

**Forest Management Plan for Garfield Township**

**Commons Property**

**3848 Veteran's Drive**

**Traverse City, MI 49684**

**Property Location: 243 acres within Section 9, Garfield Township, Grand  
Traverse County, Michigan**

**243 Acres; Traverse City's Central Park**



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**Schillinger**  
**FORESTRY, LLC**

**Table of Contents**  
**Forest Management Plan for Garfield Township**

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<b><u>Page #</u></b>	<b><u>Description</u></b>
1	Title Page
2	Table of Contents
3	Introduction of Property
4-5	Forest Health Reminders and Requirements
6	Property Wide Invasive Species Management
7-17	Recommended Management and Stand Descriptions
18	Timeline for Management of Stands
19	Aerial Photo
20	Forest Management Map
21	Soils Map
22-24	Soils Map Legends
25	Current Invasive Species Map, (February 2012)
APPENDIX: DNR Map Legend Key, Full Soils Report, Emerald Ash Borer Control, Beech Bark Disease Control, Gypsy Moth Control, Oak Wilt Disease Control, Brush Piles, Autumn Olive Control, Spotted Knapweed Control, Glossy Buckthorn Control	



## Introduction to The Common's Property

The Commons is likely the most heavily used parkland in Traverse City. People come year round to enjoy the quiet of nature right outside their backdoors. The diverse plant communities, extensive trail system and steep hills make this a place people of all ages and abilities to enjoy.

The Commons location close to town has its drawbacks. Due to the many people visiting and the land's proximity too many houses and landscapes there are extensive colonies of invasive plant species. There are several invasive tree pests present as well including; Emerald Ash Borer and Beech Bark Disease likely due to firewood brought to homes nearby. Graffiti is common on many of the unused buildings and though this painting not legal, some of the work is actually quite good. Lastly, many people who visit bring their dogs. Most dog owners are very good with controlling, leashing and cleaning up after their pets; however a few are not and on occasion spoil another user's day.

Despite these drawbacks, this land is an oasis for recreation and enjoyment of nature. Garfield Township is committed to keeping this land safe for the users and make efforts to maintain or improve ecosystem health. This plan aims at meeting these goals.

This property has a unique history which explains the current cover types. From the past self-sufficiency agriculture efforts of the residents of Building 50 to Dr. Munson's commitment to planting as many unique trees as possible, this land's past use is readily apparent today. The hilly ground which was unusable for agriculture was left to trees described in Unit #1 below. These trees are overstocked and many are extremely large and over mature. This is likely due to no timber cutting being allowed on this property for many decades. Most of the flat high ground on the property had been cleared. Agricultural furrows, remnant domestic apples trees and the historic barns point to a wise use sustained yield mentality for the past century, although trees and shrubs are beginning to reclaim these areas of land.

Scattered through this property are many unique species of trees that were either directly planted or have seeded in from Dr. Munson and staff's earlier tree planting efforts. Unique species noted include; sycamore, hawthorn, apple, pear, walnut, box elder, and many forms of oaks. These trees are typically not great specimens because they have been either out competed by naturally seeded vegetation or they were not pruned and cared for. Re-invigorating these trees will require some concerted efforts by a Certified Arborist.



Left: A trail covered in ice due to heavy foot traffic

## **Management Timing on Stands** **And Other Forest Health Issues**

Some of the stands in this parcel have many oak trees present. For the oaks present any cutting, harvesting or machine work should not be done near 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 is present on the parcel called Emerald Ash Borer. 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 or management activity takes place. A good idea is to remove more ash trees than normal, especially along the trails to make the trails safer before they are a danger to trail users after being killed by Emerald Ash Borer. In spots where key ash trees are needed commercially applied insecticides have been shown to perform very well against this insect.

A third disease could move into the area called beech bark disease and at least one portion of this disease exists on the property already. 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 management. 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. There are commercially applied chemicals which can also be quite effective against this insect for prized beech trees. As for the beech trees on this property with the scale, the moving of their 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 10% of the tree canopy so there should be no rash decisions to cut any one species completely off of the property.

Gypsy Moth egg masses were not directly noted on the parcel. However, there is a south facing slope full of red oak trees along with many clumps of aspen trees. This insect tends to have population explosions every 10-15 years so these areas will need to be monitored for excessive caterpillar numbers. During these population booms the owners/managers can partner with local government units to aerially spray an approved insecticide. Also, on a smaller scale individual trees could be protected during outbreaks by using burlap or sticky products like “tangle-foot” wrapped around the stem of the tree. Finally, any oak/aspen firewood should be thoroughly inspected for egg masses and be over 1 year old before it leaves the property. See appendix for more information on gypsy moth control.

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 15<sup>th</sup> and June 15<sup>th</sup> machine driven work of any kind should not take place on this property.

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 to date on any new treatment measures for these or other forest health issues. Should any widespread control measures be found for these pests/diseases foresters will be the first to know about them.

Left: Woodpecker damage searching for and finding Emerald Ash Borer, Right: Beech scales noted; scales are the first step toward Beech Bark Disease.



## **Directions for Invasive Species Management across this Entire Parcel**

This property is significantly infested with many species of invasive plant species, too many to map and dictate management for within this plan. Invasive plants can be so vigorous that they out compete native plants. As these invasive plants become established the areas they take-over become substantially less beneficial to wildlife. Native insects and animals have not evolved to use these invading plants as food/shelter. Therefore, on top of declining habitat for wildlife, the remaining animals have fewer things they know how to forage. As invasive plants establish they disrupt the bottom portion of the food web which magnifies problems of health and survivability in all the species up the food chain. Therefore, the following strategy should be considered to efficiently control these noxious weeds as soon as is monetarily possible.

- 1) Complete a detailed invasive species survey of the property. Currently this survey is in progress.
- 2) Use the invasive survey to identify and remove/control those species which are very low in numbers and thus un-established (Japanese knotweed). Removing these un-established invasive plants is a relatively low cost compared to eradicating extensively established plant species.
- 3) Begin work on setting back/eradicating the invasive species found in the sensitive areas; wetlands (Unit #3). Wildlife uses these areas for food, cover and as travel corridors to other locations. Therefore these areas are the most critical to be filled with desirable native plants.
- 4) During the efforts above, the control professionals should be training dedicated volunteers so they can work on setting back the other well established invasive species like; autumn olive and spotted knapweed. Although invasive control is very expensive up front, long term costs can be minimal if there is a dedicated set of volunteers who are diligent about removing the invasive plants relatively on their own, at minimal cost to the Township.
- 5) At least annually, have a trained resource professional survey the property for invasive species and map the progress of both eradication and the additional spread of un-treated species.
- 6) Create a group of volunteers, under the direction of a trained invasive species specialist, to annually monitor for and remove invasive species as they spread and/or become re-established.

Herbicide should always be applied by a trained certified applier with the applicable liability insurance. Since these plants are so aggressive the proper use as dictated by the label of herbicide will likely be a necessity to control most of these plants. Once they are relatively controlled manual or cultural efforts can be explored to maintain continued control.

(Below): Autumn Olive reaching out from under tree cover looking for sunlight in an opening.



## Management Unit#1

Mature northern hardwood stand, extremely hilly through much of the unit.



Left: Large decay spots in main stem are great for wildlife, but a liability for trail users. Right: Sharp “V” double trees are prone to catastrophic failure and therefore dangerous near trails.



## Management Unit Information

Management Unit Number: 1 Number of Acres: 94(+/-)

### =====**Major Objectives of Unit**=====

Manage for recreational user safety, wildlife habitat enhancements and improvement of forest health.

### =====**Existing Conditions**=====

**Size Class:** Northern Hardwoods (M9)

**Soil Type:** EmB, ExC ExF, EyD, EyF

**Site Quality:** Good **Stand Quality:** Fair-Good

**Stand Density:** 122 ft<sup>2</sup>/acre

### **Management Unit Description:**

This is a heavily wooded, overstocked northern hardwood unit. A majority of the diameter classes are over stocked. Sugar maple dominates the tree canopy at 69%, with white ash and beech covering 11% and 9% respectively. 45% of the trees sampled were in fair or poor condition. The scale for beech bark disease and Emerald Ash borer were actively expanding in this unit. There were some invasive plants noted in this unit, usually concentrated on the edges of openings; autumn olive, myrtle and honey suckle.

### =====**Planned Management Activities**=====

1) The exotic tree pests should be addressed, especially the beech bark disease. Beech bark disease does not appear to be wide spread and seems to be just starting in the north western corner of this unit. The owners have a very good chance to slow/stop this problem by cutting down and destroying the infested trees or hiring a licensed tree care professional to control the scale insects. When caught early enough both of the strategies work well in containing this pest. Emerald ash borer is fairly widespread throughout all the ash in this unit. The owners should immediately hire a licensed tree care service to treat prized ash trees with insecticides to protect them from EAB. This is a cost prohibitive treatment of an entire stand, but can be used on a small number of desired trees. In areas along the trails and park benches ash trees should be removed as they decline to keep these areas safe for recreational use. In areas where human safety is not a concern they can be left standing dead for wildlife benefits and nutrient cycling.

2) The Commons is a well used place for hiking and enjoying nature. Since there are so many recreational users the owners must be diligent about removing/trimming trees which are potentially dangerous to these users. At a minimum, annually a Certified Arborist should be hired to complete an inventory along each trail/bridge/bench etc, making a list of pruning and tree removals needed to increase the safety throughout the Commons. Since tree trimming budgets are tight, an efficient use of funds could include a property-wide hazard tree management plan. This plan, completed by a Certified Arborist can thoroughly identify hazardous and potentially hazardous trees. Once a priority scale has been developed in the plan tree trimming dollars can be efficiently utilized on highest priority areas to reduce costs. Further, reduction in tree trimming costs could be utilized by hiring tree services in the late fall and winter months when they are slower. Also bidding out a several year retainer contract with one tree service could reduce costs further. Lastly, pruning in the winter ensures oak wilt does not start on the property. This dormant pruning timing should be strictly enforced.

3) With the immediate needs addressed above, the owners can consider the following to enhance wildlife access and forest health;

A) Where they will pose no threat to recreational users, create at least 5 standing dead trees per acre for wildlife use, focusing on the ash, aspen and basswood, especially those growing near the beech and red oaks.

B) Create large brush piles for small mammals to hide and hibernate in. These piles should focus on open areas and be as large as possible. See appendix for brush pile literature.

C) Thin around mast (seed producing) trees to encourage heavy seed production, especially oaks and beech.

D) Clear-cut small areas of aspen to create a vigorously regenerating area for cover and food. Leave several drumming logs 12” in diameter or greater within 12” of a standing tree or stump.

E) Clear around species uncommon to the unit (hemlock, red oak) to encourage forest diversity.

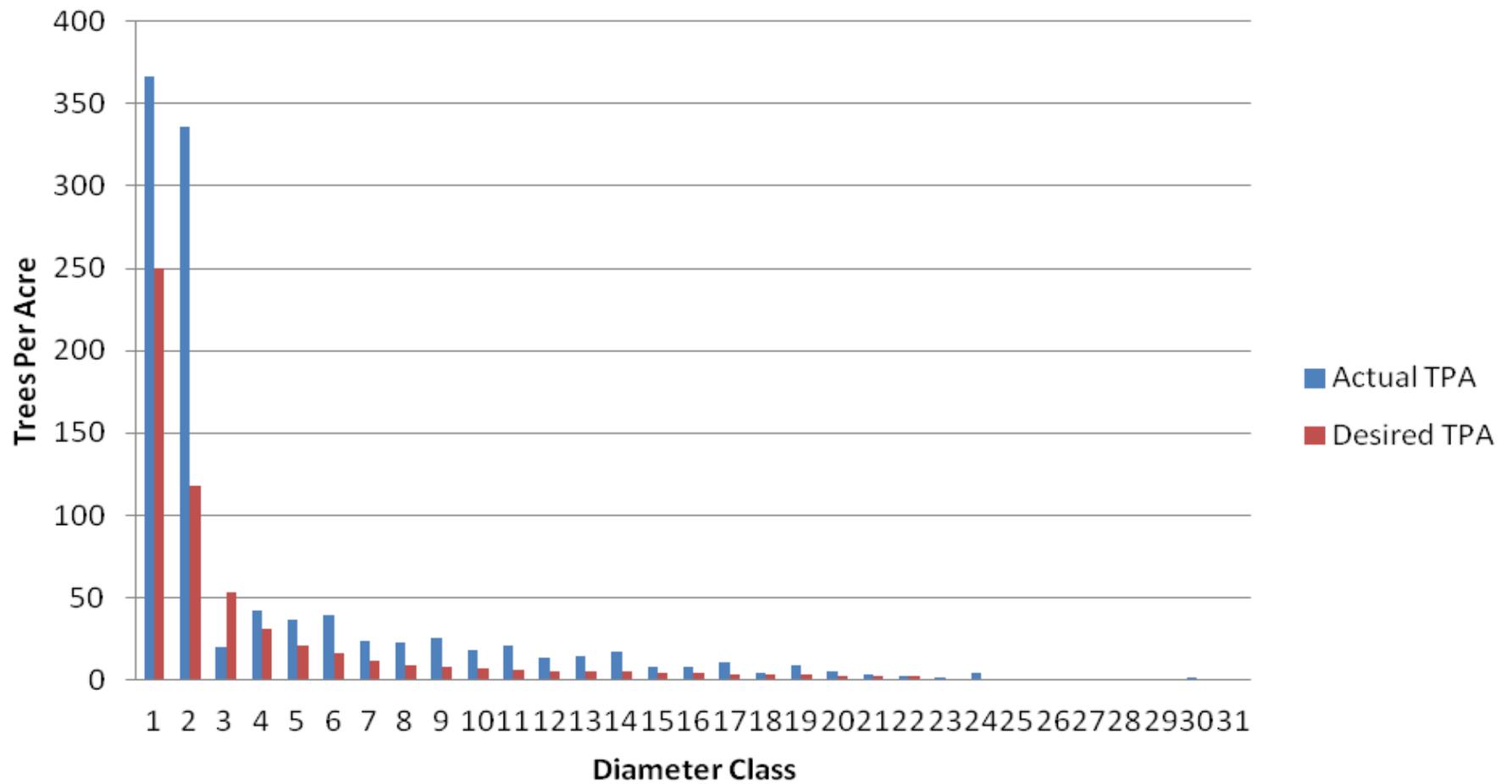
F) Construct and place several bat roosting boxes. Paint black on the outside and face it east or southeast. Best placement is 15ft above the ground out of the wind and near the water areas in Unit #3. Since bats are so beneficial to insect pest control and are on a decline nationwide, they need all the support they can get.

G) Use GPS technology to maintain maps and field mark current trails. Protect fragile areas from excessive foot traffic with barriers and signage. These things will likely be best accomplished by continuing the partnership with the Grand Traverse Conservation District.

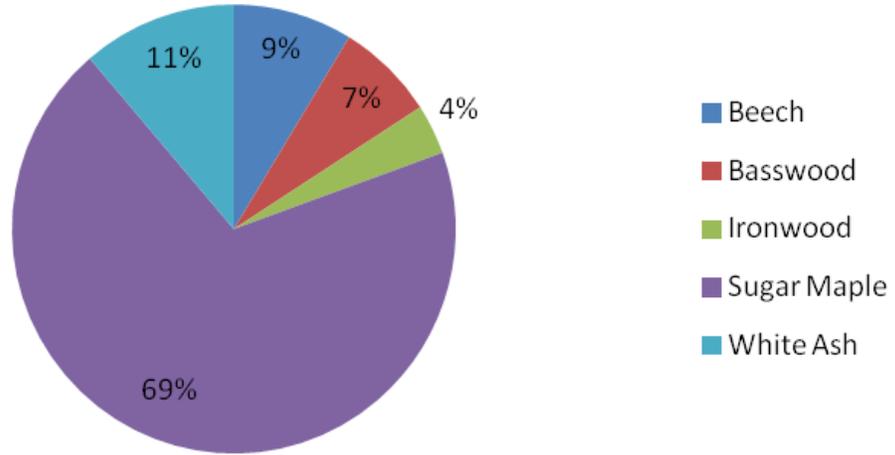
(Below): A Standing dead tree provides many benefits to a host of wildlife species. This tree should be left alone provided it is not in danger of failing on recreational user’s area(s).



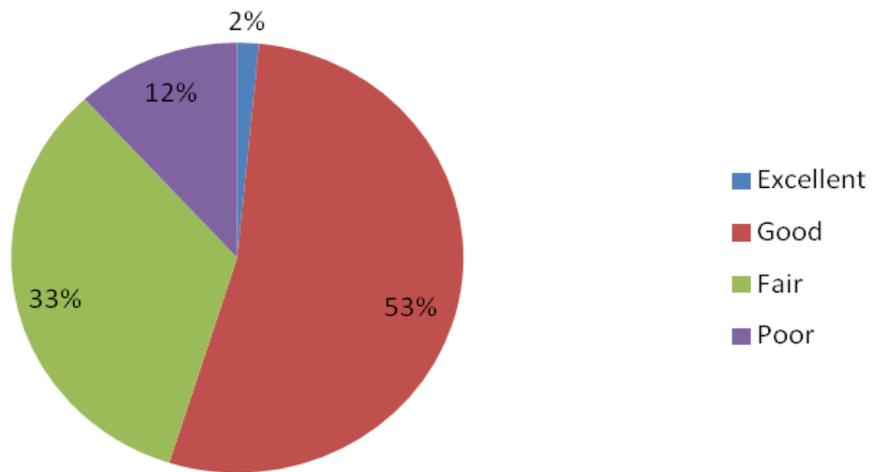
## Commons Unit #1, Trees Per Acre



### Commons, Unit #1, Specie Mix



### Commons, Unit #1, Tree Quality Index



## Management Unit #2

Densely stocked pine plantation, in need of some care.



Below: Many of the jack pine are out competed and are dying from the competition and old age.



## Management Unit Information

**Management Unit Number:** 2      **Number of Acres:** 5(+/-)

### =====**Major Objectives of Unit**=====

Improve stand health, manage toward a more natural forest cover type in the future.

### =====**Existing Conditions**=====

**Size Class:** R/W9 (Red/White Pine Plantation - Sawtimber)    **Soil Type:** EyB, EyE2, LkC, IsA  
**Site Quality:** Fair- Good      **Stand Quality:** Fair-Poor      **Stand Density:** 200 ft<sup>2</sup>/Acre

### **Management Unit Description:**

This is an over-stocked mixed pine plantation including; red pine, white pine, jack pine and scotch pine. It was likely hand planted on a 6'x8' spacing to reduce soil erosion on the hillside along North Long Lake Road and fill in an open area. The erosion has been mitigated but now the resulting stand is too overstocked. Many of the jack pine trees are dying because they are short lived and out competed by the longer lived white and red pine. The scotch pine present in the southern portion of this unit is poorly formed and starting to show decline.

### =====**Planned Management Activities**=====

This unit is likely too small for commercial logging interest. However, this unit is in dire need of a thinning. The reason is as the jack pine dieback and the scotch pine decline they encourage native bark beetles to swell in the stand causing additional stress on the other desirable pine species. These species need to be removed so bark beetle numbers do not rise within the stand causing un-due stress or dieback in the desired red and white pine.

This stand should be thinned by 1/3 as soon as possible. This thinning should remove in order of priority; 1) the dead/dying jack pine 2) the scotch pine 3) 1/3 of the remaining rows including red/white pine. This thinning should remove one of every third row, making sure to release every remaining tree in the stand from at least one side of competition. The resulting cut stems can be used for brush piles, erosion cribbing, or trail closures elsewhere on the property. Should a erosion cribbing project arise where all the stems could be used, then this unit could be cleared and replanted to northern hardwoods. Species to consider planting include; aspen, sugar maple, basswood, red oak and beech.

If the stand is just thinned by 1/3, it should be thinned again by a third every 10-15 years. The goal is to revert this stand back to a natural cover type like northern hardwoods. During the following pine cuttings, if natural regeneration is not sufficient to reclaim the site when the pine will be gone then some under-planting is suggested where the trees will not be damaged by the further removal of the pine. The species above will all tolerate under-planting with the exception of aspen, they will need actual full sun openings to survive.

### **Management Unit #3**

The wet areas of this parcel include; 1) perched wetlands dominated by cattails and red osier dogwood,



And 2) densely cedar covered stream-banks.



## Management Unit Information

**Management Unit Number:** 3      **Number of Acres:** 49(+/-)

### =====**Major Objectives of Unit**=====

Protect for water filtration value and improve wildlife habitat.

### =====**Existing Conditions**=====

**Size Class:** C9-Ld (Cedar creeks, dogwood openings)

**Soil Type:** CoA, ExA, EyA, EyD, EmB, GsE, GsF, Ho, LkD Lu, RpA, RrA, RrC

**Site Quality:** Good-Excellent      **Stand Quality:** NA/Fair      **Stand Density:** 0-110ft<sup>2</sup>/acre

### **Management Unit Description:**

This is a mix of wetter areas across the property. This unit includes both the perched wetlands and creeks draining towards Red Drive from the west. The perched wetlands are dominated by cattails and red osier dogwood but aspen, elm and willow exist too. The cedar covered creek areas are dominated by white cedar but also contain black ash, green ash, white birch, yellow birch, red osier dogwood and even some scattered apple trees. Finally the invasive shrub, glossy buckthorn was noted in the large shrub form. Heavy thickets of younger buckthorn were not noted, even though this is typical for areas invaded by the plant. It appears the resident deer population has browsed the smaller buckthorn keeping them from growing well.

### =====**Planned Management Activities**=====

This unit has two immediate needs to consider: 1) the black/green ash is likely already infested with Emerald Ash Borer. The owners should consider hiring a local certified tree service to treat these scarce trees with an insecticide or stand to lose the black/green ash. 2) Since there is a relatively smaller stand of invasive species glossy buckthorn present, this plant should be controlled by cutting the mature stems and having a registered herbicide applicator immediately apply an above water approved herbicide to the cut stump in late summer through the dormant months. With the mature shrubs controlled volunteers can be used to, repeatedly over 3-5 years, pull the younger and newly sprouted buckthorn plants out.

The on-going need of this unit is as follows. Currently, the trail system with its bridges and boardwalks are doing a good job of keeping people on trails and off sensitive areas. At a minimum the trail system should be monitored for people deviating from the trail and these areas blocked if this occurs. This unit provides visually appealing areas as well as critical "human's stay out" areas for wildlife to take refuge in. Further and most importantly, this area filters much of the ground water coming out of the west and north. The water filtration benefits being provided should be continually protected from degradation.

Finally, the following wildlife enhancements can be considered as resources allow.

- 1) Increase/maintain some large diameter logs (6-12") in/near wet areas for salamander habitat.
- 2) Create brush piles for mammals to utilize.
- 3) Create/maintain at least 5 standing dead trees per acre.
- 4) Annually monitor for invasive plants and immediately control them when found.

## Management Unit #4

This unit covers all the field areas across the property.



## Management Unit Information

Management Unit Number: 4      Number of Acres: 90(+/-)

### =====**Major Objectives of Unit**=====

Remove invasive plants, maintain chosen vistas, enhance for wildlife.

### =====**Existing Conditions**=====

**Size Class:** G (Open fields of grasses, w/scattered trees)

**Soil Type:** Es, ExD, EyD, EyE2, GsE, GsF, LkB, LkD, LkF, MeA, RrA, RcA, RrC

**Site Quality:** Fair-Good      **Stand Quality:** N/A      **Stand Density:** 0-10ft<sup>2</sup>/acre

### **Management Unit Description:**

This unit encompasses all the open field areas on the parcel. Most of these areas have scattered trees in them, species present in order of quantity include; domestic apple, box elder, sugar maple, white pine, pin cherry, white ash, walnut, sycamore, and oaks. Shrubs present are dominated by the invasive plants autumn olive, honeysuckle and multi-flora-rose but also include the native stag-horn sumac. There are many grasses and a heavy infestation of the invasive spotted knapweed. This unit has some wonderful views of West and East bay as well as Traverse City.

### =====**Planned Management Activities**=====

This unit is enjoyed by many visitors as an open place to see miles off into the distance and enjoy a nice sunny day. Any management should consider the human aesthetic portions of this unit particularly the view-sheds.

This unit has the largest component of invasive species present of all the units inventoried. Species like spotted knapweed are so prolific any control measure may seem futile. However, there are species which are still in small numbers that should be addressed rapidly; such as Japanese Barberry and Japanese Knotweed. Addressing the species which are currently low in numbers can help eradicate it from the property when volunteers are learning and monetary resources are lighter and un-planned for. After the low number species are addressed hopefully a budget can be made to include invasive species work and volunteers can be better trained and more efficient with control efforts to tackle the more established species. Species to consider working on over a number of years with trained volunteers include; autumn olive, multi-flora rose and honeysuckle. Lastly, one should refer to the appendix for further invasive plant control ideas and the special invasive species management suggestion of this plan.

Once the invasive plants are controlled the following items can be considered to enhance this unit.

- 1) Prune the old apple trees for better apple production
- 2) Consider reducing the spotted knapweed in selected areas and replace them with native wildflowers to benefit wildlife as a nectar/food source. Species to consider include; dotted mint, hoary vervain, sand coreopsis, milkweed, dogbane, golden rod, native coneflower and butterfly weed. In wetter areas; cardinal flower, great blue lobelia, and blue flag iris.
- 3) Use cut invasive shrubs to build large brush piles.
- 4) Add species of trees with browse protection from deer, which will help wildlife; white oak, red oak, beech, and black cherry. It is important to control the weeds prior to planting, especially the spotted knapweed.

**Timeline for Forest Management**  
**Garfield Township, Commons Property**

**3848 Veteran's Drive**

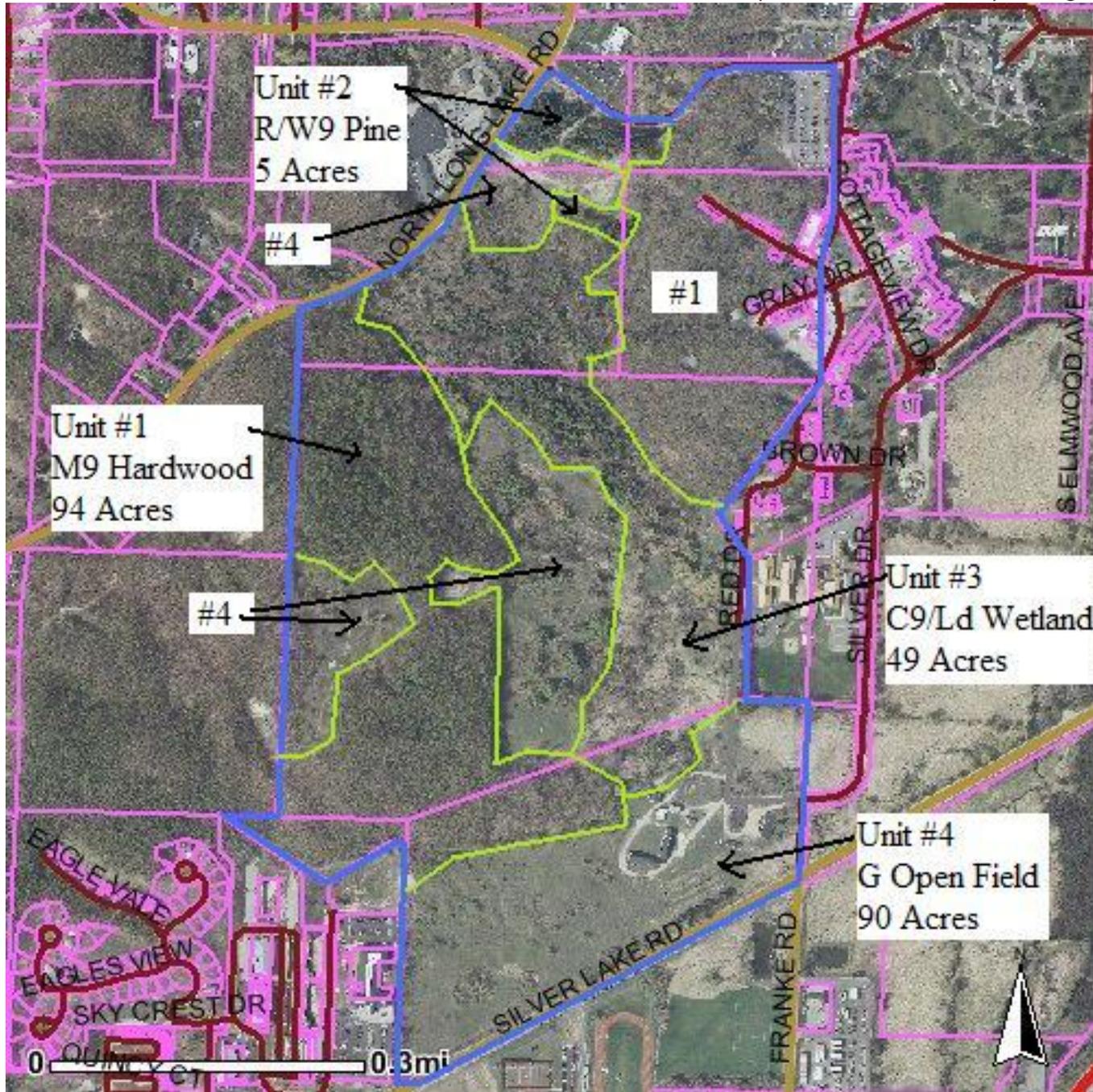
**Traverse City, MI 49684**

**Property Location: 243 acres within Section 9, Garfield Township, Grand  
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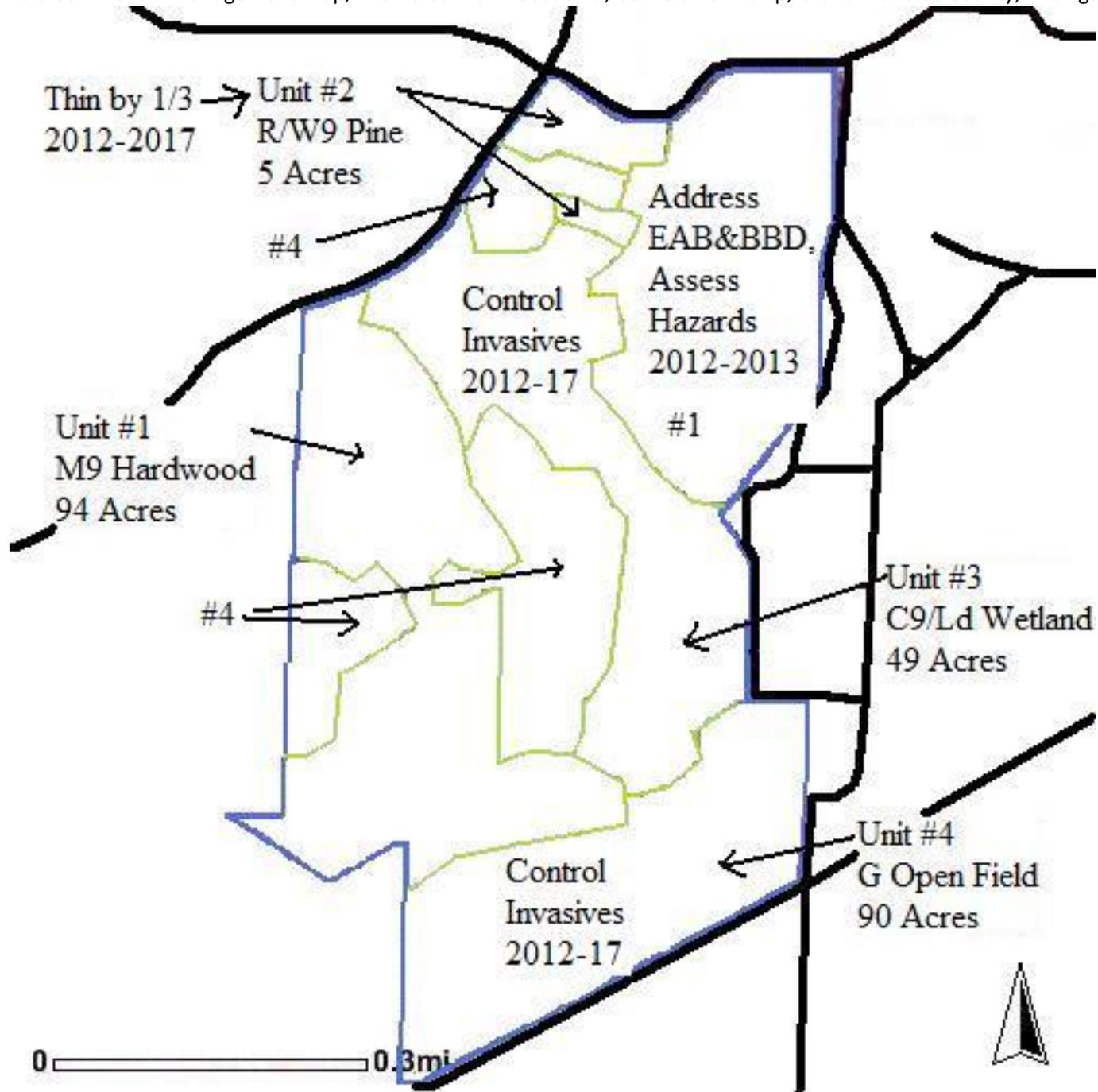
**243 Acres, Traverse City's Central Park**

Unit #	Management Activity	Year Planned	Year Complete
All units	Map Invasive Species, control invasive plants as professionally dictated	Each Year	
1	Address Emerald Ash Borer, and Beech Bark Disease	2012	
1	Hire Certified Arborist to map dangerous tree along trails, etc.	2012-2013	
2	Thin by 1/3 or remove and replant to desired species	2012-2017	
3	Address Emerald Ash Borer	2012	
3	Control/Remove Invasive plant species	2012-2017	
4	Control/Remove Invasive plant species	2012-2022	
All Units w/Trails	Certified Arborist inspect trails - improvements for hazardous trees	Each Year	
1,2,3,4	Trained volunteers monitor for and quickly remove invasive species	Each Year	
1,2,3,4	Select wildlife enhancements	When Resources permit	

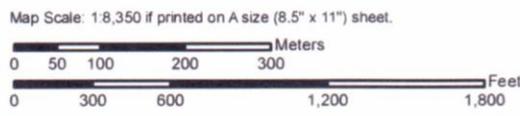
Garfield Commons – Aerial Photo, 243 Acres within Section 9, Garfield Township, Grand Traverse County, Michigan



Garfield Commons – Management Map, 243 Acres within Section 9, Garfield Township, Grand Traverse County, Michigan



# Custom Soil Resource Report Soil Map



85° 39' 29"

85° 38' 30"

44° 45' 35"

44° 45' 34"

44° 44' 38"

44° 44' 37"

# Custom Soil Resource Report

## MAP LEGEND

<b>Area of Interest (AOI)</b>		 Very Stony Spot	
	Area of Interest (AOI)	 Wet Spot	
<b>Soils</b>		 Other	
	Soil Map Units	<b>Special Line Features</b>	
<b>Special Point Features</b>		 Gully	
	Blowout	 Short Steep Slope	
	Borrow Pit	 Other	
	Clay Spot	<b>Political Features</b>	
	Closed Depression	 Cities	
	Gravel Pit	<b>Water Features</b>	
	Gravelly Spot	 Streams and Canals	
	Landfill	<b>Transportation</b>	
	Lava Flow	 Rails	
	Marsh or swamp	 Interstate Highways	
	Mine or Quarry	 US Routes	
	Miscellaneous Water	 Major Roads	
	Perennial Water	 Local Roads	
	Rock Outcrop		
	Saline Spot		
	Sandy Spot		
	Severely Eroded Spot		
	Sinkhole		
	Slide or Slip		
	Sodic Spot		
	Spoil Area		
	Stony Spot		

## MAP INFORMATION

Map Scale: 1:8,350 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:15,840.

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

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>  
 Coordinate System: UTM Zone 16N NAD83

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

Soil Survey Area: Grand Traverse County, Michigan  
 Survey Area Data: Version 6, Nov 30, 2011

Date(s) aerial images were photographed: 6/20/2005

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

Grand Traverse County, Michigan (MI055)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CoA	Croswell loamy sands, 0 to 2 percent slopes, overwash	2.3	1.0%
EmB	East Lake-Mancelona loamy sands, 2 to 6 percent slopes	6.3	2.7%
Es	Edwards muck	1.4	0.6%
ExA	Emmet gravelly sandy loam, 0 to 2 percent slopes	0.7	0.3%
ExC	Emmet gravelly sandy loam, 6 to 12 percent slopes	10.2	4.4%
ExD	Emmet gravelly sandy loam, 12 to 18 percent slopes	3.9	1.7%
ExF	Emmet gravelly sandy loam, 25 to 45 percent slopes	52.8	22.8%
EyA	Emmet sandy loam, 0 to 2 percent slopes	0.8	0.3%
EyB	Emmet sandy loam, 2 to 6 percent slopes	9.5	4.1%
EyD	Emmet sandy loam, 12 to 18 percent slopes	9.4	4.1%
EyE	Emmet sandy loam, 18 to 25 percent slopes	3.4	1.5%
EyE2	Emmet sandy loam, 18 to 25 percent slopes, moderately eroded	5.7	2.5%
EyF	Emmet sandy loam, 25 to 45 percent slopes	24.4	10.5%
GsE	Gravelly land, moderately steep	6.0	2.6%
GsF	Gravelly land, steep	1.9	0.8%
Gt	Gravel pits	2.0	0.9%
Ho	Houghton muck	13.6	5.9%
IsA	Iosco-Ogemaw loamy sands, 0 to 2 percent slopes	0.8	0.4%
LkB	Leelanau-Kalkaska loamy sands, 2 to 6 percent slopes	14.6	6.3%
LkC	Leelanau-Kalkaska loamy sands, 6 to 12 percent slopes	3.7	1.6%
LkD	Leelanau-Kalkaska loamy sands, 12 to 18 percent slopes	8.6	3.7%
LkE	Leelanau-Kalkaska loamy sands, 18 to 25 percent slopes	2.0	0.9%
LkF	Leelanau-Kalkaska loamy sands, 25 to 45 percent slopes	6.0	2.6%
Lu	Lupton muck	10.0	4.3%
MeA	Mancelona-East Lake loamy sands, 0 to 2 percent slopes	0.2	0.1%
RcA	Richter loams, 0 to 2 percent slopes, overwash	9.2	4.0%

## Custom Soil Resource Report

<b>Grand Traverse County, Michigan (MI055)</b>			
<b>Map Unit Symbol</b>	<b>Map Unit Name</b>	<b>Acres in AOI</b>	<b>Percent of AOI</b>
RpA	Richter, Tonkey, and Pinconning loams, 0 to 2 percent slopes, overwash	15.2	6.6%
RrA	Richter, Tonkey, and Pinconning loams, 0 to 2 percent slopes	1.7	0.7%
RrC	Richter, Tonkey, and Pinconning loams, 6 to 12 percent slopes	5.0	2.2%
W	Water	0.0	0.0%
<b>Totals for Area of Interest</b>		<b>231.4</b>	<b>100.0%</b>

## 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 particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

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