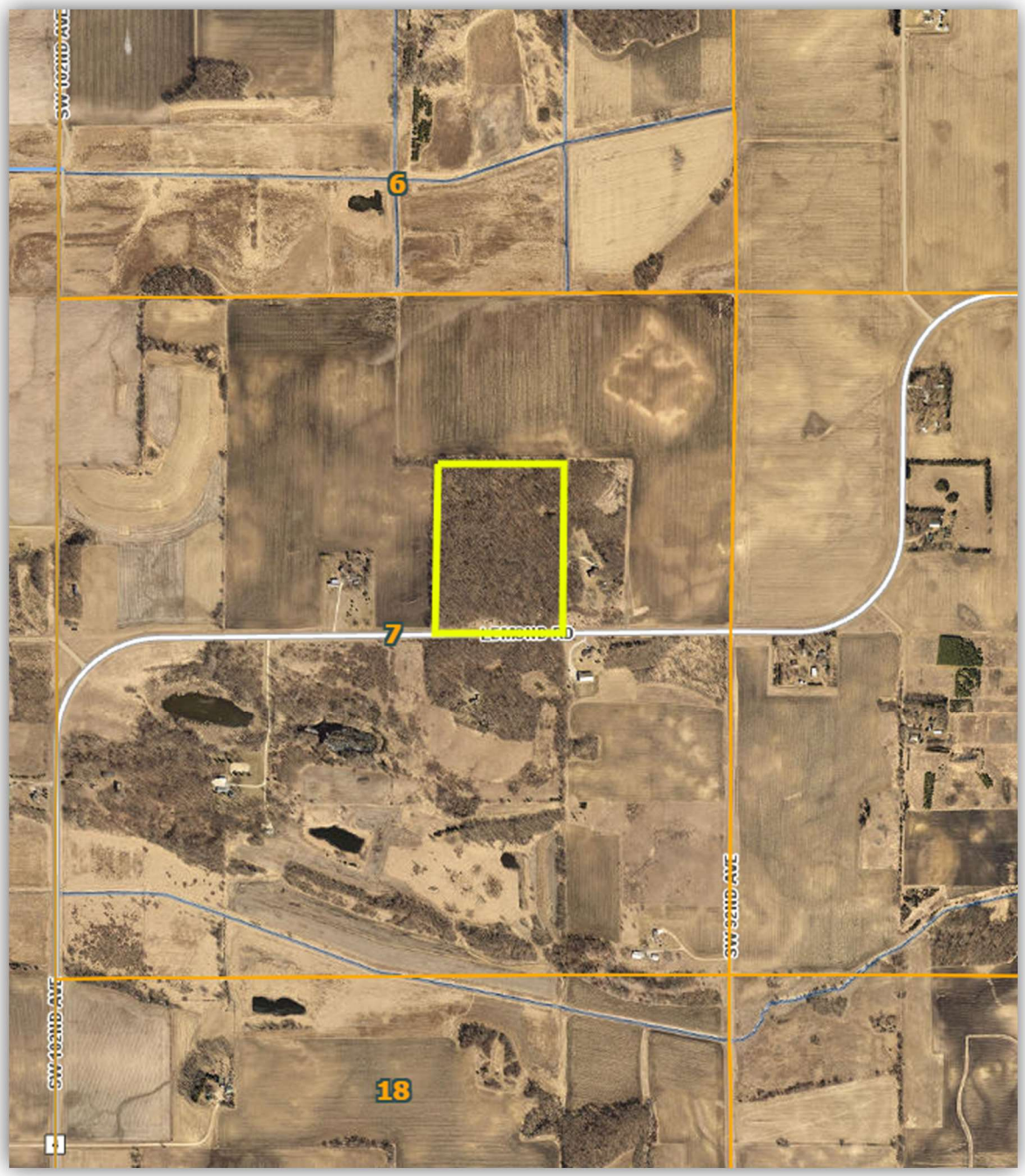
PROPERTY DESCRIPTION

Location and Access

This property is located about 9 miles southwest of Owatonna. Access to the property is good with Lemon Road bordering the southern boundary that allows access. Interior access is good with some maintained trails on the property and old logging roads. The landowner does not live on the property.

Surrounding Area

The surrounding area is mostly woodlots and agriculture, spotted with some wetlands and creeks. The natural upland forests of this region are predominantly hardwoods. The adjacent acreage is privately owned. The main drainage in the area is the Little Le Sueur River that flows less than a mile south of the property. The property is part of the Le Sueur River Watershed.



Rare Species and Cultural Features

Although rare plants, animals, and/or cultural features may exist in the area, none were seen on this property. The Minnesota Natural Heritage Database was consulted, and there were no important rare or cultural features listed for the property as well. This does not mean that they do not exist here, but simply there is no recorded data of such.

Covertypes Delineated

Covertypes are areas within the property boundaries with similar vegetation composition, structure, and age. Pockets may exist within the delineated boundaries where the composition differs slightly. However, in some cases it is impossible to map variations smaller than one acre.

This Woodland Stewardship Plan covers three different covertypes:

Type #	Cover type	Stewardship Acres	Non- Stew. Acres	Page
1	Harvested Hardwoods	26	0	#11
2	Ash Lowlands	3	0	#19
3	Open/Brush Area	1	0	#22
	Total	**30**	**0**	

Each covertype is described in detail and contains the following information: how many acres; average tree age; Native Plant Community classification; vegetation composition; and size and stocking of the dominant timber species. The stewardship objectives are identified and recommendations are made to meet the landowner's objectives. Additional and/or alternative objectives and recommendations may be provided as well. Finally, each covertype will include a reference to the black *Woodland Stewardship Plan, Forest Treasures* ringed binder where the landowner can clarify or obtain more information on the topics discussed in that covertype.

Property Map and Summary

Found on the last page(s) there is an aerial photograph overlaid with a map depicting the boundaries of each covertype. There is also a Project Summary page containing an overview of the recommendations for each covertype and a timeframe when these recommendations should be put into practice as well as a page explaining special programs available and timber sale management considerations.

Forest Health

Emerald ash borer is an invasive wood-boring beetle that attacks all species of ash trees that exist in Minnesota. It was first introduced into the United States on shipping crates from China, where it is a native species. Since its first detection in Michigan in 2002, it has spread to most states east of the Mississippi and a number of states west of the Mississippi. It is expected that wherever ash trees are present, EAB will eventually show up and cause widespread mortality. EAB moves to new areas when humans carry it there, usually on firewood.

Oak wilt is a fungal disease that impacts oak trees. Oak wilt kills red oak and can affect white oak as well. This is a fungus that enters through wounds on oak trees. Prevention is the best strategy. The fungus is spread mostly by beetles that are most active from April 15th to July 15th. Avoid harvesting operations or otherwise wounding oak trees during this time period.

If you are concerned about tree diseases on your property visit the link here and reach out to your forest health specialist: https://www.dnr.state.mn.us/treecare/forest_health/forest-health-contacts.html

Soils Present on the Property:

The foundation of your habitat type will depend on the soil of your property. Soil is what will influence what vegetation is on the landscape. Taking care of your soil will allow for a healthy ecosystem and a healthy forest for years to come.

Attached with this Woodland Stewardship Plan (paper copy) are full descriptions of the soil types that are found on your forested acreage. The numbers in the chart below correspond with the soil type descriptions. The letters at the end of the soil type number (if any) are a slope percent range indicator with "A" being the lowest slope percent.

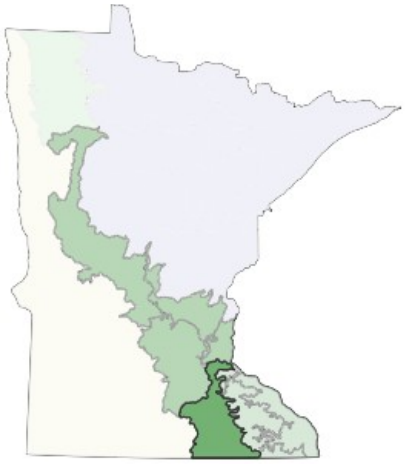
Steele County, Minnesota (MN147)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Gc	Glencoe clay loam, 0 to 1 percent slopes	4.6	15.9%
L78A	Canisteo clay loam, 0 to 2 percent slopes	1.5	5.3%
L113B	Reedslake-Le Sueur complex, 1 to 6 percent slopes	1.0	3.5%
LlC	Lester loam, 6 to 10 percent slopes	17.9	61.5%
LlC2	Lester loam, 6 to 10 percent slopes, moderately eroded	0.5	1.8%
Wt	Webster clay loam, 0 to 2 percent slopes	3.5	12.0%
Totals for Area of Interest		**29.2**	**100.0%**

See attachments for full soil map.

ECOLOGICAL CLASSIFICATION SYSTEM

The **Ecological Classification System** (ECS) is a tool for the management of natural resources based on a nationwide mapping system. The three upper levels in the Minnesota ECS are: Province, Section, and Subsection. This property is primarily within the Eastern Broadleaf Forest *Province*; The Minnesota and Northeast Iowa Morainal S*ection*; and the Oak Savanna S*ubsection* (described below).

The actual boundaries for the subsections are not as sharp as the lines on the map may imply: islands of one type may lie inside another. The purpose of providing this ecological information is to help assemble a picture of how this land and its management fit into the larger landscape.



THE OAK SAVANNA SUBSECTION

The western boundary of this subsection consists of a series of end moraines that disrupted the spread of prairie fires from the west but did not provide sufficient protection for hardwood forests to become established. The subsection is bounded on the east by land dominated by hardwood forest. This boundary coincides with a increase in loess thickness. The northern boundary separates calcareous gray Des Moines lobe glacial till from red Superior lobe glacial till.

Much of this subsection is a rolling plain of loess-mantled ridges over sandstone and carbonate bedrock and till. At the southwestern edge of the subsection are moraine ridges. They are a continuation of those present in the Big Woods subsection, but smaller. As a result, fires from the surrounding prairies to the south, west, and east burned the landscape frequently enough to maintain oak opening rather than forest (Albert 1993). Presently, most of the subsection is farmed.

Landform

Much of the subsection is a loess plain over bedrock or till. Also included are Late Wisconsin end moraines, stagnation moraines, and outwash. Topography is gently rolling. The subsection contains few lakes. Stagnation moraines in the southwest are not large, but slopes are often steep.

Bedrock geology

Glacial drift is generally less than 100 feet thick within the subsection, with maximum thickness of about 200 feet (Olsen and Mossler 1982). Ordovician and Devonian dolomite (some limestone, sandstone, and shale) is locally exposed, especially in the dissected stream valleys at the eastern edge of the subsection (Morey 1976, Olsen and Mossler 1982).

Soils

The soils of the subsection are a mosaic of Mollisols and Alfisols. Alfisols correlate with savanna and forest vegetation, and Mollisols correlate with either upland prairie on relatively flat ridgetops or wetland prairies in broad depressions. Common soils include Aquolls (wet soils developed under prairie vegetation), Udolls (well-drained soils developed under prairie vegetation), Udalfs (well-drained soils formed under forest vegetation), and Aqualfs (wet soils developed under forest vegetation) (Cummins and Grigal 1981).

Climate

Annual normal precipitation ranges from 28 inches in the north to 31 inches in the south, and growing season precipitation ranges from 12.5 to 13 inches. The average growing season length ranges from 146 to 156 days.

Hydrology
Most of this subsection has a fairly well developed drainage network. This is due to the nature of landforms within the unit. There are few lakes; but they are present in the moraines that form the western edge of the subsection.

Presettlement vegetation

Bur oak savanna was the primary vegetation, but areas of tallgrass prairie and maple-basswood forest were common. Tallgrass prairie was concentrated on level to gently rolling portions of the landscape, in the center of the subsection. Bur oak savanna developed on rolling moraine ridges at the western edge of the subsection and in dissected ravines at the eastern edge. Maple-basswood forest was restricted to the portions of the landscape with the greatest fire protection, either in steep, dissected ravines or where stream orientation reduced fire frequency or severity (Albert 1993).

Present vegetation and land use
Presently, most of the area is farmed. Urban development is accelerating along the northern boundary.

Natural disturbance
Fire is the most important disturbance within the subsection. Tornados and high wind events also created significant disturbances. Periodic flooding occurs in river and stream valleys.

Conservation Concerns
Species in Greatest Conservation need for the Oak Savanna Subsection (PDF)

NATIVE PLANT COMMUNITIES

The native plant community (NPC) is the final break down using the Minnesota Ecological Classification System**.** *The Field Guide to the Native Plant Communities of Minnesota – The Eastern Broadleaf Forest Province* was developed by the Minnesota Department of Natural Resources. This guide describes each native plant community found in central and southeast Minnesota. For more information on this guide, visit the DNR web site: *www.dnr.state.mn.us /npc/index.html*.

Native plant communities are categorized by the native plants in an area and their interaction with each other and with their environment – not greatly altered by modern human activity or by introduced organisms. Native plant communities are classified considering vegetation, hydrology, landforms, soils, and natural disturbance regimes (i.e. wildfires, severe droughts, windstorms, and floods). Assigning an NPC for a given covertype or area tells us what plants will naturally take over the area and what will occur as natural succession continues.

Areas that have been significantly altered by farming, overgrazing, non-sustainable logging, and development or where native species have largely been replaced by exotic or invasive species as well as orchards, pine plantations, golf courses, and lawns are not classified into native plant communities. However, if left idle and given enough time, these areas may possess some of the original plant species.

The native plant communities for the *upland* forests on this property is made up of the Southern Wet-Mesic Hardwood Forest - MHs49 and is described below. The lowland NPC areas (wetlands, wet forests, and/or rivers/streams) are described within their covertypes.

SOUTHERN WET-MESIC HARDWOOD FOREST - MHS49

This plant community occurs on rich, wet-mesic lowland hardwood forests on level silty alluvium in stream valleys and on level glacial till bordering lakes. Sites are protected from fire, and soil remains moist throughout the growing season.

Landscape Settings and Soils

Stream valleys and stagnation moraines — Common. Present on modern alluvium in rugged landscapes, including dissected sedimentary bedrock terrain, stagnation moraines, and deep tributary stream valleys of major rivers. Local relief is sufficiently high for alluvium to be deposited as terraces, fans, and benches at toes of slopes. Parent material is silty on the surface with complex stratification of silt, coarse sand, gravel, and buried organic matter below. Soil is

typically leached of free carbonates. Soil colors 50-80in (125-200cm) deep indicate prolonged periods of saturation. Soils are moderately well drained. Soil moisture regime is moist to very moist. (Anoka Sand Plain, Big Woods, and Oak Savanna in MIM; PPL; Minnesota River Prairie in CGP)

Moraines and till plains — Occasional. Present on lake peninsulas, benches along lakeshores, and as wet inclusions on low sites within larger areas of Mesic Hardwood Forest Communities. Parent material is clayey to loamy, calcareous till with free carbonates present below 30-40in (75-100cm). Clayey subsoil horizons and generally fine-textured parent material help to perch snowmelt and rainfall near the soil surface. Most soils have rather black surface horizons, suggesting a past history of prairie on these sites. Gray soil colors or mottles are commonly present but at depths greater than 30in (75cm). Soils are moderately well drained. Soil moisture regime is moist to very moist. (Big Woods and Oak Savanna in MIM; Minnesota River Prairie in CGP)

Vegetation Structure & Composition

The **ground-layer** cover is mostly continuous (75–100%). Important species include false rue anemone, blue phlox, common blue violet, hispid buttercup, appendaged waterleaf, Virginia spring beauty, tall coneflower, white trout lily, yellow trout lily, white bear sedge, and hairy-leaved sedge. Other common and often abundant species include Virginia waterleaf, cleavers, and wood nettle.

The **shrub-layer** cover is variable, ranging from sparse to continuous (5–100%); typical species are chokecherry, Missouri gooseberry, basswood, sugar maple, black ash, hackberry, bitternut hickory, American elm, red elm, and rock elm.

The **subcanopy** cover is generally patchy to continuous (25–100% cover) with sugar maple, basswood, hackberry, ironwood, black ash, and elms.

The **canopy cover** cover is mostly interrupted to continuous (50–100%). Species composition is variable, but basswood, black ash, sugar maple, American elm, red elm, rock elm, green ash, hackberry, box elder, and bur oak are common. Butternut and black walnut are present in some stands.

Natural History

In the past, catastrophic disturbances were rare in MHs49. An analysis of Public Land Survey records indicates the rotation of catastrophic windthrow was in excess of 1,000 years, and there were no references to fire.1 Events that result in partial loss of trees, especially light surface fires, were much more common, with an estimated rotation of about 160 years. There are almost no compositional changes among historic age classes in the community. Young, mature, and old stands were all dominated by elm—probably including American, red, and rock elm—mixed with lesser amounts of basswood and sugar maple. Because of Dutch elm disease, elms (especially American elm) are less abundant today than historically. In contrast, black ash is common in modern forests across much of the range of the community, but was a minor component in historic records.

EXPLANATION OF TIMBER SUMMARY CHART

Within each forested covertype there is a **Timber Summary** (or **Regeneration Summary**) chart with the dominant tree species names, percentage of cover, average DBH, and basal area (or stems per acre) along with stocking, site index, and timber size class. The definition of these terms follows:

Average Diameter at Beast Height (DBH)

DBH is the average diameter of each tree species at breast height (4.5 feet).

Basal Area/Acre

Basal area (BA) is the cross-sectional area (in square feet) of a tree's bole at breast height. The total of all trees in an acre will give the basal area per acre. Each tree in each acre for each forest type is not actually measured, rather estimated.

Basal area is used to estimate stand volume and is a useful measure of the degree of competition in the stand. For example: a BA below 80 sq. ft./acre usually means low overstory stocking while normal stocking is usually between 110 to 160 sq. ft./acre. Once the BA is over 170 sq. ft./acre stocking is becoming too high and competition between the trees is restricting growth. Higher soil productivity can hold a higher BA than less productive soils. However, a lower BA below 80 sq. ft./acre isn't necessarily a bad thing. A lower BA will mean increase sunlight to the forest floor which will increase habitat and forage for wildlife. If you are managing for wildlife, you do want areas with lower BA.

Cords/Acre

A cord is described as a stack of wood 8ft long, 4ft high, and 4ft wide. A normal range of volume estimates per acre is 1-45 cords.

Stems/Acre

Total stems (seedlings or saplings) estimated per acre.

Stocking

Stocking is the total of all basal areas or stems/acre.

Site Index (SI)

Site index is the relative measure of forest site quality based on the height of a dominant, main species tree in the overstory at a specific age (50 years). Using the current age and height of a given tree, the SI is estimated using a chart for that species. Each species has a slightly different chart.

An SI of 62 means the tree should be (or probably was) 62 feet tall at 50 years of age. For example: an aspen tree with an SI of 90 is very good while an SI of 45 is poor; a tamarack tree with an SI of 60 is considered very good while an SI of 20 is considered poor. SI cannot be calculated on trees younger than 20 years of age, and is therefore estimated using trees found in the immediate area.

Size Class

Each forest type is assigned into one of four basic size classes:

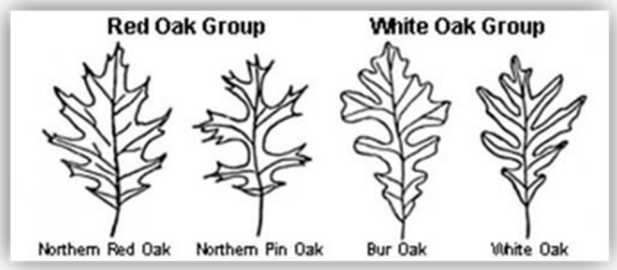
- *Seedling:* Trees less than 5 feet in height.
- *Sapling*: A very young forest ranging from over 5 feet in height to 5 inches in diameter with no merchantable volume.
- *Pole*: A young forest with diameters between 5 to 12 inches with no or very few merchantable trees.
- *Sawlog*: A majority of the trees are over 12 inches in diameter, many merchantable size.

TYPE #1: HARVESTED HARDWOODS
Acres: 26
Average Tree Age: 60+ years

Native Plant Community
Southern Wet-Mesic Hardwood Forest - MHs49

Type Description
This type is found throughout most of the property and is in the *Transition Period* of the MHs49 plant community. This type was selectively harvested in the winter of 2024. Mature black walnut, oak, ash and possibly other select hardwoods were harvested. The remaining hardwoods comprised of pole to sawlog-sized bur/white oak, red oak, walnut, ash, basswood, American elm, hackberry, black cherry, boxelder, and some aspen. For the most part, the remaining trees have good timber quality with smooth bark and straight boles, and the type has moderate stocking. There was once area in the central portion of property that had a fair amount of ash trees harvested which resulted in a few clearcut pockets. The areas that have been harvested have reverted back to the *Young Forest* stage of the MHs49 plant community. These areas are currently a regeneration mixture of residual hardwoods and some aspen root suckers, stump sprouted and single seedling ash, hackberry, oak, basswood, walnut, and ash. There are shrubs here as well: hawthorn, gray dogwood, elderberry, prickly ash, and choke cherry. There is also a fair amount of brambles and grasses.

The production of acorns in this stand is important for wildlife forage during the late fall and early winter. Because of the amount of tannins in red oak acorns, they are too bitter to eat when they first fall off the tree. Water and melting snow washes the tannic acid away causing the acorn to become less bitter in taste. Thus, red oak acorns provide mast in the late fall, early winter and even the spring. On the contrary, bur oak acorns do not have high amounts of tannins. These acorns are much sweeter and are usually eaten right away.



Timber Summary

Species	**Percentage of Cover**	**Average DBH**	**Basal Area** (sq. ft./acre)
Walnut	43%	12”	30
Bur Oak	25%	18”	20
Red Oak	18%	20”	15
Elm	10%	8”	5
Basswood & Boxelder	3%	14”	5
Aspen, Hackberry, & Cherry	1%	12”	2

Site Index: 65 – red oak (good)	Size Class: Pole to Saw-timber	Stocking: 77 sq. ft./acre (Average)

Stewardship Objectives

Improve the stand for forest health and wildlife habitat; remove invasive species, implement forest stand improvement (FSI), maintain young forest areas, and encourage oak regeneration.

Recommendations

Regeneration response to the past harvest has created a cover of young forest with a variety of species mixed in. Let this type continue to grow and it will produce an excellent timber supply in 40 to 50 years. There is also a fair amount of crop trees to provide acorn mast as forage for wildlife. Red and white acorns are vital to various animals including white-tailed deer, turkeys, squirrels, fox and many more. Eventually, this covertype will move further into forest succession. The red oak will continue to be present in the overstory. However, over time the trees will start to compete with one another, the overstory trees will be slow; competition will cause some of the overstory trees to decline and die. More shade tolerant species like buckthorn, maple and ironwood/musclewood, will out compete the oak seedlings in some areas. Thus, with oak regeneration hampered, the future stand will consist primarily of buckthorn mixed with maple, basswood, walnut, red oak, white oak, green ash, American elm, and ironwood/musclewood

Proper forest management practices ensure an acceptable percentage of the forest is in a young age class (0 to 10 years). Mature forests usually only provide 50 to 100 pounds of forage (leaves and buds) per acre while young forests (recently harvested) can provide up to 1,000 pounds of forage per acre. That is a significant difference. These young forest areas will usually create an "edge" habitat which whitetails especially love to use for travel and bedding areas. But also, a wide array of wildlife needs the young forest and "edge" habitat throughout a property. When you are managing for deer and a variety of other wildlife, **about 20% of the forested acres should be at this young age class.**

Remove Invasives: Buckthorn and bush honeysuckle, are exotic species: It is affecting desirable tree regeneration along with wildlife habitat and should be removed. Leaving invasives on the property will prohibit the growth of native woody plants and understory regeneration. The exotic honeysuckle can be removed in the same methods described below.

Buckthorn can be easily identified in the late fall because it retains its green leaves well after other shrubs and trees have lost theirs. Because of their shallow roots, buckthorn under ½" diameter can be removed by simply pulling them out by hand. Mechanical pullers such the *Extractigator* or the *Uprooter* can uproot to 2" diameter.

Buckthorn over 2" will need to be cut down and stump sprayed. Chemicals such as Triclopyramine (*Ortho; Brush-be- Gone*) or Glyphosate (*Roundup*) should be applied to the freshly cut stump to kill the root system. Basal stem treatment, a method that applies chemical through the bark, low volume spray applications can be made with Garlon 4 and similar oil-based products. This application method uses triclopyr ester mixed with an oil diluent (i.e. *Bark Oil Blue*, kerosene, canola or diesel oil) applied directly to the bark of buckthorn from the root collar up about 12-18 inches. This treatment works best on stems less than 2-3 inches in diameter. (Be sure to read all herbicide labels carefully for restricted uses and hazards.)

The male buckthorn plants do not produce berries, so if the buckthorn is abundant, concentrate on removing the berry producing (female) plants first. Also, buckthorn seed is viable for 1-2 years. So, once the overstory buckthorn has been removed follow up the next couple of years by weeding out any buckthorn seedlings that may germinate.

Using Goats: Using goats has become a popular way to control buckthorn that is smaller and within browse range of a goat. The goats are set in a prearranged area which is enclosed by fencing and they focus on eating their way through the thickest bush and weeds. They can eat vegetation at heights of up to 6 feet off the ground.

By eating the live plants and seeds they leave only droppings (fertilizer). The digestive system of the goat breaks down plant seed and there is little re-germination of the plant's seed after. The goats will graze specific areas and for a specific time period (Controlled grazing). They typically eat from their line of sight and up first and leaving grasses for last. By clearing the upper vegetation, the sun can get through to the under layers of grass and promote future grass growth while sequestering carbon.

Using Prescribed Fire: Having a hot fire burn through younger buckthorn could be a follow up treatment to control younger buckthorn. Burning would need to be done every 2- 3 years. Contact your local forestry office for necessary permits.

Follow Up Treatment/ Planting: Regardless of what method you use, follow up treatment will be necessary to get a handle on the buckthorn. Replanting of native shrubs/ species in high density has been found to reduce growth and survival of buckthorn. Replanting of native shrubs such as: high-bush cranberry, nannyberry, chokecherry, pagoda dogwood, gray dogwood, and black chokeberry. Also, native trees such as balsam fir and sugar maple have been none to work well. The balsam fir will also give you nice thermal cover for wildlife. Then native seedings of wildflowers and grasses and wildrye, can reduce regrowth drastically.

See: *http://www.dnr.state.mn.us/invasives/terrestrialplants/woody/buckthorn/control.html* for more control information.

Encourage Oak and Native Regeneration: Use areas where invasives and ironwood have been removed to enhance oak regeneration before other un-wanted trees or shrubs become established. In the fall, gather oak acorns and push them into the soil in the newly cleared areas. Push the acorns into the soil rather than simply scattering them: This will increase the chance of germination while lowering the risk of consumption by squirrels and other wildlife.

Implement Forest Stand Improvement (FSI): Due to the amount of mature trees, invasives, and ironwood on the property there are areas where not enough sunlight is reaching the forest floor to promote more understory vegetation that will provide wildlife habitat and forage. Research says that closed canopy settings like you have in some areas (heavy mature tree stocking) are only allowing 2-3% sunlight hitting the forest floor which only correlates to about 120 lbs/acre of forage that is available for white-tailed deer and other wildlife. However, if you open up your canopy to allow 30% sunlight to the forest floor that will

This stand shows the structure and understory response typical after allowing approximately 20 percent sunlight into the stand.

increase to 750 lbs/acre of forage. And if you release your canopy even more to 50% sunlight, that correlates to 1,200 lbs/acre of forage. The way to allow more sunlight is by removing trees through forest stand improvement.

Areas that you allow at least 75% sunlight will allow great cover for deer bedding and turkey/ grouse nesting. Keep this in mind as you are choosing areas to implement the FSI on your property.

FSI is a common practice foresters and wildlife managers will use to increase the habitat and overall forest health on a property. The big thing that you will need to be able to do first is identify certain tree species. Then you know what to cut and what to leave (see the guide at the bottom) FSI can be used if a commercial logger isn't an option or if the landowner isn't interested in logging but still wants to increase wildlife habitat and forest health on the property.

Trees to cut and kill- Start by selecting smaller areas that may have invasives (buckthorn, honeysuckle) or ironwood. These species can be cut and then treat the stump with herbicide to prevent the tree from "stump sprouting".

Trees to kill and let standing- If there are larger trees of the species mentioned above you would like to kill (to allow more sunlight) but are too large to safely drop, then you can double girdle the tree and use herbicide. Cutting two rings completely around the tree just inside the bark and spraying the cut area with herbicide will kill the tree standing. This will still accomplish the goal by allowing more sunlight into the forest and also create a "snag" that various animals will use as the tree decays.

Trees with options- Even if a tree is desirable, it is possible to be overabundant. Oaks are valuable and produce high-quality acorns, but if you have to many of them in a given area that will cause them to compete with one another and cause a closed canopy. Removing surplus oaks and selecting down to one individual in a given space will allow that tree to put on more branches and produce more acorns for wildlife.

Trees to cut and let live - However, there are trees you can cut down and allow to "stump sprout" because it will allow fresh forage for deer and cover. These types of trees would also be good to hinge cut (only hinge cut about 20% of the trees in an area). The types of trees to cut down and allow to sump sprout or hinge cut would be red maple, American elm, basswood, paper birch, green ash, box elder, and cherry. Keep in mind that to make it easier and safe, the trees you are cutting down should be around 1"- 8" inches in diameter.

Note: Always use appropriate clothing/ gear when operating a chainsaw and only cut what you are comfortable with. Reach out to me with any specific questions regarding FSI.

Removal of Overtopping Competition: In areas where ironwood, prickly ash, and/ or buckthorn cover is thick, but oak, walnut or conifer saplings are already established and are 4 to 5 feet or taller, simply cut any *overtopping* vegetation within a 5 to 10 foot radius of each tree. These larger, established saplings are out of deer browse range and should respond very quickly to competition removal.

Thin around oak trees to create larger crowns. Large crown mast trees produce more acorns, which is a valuable food source for wildlife and will increase your oak regeneration. When you thin, you should select trees with good stems and bases. These would be trees without multiple stems or frost cracks. Then look up and remove any tree with a branch interfering with the selected oak tree. A space of at least 10 feet should be made between tree crowns. The trees will take advantage of the increased sunlight by adding branches and then more acorns. You can also do this with the scattered hawthorn and crabapple trees we found.

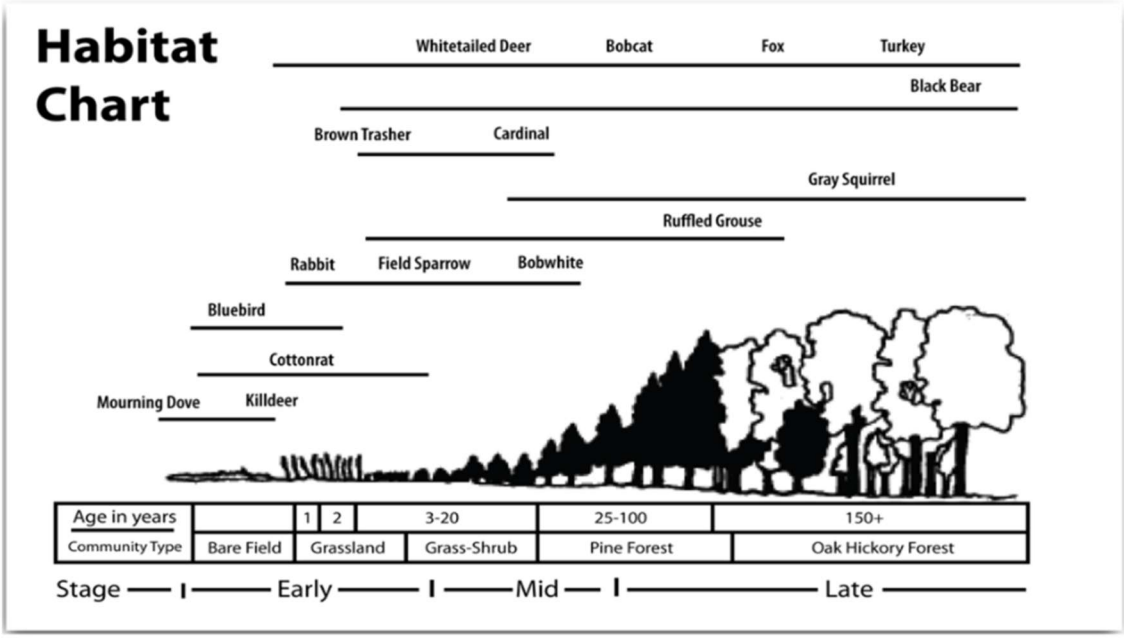
Harvest Aspen Patches: Some of your aspen has started to die out or will be dying out within the next 10 years. The aspen portion of this type provides habitat diversity. The aspen should be harvested to ensure regeneration from suckering and prevent losses from old age. Clearcutting the aspen patches will ensure the best natural regeneration. If you cut the aspen trees and all other trees within 50 feet of them, aspen regeneration will occur. Winter cutting can produce 10 to 15,000 stems per acre about 6 feet tall after the first year of growth. Summer cuts produce 2 to 3,000 stems per acre, about 3 feet tall after the first growing year. So, it should be cut in the winter to get the best results.

Because the area is dominated by other hardwoods, keeping the aspen component in this type (and increasing the amount) will continue to provide a diverse area for wildlife. The aspen is a short lived pioneer species, however, and must be cut to allow a new forest to grow. Therefore, removing pockets of mature aspen will promote more aspen re-growth within this covertype.

A small pocket (1/4 acre) where mature aspen was cut.

A thick overstory will prohibit aspen growth so it is necessary to extend the harvest to the perimeter oaks and conifers as well. Remove all trees in a 25 to 50 foot radius around the aspen pockets. This will allow the aspen regeneration to flourish and the amount of aspen to increase.

Aspen sprouts produced after a harvest are desired forage for white-tailed deer and other wildlife until the trees grow above browse height, while the dense regeneration will provide cover for grouse and their young chicks.



The more diversity on a property = the more wildlife it will be able to support.

Establish conifer pockets: By adding conifers to this stand you would improve its value for wildlife. Many species of birds find food and cover in these stands, in addition to white-tailed deer and wild turkey. Deer, turkey, and pheasant will especially use dense conifer pockets in the wintertime. If you decide to plant these trees, natural openings or cleared buckthorn pockets would be great areas to plant white spruce, Norway spruce, or white pine. Small pockets of 10-15 trees planted at 11' x 11' spacing will give you a nice thermal pocket over time. After planting, remove the vegetation in the immediate area of the young trees to decrease competition. Deer browse control for white pine will ensure their survival. See *open area* for more information on planting.

Alternative Option
Convert areas into Oak Savanna.

Additional Alternative Recommendations
It is possible that some of these areas were once Oak Savanna ecosystems. The first step would be removing around ½ to ¾ of the trees in the desired area and leaving the bur oaks but could also save some red oaks. However, in most of the harvested areas you may not have to remove any trees. Then conducting prescribed burns to knock back the buckthorn and woody vegetation will hopefully allow the native prairie seed bank to be restored. Very few of these ecological types remain so restoration or creation is a high priority.

Any very steep south and west facing slopes historically were occupied mostly by native prairie grasses typically Big Bluestem and Little Bluestem, Indian grass, Side Oats Gramma, many kinds of wildflowers such as Bergamot, Purple Coneflower, many kinds of Goldenrods and large, widely-spaced oak trees usually Burr Oak. But with fire suppression of the past century, they are being overgrown with things like Red Cedar, Smooth sumac, Paper birch, Quaking aspen, and invasive exotics like European buckthorn and exotic Tartarian honeysuckles.

MN NPS photo.

Minnesota has lost nearly all of the prairies and oak savannas that existed before European settlement. The recommendation really depends on what you want to have there and your ability to conduct a prescribed burn on the area. Without fire, the woody vegetation will continue to occupy the site and further crowd out the native grasses. Repeated prescribed burns will knock back that woody vegetation and stimulate those grasses. Those grasses have root systems that easily go down 6 feet and the seed can lay dormant for many years so even if little remnant is left now, fire can restore it. Contact DNR Forestry or DNR Wildlife for technical advice and/or the necessary permits.

My Recommendation
The biggest priority is starting to remove the invasives on the property and continuing to monitor. **I cannot stress the importance enough of removing these invasives earlier rather than later**. If nothing is done, they will continue to spread and take over native habitat. Even keeping the invasives controlled in a certain area would be better than letting it go. The regeneration from the past harvesting has created great habitat/ forage for a variety of wildlife.

However, the regeneration will get to a point where it is not providing as much forage and cover as a more recently harvested area would. An important thing to do is maintain pockets of the young forest habitat type to allow more cover and browse for songbirds, deer, turkey and other wildlife. When saplings get to 6+ years old it is time to recut them or conduct prescribed burns and allow the fresh regeneration to occur again. Any oaks and walnuts you can leave and that will release them to encourage faster growth. These recut areas will provide great bedding for deer and nesting cover for upland birds. Also, young sapling regeneration is a lot easier to clear out than mature trees and planting conifers pockets in certain areas would be another project to do over time.

Based off Web Soil Survey a fair amount of the property may have historically been Oak Savanna. Due to the recent harvesting, the property is at a point where you can look into converting some of it into an Oak Savanna. As mentioned earlier the most important factor is being able to implement prescribed fire. Luckily the property does lay out nicely for being able to implement prescribed fire. There may be cost sharing opportunities as well to convert some of the forest into oak savanna.

Woodland Stewardship Plan Binder Reference

Topic	Chapter
How Trees Grow	Chapter 3: How Trees and Woodlands Grow
Regeneration and Site Preparation	Chapter 4: Regenerating Woodland Stands
Timber Stand Improvement	Chapter 5: Woodland Improvement Practices
Various Tree Species and Forest Types	Chapter 6: Managing Important Forest Types
Harvesting Timber	Chapter 9: Harvesting Timber
Wildlife and Forest Management	Chapter 11: Wildlife and Forest Management
Taxes, Woodland Investment and Estate Planning	Chapter 14: Financial Considerations

Websites

General	*http://www.dnr.state.mn.us/foreststewardship/topics.html*
Seedling Sources	*http://www.itascagreenhouse.com* *http://www.maswcd.org/SWCDs_On_The_Web/swcds_on_the_web.htm* *https://www.dnr.state.mn.us/forestry/nursery/index.html*
Enhancing woodlands and forests for white-tailed deer	*https://extension.missouri.edu/publications/g9495* *https://files.dnr.state.mn.us/assistance/backyard/privatelandhabitat/managing_woodland_deer_flat.pdf*
Managing your woodlands for wild turkey	*https://files.dnr.state.mn.us/assistance/backyard/privatelandhabitat/managing_woodland_turkeys.pdf*
Managing your woodlands for non-game species	*https://files.dnr.state.mn.us/assistance/backyard/privatelandhabitat/woodlands_and_non game_wildlife.pdf*
Walnut Management	*https://extension.umn.edu/managing-woodlands/managing-black-walnut-forests* *Walnut Management Overview*
Managing Aspen Stands for wildlife	*https://extension.umn.edu/managing-woodlands/managing-aspen-and-birch-forests* *https://www.pgc.pa.gov/Wildlife/HabitatManagement/Documents/Aspen%20Management.pdf*
Tree & Plant ID	*http://files.dnr.state.mn.us/forestry/ecssilviculture/npc_plantID_intro_umbels.pdf* *https://www.dnr.state.mn.us/trees/native-trees.html*

	inaturalist app on any smartphone.
Forest Stand Improvement	*https://www.deerassociation.com/deer-habitat-in-a-squirt-bottle-part-1-add-great-deer-habitat-by-subtracting/* *https://utia.tennessee.edu/publications/wp-content/uploads/sites/269/2023/10/PB1885.pdf* *https://dnr.wisconsin.gov/sites/default/files/topic/ForestManagement/24315_23.pdf*
Timber Harvesting for Wildlife	*https://open.lib.umn.edu/woodlandstewardship/chapter/wildlife-and-forest-management/* *https://youtu.be/NRMmLD4S8ng?si=2RYtqVnGUji1dgGY*
Young Forest Habitat	*https://deerassociation.com/put-green-leaves-deer-level/* *https://deerassociation.com/give-yourself-the-edge/*
Post Timber Harvest	*https://www.nnrg.org/wp-content/uploads/2017/11/Practices-to-Steward-a-Beautiful-Forest-after-Timber-Harvest.pdf*
Prairie/ Oak Savanna	*https://www.nature.org/en-us/about-us/where-we-work/united-states/minnesota/stories-in-minnesota/prairie-restoration-guides/* *https://www.dnr.state.mn.us/prairierestoration/index.html*
Increase acorn production	*https://youtu.be/gtlj7G0IOrg* *https://deerassociation.com/for-more-acorns-dont-fertilize-oak-trees-maybe-cut-some-down/* *https://deerassociation.com/7-steps-stronger-acorn-production/*
Invasives Removal	*https://www.dnr.state.mn.us/invasives/terrestrialplants/woody/buckthorn/control.html* *https://coveritup.umn.edu/* *https://www.dnr.state.mn.us/mcvmagazine/issues/2024/jan-feb/buckthorn.html* *https://kanatiland.com/services/project-implementation/* *https://midwestgoatmitigation.com/*
Oak Wilt	*https://extension.umn.edu/plant-diseases/oak-wilt-minnesota*

TYPE #2: LOWLAND HARDWOODS
Acres: 3
Average Tree Age: 60

Native Plant Community
Southern Wet Ash Swamp (WFs57)

This NPC is a wet hardwood forest found on mucky mineral soils in shallow basins or low, level terrain near rivers, lakes, or wetlands. Typically, this community has standing water in the spring but may drain by late summer.

- **Ground-layer** consists of common marsh marigold and fowl manna grass are common in wet areas, with touch-me-nots, Virginia creepers, jack-in-the-pulpit, wood nettle, wild geranium, tall coneflower, and other mesic or wet-mesic forest species present on hummocks. Skunk cabbage, is often present in seepage zones.
- **Shrub-layer** is sparse (5-25% cover). Black ash seedlings or saplings are almost always present, often with chokecherry, willow, red osier dogwood, wild black currant, and nannyberry.
- **Subcanopy**, when present, is patchy to interrupted (25-75% cover) and generally not well differentiated from canopy.
- **Canopy** is patchy to interrupted and dominated by black ash, often with other hardwood species, especially basswood, sugar maple, and American elm. Yellow birch and bur oak is sometimes abundant.

Although black ash is shade **in**tolerant, it is the climax species on this site due to the high soil moisture and the trees' shallow root system. The water table is too high for most tree species to survive, but is low enough to allow the ash to develop with good form and growth. Small animals as well as game birds and songbirds eat the seeds of ash. Beaver will use ash trees for building dams where no aspen is available. Shrub species like willow, dogwood, and alder found in the immediate area of black ash swamps also provide good forage for wildlife.

Type Description
This covertype, found in pockets mainly in the *eastern* portion of the property, has green & black ash as the main overstory tree along with scattered silver maple, bur oak, American elm, hackberry, and boxelder. The black ash are pole to small sawtimber size with fair timber quality. There was a fair amount of black ash regeneration which is great cover and browse for wildlife. There are areas dominated by buckthorn in this type. Red osier dogwood, willow, and alder shrubs were found in the understory as well which provide a variety of wildlife habitat. Some of the ash trees in this type were harvested or cut down during the harvest of *type #1*.

Timber Summary

Species	**Percentage of Cover**	**Average DBH**	**Basal Area** (sq. ft./acre)
Ash	60%	10"	40
Silver Maple	30%	12"	20
Bur oak, Hackberry & Boxelder	10%	10"	10

Site Index: 55 – black ash (good)	Size Class: pole-sawlog size	Stocking: 70 sq. ft./ac. (average)

Stewardship Objectives
Maintain the covertype as is to continue to provide wildlife habitat and water quality. Improve wildlife habitat by removing buckthorn and releasing bur oaks.

My Recommendation
The priority again is removing any buckthorn. This area provides great wildlife value as is. Naturally, black ash will continue to successfully regenerate itself through single-tree-windthrow and seedling regeneration. The ash covertype has a fair to good rating for wildlife. The ash community understory is vitally important for providing late fall and winter deer browse (less than 6 feet tall ash, alder, willow, and red-osier dogwood) and upland edges are important fall feeding sites (gray dogwood and high-bush cranberry) for ruffed grouse and deer. The ash overstory is also sometimes used as nesting sites for blue herons.

Thin around oak trees to create larger crowns. See type #1 for more information.

Plant willow, red osier dogwood/ floodplain cuttings: Certain "open" wetland areas would be great spots to do shrub "cuttings". In spring, certain species of trees and shrubs can be grown from cuttings (cut twigs or branches). They include nannyberry, red osier dogwood, willows, cottonwoods, alder, and poplars. Collection should occur in late winter or early spring, a few weeks prior to bud burst for spring plantings. Cuttings should be 1½ to 4 feet long and ½ to 2 inches in diameter and from relatively young trees/shrubs. Branches used for cuttings should be cut with a pruning shears to achieve a clean cut. There has also been success with planting larger diameter, pole size cuttings of willow and cottonwood installed in existing reed canary grass stands.

Planting should occur shortly after the ground thaws and as late as July 1 if conditions are favorable. It is recommended to make holes in the soil using metal re-rod to prevent the loss of buds as cuttings are installed. One-half to two-thirds of the cutting should be placed in the soil depending on the length of the cutting. Typically, cuttings are installed one to two feet into the ground. It is important that the soil remains moist until the cuttings have developed a root system. High mortality can occasionally occur, but this is somewhat offset by lower cost, ability to rapidly plant large numbers, and ease of replanting the following year. Cuttings can also be placed in buckets or tubs of water until they develop root systems. Once roots are sufficiently developed the plants can be transplanted. This technique works best when transplanting can occur relatively early in the season when soil moisture is high or when installing into saturated soil.

Adding lowland conifers: Planting balsam fir or black spruce like we discussed could be an option to create thermal cover out in the lowland areas. By adding conifers to this stand you would improve its value for wildlife. Many species of birds find food and cover in these stands, in addition to white-tailed deer and wild turkey. If you decide to plant these trees, natural openings, or areas where there is less competition would be great areas to plant black spruce or balsam fir. Small pockets of 10-15 trees planted at 11' x 11' spacing will give you a nice "thermal" pocket. After planting, remove the vegetation in the immediate area of the young trees to decrease competition. A "weed mat" or cardboard will be necessary to keep down competition.

Fruiting shrubs to plant: Other shrubs you can plant in this type are high bush cranberry, crabapple, winterberry, and black chokeberry. See *open area* for planting information.

Alternative Objectives
Due to emerald ash borer, harvest infected trees.

Alternative Recommendations

Emerald Ash Borer (EAB), a non-native beetle, has been found in the southern and central part of Minnesota. Once an ash tree is attacked by an EAB, it will be killed – ash trees have no defense against this insect. Due to a future *possibility* of the EAB affecting this type, a harvest would capture current value and utilize standing timber. Due to the wetness of this type, any harvesting is limited to frozen conditions.

Harvesting *select trees* from this type would create small openings to mimic the natural single-tree-windthrow these types of forests normally experience. Selective harvesting would allow ash to naturally regenerate in the openings while preserving the rest of the overstory. (Note: This recommendation is a preemptive measure only. There is no guarantee this type will be compromised by the EAB. More information about the EAB can be obtained at a local University of Minnesota Extension office or at *http://www.extension.umn.edu.*)

If a clearcut harvest is performed here instead of a select cut, there is a good chance this type will not regenerate to ash: There is insufficient advanced ash regeneration to establish a new forest. Wet sites are not often naturally severely disturbed, meaning entire wet-forests are typically not replaced in a single event. Disturbance is usually in the form of single-tree-windthrow. When the timber in wet stands is removed all at once, the type often fails to regenerate due to increased water levels. (When the overstory is removed, there is no longer enough vegetation to transpire the water.) The natural water level increases to a point that is not conducive to tree establishment or survival. Given the current grass cover, it is likely this type would transition to a Northern Wet Meadow/Carr covertype with only scattered ash regeneration if a clearcut harvest were performed.

Woodland Stewardship Plan Binder Reference

Topic	Chapter
Various Tree Species and Forest Types	Chapter 6: Managing Important Forest Types
Tree Damage	Chapter 7: Forest Health
Harvesting Timber	Chapter 9: Harvesting Timber

Websites

General	Managing Lowland Hardwoods
Emerald Ash Borer	*https://extension.umn.edu/tree-and-shrub-insects/emerald-ash-borer*
Planting wetland trees and shrubs	*https://bwsr.state.mn.us/sites/default/files/2019-01/5A 13%20Planting%20Wetland%20Trees%20and%20Shrubs.pdf*
Lowland Conifers	Lowland Conifer Management
Managing wetlands for waterfowl	*https://www.mdwfp.com/media/4095/wetlandmgtforwaterfowl.pdf*
Planting tree cuttings	Planting wetland trees & shrubs *Aspen Propagation* *https://youtu.be/HP149BhZ5Tk* *https://youtu.be/VHXQW5lKQD8* https://bwsr.state.mn.us/sites/default/files/2022-02/Snapshots-story-4-March-2022-Live-Stakes-Tutorial.pdf
Managing Shrub Wetlands	*https://www.wiyoungforest.org/shrub-wetlands*
Pond Construction	*https://www.dnr.state.mn.us/excavatedponds/guidelines.html*

TYPE #3: OPEN/BRUSH AREAS
Acres: 1

Native Plant Community
If left idle for enough time and allowed to *naturally* succeed this covertype may resemble the Southern Wet-Mesic Hardwood Forest - MHs49.

Type Description
The main open area is in the *southern* part of the property. The area is a natural open area and part of a ROW. The current vegetation cover is grasses with scattered aspen saplings, red cedar, sumac, and brambles. It is great to have a mix of all different types of open areas grassy & brushy. The red cedar could be removed over time if it continues to spread.

Stewardship Objective
Keep the type open for wildlife forage and a diversity of habitat. Increase fruit shrubs and remove any invasive species.

Recommendations
By managing the open area covertype properly for wildlife, it can provide up to 2,500lbs of forage per acre in the spring and summer when wildlife needs it the most. Use one of the following methods to promote and maintain desirable forage:

- Burn every 3 to 5 years. A hot fire in the late spring will kill most of the woody vegetation. Prescribed burning will also help the fire-dependent plant species thrive. (Please consult the local DNR office for burning information.)

- Disc every 5 to 10 years and plant with clover, alfalfa, oats, winter wheat, brassicas, or other wildlife forage.

- *Plant Natural Pollinator Plants:* Plant natural pollinator plants for bees and other nectar dependent organisms. For more information, visit the pollinator's website listed at the end of this type description.

- *Add fruiting shrubs or apple trees*: Crabapples, apples, and plums are great species to plant for white- tailed deer. If you plant different varieties, there will be fruit for them year-round.

Food Plots: The first step in a successful food plot is getting a soil test to know if you will need to add any fertilizer or lime (find link at the bottom for soil test). Some of the best food plots are those that require *low maintenance* such as oak trees or fruiting shrubs like apple trees, wild plum, crabapple, chokecherry or sumac shrubs. Low maintenance plantings require some care when installed but after a short time of establishment they can produce crops of food for wildlife for years to come.

Medium maintenance food plots are perennial cool season mixes like alfalfa, clover, chicory and winter wheat. These food crops require an initial seeding and then perhaps a once a year mowing or disking to regenerate. See the variety of cool season mixes here: https://deerassociation.com/try-cool-season-food-plot-mixes/. Butyrac is a chemical that will help control undesirable weeds that come up and Intensity One will control any unwanted grasses. Both of these chemicals will not harm the clover. Read the chemical labels before applying to ensure the best results.

The last type of food plot is *high maintenance* ones. They are ones that require yearly planting and tilling. Corn and soybeans is the most widely known food plot crop. Corn must be planted in a large enough area to permit tillage. Large areas also make it more likely that there will be some food left for wildlife in the deep winter when it is needed most. Unfortunately, most corn food plots are used heavily in the fall when they are ripe and provide little benefit to deer in the wintertime. Brassicas like turnips, rapes, or radish are becoming a popular food plot seed and also usually require some type of yearly tillage and planting. Deer will eat both the top or vegetation part of the turnip and also the bulb part come later in the season. See a guide to summer food plots here: https://deerassociation.com/ndas-guide-to-summer-food-plots/

Edge feathering: Edge feathering around the edges of your open areas can create even more forage potential with what is already in your food plots. Cutting brush and timber 10-15 yards away from the opening into the forest will allow more sunlight to hit the edges of the open area and create more forage for wildlife. The edge feathering can go around the entire food plot and then take the browse stress off the food plot itself. This technique can also be used to direct deer or other game movement into the food plot. Leave mast producing trees like oaks or crabapple trees.

Additional Objective

Create better forest stocking of desirable tree species through natural conversion, seeding, and/or planting to improve future timber growth, aesthetics, and wildlife habitat.

Additional Recommendations

Increasing shrub/ fruit trees cover in this covertype will increase aesthetics, wildlife cover and forage. "Soft mast" that fruit bearing trees and shrubs provide will give you another food source for wildlife throughout the year when acorns may not have dropped yet. The fruit also just gives wildlife a variety of food source that will provide more nutrients for them.

Tree Suitability: The following trees will grow well in the MHs49 plant community and are recommended given the current forest condition on this property. While conifers are not listed below, they can be planted. The trees are ordered in suitability from left to right in each category with the leftmost trees being the most suitable.

> Excellent Suitability: black ash, rock elm, American elm, black walnut, hackberry, box elder, green ash, bur oak, sugar maple, basswood, and red elm.
>
> Good Suitability: northern red oak, bitternut hickory, and butternut
>
> Fair Suitability: Black maple and black cherry
>
> *Note: other trees may grow here, but the above trees naturally suit this native plant community the best.*

For more information, visit the tree suitability website listed at the end of this type description.

Reforestation: There are three primary options to consider for increasing tree cover in this covertype: natural conversion, seeding, or planting.

Natural Conversion: The easiest and cheapest method to create forest cover is to leave the covertype idle and allow it to convert to forestland by native tree invasion. Any aspen found in

the immediate area will move into sunny areas through their roots, while nearby hardwoods (oak, maple, birch, ash, and basswood) and conifers will seed in.

One problem with this method is that many times unwanted tree species such as prickly ash, willow, and alder become prevalent. To mitigate this, selectively remove unwanted trees and shrubs or brush-cut large areas.

Seeding:
Open Area – One option that could be effective is to do a **direct seeding** method. This is where seeds of different types of trees are broadcasted into a prepared seed bed just like a food plot. Direct seeding establishes thousands of seedlings per acre rather than hundreds per acre with traditional bare root planting. Trees reach "crown closure" and begin shading out grass and weed competition earlier. This also means that wildlife cover will then be established faster. Then also due to the higher seedlings per acre the deer will not be able to browse on all the stems.

Direct Seeding Rates:

Species	Bushels Per Acre	Species	Pounds Per Acre
Red oak	1 to 2	Black cherry	1/4 to 1/2 pound
White oak	1/4 to 1	Hackberry	1/4 to 1/2 pound
Bur oak	1/2 to 1	Kentucky coffee	5 to 10 pounds
Black walnut	10 to 20		
Shagbark hickory (within its range)	1/4 to 1/2	**SHRUBS:**	
Swamp White oak (lowland sites)	1/4 to 1/2	Grey or red-osier dogwood	1/4 pound
Ash (green, white, black)	1/4 to 1	Highbush cranberry	1/4 pound
Sugar maple	1/4 to 1/2	Chokecherry	1/4 pound
		Wild plum	1/4 pound

First, large seed - acorns, walnuts, hickory nuts—are typically broadcast with a fertilizer spreader over the entire field and then disced into a depth of 1 to 2 inches. The lighter seed—ash, maple, cherry (and shrubs if any)—are broadcasted and dragged in lightly.

Controlling grass and weed competition until seedlings reach "crown closure" (which often happens in year 3) is crucial to the success of any seeding project. If weeds are not controlled, tree seedlings will be out competed for moisture and sunlight. Typically, a pre- or post-emergent herbicide is used early in the first season and a post-emergent herbicide is used later in the first year. Apply ¾ ounce Oust and 3 ounces Princep herbicide/acre to control grass and weed competition. If broadleaf weeds become a problem in year one, mow the area high, above the top of tree seedlings. A pre- or post-emergent herbicide application will be needed in year two.

Brush Area – Because of the scattered overstory in this type, tilling and planting seed will not be as productive. In the fall, simply promote oak regeneration in this type by scattering and pushing oak acorns into the ground.

Young oak trees need light in order to thrive. Therefore, any competition that encroaches into the area must be removed to allow the young oaks to grow. The easiest way to do this is to cut all

shrubs **and** hardwood tree regeneration each fall. (Leave any established/desired young trees over 3 inches in diameter and all conifers.)

Every autumn re-cut the area. The healthier oak seedlings (the ones cut) will **not** be killed, but actually "stump sprout" from the established root system each spring. This will allow oak seedlings in these areas to build larger root systems and increasingly taller heights. Ideally, after the fourth year, the oak sprouts should be taller than the competition and above deer-browse height. When this happens, the yearly cutting will no longer be needed. (This method is intended to simulate multiple-year ground-fires that were so important in the regeneration of oak trees in pre-settlement times.)

Planting:
Open Area – *Seedlings* (both hardwoods and conifers) purchased from State or private nurseries range in age from 1 to 3 years. Site preparation before planting (either mechanically removing or chemically treating competing vegetation) is recommended. After the site has been prepared, the trees can be planted by hand or with a machine. For larger areas, machine planters do very well.

Continual control of competing grasses and shrubs is important for good seedling survival and growth. The easiest and most effective control of competition is through the use of herbicides. There are a variety of chemicals that work on plants differently. (Before using any chemical read the label as to how to handle it, when it should be applied, how it should be applied, and which plants/trees it works with and against.)

Vegetative Mat

Vegetative matting is an alternative to herbicides in controlling competing grass. These mats, installed before planting, are ideal for sensitive areas or wetter sites. The matting will inhibit competing vegetative growth for at least five years.

Adding Fruiting Shrubs: Fruit bearing shrubs are often eaten by deer, turkeys, grouse, and a variety of other wildlife as they are sweet tasting. Shrubs such as crabapple, American plum, red osier dogwood, high bush cranberry, and Amelanchier shrubs (also known as Juneberry or serviceberry) could be planted. To improve their survival and chances to bear fruit, consider matting and putting tubex tree shelters on some of them. These structures protect them and improve the shrub growth. This will eventually provide wildlife with good browse shrubs and mast (fruit) production.

Tree Tube Shelters

Browse Control: Deer browse can be a problem for certain species of newly planted trees. White pine is a preferred browse species of deer and must be protected, especially during the late fall through early spring.

Red pine usually doesn't need browse protection. For spruce, the deer will avoid it and no protection is required. Hardwood trees vary: oak buds are like candy to hungry deer whereas some hardwood species are left alone. When protection is essential use one of the following methods:

- Plastic mesh tubing staked around the tree will provide 2-3 years of protection with little maintenance. This method is initially labor intensive but effective.

- Chemical repellents such as *Tree Guard* and *Plantskydd* (available at most landscaping nurseries) use scents or bitter tastes to deter deer. Each spring and fall, the trees will need to be re-sprayed.

Mesh Tubing

- "Bud capping" is the process of stapling waterproof paper (or placing flexible plastic mesh) around the terminal bud. The cap protects the terminal bud until the bud grows out of the cap. The cap will then have to be reapplied every year until protection is no longer needed. (For oak seedlings, a simple latex party balloon over the terminal bud works well.)

If interested in planting, please contact this plan writer to create a "planting plan" which will discuss the project details. Also, cost share may be available for projects like these.

Woodland Stewardship Plan Binder Reference

Topic	Chapter
Planting and Regeneration	Chapter 4: Regenerating Woodland Stands
Seedling Stands	Chapter 5: Woodland Improvement Practices
Various Tree Species / Forest Types	Chapter 6: Managing Important Forest Types
Animal Damage	Chapter 7: Forest Health

Websites	
General	*http://www.dnr.state.mn.us/foreststewardship/topics.html*
Seedling Sources	*http://www.maswcd.org/SWCDs_On_The_Web/swcds_on_the_web.htm* *http://www.itascagreenhouse.com* *http://www.dnr.state.mn.us/forestry/nurseries/ordering.html*
Tree Suitability	https://files.dnr.state.mn.us/forestry/ecssilviculture/treetables.pdf
Pollinators	http://www.beelab.umn.edu/
Native Prairie	https://www.dnr.state.mn.us/prairierestoration/index.html
Direct Seeding	MN DNR Direct Seeding Step by Step Guide *https://silvlib.cfans.umn.edu/converting-agricultural-land-through-hardwood-direct-seeding-private-land*
Fruit trees for wildlife	https://bluehillwildlifenursery.com/ https://www.midwestdeertrees.com/
Food plots	https://deerassociation.com/plant-food-plot/ Wildlife food plots
Soil test	https://soiltest.dl.umn.edu/sites/soiltest.dl.umn.edu/files/media/farm_and_field_2020-21.pdf
Old Field Management	https://www.pgc.pa.gov/Wildlife/HabitatManagement/Documents/Field%20Management.pdf

	https://deerassociation.com/fresh-tips-on-using-fire-for-better-deer-habitat/
Cost Share Information	https://www.dnr.state.mn.us/woodlands/cost-share.html
Thistle	*https://bwsr.state.mn.us/invasive-thistle-species-control*

INCENTIVE PROGRAMS

The Sustainable Forestry Incentive Act (SFIA)

This State of Minnesota program allows property owners to receive income: For 2024 the payment is **$10.48/acre** for the 8-year covenant, **$14.51/acre** for the 20-year covenant and **$18.54/ acre** for the 50-year covenant. Started in 2018 landowners have the option to enter into an 8, 20 or 50-year covenant. The application process starts after a Woodland Stewardship Plan (this document) has been written and the landowner submits the appropriate paperwork. This involves a visit to the local County Courthouse and the acreage must be kept free from development and agriculture for an extended timeframe. Applications must be submitted by October 31st. (Once in the SFIA program the landowner still pays normal property taxes but receives a check the following October.) For more information: https://www.northlandhabitat.com/tax-incentive-programs

2c Managed Forest Land

This is a property tax classification *for rural, wooded property that is not used for agricultural purposes. Landowners enrolled may qualify for a reduced tax-class rate of 0.65 percent.* Like the SFIA, a Woodland Stewardship Plan must be registered with the DNR and must be no more than ten years old. Acreage already enrolled in a tax reducing program, such as SFIA or Green Acres, is **not** eligible for the 2c program. Eligible landowners can apply for a change of classification through their county assessor. Applications must be submitted by May 1st.

Cost Share

Money may be available for certain woodland improvement projects: tree planting, site preparation, tree release, prescribed burning, wetland reclamation, wildlife habitat enhancement, etc. Designated funds may be available (first-come-first-serve) on a county or DNR area-wide basis. The landowner must file a Request for Cost Share application – available through the local DNR and/or Soil & Water Conservation District and Natural Resource Conservation Service (SWCD/NRCS) offices. (Any cost share that is received needs to be counted as income on your tax return.)

Reach out to your local DNR forester for more information:
https://www.dnr.state.mn.us/woodlands/cfm-map.html

TIMBER SALE OVERVIEW

If you choose to harvest your timber, there are some steps you should take. Most people are not familiar with logging or different loggers, so it is advisable to hire a professional forester to handle the following:

- ✓ Find out how much timber you have
- ✓ Contact a suitable logger
- ✓ Produce a written contract
- ✓ Designate the wood to be harvested
- ✓ Mark the harvest boundaries
- ✓ Oversee the harvesting of the timber

To find a forester to do this work, you could contact your Woodland Stewardship Plan writer. Setting up private timber sales is one of the services **Northland Habitat** provides, which includes all of the items listed above. Alternatively, you can call the state DNR office in your area to obtain a list of other consulting Foresters.

If you plan on selling the timber yourself, many of the checked items should be done before the logging is started. The most important thing is to **get a written contract.**

PROJECT SUMMARY

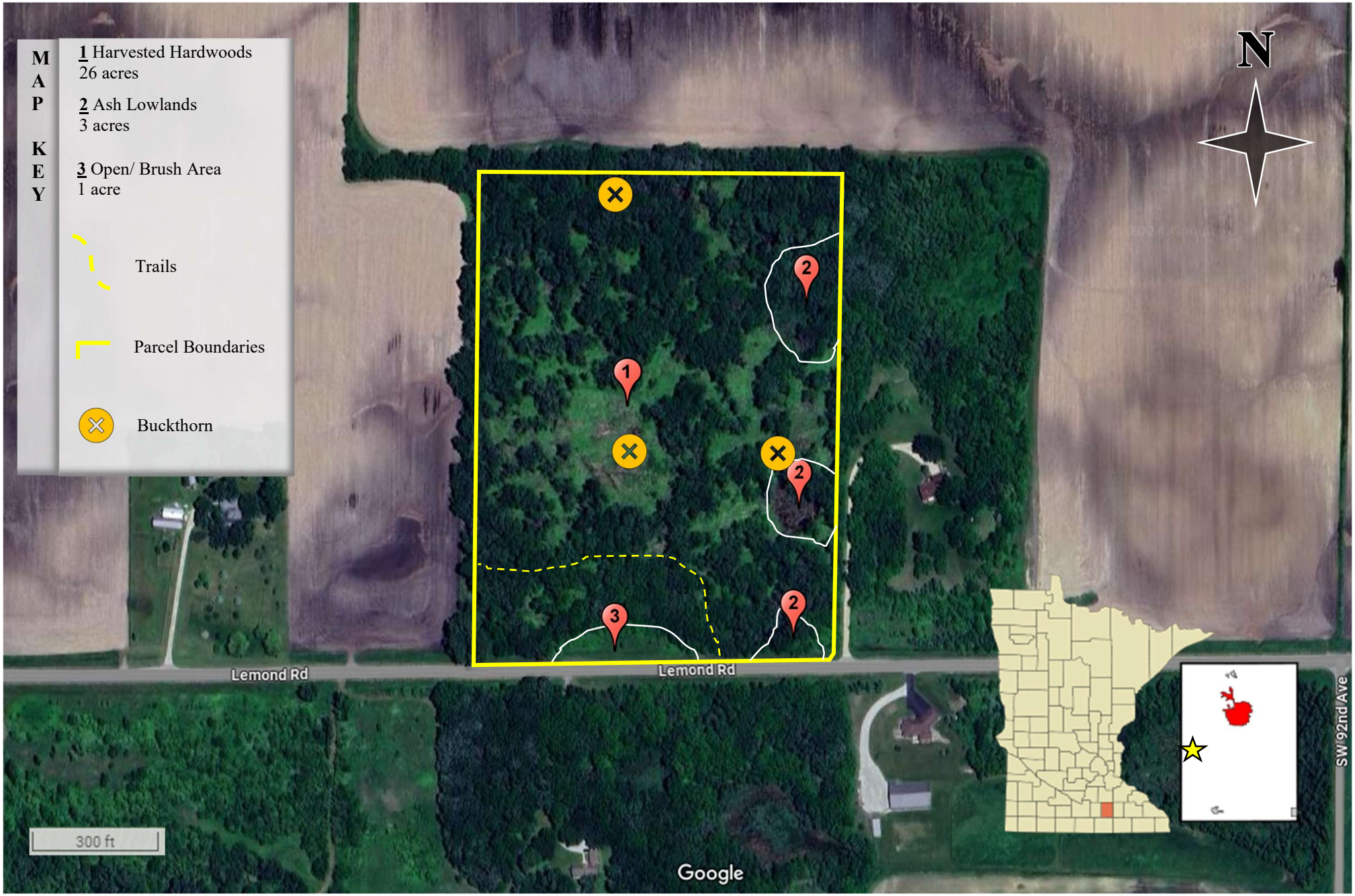
Year Scheduled	Covertype	Project	Priority	Year Complete
2024-2025/ Ongoing	All	Remove buckthorn and honeysuckle. Look into DNR cost share funding.	High	
2025/Ongoing	#1	Thin any stump sprouts and release oaks, and other desirable trees.	Medium	
2026/Ongoing	#1	Underplant conifer pockets	Medium	
2027-2030	#1	Consider restoring areas into Oak Savanna. This can be considered earlier if it becomes a priority.	Medium	
Ongoing	#3	Continue to keep open for wildlife forage/ habitat and plant fruit shrubs.	Medium	
Ongoing	#2	Maintain the covertype as is. Put up duck boxes/ nests.	Low	
2034	-	Update Forest Management Plan & Reevaluate Type #1 for a harvest.	High	

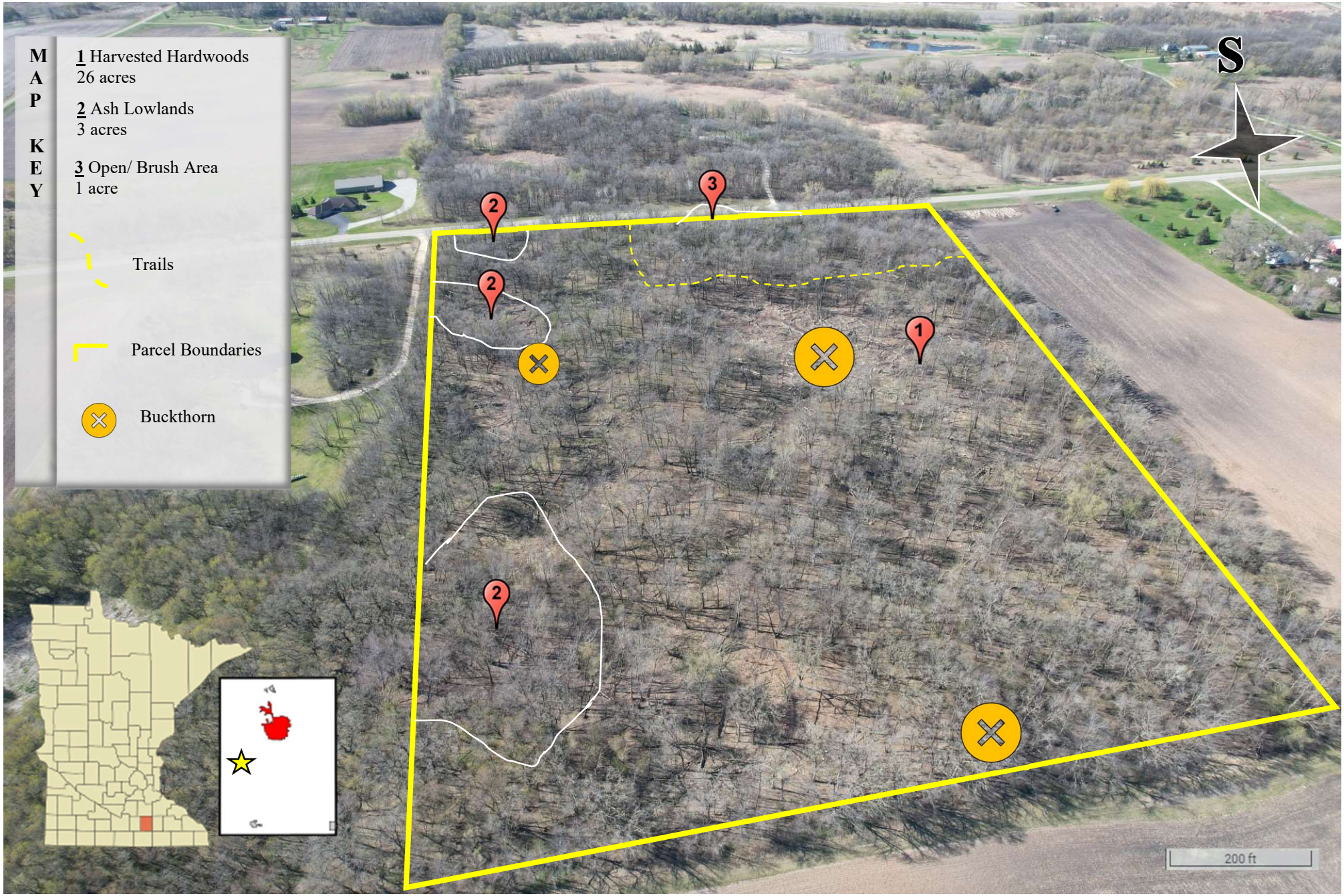
TOP THREE THINGS TO DO

- Remove the invasives on the property.
- Release younger oak trees and other desirable trees in *type #1*.
- Consider restoring areas into Oak Savanna.

MAP OF STEWARDSHIP PARCEL

Name: Wade Kallhoff & Nicole Evans	Address: 1035 Smith Ave. Owatonna, MN 55060	Phone Number: 507-530-7507		
Subsection: E 30 acres SW 1/4 NE 1/4 Section 7		Township: 106N	Range: 21W	County: Steele
Parcel ID #: 06-007-1300				



DRONE VIEW OF PARCEL

Name: Wade Kallhoff & Nicole Evans	Address: 1035 Smith Ave. Owatonna, MN 55060	Phone Number: 507-530-7507		
Subsection: E 30 acres SW 1/4 NE 1/4 Section 7		Township: 106N	Range: 21W	County: Steele
Parcel ID #: 06-007-1300