Forest Stewardship Plan for Leelanau County, Miles Kimmerly Park

8527 E. Government Center Drive
Suttons Bay, MI 49682
Property Location: 177 acres; within the SW ¼ of Section 4 and NW ¼ of the NE ¼ and the NE ¼ of the NW ¼ of Section 9 Kasson Township (T28N R13W), Leelanau County, Michigan

Plan created, 2016 -Planning prescribed through, 2036

Plan Written By:
Daniel Schillinger, ACF
Schillinger Forestry, LLC
5138 Hidden Glen Drive
Traverse City MI, 49684
(231) 633-8733
schillingerforestry@gmail.com
www.michiganforester.net

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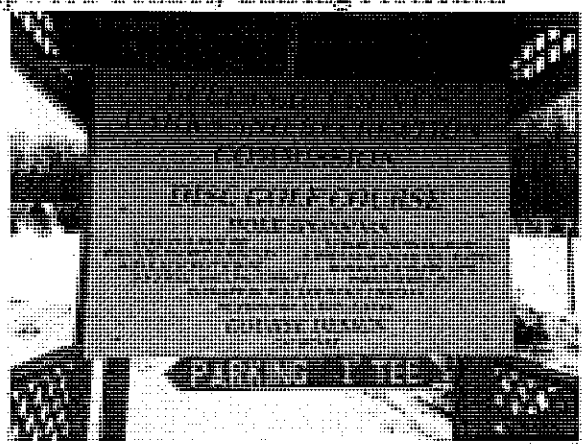


Signed: _____ Date: _____

Schillinger Forestry by: Daniel L. Schillinger

_____ Date: _____

Mike Smallegan Date: 9/16/16

Introduction to Leelanau County's Miles Kimmerly Park

Miles Kimmerly has been a County asset for decades providing the residents of Leelanau County a fun place to recreate and conduct 4-H activities. The County wishes to expand both the services offered at this park along with the amount of residents who get to enjoy them. This has been the main catalyst for this plan; inventorying the forested resources so decisions can be made to enhance the overall use, safety and enjoyment of the park. This plan will explain a path for forest management to assist officials in long term planning discussions.

This parcel has three main cover types; Over-mature northern hardwoods, younger aspen hardwood mix and open areas used for recreational activities. There was both the invasive herbaceous plant spotted knapweed and some of the invasive shrub autumn olive within parts of the open unit. Removing/controlling these invasive species and replacing them with native desirable plants offers the best opportunity for habitat improvement and will be described below. The hardwoods area has some tree damage/blow down from a large wind storm August 2, 2015, making some of the storm damaged area dangerous for residents to use.

Terrain is rolling across most of the property but easily accessed by standard logging equipment. While unlikely, should soil be disturbed during management, silt fence, cover crop seeding or trail water bars could be installed on an as needed basis. There were no observed wetland areas on the parcel.

The invasive insect pest Emerald Ash Borer was noted on the parcel in heavy numbers. The management of this pest will be address fully in this plan. The first stage of beech bark disease was noted on the parcel. The Beech Bark Disease scale is present and is expanding currently. Management suggestions with aim to reduce the incidence of this disease across the parcel.

Ginseng (*panax quinquefolius*), the endangered plant due to illegal harvesting, was last observed in the area of this property in 1978. If it is found it should be avoided during management activities. See appendix for further details.

Management Timing on Stands And Other Forest Health Issues

All of the stands in this parcel have or have the capacity for oak trees to be present. For the oaks present any cutting, harvesting or machine work should not be done near the oak trees when the leaves are on the trees or are about to come out to inhibit the spread of the oak wilt disease. Oak wilt will not bother other species of trees but cutting during the growing season, especially in the spring, has the potential to greatly degrade the standing value of any woodlot. Oak wilt is already present in the County and cutting or pruning of oaks during the early growing season will increase the likelihood of the oaks getting the disease and is strictly not allowed.

There is another pest that has moved into the area called Emerald Ash Borer (see adult exit hole pictured right). This insect can kill any type of ash tree fairly quickly. This pest should not cause a panicked harvest on this or any land, but it should warrant some consideration when the next scheduled harvest time comes. A good idea is to remove more ash trees than normal, to get value from them rather than having them killed by Emerald Ash Borer.

A third disease has moved onto the property called beech bark disease. This is a two factor disease that starts with a scale insect, secondly a fungus gets into the wounds from the scale insects and can eventually kill large beech trees. To prepare for the coming of this disease the larger rougher barked beech trees should be harvested during the next scheduled harvest. The younger smoother barked trees are less likely to get this disease since the rain washes away the crawler stage of the scale insect before they can cover themselves with their protective scale. Should the beech trees on this property get this disease, the moving of beech firewood or logs is prohibited from mid-summer to late fall. This is the time of year that the scale insects are in their crawler stage and can re-infect neighboring trees when the infected wood is moved to a new location. This disease is a problem in Michigan, but the beech component on this property is less than 5% of the tree canopy in one management unit so there should be no rash decisions to cut any one species completely off of the property.

Mechanical work of any kind should not be done on this land during the spring “bark slip” period. This is the time of year when the leaves are just about to or have recently come out. The tree trunk is growing quickly and the bark is therefore quite loose on the tree accelerating any mechanical injury to the stem. Therefore, between April 15th and June 15th machine driven work of any kind should not take place on this property.

Best Management Practices should be followed when completing management on this parcel. A full book of information on these practices can be found at http://www.michigan.gov/dnr/0,4570,7-153-31154_31261---,00.html These practices help to reduce sediments and chemicals into wetlands and reduce erosion.

These forest health issues need to be addressed when management takes place on this property. The landowner is encouraged to keep in contact with a Schillinger Forestry or a Registered Forester to keep up on the latest land and tree health protection solutions. Should any widespread control measures be found for these pests/diseases foresters will be the first to know about them.

Management Unit#1

Fair-Poor Quality Over Mature Northern Hardwood Stand, one of which is pictured below

(Below) Strom Damage from the 8/2/15 storm, in the middle is a clipboard

Management Unit Information

Management Unit Number: 1 **Number of Acres**: 55.2(+/-)

==========Major Objectives of Unit==========

Manage for sustainable timber management with an emphasis on encouraging recreational use.

==========Existing Conditions==========

Size Class: M9 (Northern Hardwoods) **Soil Type**: EoD, LIC, LIE
Site Quality: Fair- Good **Stand Quality**: Fair-Poor **Stand Density**: 109 ft^2/acre

Management Unit Description:

This is a medium stocked over mature, fair-poor quality northern hardwood stand. This type of stand is common on properties which have never seen forest management for decades. Sugar maple dominates most of the forest canopy at 63% but 7 other species were noted making this stand relatively diverse. Tree quality is fair to poor with 22% of the sampled trees in fair or poor condition and none of the trees sampled were in excellent condition and this is below average for the soils of our region. The diameter distribution is close to ideal in the diameters less than 25" and over stocked with trees above 25" in diameter. The sapling diameter classes are over stocked since there is a large influx of new hardwoods filling in under the declining hardwood trees. Currently all of the sampled white ash trees had significant damage from Emerald Ash Borer. Herbaceous understory likely includes; stinking Benjamin, raspberry, trout lily and leek. The current 18-hole disc golf course resides completely within this unit.

==========Planned Management Activities==========

This unit's primary objective is recreation and County resident enjoyment. To this end there is an 18-hole disc golf course spread throughout and there is talk about adding more holes or another course altogether. In addition, there are some minor hiking trails present and those will likely be expanded into the future. There are many trees damaged or completely tipped over in this unit from the August 2nd 2015 storm.

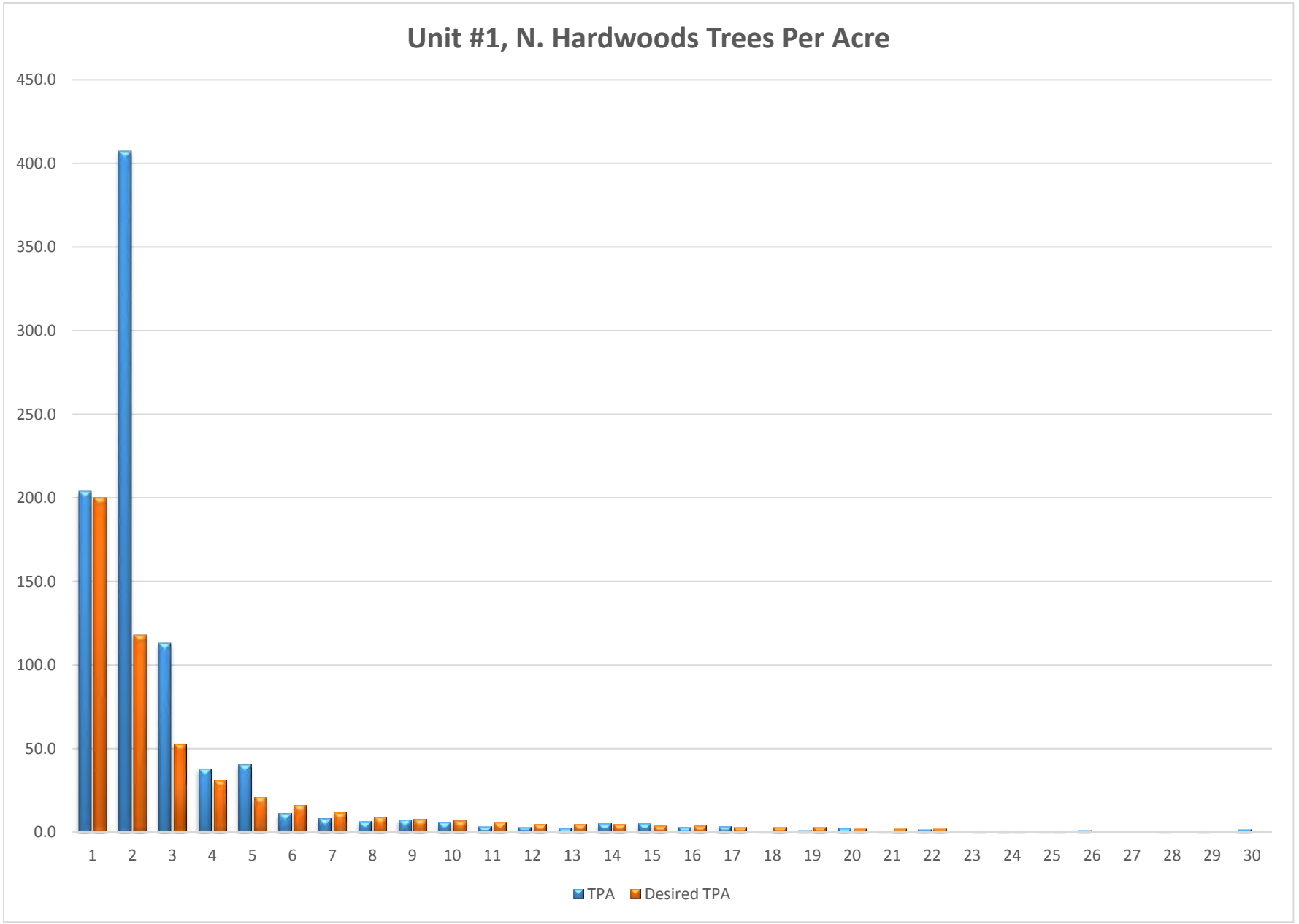
To meet this unit's primary task of recreational safety the following should be considered. If the County does not plan to act quickly on the forest management suggested below, then in the in-term a hazard tree inventory should be completed by a Certified Arborist to address the immediate tree safety concerns in an around the disc golf course and existing hiking trails. Once tree dangers are identified a qualified tree service should be hired to address the hazardous trees. If the County can act relatively quickly the hazardous trees in this unit could be addressed through the active forest management described below.

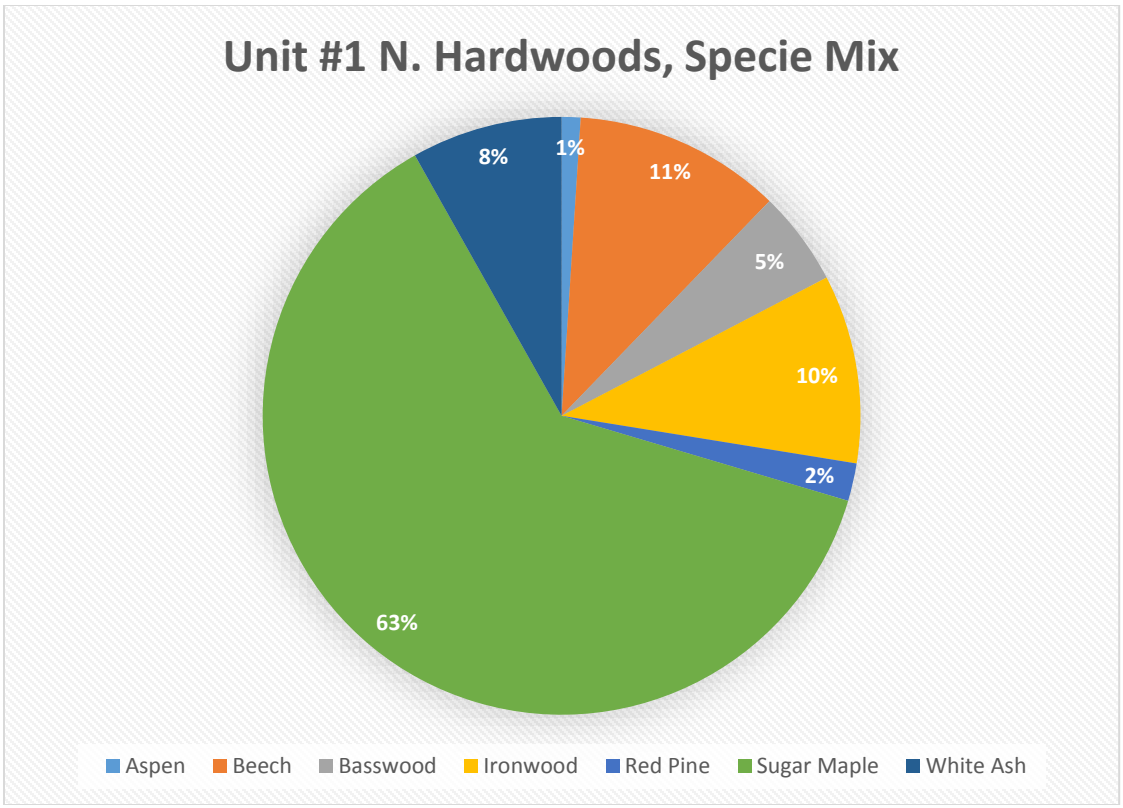
This stand should be thinned down to 80-90 ft^2 per acre in all areas. Tree selections should be made in the order described below until this density is reached then tree removal selections should stop. This thinning should happen soon 2016-2019. In order of importance commercial tree cutting should; 1) Address all tree safety concerns in existing and planned hiking trails/disc golf improvements 2) remove/salvage those trees dead or dying from the August 2nd storm and invasive insect pests; Emerald Ash Borer and Beech Bark Disease (note: beech trees noted with no visible scale should be retained since research has shown 5-10% of beech trees appear to have

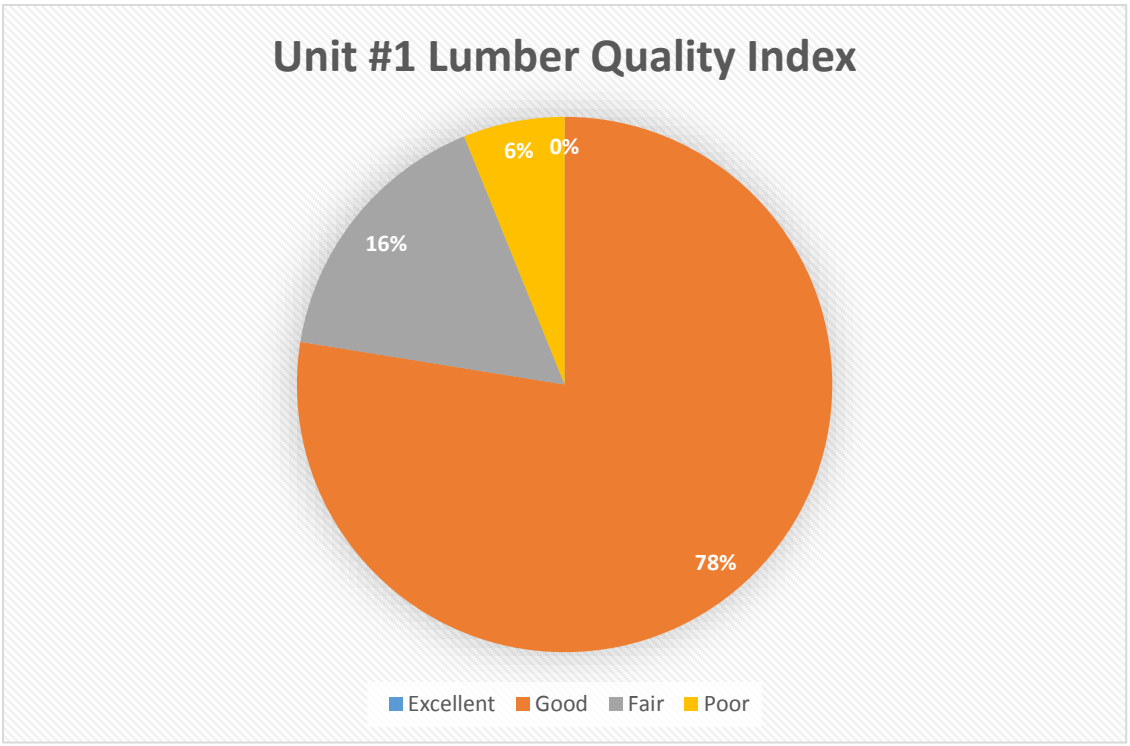
some immunity/defense against this scale insect and these tree's genes are key to reintroducing beech into tomorrow's forests.) 3) The tree's present which are over mature and declining in timber value 4) Those trees which are of the poorest quality leaving the best formed trees to grow without excess competition. 5) Any trees which are categorized as overstocked in the diameter distribution table shown below, focusing on diversifying tree species present; removing sugar maples, keeping other desirable species like black cherry, basswood, red oak and non-scale infested beech.

After this stand has been thinned to the suggested stocking then during the next cutting, 10-15 years after the first, canopy gap cutting strategies will need to be incorporated by a Registered Forester. This cutting technique purposely adds larger canopy gaps (1/2 - 2 acres) into the stand so dense regeneration of many species can establish in the openings. These openings are created by cutting an area full of over mature trees or those which are of poor health. Further, adding these openings during the proper management entries allow a diverse age structure to constantly occur across the entire management unit. This allows well formed "crops" of young trees to always be available for management entries decades into the future. Finally, these openings should never be an excuse to cut younger healthy trees which are rapidly improving in value.

As resources and timing allow the following wildlife enhancements can be considered to further the access for all wildlife species. All standing dead trees should remain and the alive hollow/decaying trees can be girdled to increase wildlife use adding at least 5 dead trees per acre. However, these hollow trees should be retained/created only where they will not pose a physical threat to recreational users. Removing the hemlock trees should be avoided during management as there are only a few individual trees across the whole parcel and they provide different structure to the stand. The large, healthy, mast (seed) producing trees such as beech or oak should be thinned around to encourage large healthy canopy growth capable of large seed production. Some coarse woody debris should be maintained to provide insect and small mammal benefits.


Unit #1, N. Hardwoods Trees Per Acre
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
TPA
Desired TPA


Unit #1 N. Hardwoods, Specie Mix
1%
11%
5%
10%
2%
63%
8%
Aspen
Beech
Basswood
Ironwood
Red Pine
Sugar Maple
White Ash


Unit #1 Lumber Quality Index
6%
0%
16%
78%
Excellent
Good
Fair
Poor

Management Unit #2

This unit is younger than Unit #1 but contains most of the species found in the previous unit with aspen trees' population increasing significantly in this unit.

Management Unit Information

Management Unit Number: 2 **Number of Acres**: 59.6(+/-)

==========Major Objectives of Unit==========

Enhance recreational opportunities, sound forest management.

==========Existing Conditions==========

Size Class: (M6/A6) Well stocked young aspen/hardwood mix **Soil Type**: KmC, LIC
Site Quality: Fair - Good **Stand Quality**: Good **Stand Density**: 114ft^2/acre

Management Unit Description:

This unit is similar to unit #1 in species make up with the exception that the trees are younger and there are considerably more aspen trees. Likely decades ago this land was cleared and the existing trees sprouted up after that. Aspen was the tree most sampled at 58% while 5 other species were noted. Tree quality is quite good with 90% of the sampled trees in good condition and although no sampled trees were of excellent quality it is likely a number of trees will grow into that grade as they get bigger. Herbaceous plants present are likely; raspberry, trout lily, and leek.

==========Planned Management Activities==========

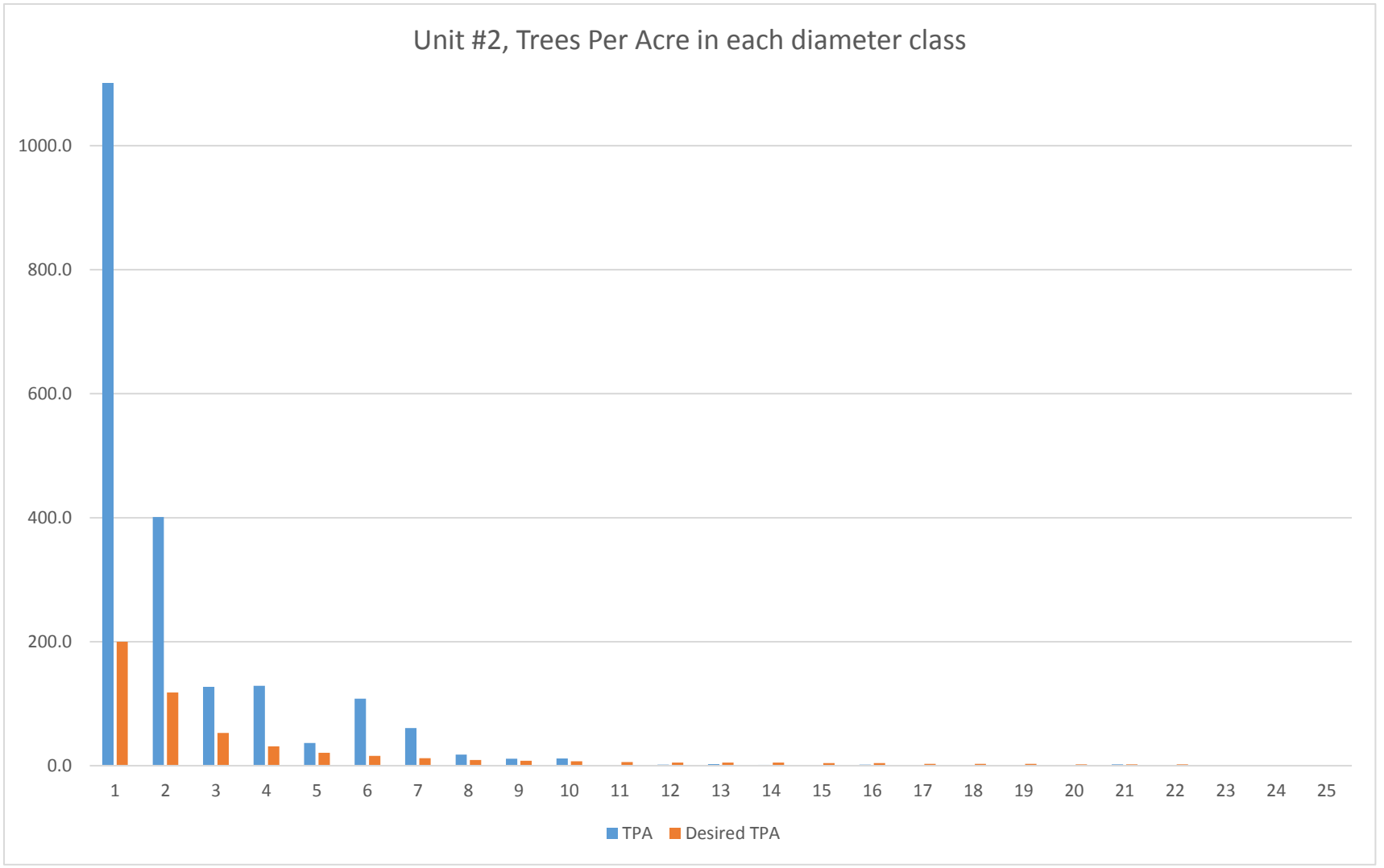
The County is considering expanding hiking trails and/or disc golf into this unit. If so, this unit's hazardous trees should be identified and removed at the same time as unit #1 in preparation of increased public use. Any future management should always address the tree safety concerns within this unit.

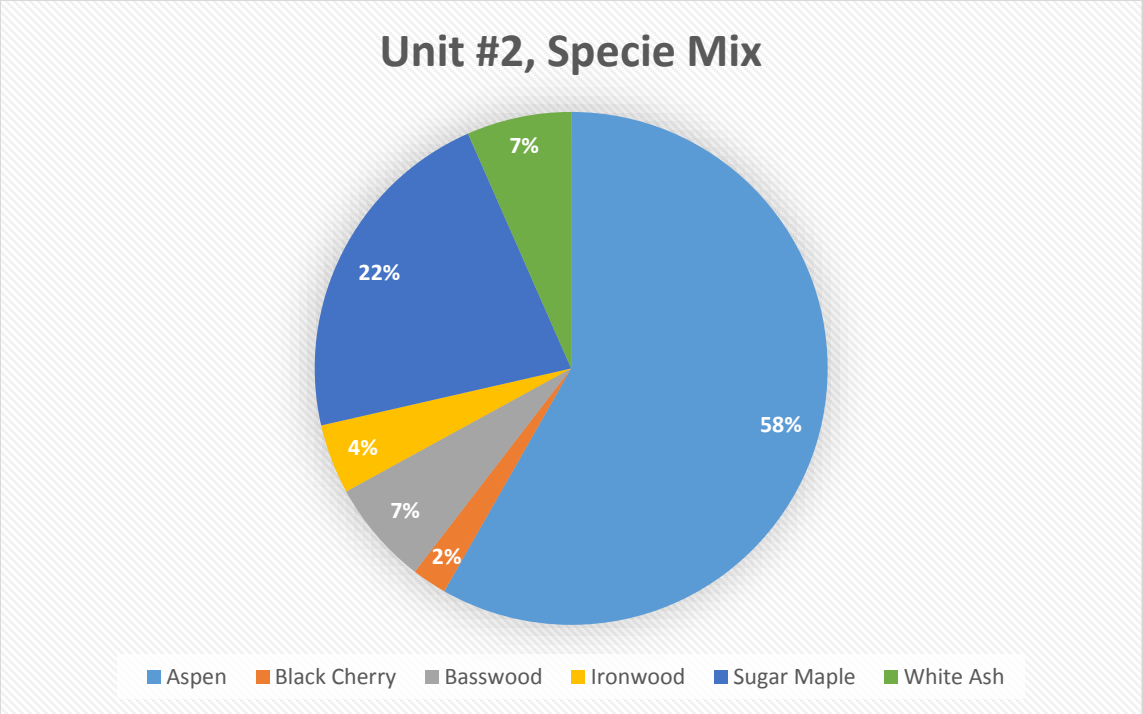
With the hazards addressed this stand should be left to mature for a number of years. The length of time will be determined by the management style selected from below.

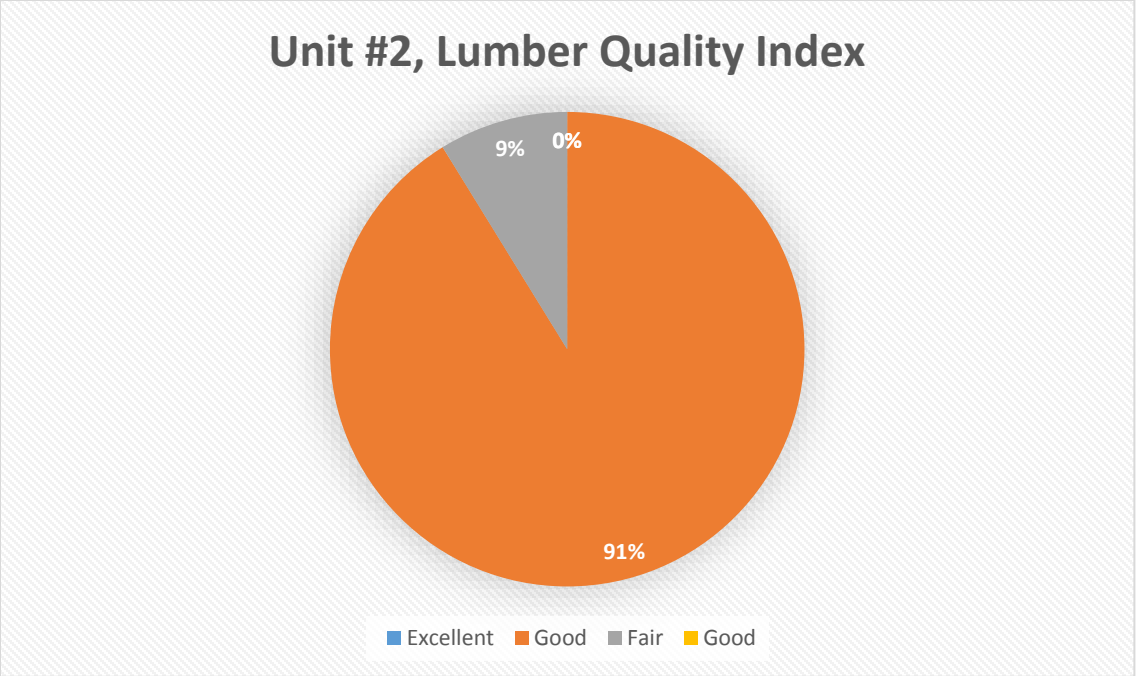
To manage this stand for long-term timber production; While taking care to protect the young hardwood trees present, the aspen should be cleared out in approximately 12-20 years or 2028-2036. This thinning is intended to release those hardwood tree present and allow them full access to the canopy while they are still young enough to respond effectively to a canopy opening. Secondly, waiting until the current aspen is older will garner more timber buyer interest. Ideally, this thinning should happen before the aspen get mature/over mature and start declining in value. The exact year this will happen will be dictated by future years' growing conditions and should be determined by a Registered Forester. After this first harvest, future harvests should be conducted as described in unit #1

To manage this exclusively for wildlife; With the heavy aspen component this unit could also be managed to most benefit wildlife but this style would reduce future per acre harvest revenues. Starting in 5-10 years, cut random shaped clear cuts about 8-12 acres in size every 5-8 years to produce about 5 different age classes of aspen regeneration. Done correctly, these various aged aspen stands provide perpetual food, cover and habitat for a host of wildlife species like woodcock, grouse and white-tail deer. Creating the cleared areas as odd shapes provide lots of forest edge transition zones which benefit a considerable amount of additional wildlife species. Note: This management style is the best for wildlife habitat but also the hardest from a public relations standpoint. So if this management style is selected considerable public education and on the ground signage is necessary.

Lastly, a combination of the 2 strategies above is also an appropriate course of action. It is recommended the County decide their desired route in 2021.


Unit #2, Trees Per Acre in each diameter class
1000.0
800.0
600.0
400.0
200.0
0.0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
TPA
Desired TPA


Unit #2, Specie Mix
7%
22%
58%
4%
7%
2%
Aspen
Black Cherry
Basswood
Ironwood
Sugar Maple
White Ash


Unit #2, Lumber Quality Index
9%
0%
91%
Excellent
Good
Fair
Good

Management Unit #3

This unit covers all of the open areas of the parcel. This open unit contains most of the recreational activities and resident use; Baseball, Soccer, Disc Golf, 4-H, golf driving range, etc.

Management Unit Information

Management Unit Number: 3 **Number of Acres**: 61.1(+/-)

==========Major Objectives of Unit==========

Remove invasive plants; enhance for wildlife use.

==========Existing Conditions==========

Size Class: (G) Open with scattered trees **Soil Type**: EaB, EnF, KeB, KmE, LIC
Site Quality: Fair - Good **Stand Quality**: N/A **Stand Density**: 0-10ft^2/acre

Management Unit Description:
This unit comprises the open areas on the property. In areas without much recreational use there are the following trees and shrubs; sugar maple, spruce, red pine and the invasive shrub autumn olive. Herbaceous plants present are dominated by field grasses but also include the invasive spotted knapweed, and golden rod.

==========Planned Management Activities==========

There are no active forest management plans for this unit at this time. This unit will continue to be used for public recreation as it currently is.

If resources allow the following wildlife improvements can be considered. The greatest benefit to animal and insect wildlife species is to restore the land and resources taken away by noxious invasive plants. To control autumn olive: Cut all autumn olive when it is found during the late summer or fall and immediately apply an approved basal treatment herbicide. Refer to reference material for more removal details. To control spotted knapweed: prescribed burning, selective herbicide application, manual removal and/or smothering with mulch or landscape fabric. Black plastic applied for an entire growing season kills the weeds and many of the seeds within the soil's seed bank. This is the most effective when treating small areas. With the invasive plants controlled there are a host of fun wildlife beneficial items to pursue; Warm season grass meadow(s), native wildflower plantings, storm water garden(s), plant wildlife beneficial shrubs like gray dogwood, serviceberry or sand cherry, and plant native trees (with protection from browse) for shading; sugar maple, red oak, beech, and white pine.

Timeline for Forest Management
Leelanau County, Miles Kimmerly Park
8527 E. Government Center Drive
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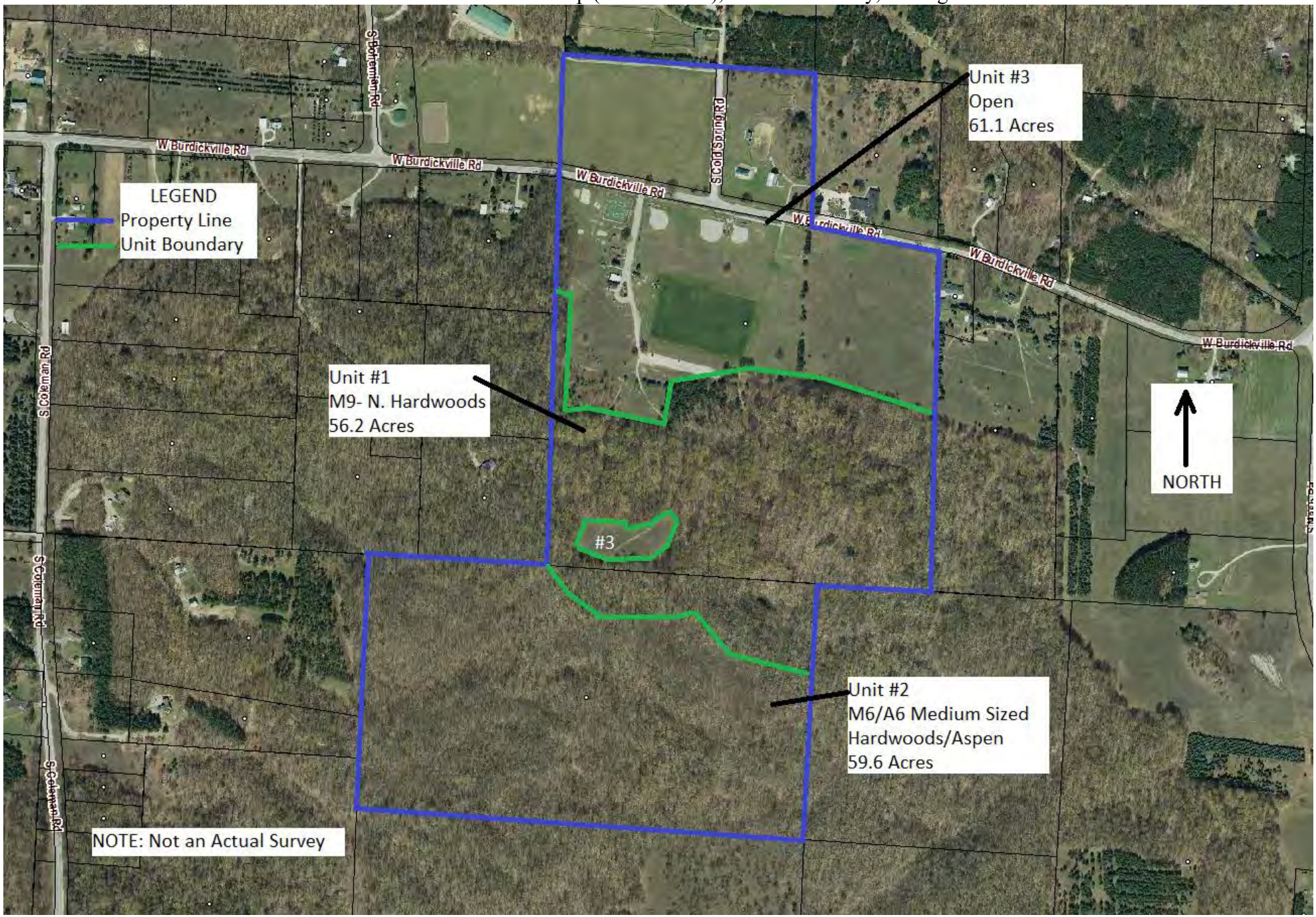
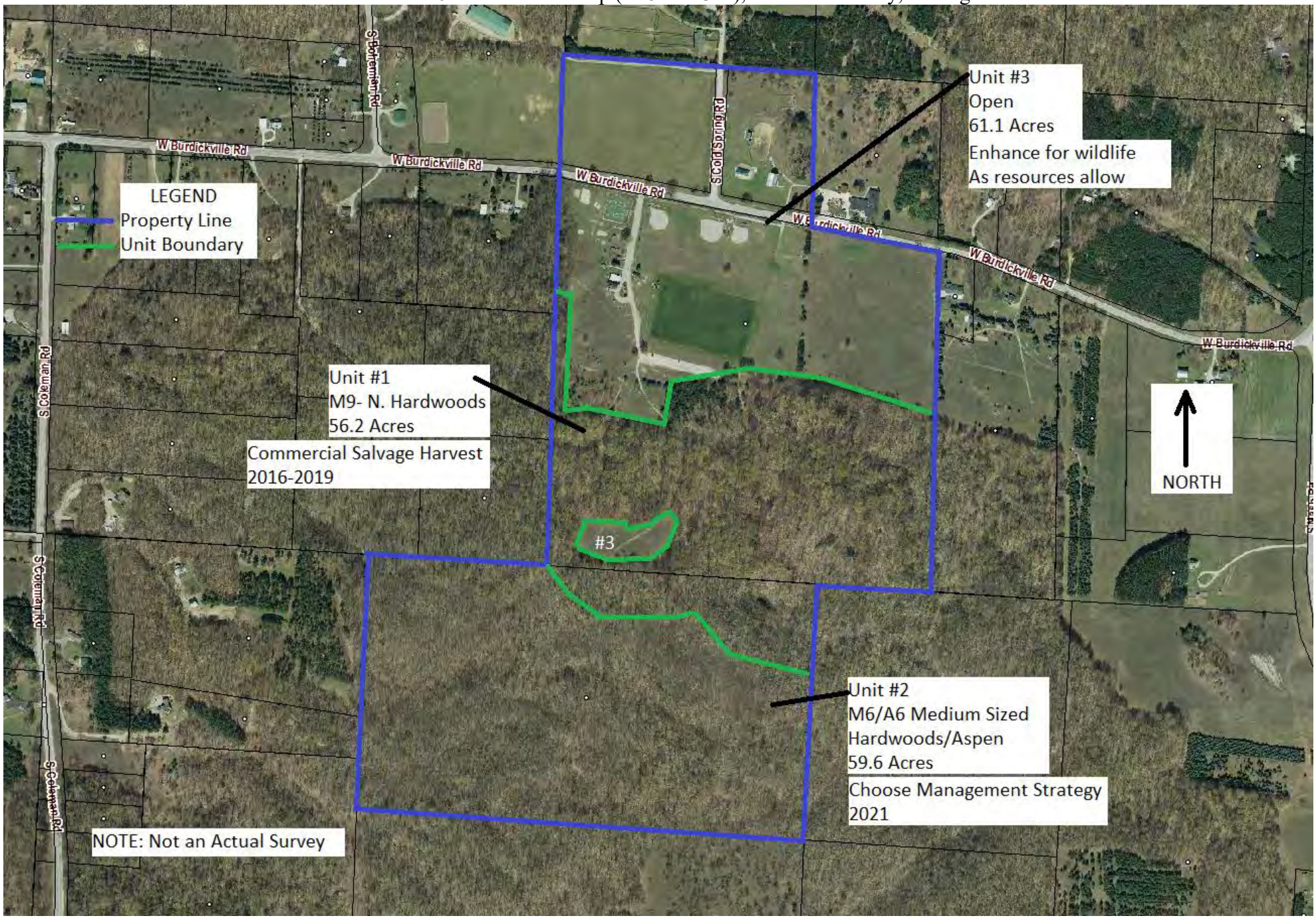
Property Location: 177 acres; within the SW ¼ of Section 4 and NW ¼ of the NE ¼ and the NE ¼ of the NW ¼ of Section 9 Kasson Township (T28N R13W), Leelanau County, Michigan

Unit #	Management Activity	Year Planned	Year Complete
All Units	Hazard Tree Inventory to all areas where people use	Annually	
1	Commercial hazard tree removal and salvage harvest	2016-2019	
2	**Select either management strategy below**	2021	
2	Retain hardwoods and thin out aspen **OR**	2028-2036	
2	Clear cut 8-12 acres for dense aspen regeneration	2021-2026	
2	Clear cut another 8-12 acres	Every 5-8 years thereafter	
3	Improve wildlife habitat	As resources allow	
1	Commercial harvest with canopy gap strategy, add unit #2 if desired	2026-2034	

Aerial Photo - Leelanau County, Miles Kimmerly Park: 177 acres; within the SW ¼ of Section 4 and NW ¼ of the NE ¼ and the NE ¼ of the NW ¼ of Section 9 Kasson Township (T28N R13W), Leelanau County, Michigan



Management Map - Leelanau County, Miles Kimmerly Park: 177 acres; within the SW ¼ of Section 4 and NW ¼ of the NE ¼ and the NE ¼ of the NW ¼ of Section 9 Kasson Township (T28N R13W), Leelanau County, Michigan



Custom Soil Resource Report
Soil Map

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Leelanau County, Michigan
Survey Area Data: Version 8, Sep 18, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Leelanau County, Michigan (MI089)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
EaB	East Lake loamy sand, 0 to 6 percent slopes	23.3	13.1%
EnF	Emmet-Leelanau complex, 25 to 50 percent slopes	3.9	2.2%
EoD	Emmet-Mancelona gravelly sandy loams, 12 to 18 percent slopes	12.0	6.8%
KeB	Kalkaska-East Lake loamy sands, 0 to 6 percent slopes	12.5	7.1%
KmC	Kiva-Mancelona gravelly sandy loams, 6 to 12 percent slopes	50.9	28.7%
KmD	Kiva-Mancelona gravelly sandy loams, 12 to 18 percent slopes	0.8	0.4%
KmE	Kiva-Mancelona gravelly sandy loams, 18 to 25 percent slopes	2.5	1.4%
LIC	Leelanau-East Lake loamy sands, 6 to 12 percent slopes	40.5	22.8%
LIE	Leelanau-East Lake loamy sands, 18 to 25 percent slopes	30.9	17.4%
LIF	Leelanau-East Lake loamy sands, 25 to 45 percent slopes	0.0	0.0%
Totals for Area of Interest		**177.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a

Soils Narrative Summary – From Leelanau County Soils Map Data

EaB – East Lake loamy sand, 0 to 6% slopes; East Lake series consists of well drained and moderately well drained soils on outwash plains and moraines. Surface run off is slow and the erosion hazard is moderate. Care should be taken during mechanized work to keep vegetation in place. Soils are well suited to woodlands and orchards in frost free areas. Natural woody vegetation which would consistently grow in this soil includes; elm, sugar maple, beech, hemlock and aspen.

EnF – Emmet-Leelanau complex, 25 to 50% slopes; Emmet series consists of well drained soils on moraines, drumlins, and till plains. Surface run off is rapid and erosion hazard is very severe. Therefore mechanized work should be kept to a minimum on steep slopes within this type to reduce erosion potential. Should mechanized work have to be completed it should be timed during the driest parts of the year or when temperatures are consistently below freezing. If soil surface is exposed during mechanized work consider a non invasive cover crop, silt fencing or both to reduce erosion potential. Natural woody vegetation which would consistently grow in this soil includes; sugar maple, beech, some yellow birch, black cherry and elm.

EoD – Emmet-Mancelona complex, 12 to 18% slopes; Emmet series consists of well drained soils on moraines. Surface run off is rapid and erosion hazard is severe. Therefore, mechanized work should be kept to a minimum on steep slopes within this type to reduce erosion potential. Should mechanized work have to be completed it should be timed during the driest parts of the year or when temperatures are consistently below freezing. If soil surface is exposed during mechanized work consider a non invasive cover crop, silt fencing or both to reduce erosion potential. Natural woody vegetation which would consistently grow in this soil includes; sugar maple, beech, some yellow birch, black cherry and elm.

KeB – Kalkaska-East Lake loamy sands, 0 to 6% slopes; Kalkaska series consists of well drained or moderately well drained, sandy soils on outwash plains and moraines. Surface run off is slow and erosion hazard is moderate. Care should be taken during mechanized work to keep vegetation in place. Natural woody vegetation which would consistently grow in this soil type includes; elm, beech, red maple, and a few hemlocks and white pine.

KmC – Kiva-Mancelona gravelly sandy loams, 6 to 12% slopes; Kiva-Mancelona series consists of well drained sandy soils over gravel on outwash plains, lake plains and moraines. Surface run off is medium and erosion hazard is moderate. Care should be taken during mechanized work to keep vegetation in place. These soils are well suited to woodlands and wildlife habitat. Natural woody vegetation which would consistently grow in this soil type includes; sugar maple, beech, black cherry with some elm.

KmD – Kiva-Mancelona gravelly sandy loams, 12 to 18% slopes; Kiva-Mancelona series consists of well drained sandy soils over gravel on outwash plains, lake plains and moraines. Surface run off is medium and erosion hazard is severe. Therefore, mechanized work should be kept to a minimum on steep slopes within this type to reduce erosion potential. Should mechanized work have to be completed it should be timed during the driest parts of the year or when temperatures are consistently below freezing. If soil surface is exposed during mechanized

work consider a non invasive cover crop, silt fencing or both to reduce erosion potential. These soils are well suited to woodlands and wildlife habitat. Natural woody vegetation which would consistently grow in this soil type includes; sugar maple, beech, black cherry with some elm.

KmE – Kiva-Mancelona gravelly sandy loams, 18 to 25% slopes; Kiva-Mancelona series consists of well drained sandy soils over gravel on outwash plains, lake plains and moraines. Surface run off is medium and erosion hazard is moderate. Therefore, mechanized work should be kept to a minimum on steep slopes within this type to reduce erosion potential. Should mechanized work have to be completed it should be timed during the driest parts of the year or when temperatures are consistently below freezing. If soil surface is exposed during mechanized work consider a non invasive cover crop, silt fencing or both to reduce erosion potential. These soils are well suited to woodlands and wildlife habitat. Natural woody vegetation which would consistently grow in this soil type includes; sugar maple, beech, black cherry with some elm.

LIC – Leelanau-East lake loamy sands, 6 to 12% slopes; Leelanau series consists of well drained sandy soils on till plains, drumlins and moraines. Surface runoff is medium and erosion potential is moderate. Therefore care should be taken during mechanized work to ensure erosion is kept to a minimum. This can be accomplished by timing work during the driest parts of the year or when temperatures are consistently below freezing. If soil surface is exposed during mechanized work consider a non invasive cover crop, silt fencing or both to reduce erosion potential. Natural woody vegetation which would consistently grow in this soil type includes; sugar maple, beech, elm and scattered white pine and hemlock.

LIE – Leelanau-East lake loamy sands, 18 to 25% slopes; Leelanau series consists of well drained sandy soils on till plains, drumlins and moraines. Surface runoff is medium and erosion potential is severe. Therefore mechanized work should be kept to a minimum on steep slopes within this type to reduce erosion potential. Should mechanized work have to be completed it should be timed during the driest parts of the year or when temperatures are consistently below freezing. If soil surface is exposed during mechanized work consider a non invasive cover crop, silt fencing or both to reduce erosion potential. Natural woody vegetation which would consistently grow in this soil type includes; sugar maple, beech, elm and scattered white pine and hemlock.

LIF – Leelanau-East lake loamy sands, 25 to 45% slopes; Leelanau series consists of well drained sandy soils on till plains, drumlins and moraines. Surface runoff is medium and erosion potential is severe. Therefore mechanized work should be kept to a minimum on steep slopes within this type to reduce erosion potential. Should mechanized work have to be completed it should be timed during the driest parts of the year or when temperatures are consistently below freezing. If soil surface is exposed during mechanized work consider a non invasive cover crop, silt fencing or both to reduce erosion potential. Natural woody vegetation which would consistently grow in this soil type includes; sugar maple, beech, elm and scattered white pine and hemlock.