



WOODLAND STEWARDSHIP PLAN

Prepared for:

Mora School District #332, County Line School Forest

400 E. Maple Ave.

Mora, MN 55051

(320) 679-6200

mmlinar@moraschools.org

NW1/4NW1/4 Except for Hwy ROW, Section 5, T42N, R23W

PIN 05.00080.00 (36.44 acres)

NE1/4NE1/4, Section 6, T42N, R23W

PIN 05.00175.00 (37.04 acres)

Kanabec County; Minnesota

Deed Acres: **73.48**

Management Plan Acres: **73.48**

Prepared by:

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Mora School District's forest stewardship goals for this property are:

- To achieve some level of economic gain via forest products while maintaining sustainable forest management objectives.
- To improve wildlife habitat through forest management methods that will increase the number and diversity of wildlife species on the property
- To promote and/or increase desirable tree species
- To identify, eliminate, and instill preventative measures for the invasive species that are currently on or threatening the property.
- To enhance recreational opportunities for the property.
- To enhance forest health.
- To manage the property in a way that will improve water quality now and maintain it in the future.

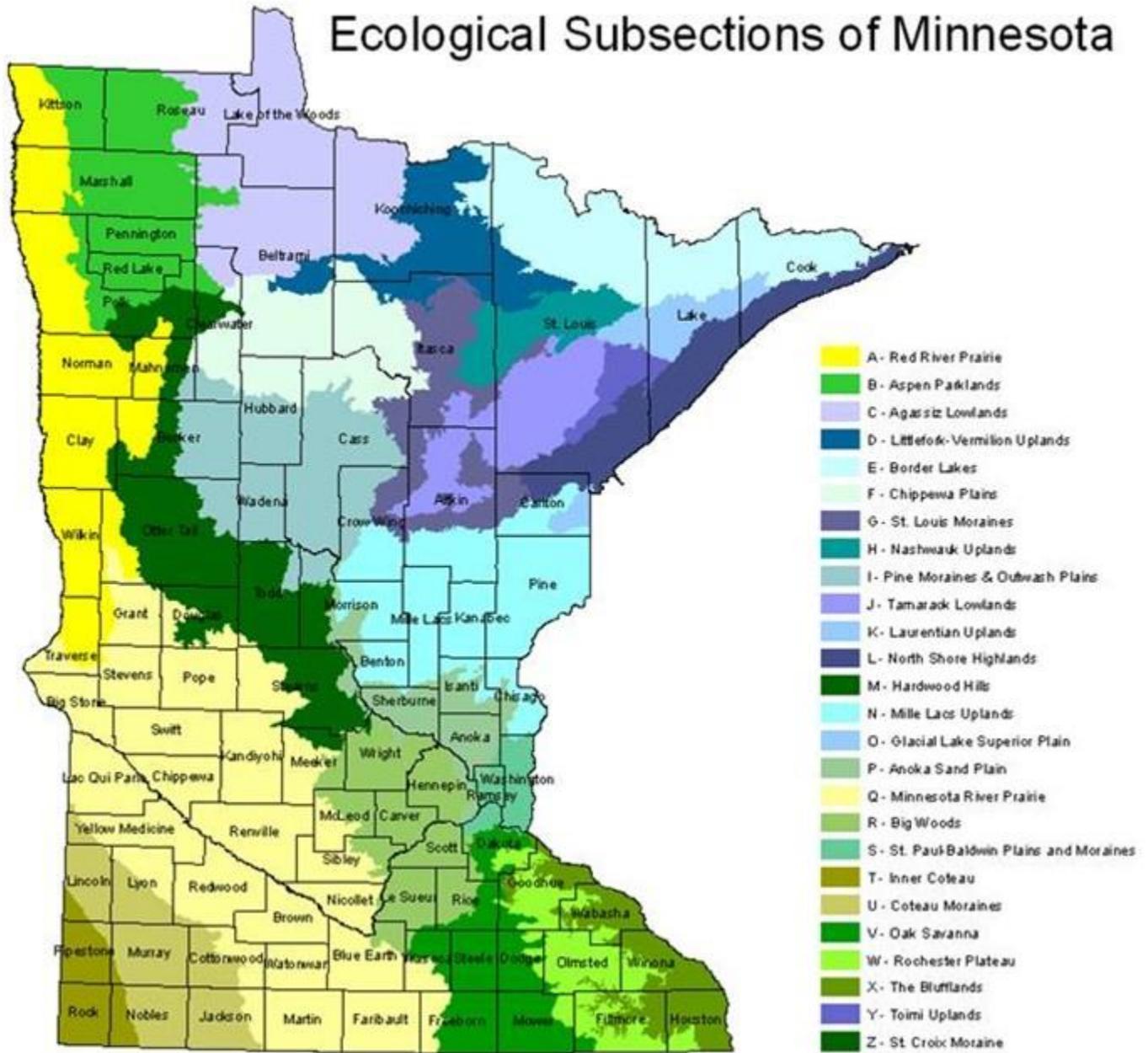
PROPERTY DESCRIPTION: Landscape Region

The property falls within the **Mille Lacs Uplands** Ecological Subsection.

General Description:

This subsection covers the large area of Superior Lobe ground moraines and end moraine in east-central Minnesota. Gently rolling till plains and drumlin fields are the dominant landforms in this ecoregion. The jewel of the region is Mille Lacs Lake, well known for walleye fishing.

Brown and red till forms the parent material. In the southern portion, upland hardwood forests consisting of northern red oak, sugar maple, basswood, and aspen-birch were common before settlement. Presently, forestry, recreation, and some agriculture are the most common land uses.



Landform:

This subsection consists primarily of Superior lobe ground moraine, and includes the Brainerd-Pierz and Automba Drumlin Fields (Dept. of Soil Science, Univ. of Minnesota 1977, 1980b, Hobbs and Goebel 1982). The depressions between drumlin ridges contain peatlands with shallow organic material. There are also small areas of Des Moines lobe ground moraine in the southeastern portion of the subsection (Hobbs and Goebel 1982). A large end moraine in the center of the subsection forms the dam that created Mille Lacs Lake. In the northeast, there is another series of end moraines, which marked later advances and retreats of the Superior lobe.

Bedrock Geology:

Glacial drift ranges from 100 to 300 feet in depth over bedrock. Bedrock is locally exposed throughout the northern portion of the subsection, where depths are typically 100 feet or less (Olsen and Mossler 1982, Trotta and Cotter 1973). Bedrock consists of Middle to Late Archean and Early Proterozoic gneiss, amphibolite, undifferentiated granite, and metamorphosed mafic. At the southeastern edge of the subsection are Cretaceous marine shale, sandstone, and variegated shale (Morey 1976, Morey et al. 1982, Ostrom 1981).

Soils:

At the eastern end of the subsection, the end moraines and ground moraines have loamy soils. Typically, there is dense glacial till underlying most soils in this subsection. This dense till impedes water movement throughout the soil profile. The soils are described as acid, stony, reddish sandy loams, silt loams, and loamy sands (Hole 1976, Hobbs and Goebel 1982). The parent material in the Grantsburg (Des Moines Lobe) portion of the subsection is more calcareous and finer textured than Superior Lobe sediments. It is underlain by Superior lobe drift which is locally exposed. The soils are classified as Boralfs (well-drained soils developed under forest vegetation) and Ochrepts (poorly developed soils formed under forest vegetation) on the moraines (Anderson and Grigal 1984).

Climate:

This subsection has little moderation from Lake Superior. Total annual precipitation ranges from 27 inches in the west to 30 inches in the east, with growing-season precipitation ranging from 12 to 13 inches. Snowfall is relatively light- the location of the subsection, primarily southwest of Lake Superior, is not characterized by lake-effect snows (Albert 1993). Growing-season length is quite variable, ranging from 97 to 135 days, with the longest growing season in the south and the shortest on the outwash plains at the northern edge of the subsection (Dept. of Soil Science, Univ. of Minnesota 1977, 1980b).

Hydrology:

Major rivers running through this subsection include the St. Croix, which forms part of the eastern boundary and the, Kettle, Snake, Rum, and Ripple rivers. The drainage network is young and undeveloped, with extensive areas of wetlands present. There are 100 lakes greater than 160 acres in size. Most occur on end moraines.

Pre-settlement Vegetation:

The original vegetation consisted of a mosaic of forest types. Along the southern boundary, maple-basswood forests were prevalent. The rest of the subsection was a vast mix of conifer, hardwood and mixed conifer-hardwood forests. Peatland areas were inhabited by sedge-fen, black spruce-sphagnum, or white cedar-black ash communities.

Present Vegetation and Land Use:

Agriculture is concentrated in the western and southern portions of this subsection. Forestry and recreation are the most important land uses in the central and eastern part. There are large areas in eastern Pine County that are still heavily forested and relatively undisturbed, although there are no significant examples of large white pine stands still present.

Natural Disturbances:

Both fire and windthrow were important in determining the vegetation of the subsection. Because dense basal till is present at depths of 20 to 40 inches throughout most of the subsection, rooting depths for trees are shallow and windthrow is common.

Conservation Concerns:

Native American fishing and hunting rights are a major conservation issue that is going to be decided by the federal courts.

Other conservation concerns include timber harvesting, old growth, and water quality.

PROPERTY DESCRIPTION: General Property Description

Your property:

This School Forest is located 20 miles north of Mora, MN on the west side of State Highway #65 in Kanabec County. The north property line is the Aitkin County line, and the property runs one half mile west of Highway #65 which is the east boundary. The south and west property lines are shared with privately owned lands. Access to the property is not good because of the deep ditch along Highway #65, however the property lines were cleared out for fire breaks in 1973 and are still visible. Walking trails recommended in the management plan written in 1972 were maintained until 1976, but have since grown in limiting access to the interior of the property. New interior walking trails are in the process of being cleared, thanks to a School Forest Grant that paid for a Conservation Corp of Minnesota (CCM) crew to work for 4 days this past summer and the seasonal work of a DNR smokechaser currently working in Mora.

The property had not been used for environmental education purposes since 1976 until recently because of the distance from the school and changes in instructors at the school. The current administration has been using it much more in the last few years. The property is all forested except for the wetland area adjacent to Bergman Brook, and consists of four major cover types: aspen regeneration, mature aspen, mature bur oak, and lowland grass & brush. The topography is level to gently rolling, and drains into Bergman Brook.

There are eight major soil types found on this property. On the north side of the brook: Mora-Brennyville, wet, complex (1% to 6% slopes) fine sandy loam and Cebana (0% to 2% slopes) silt loam make up the majority of the area, with smaller amounts of Milaca-Brennyville, complex (3% to 8% slopes) fine sandy loam and Milaca (8% to 15% slopes) fine sandy loam. On the south side of the brook: Ossmer-Billyboy complex (0% to 3% slopes) silt loam makes up the majority of the area, with smaller amounts of Annriver silt loam (0% to 2% slopes), Billyboy-Ossmer complex silt loam (0% to 3% slopes), and Rosholt-Chetek complex loam over fine sandy loam (2% to 8% slopes).

The silt loam soils are intermediate in drainage characteristics and occur in the poorly drained areas of the property. The un-cleared lands on this soil in the County are covered with willow, dogwood, and alder thickets, or with fair-sized elm, basswood, ash, sugar maple, red oak, bur oak, and a few white pine trees. Poplar thickets are common on the burned-over areas. The fine sandy loam soils are moderately well drained, as surface runoff is rapid and internal drainage is excellent. The original forest growth on this soil type was principally white pine and red pine, with some oaks and other hardwoods. The second growth is mostly aspen and paper birch, with thick undergrowth of briers and hazel brush. The soil found adjacent to Bergman Brook is Bowstring muck and Fluvaquents, loamy (0% to 1% slopes). This soil is composed mainly of plant remains that have accumulated in wet depressed areas. Most are covered with sedges, wild grasses, and scattered swamp birch, tag alder, and willow.

Rare and Natural Features:

A search of the Minnesota Natural Heritage Information System showed there are no rare and natural features within 1 mile of your property. No rare features were observed during the inventory of the property to prepare this plan. We urge you to become familiar with rare species, so you are able to identify them on your property.

Cultural Heritage Sites:

A check of the State Archeologist's inventory did not reveal any recorded historical features on your land. Heritage, or Cultural resources are of concern in forest management because many of them occur in Minnesota's forestlands and they can be damaged by some management activities. The DNR feels a landowner should at least be aware that heritage resources may be present on the property. Ideally a landowner would plan management activities to avoid damaging any heritage resources that are present. Such features may still exist on your property since neither this plan, nor the existing records are based on exhaustive inventories. If you

believe your property might have some rare or historical features, please contact me about the process of further survey work.

Tree Farm:

This property is not enrolled as a Tree Farm.

Conservation Easement:

No conservation easements.

Grant:

Not funded by a grant.

PROPERTY DESCRIPTION: Interaction with Nearby Properties

This property is surrounded by private land that is used mostly for hunting recreation. The Hay Snake Wildlife Management Area (240 acres), which is surrounded by 1800 acres of State Forest lands, is located one mile south of the property and east of Highway #65. The Snake River State Forest (approximately 8,000 acres) is located 4 miles to the east, which includes the Bean Dam Wildlife Management Area (200 acre). The Lake Five Wildlife Management Area (280 acres) is located 7 miles to the east. All of these public lands are managed for timber and wildlife. Public recreational use is very high in this area, however the Mora School District has not encouraged public use of this property.

Numerous lakes and rivers are in the vicinity of this property. Bergman Brook runs through the property from west to east, and drains into the Snake River less than two miles to the east. Two public accesses to the Snake River are provided within 3 miles of the property. Cowan Brook is just over two miles to the east, and Hay Creek is less than two miles to the south. Nearby named lakes include Lake Five, Long Lake, Loon Lake, Beauty Lake, Lake Eleven, Bass Lake, Lake Twelve, Thirteen Lake, Flathead Lake, and White Lily Lake in Kroschel Township, and Snowshoe Lake in Ford Township, all within 10 miles of the property. There are several unnamed lakes in the area as well, mainly surrounded by private property.

MANAGEMENT COVER TYPES

Cover Type: Aspen (regeneration)

Cover Type Label (on map): 1

Acres: 15

Cover Type Description: This cover type is the regeneration resulting from timber harvested in 2010 as recommended in the 2008 management plan. Because of the age of the aspen and the length of time since the last harvest, it was decided to cut it all at one time rather than in strips like suggested in the first management plan. All aspen, birch, maple, basswood, and all oak less than 12” diameter at breast height (DBH) was harvested, leaving all oak larger than 12” DBH as residual. Natural tree regeneration includes approximately 8134 stems/acre of aspen (0” to 3” diameter), 800 stems/acre of bur oak (0” to 3” diameter), and 66 stems/acre of elm (1” to 5” diameter), for a total of 9000 stems/acre. A few large white spruce trees were also observed scattered throughout the stand, as well as a very large lone white pine that has been used for educational purposes for many years. The shrub layer is mostly hazel, with smaller amounts of dogwood and nannyberry. Grass and common forbs make up the ground cover. The topography is gently rolling towards Bergman Brook to the south.

Tree Summary Data	Estimated Volume/Acre
Age: 8 years	Species: Elm, American 66 Stems/Acre
Growth potential: Good (SI = 65)	Species: Aspen, Trembling 8134 Stems/Acre
Tree Density: Adequate (9000 stems/acre)	Species: Oak, Bur 800 Stems/Acre
Timber Quality: N/A	
Timber Volume: 9000 Stems/Acre	

Cover Type Objective: To maintain for wildlife habitat and educational purposes.

Main Recommendation

Action: No Action-Free to Grow

Regeneration after the aspen harvest was very good for aspen and oak. In order to achieve maximum regeneration such as this you would need full sunlight. Typically in this area aspen matures at approximately 55 years and will deteriorate rapidly after that. An indicator of deterioration is Hypoxylon canker which indicates heart rot. An excellent web site titled, “Managing Aspen in the Lake States,” is located at: www.extension.umn.edu/distribution/naturalresources/DD3473. This is a very informational web site explaining the ecology of aspen and how it benefits wildlife.

Alternative Recommendation

Action: Stump Sprout Release: Mechanical-Manual

Uses hand tool such as a brush axe, axe, or other tool to manually cut and remove unwanted trees or shrubs from desirable vegetation. This can be effective on smaller vegetation less than two or three inches in diameter. Apply this practice to the hardwood stump sprouts, favoring only the best stems. When thinning young sprouts, remove those that arise from the parent stump above the root collar (i.e. retain those that attach to the parent stump at the root collar), and reduce clumps to one or two vigorous stems, which should be well spaced and not connected to one another. Doing this work before stands are 20 years old is recommended (Campbell 1938).

Educational Recommendations

- Natural tree regeneration surveys
- Tree development studies
- Young tree & shrub identification

Stewardship Binder References: (for additional information)

<u>Chapter</u>	<u>Reference Name</u>
1.....	Preparing a Woodland Stewardship Plan
2.....	Conducting a Woodland Inventory
3.....	How Trees and Woodlands Grow
4.....	Regenerating Woodland Stands
5.....	Woodland Improvement Practices
6.....	Managing Important Forest Types
7.....	Forest Health
11.....	Wildlife and Forest Management
13.....	Recreational Trail Design

Cover Type: Aspen (mature)

Cover Type Label (on map): 2

Acres: 8

Cover Type Description: The management plan, written in 1972, recommended harvesting two 5-acre strips of timber running north and south in the current aspen cover type every 5 years and progressing from the east side of the property to the west. This cover type is the result of the first such strip cuttings, however the practice was not continued all the way to the west property line as suggested. Past records show that 177 cords of wood was harvested from this area before 1976, and tours were given to students at that time to educate them on timber harvesting activities and the importance of tree regeneration. There is no current evidence of an access route for this timber harvest, and our records do not show how the timber was removed. Any access approach must have been obliterated and not replaced as improvements have been made to the highway over the years, or there never was a truck access. This has created a challenge for future forest management activities.

The aspen is now 45 years old and is again merchantable. Aspen is the dominant overstory species, with smaller amounts of basswood, red maple, and bur oak. There are some scattered red pine trees along the highway, however their numbers are insignificant. The understory tree regeneration consists of 100 stems/acre of bur oak (0-3" diameter), 75 stems/acre of ash (0-5" diameter), 50 stems per acre of aspen (3-5" diameter), 50 stems/acre of basswood (1-3" diameter), and 50 stems/acre of birch (1-3" diameter), for a total of approximately 225 stems/acre. The shrub layer consists of a light to moderate density of hazel, dogwood, Juneberry, winterberry, nannyberry, and a light density of buckthorn. Common forbs make up the ground cover. The topography is mostly level.

Tree Summary Data	Estimated Volume/Acre
<p>Age: 45 years</p> <p>Growth potential: Good (SI = 65)</p> <p>Tree Density: Overstocked (BA = 152)</p> <p>Timber Quality: Good</p>	<p>Species: Basswood 1.5 Cords/Acre, 50 Stems/Acre</p> <p>Species: Maple, Red 1.0 Cords/Acre, 0.0 MBF/Acre</p> <p>Species: Oak, Bur 0.25 Cords/Acre, 100 Stems/Acre</p> <p>Species: Aspen, Trembling 30.75 Cords/Acre, 50 Stems/Acre</p> <p>Species: Birch, Paper 0.0 Cords/Acre, 50 Stems/Acre</p> <p>Species: Ash, Green 0.0 Cords/Acre, 75 Stems/Acre</p>
<p>Timber Volume: 33.5 Cords/Acre, 325 Stems/Acre</p>	

Cover Type Objective: To maintain for wildlife habitat and educational purposes.

Main Recommendation

Action: Harvest: Clearcut with Reserves

Harvest this stand in 5-10 years. Clearcutting with reserves is a harvest technique that can take advantage of the diversity within a forest type. As the name implies, most of the harvest area is clearcut. However, some trees are left uncut after the harvest operation. These trees may be selected single trees or selected groups of trees within the harvest area. Selecting which trees remain depends on the goals of the harvest operation, though all have remained vigorous enough to develop taper and tree form capable of resisting windthrow. Reasons for leaving residual trees include: improving or maintaining wildlife habitat; providing shade or protection to the forest floor; controlling erosion; maintaining species diversity within the stand; protecting valuable timber species; and aesthetics. Leave 6-12 live trees per acre (or about 5% of each clearcut harvest unit and as many dead snags as possible.

Alternative Recommendation

Action: Timber Stand Improvement

Timber stand improvement (TSI) is a broad term encompassing a wide variety of forest practices. The purpose of the practices is to improve the overall health, timber growing potential, aesthetics, wildlife habitat and/or quality of the trees being grown. There are four general categories of TSI practices. They are thinning, release, pruning, and protection. These practices, alone or in combination, can often add value to a forest type. Generally, thinning involves the removal of some trees for the betterment of others, release involves removing vegetation that is harmfully competing with crop trees or desirable trees, pruning is the removal of branches to improve wood quality, and protection involves practices that control or eliminate disease, insects, or animals that are harmful to the forests' health

Educational Recommendations

- Tree identification
- Timber appraisal plots
- Comparison with adjacent regenerating stand
- Future timber sale

Stewardship Binder References: (for additional information)

<u>Chapter</u>	<u>Reference Name</u>
1.....	Preparing a Woodland Stewardship Plan
2.....	Conducting a Woodland Inventory
3.....	How Trees and Woodlands Grow
4.....	Regenerating Woodland Stands
5.....	Woodland Improvement Practices
6.....	Managing Important Forest Types
7.....	Forest Health
8.....	Marketing Timber
9.....	Harvesting Timber
11.....	Wildlife and Forest Management
13.....	Recreational Trail Design

Cover Type: Oak

Cover Type Label (on map): 3

Acres: 23

Cover Type Description: This cover type includes the remainder of the forested areas on the property. The small areas south of Bergman Brook consist mostly of mature aspen and are also included in this cover type. The major species in the overstory of this type is bur oak, with smaller amounts of basswood, aspen, and elm. The understory regeneration consists of 75 stems/acre of bur oak (1-5" diameter), 75 stems/acre of ash (0-1" diameter), 25 stems/acre of black cherry (1-3" diameter), 25 stems/acre of red maple (1-3" diameter), and 25 stems/acre of white spruce (0-1" diameter and planted by the school in the past), for a total of approximately 225 stems/acre.. The shrub layer is mostly hazel, arrowwood, blue beech, ironwood, dogwood, and a light density of buckthorn. Grass and common forbs make up the ground cover. The topography is mostly level.

The 1972 management plan recommended clearing and planting 6 acres of the area south of Bergman Brook with red pine, white pine, and white spruce seedlings. The school forest accomplishment reports show that 1500 seedlings were planted somewhere on the property from 1973 to 1975, but it does not specify what species were planted or where they were planted. There also are no records showing that these seedlings were ever maintained after planting. An arboretum was also proposed in the part of this cover type north of Bergman Brook in the 1972 plan. Suggested species for planting there included white pine, red pine, white spruce, white cedar, balsam fir, tamarack, and native shrub species. The idea was to incorporate this arboretum into the proposed nature trail. A few of these species were observed scattered throughout the property, however it is difficult to tell if these were part of this proposed planting or just naturally occurring. White spruce seedlings were planted by students recently, and they seem to be doing very well.

Tree Summary Data	Estimated Volume/Acre
<p>Age: 64 years</p> <p>Growth potential: Fair (SI = 50)</p> <p>Tree Density: Adequate (BA = 88)</p> <p>Timber Quality: Fair</p>	<p>Species: Pine, White 0.0 Cords/Acre, 3.25 BF/Acre</p> <p>Species: Oak, Bur 14.5 Cords/Acre, 8.75 BF/Acre, 75 Stems/Acre</p> <p>Species: Spruce, White 0.0 Cords/Acre, 25 Stems/Acre</p> <p>Species: Maple, Red 0.0 Cords/Acre, 25 Stems/Acre</p> <p>Species: Ash, Green 0.0 Cords/Acre, 75 Stems/Acre</p> <p>Species: Cherry 0.0 Cords/Acre, 25 Stems/Acre</p> <p>Species: Elm, American 1.5 Cords/Acre, 0.0</p>

	<p>Species: Aspen, Trembling 2.0 Cords/Acre, 0.0 MBF/Acre</p> <p>Species: Basswood 3.5 Cords/Acre, 0.0 MBF/Acre</p>
<p>Timber Volume: 21.5 Cords/Acre, 0.12 MFB/Acre, 225 Stems/acre</p>	

Cover Type Objective: To improve timber quality and maintain for educational purposes.

Main Recommendation

Action: No Action-Free to Grow

No management activity will be required for your oak stand during the next ten years. The oaks and other types of trees in the area are relatively young. They need some more time to grow to maturity. Meanwhile, your oak stand is providing valuable cover and food (acorns) to wildlife including squirrels, fox, white-tailed deer, hawks, and wild turkey (southeast Minnesota). Be sure to take advantage of your woods for hiking, camping, hunting, or for watching wildlife. Check your stand each August for signs of oaks that are wilting or turning brown early--this could indicate oak wilt, a serious disease of oak. Contact you DNR forester is you suspect oak wilt in your trees.

Alternative Recommendation

Action: Planting: Softwoods

Seedlings may be planted using a planting bar (dibble), shovel, hoedad, or planting tube (containerized seedlings only). Seedlings may be planted without preparing the site but success could be poor. For best results use herbicide to reduce competition for water and nutrients. Containerized stock gives great flexibility in planting. Whereas bare root stock has to be planted before they start to grow, the time frame for containers is much longer because the seedlings are actively growing and may be planted well into the summer or early fall.

Alternative Recommendation

Action: Timber Stand Improvement

Timber stand improvement (TSI) is a broad term encompassing a wide variety of forest practices. The purpose of the practices is to improve the overall health, timber growing potential, aesthetics, wildlife habitat and/or quality of the trees being grown. There are four general categories of TSI practices. They are thinning, release, pruning, and protection. These practices, alone or in combination, can often add value to a forest type. Generally, thinning involves the removal of some trees for the betterment of others, release involves removing vegetation that is harmfully competing with crop trees or desirable trees, pruning is the removal of branches to improve wood quality, and protection involves practices that control or eliminate disease, insects, or animals that are harmful to the forests' health.

Alternative Recommendation

Action: Thinning: Commercial, Selection

Harvest all the aspen, birch, maple, and basswood at the same time when cover type #2 is harvested. Partial harvesting means that only some of the trees in a stand are removed at any one time. Well planned partial harvests result in a higher quality stand with an improved growth rate. Partial harvests can also provide forest products and an income for the landowner. It is important to have a forester assist in deciding which trees should be removed in order to protect against "high grading" (removing the best trees from the stand). Reserve all the oak for future timber and wildlife purposes.

Alternative Recommendation

Action: Trail and Path Recon and Construction

Field inspection of the trail or path layout should be done in the early spring after the snow has melted when visibility in the forest is best (no leaves to block sight lines) and natural drainage patterns can be seen. Starting at the trail head, walk the system in both directions to identify problem areas, points of interest, slope angles, sun and wind exposure, drainage, and ease of clearing. The exact route should then be flagged with plastic ribbon and any large trees to be removed should be marked. Construction of the trail or path will start with removal of unwanted vegetation, mainly trees and shrubs. Full trees will need to be removed with heavy equipment or cut with chain saws while shrubs can be cut with a brush saw or hand tools. To provide a clear trail or pathway, tree limbs may need to be pruned using a pruning saw. The debris can be scattered, buried, burned, chipped, or utilized. Heavy equipment may be needed next to fill holes, shape slopes, level the trail bed, and install drainage structures, such as culverts or water bars.

Alternative Recommendation

Action: Trail and Path Maintenance

The quality of a trail or path will depend largely on the maintenance it receives. The goal of maintenance is to continue to provide a safe and stimulating recreational experience and to prevent degradation of the trail or path environment. Trail or path maintenance includes trail-bed stabilization, vegetative management, weed control, grooming, and sign replacement. Inspections of the trail or path should be done periodically to check the need for clearing of unwanted vegetation, repairing the trail-bed, cleaning and repairing drainage structures, correcting erosion problems, mowing, replacing signs, and grooming.

Alternative Recommendation

Action: Trail Seeding

To help prevent soil erosion on newly constructed or repaired trails, all disturbed areas exposing bare soil should be prepared and seeded with a grass mixture to stabilize the soil. The seedbed preparation may involve discing and/or dragging. The grass mixture should include clover to provide forage for wildlife.

Alternative Recommendation

Action: Bridge Reconstruction

Careful consideration should be given to alternate trail locations before deciding that a bridge is really necessary. It may be less expensive to re-route the trail than to build a bridge. In selecting a site for a bridge, attention should be directed to the alignment of the stream as well as that of the trail. The crossing should be at right angles, with alignment of stream and trail straight in all four directions. The stream bed should be straight and should also be of uniform profile to provide for unobstructed flow of water. The grade of the bridge should coincide with that of the trail. Abrupt rises or falls in the grade line at the ends of the bridge are to be avoided. Bridges are an excellent idea for boy scouts looking Eagle Scout projects.

Educational Recommendations

- Tree identification
- Timber stand improvements
- Tree planting opportunities
- Nature trail adventures

Stewardship Binder References: (for additional information)

<u>Chapter</u>	<u>Reference Name</u>
1.....	Preparing a Woodland Stewardship Plan
2.....	Conducting a Woodland Inventory
3.....	How Trees and Woodlands Grow
4.....	Regenerating Woodland Stands
5.....	Woodland Improvement Practices
6.....	Managing Important Forest Types
7.....	Forest Health
8.....	Marketing Timber
9.....	Harvesting Timber
11.....	Wildlife and Forest Management
13.....	Recreational Trail Design

Cover Type: Lowland Brush/Bergman Brook

Cover Type Label (on map): 4

Acres: 27.48

Cover Type Description: This cover type is a lowland brush wetland along Bergman Brook that makes up the remainder of the property. This type of wetland would be classified as a Type 6 shrub swamp. The soil is waterlogged or covered with as much as 6 inches of water during the growing season. Vegetation includes alders, willows, and dogwoods. Animal use in these swamps includes 12 species of reptiles and amphibians, 15 species of mammals, and 62 species of birds. Bergman Brook is listed as protected by the Department of Natural Resources on the protected waters list. Current beaver activity was observed, and the topography here is level. The proposed trail system described in the 1972 management plan suggested a spur trail leading to a good spot for viewing the beaver activity somewhere in this cover type. There are plans by a local Scout to construct and install a new wildlife viewing dock sometime in 2018 as part of his Eagle Scout service project.

Cover Type Objective: To maintain water quality and provide for better educational opportunities.

Main Recommendation

Action: No Action-Free to Grow

This lowland brush type is actually an important wetland. This wetland cleans water, helps prevent flooding, and provides habitat for wildlife. You won't need to perform any type of management activity on this area for the next ten years. Look for species such as high-bush cranberry and dogwood on your land. In the winter, you can hike or snowshoe through this frozen wonderland.

Alternative Recommendation

Action: Water Quality Projects

These projects are designed to preserve and enhance water quality. They can consist of trees planted along a streambank or other projects intended to control effluent. Consider water quality when planning any activity on the property, including future timber harvests, new trail construction, and the installation of the new viewing dock.

Alternative Recommendation

Action: Wildlife Habitat-Nest Boxes

Wood ducks have made an amazing recovery in Minnesota in the last 30 years to where wood ducks are among the most abundant of waterfowl species in the state. Properly constructed and placed nest boxes will help continue this trend. Nest boxes should be constructed of wood that is strong and weather resistant, and should only be stained or painted on the outside. Nest boxes can be placed in woodland habitat up to one half mile from water, although shorter distances are better. Avoid placing nest boxes in aspen trees, since they are vulnerable to beavers. It is better to scatter nest boxes around an area than to concentrate them.

Educational Recommendations

- Waterfowl studies
- Beaver activity studies
- Water quality studies

Stewardship Binder References: (for additional information)

<u>Chapter</u>	<u>Reference Name</u>
11.....	Wildlife and Forest Management
Appendix C	Managing Your Woodland Wetland
Appendix C	Managing Your Brushland for Wildlife

PROPERTY-WIDE PROJECTS

General Wildlife Habitat Recommendations:

The objective of these recommendations is to improve and maximize habitat for a variety of wildlife species. As outlined above in the forest management recommendations, much of what is listed below will be accomplished by implementing those activities:

- Mast-producing trees and shrubs attract many different species of wildlife. Plant only native species that are locally adapted to the soils and climate (as opposed to exotic, non-native species). Birds particularly favor shrubs and small trees like highbush cranberry (*Viburnum trilobum*),
- Juneberry (*Amelanchier* sp.), elderberry (*Sambucus canadensis*), cherries (*Prunus* sp.), dogwood (*Cornus* sp.), hazelnut (*Corylus americana*), mountain ash (*Sorbus americana*), American plum (*Prunus americana*), hawthorn (*Crateagus* sp.) and nannyberry (*Viburnum lentago*). Desirable hardwood trees include oaks (*Quercus* sp.), hickories (*Carya* sp.), and basswood (*Tilia americana*).
- A diversity of forest types and age classes benefits a diversity of wildlife. Thinning hardwood stands creates more structural diversity by having a variety of ages in the forest. Preserving old-growth areas that are utilized by certain species of wildlife is also important. Older trees contain cavities that are utilized by wildlife. Also preserve younger, brushy areas that provide habitat for a different suite of species.
- Create brush piles and down woody debris. Many species of wildlife utilize brush piles for cover, including rabbits, chipmunks, woodchucks, coyotes, and songbirds. Brush piles can be an easy way to improve structural diversity.
- Coarse Woody Debris – Logs and rotting material on the forest floor provide important micro-habitat for mosses, lichens and fungi, as well as cover for small mammals, reptiles, and amphibians.
- Snags and Den Trees - Dead and dying trees are very important for woodpeckers, chickadees, nuthatches, bluebirds, squirrels, bats, wood ducks, furbearers, and many other animals. Leave most dead trees or cavity trees standing – unless they may present a hazard (see information below regarding hazard trees) with a goal to have at least 3 per acre. Also reserve some live large-diameter trees for future snags. You can create snags by girdling (cutting through the bark all the way around the tree) undesirable trees.
- The zone (riparian area) around the Bergman Brook is teeming with life because it supports species of both aquatic and terrestrial habitats. Preserve and buffer these areas from negative impacts such as invasive species (reed canary grass) and soil erosion.

ADA Requirements:

Consider ADA requirements when developing trails or other areas to be accessed for outdoor learning purposes.

Bio-Blitz:

A Bio-Blitz is an activity in which teams of volunteer scientists, families, students, teachers, and other community members, work together to find and identify as many species of plants, animals, microbes, fungi, and other organisms as possible.

Hazard Trees:

A “hazard tree” is a tree with structural defects likely to cause failure of all or part of the tree, which could strike a “target” that can be a place where people (students) gather such as an interpretive sign along a trail, designated outdoor classroom area, play equipment, picnic tables or other seating, a structure such as a building or fence, or vehicle, for example. The important concept is that there must be a defined target, as briefly described above.

In a natural forest environment, dead and dying trees serve an important purpose for wildlife and soil development so these trees should be left to natural processes if deemed safe to do so. A trained arborist or forester should be consulted to conduct a hazard tree assessment and recommend a plan for mitigation. Ideally, because this is a school/public place, an assessment should be conducted for the entire grounds. Implementing a plan for mitigating potential hazards can be accomplished based on safety priorities and available funds. Areas deemed unsafe can be cordoned off with warning signs until the hazard is removed. For more information, reference the USDA Forest Service publication “How to Recognize Hazardous Defects in Trees” at <http://www.treesaregood.com/treecare/hazards.aspx>.

Invasive Species Management:

Buckthorn:

Buckthorn removal projects have occurred in the School Forest and should continue to be implemented as time and resources allow. The first priority is to identify and remove female seed-producing plants. The second priority is to monitor previous removal sites for sprouting and/or seeding and continue to remove any regeneration.

Reference the MN DNR publication “Buckthorn: What You Should Know. What You Should Do” at <http://www.dnr.state.mn.us/invasives/terrestrialplants/woody/buckthorn/index.html> for more information on best methods to control and manage buckthorn as well as planting native replacement species. Hard copies can be obtained through the DNR School Forest Program.

Buckthorn is the only green-leaved deciduous shrub/tree in the forest in November. Fall into early winter is an easy time to identify and treat/remove.

It is important to understand that buckthorn is a very successful and persistent invasive woody plant that takes time and patience to control and manage, but it can be done. The best approach is to properly identify it (as compared to native woody plants such as cherry or dogwood) and strategically remove it (female seed-producing plants first) as your/volunteer time and resources allow. Pulling small, manageable plants is best when the entire root system can be removed, however, chemical treatment will be necessary for larger plants that have to be cut, or the buckthorn will sprout back creating a worse problem.

Emerald Ash Borer (EAB):

Reference the MN DNR publication “EAB Alert: A Guide to the Emerald Ash Borer” or the websites listed below for more information.

Emerald ash borer is a fairly new and serious pest to Minnesota’s ash trees having been found in St. Paul in 2009. It was first discovered in the U.S. in Michigan in 2002. In the Metro Area, Hennepin and Ramsey counties are currently under quarantine; Houston and Winona counties are under quarantine in the southeast. Ash is a very common species planted on school grounds and in residential areas and is also common in native habitats.

Emerald ash borer cannot currently be eradicated and is expected to have a significant impact on our boulevard, backyard, parks and natural ash tree resources, much like Dutch elm disease. However, there are strategies for dealing with this pest that include the following:

- Identify, map and record all ash trees on your property, not just in the designated school forest area.
- Assess the condition of each of the ash trees for health and function (is it healthy and providing significant shade or is it not very vigorous and mixed in a woodland area). This will help you determine if the tree is worth trying to save or not. What will be lost if it dies?
- Decide what trees should be saved, left to die, or be immediately replaced:
 - Trees to be saved:
 - Chemical treatments are proven to be effective against EAB

- There are costs associated with treatments and should be researched thoroughly before deciding if and how to proceed
 - Contact tree care companies that have ISA Certified Arborists on staff for additional information on services and costs
 - Trees to be immediately replaced:
 - For all remaining trees not being chemically treated, develop a plan for immediate replacement of those that provide the most benefit due to location and function and those that are least healthy. For example, if an ash tree is in severe decline but is in a situation where it provides significant benefits (such as shade), consider cutting that tree and replacing it immediately. Or, if an ash tree is currently providing a great deal of shade in a high use area and is in reasonable health but is not healthy enough to chemically treat, look for a nearby space where a replacement tree can be planted and grow while the ash declines. The declining ash should be removed at the time the replacement tree has grown enough to begin to replicate the benefits.
 - Trees left to die without replacement:
 - There are many situations where cost, logistics or other factors will not allow for saving an ash tree and replacing it is not a viable option. These trees are simply left to die. Often these trees are in situations that they will ultimately need to be removed, such as along streets, around play areas, or other areas where their decline could pose a safety risk. Other trees are in more natural areas where they are left to die, fall and recycle into the environment. These trees need to be evaluated for potential safety risk if there is a trail, bench, educational station or other “invitation” for people to be near that tree.
- There are many resources relating to EAB with a few listed below:
 - MN Department of Natural Resources:
 - <http://www.dnr.state.mn.us/invasives/terrestrialanimals/eab/index.html>
 - http://www.dnr.state.mn.us/forestry/urban/community_eab.html
 - MN Department of Agriculture: <http://www.mda.state.mn.us/plants/pestmanagement/eab.aspx>
 - UMN Extension: <http://www.extension.umn.edu/issues/eab/>
 - City of Mounds View: <http://www.ci.mounds-view.mn.us/>. Information on EAB and other local forestry topics can be found through its Public Works Department webpage link to Forestry.

Garlic Mustard:

Garlic mustard is a significant ecological threat by spreading into high quality forests and woodlands, upland and floodplain forests, not just into disturbed areas. Invaded sites undergo a decline in native herbaceous cover within 10 years. Garlic mustard alters habitat suitability for native insects and thereby birds and mammals.

Garlic mustard is found in some areas of your School Forest. Identifying and removing garlic mustard is important and will be to try to contain its spread.

Garlic mustard is a prolific seed producer which helps it successfully spread. One pathway the tiny seeds take is through soil attached to footwear. Please be aware of this when walking in areas with garlic mustard and be sure to clean footwear before entering un-infested areas. Interpretive signage in the areas where it is located may help students, staff and visitors identify this invasive plant and take precautionary measures to prevent its spread.

For more information on garlic mustard, reference the MN DNR webpage:

<http://www.dnr.state.mn.us/invasives/terrestrialplants/herbaceous/garlicmustard.html> for information on best methods to control and manage garlic mustard as well as planting native replacement species.

Exotic Honeysuckles:

Exotic honeysuckles replace native forest shrubs and herbaceous plants by their invasive nature and early leaf-out. They shade out herbaceous ground cover and deplete soil moisture. The seeds are readily dispersed by birds, making them very invasive. Some research suggests that the plant inhibits the growth of other plants in its vicinity. These species were introduced to North America as ornamental shrubs and beneficial to wildlife.

For more information on exotic honeysuckles, reference the MN DNR webpage:

<http://www.dnr.state.mn.us/invasives/terrestrialplants/woody/exotichoneysuckles.html>

Reed Canary Grass:

Reed canary grass is a major threat to natural wetlands. It out competes most native species and presents a major challenge in wetland mitigation efforts. It forms large, single-species stands, with which other species cannot compete. If cut during the growing season a second growth spurt occurs in the fall. Invasion is associated with disturbances, such as ditch building, stream channeling sedimentation and intentional planting.

For more information on reed canary grass, reference the MN DNR webpage:

<http://www.dnr.state.mn.us/invasives/terrestrialplants/grasses/reedcanarygrass.html>

Siberian Elm:

This tree species is particularly aggressive and can invade and dominate disturbed prairies and forests in just a few years. Seed germination rate is high and seedlings establish quickly in sparsely vegetated areas. It grows readily in disturbed areas with poor soils and low moisture. A native of eastern Asia, Siberian elm was introduced to the U.S. in the 1860s for its hardiness, fast growth, and ability to grow in various moisture conditions. It is still sold commercially as a shelterbelt and windbreak tree.

For more information on Siberian elm, reference the MN DNR webpage:

<http://www.dnr.state.mn.us/invasives/terrestrialplants/woody/siberianelm.html>

Spotted Knapweed:

Spotted knapweed especially threatens dry prairie, oak and pine barrens, dunes and sandy ridges. Spotted knapweed is poisonous to other plants (phytotoxic) and spreads rapidly in artificial corridors, gravel pits, agricultural field margins and overgrazed pastures. It is a native of Europe and Asia it has become a serious problem in pastures and rangeland of the western states. Spotted knapweed is a MN Department of Agriculture listed prohibited noxious weed. It is known to be in the Blaine Preserve SNA. For more information on spotted knapweed, reference the MN DNR webpage:

<http://www.dnr.state.mn.us/invasives/terrestrialplants/herbaceous/spottedknapweed.html>

There is a potential for other invasive species on the property, but their numbers and impacts are far less than those outlined above. When removing buckthorn, make sure that no other invasive species are overlooked and left to further invade the area once the buckthorn is removed.

Deer Protection for New Plantings:

It is known that deer utilize the school forest and that they can damage seedlings and small trees and shrubs. Therefore, it may be necessary to protect newly planted trees and shrubs through a variety of techniques including wire cages, paper bud capping, and surrounding a seedling with a pile of downed woody material or planting in somewhat inaccessible places. Note winter deer trails and avoid planting along those routes or be sure to protect the plants if you do.

Monitor:

Monitoring is to observe and check the progress or quality of (something) over a period of time; to keep under systematic review. This is critical to know if your projects are successful and learn what may need to be adjusted or redone. For example, it can be as simple as monitoring mulch for replacement or new plants for watering. For buckthorn removal projects, this monitoring is important to assess if chemical treatments worked and to manage buckthorn seedlings. Monitoring can be developed into a fun and educational project for your students.

Pruning:

Pruning is the removal of live or dead branches to improve the quality and value of the tree and clear trails or designated learning areas. A high-quality saw is used, and the branches are removed flush with the trunk when pruning coniferous trees and outside of the branch collar when pruning deciduous trees. Pruning should be done in the late-fall and winter when the trees are dormant.

Poison Ivy (native)

Western Poison Ivy is on the noxious weed list for Minnesota due to its toxic, rash-producing properties, as well as its propensity to form large colonies from underground rhizomes. Western poison ivy is a smallish, nonclimbing shrub usually about knee high, with a single stem and only a few stubby branches or no branches at all. The leaves can be relatively large but always with three leaflets that are shiny and are large-toothed along the edges. Western poison ivy occurs essentially statewide and is common everywhere except the northern tier of counties. Although it is primarily a forest species, it is adapted to a remarkably wide range of ecological conditions. The sap contains a toxic oily compound (3-n-pentadecyl-catechol) that is found in the leaves, flowers, stems, and roots. If any portion of the plant is bruised or broken, the poison may exude onto the surface, which is how people typically come in contact with it.

For more information on Western poison ivy, reference the MN DNR webpage:

http://www.dnr.state.mn.us/trees_shrubs/deciduous/poisonivy.html

School Forest Committee Objectives

The preceding *current conditions* and *management objectives* sections of the School Forest Stewardship Plan provide a current picture, as well as a vision for the future, of the Mora County Line School Forest. This section outlines the steps necessary to bring the School Forest from the current picture to the desired future condition of the site:

- Annually appoint a School Forest Management Committee to guide the development and continued visioning of the School Forest.
- Review the goals of the School Forest Stewardship Plan annually to update completed activities, current conditions, redefine goals and objectives, identify new opportunities and activities, and update the Future Stewardship Projects table (see below) as needed.
- Using the Future Stewardship Projects table, develop an annual plan of work for the School Forest, which outlines the steps that will be taken the current year to meet one or more of the objectives outlined in the School Forest Stewardship Plan.
- At the completion of the year, submit a report to the DNR School Forest staff that highlights the activities, the steps taken, and objectives addressed during the year. This report should also document any unexpected outcomes or difficulties in meeting the stated objectives.

FUTURE STEWARDSHIP PROJECTS

Scheduled Year	Cover Type	Map Label	Project Prescription	Acres
5-10 Years	Aspen (mature)	2	Harvest: Clearcut with Reserves	8
5-10 Years	Aspen (mature)	2	Timber Stand Improvement	*
Fall 2017	Aspen (regeneration)	1	No Action-Free to Grow	15
1-5 Years	Aspen (regeneration)	1	Release: Mechanical-Manual	15
Spring 2017	Lowland Brush	4	No Action-Free to Grow	27.48
1-5 Years	Lowland Brush	4	Water Quality Projects	27.48
1-5 Years	Lowland Brush	4	Wildlife Habitat-Nest Boxes	*
Fall 2017	Oak	3	No Action-Free to Grow	23
1-5 Years	Oak	3	Planting: Softwoods	*
1-5 Years	Oak	3	Timber Stand Improvement	23
5-10 Years	Oak	3	Thinning: Commercial, Selection	23
Winter 2017	Oak	3	Trail & Path Recon & Construction	*
1-5 Years	Oak	3	Trail and Path Maintenance	*
1-5 Years	Oak	3	Trail Seeding	*
1-5 Years	Oak	3	Bridge Reconstruction	*

An asterisk* indicates the entire cover type may not need treatment.

Woodland Stewardship Cover Types



Mora School District #332
County Line School Forest
400 E. Maple Ave.
Mora, MN 55051
(320) 679-6200

Cover Types
1 : Aspen (regeneration) - 15 acres
2 : Aspen (mature) - 8 acres
3 : Bur Oak - 23 acres
4 : Lowland Brush/Bergman Brook - 27.48 acres

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0 330 660
Feet

October 30, 2017



Woodland Stewardship Cover Types



Mora School District #332
County Line School Forest
400 E. Maple Ave.
Mora, MN 55051
(320) 679-6200

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Feet

October 30, 2017



Minnesota Department of Natural Resources



MNDNR
460 W. Maple Ave.
Mora, MN 55051
(320) 679-3683

Mora School District #332, County Line School Forest
400 E. Maple Ave.
Mora, MN 55051

October 30, 2017

Dear Proprietor of Mora School District #332, County Line School Forest,

I enjoyed our recent visit. You have a splendid piece of property. Because of your strong concern for the environment and your desire to work with the land, I'm pleased to provide you this Woodland Stewardship Plan. The plan has three components. The first segment includes some brief information about the history of the Forest Stewardship Program. The second is your property management plan and offers management options and recommendations. It matches your goals with the potential of your land. The remainder is reference material which can include information you requested to learn more about a specific topic. Finally you will find the 2nd edition of the Woodland Stewardship publication. This publication was designed as a practical guide for landowners in the Midwest.

This plan offers mostly conceptual recommendations and alternatives. Should you decide to undertake specific activities, I will follow up with a short, but specific project plan. One of the first management opportunities I feel you should undertake is to complete the site improvement projects that are currently being planned. Additional opportunities include another timber harvest in 5 to 10 years.

I am prepared to provide the field assistance needed to carry out your plan. (On some projects we may refer you to more appropriate professional support.) Financial assistance may be available for activities that do not generate revenue. Feel free to contact me if you have any questions or need additional information.

Soon you will receive an invoice for this plan. Please return payment according to instructions on the invoice. Once payment is received, your plan will be registered. Registration will allow you to apply for cost sharing and is necessary to be eligible for certain tax programs. As property owner and land steward, you have the opportunities and responsibilities of protecting, improving, using, and enjoying your woodland. I wish you well and look forward to working with you.

Yours for conservation,

Tony Miller

P.S. I've enclosed a "field copy" of the plan in the front pocket.

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