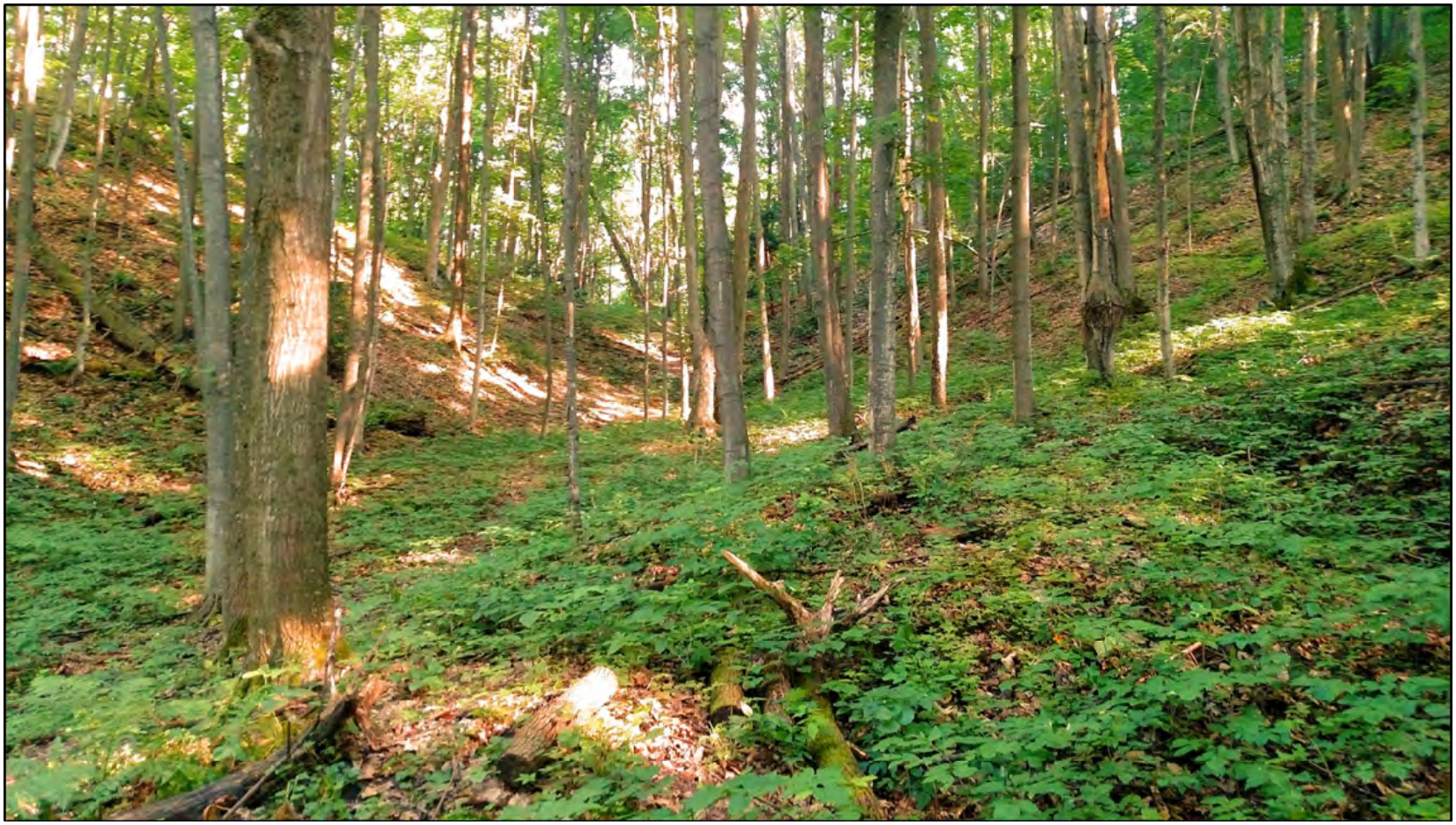
Avalanche Preserve

Resource Inventory and Management Plan



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Avalanche Preserve
Resource Inventory and Management Plan

Avalanche Preserve covers nearly 300 acres of woodlands and clearings. The property is located in the southern part of Boyne City and extends southward into Wilson Township. Approximately 87 percent of the property is forested with the primary forest type being Northern Hardwoods. A high ridge that runs in a northwest-southeast direction is a prominent physical feature of the property. The northern terminus of the ridge is the face of the old ski slope, currently used as a sledding hill. For the purposes of this report this topographic feature will be called Avalanche Mountain. There are three small knolls in the eastern parts of the Preserve. An intermittent drainage and forested wetland crosses the eastern edge of the property. The northern extension of the Preserve, where the City's water wells are located, has a small remnant wetland complex with a grove of older Northern White Cedar trees and a small creek. This overlooked corner of the Preserve would benefit from restoration activities. The park offers many types recreational activities including hiking, birding, wildflower viewing, mushrooming, nature study, biking, cross country skiing, skating, jogging, disc golf, snowmobiling and sledding.

Background

In August of 1978, Boyne City agreed to lease the property known as Avalanche Mountain from The Nature Conservancy. After two years, the City purchased the property from the Nature Conservancy for $100. The City agreed to maintain the property "as a park and outdoor laboratory." Since the transfer the City has directly or indirectly addressed the park in several planning documents.

The **Boyne City Master Plan** recognizes the importance of recreational opportunities in the community.

Master Plan Goals: An Active Community embracing recreation and water-based opportunities

- Maintain and enhance Boyne City's parks and recreation facilities
- Establish, expand and maintain the trail networks, both within Boyne City and connections to regional trail systems, including water trails.

The **Boyne City Recreation Plan** addresses recreational assets, trails within the community and connections to regional trail systems.

<u>Recreation Goals</u>

Based on the public input the recreation goals of the City are as follows:

1. As resources and opportunities allow, implement the recreation objectives of the adopted sub area plans including the Avalanche Master Plan, Old City Park Master Plan, The Waterfront Master Plan, The Trail Town Plan and Veterans Park Pavilion Plan.
2. Continue to improve and develop existing parks.
3. Maintain existing recreational areas and assets.

4. Improve, extend and connect trail system.
5. Plan for and develop unimproved recreational areas.

In 2010 the Boyne City Parks and Recreation Commission's Avalanche Preserve Committee completed the **Avalanche Master Plan.** According to this document the following planning activities were completed for the Avalanche Preserve since the property was acquired in 1978.

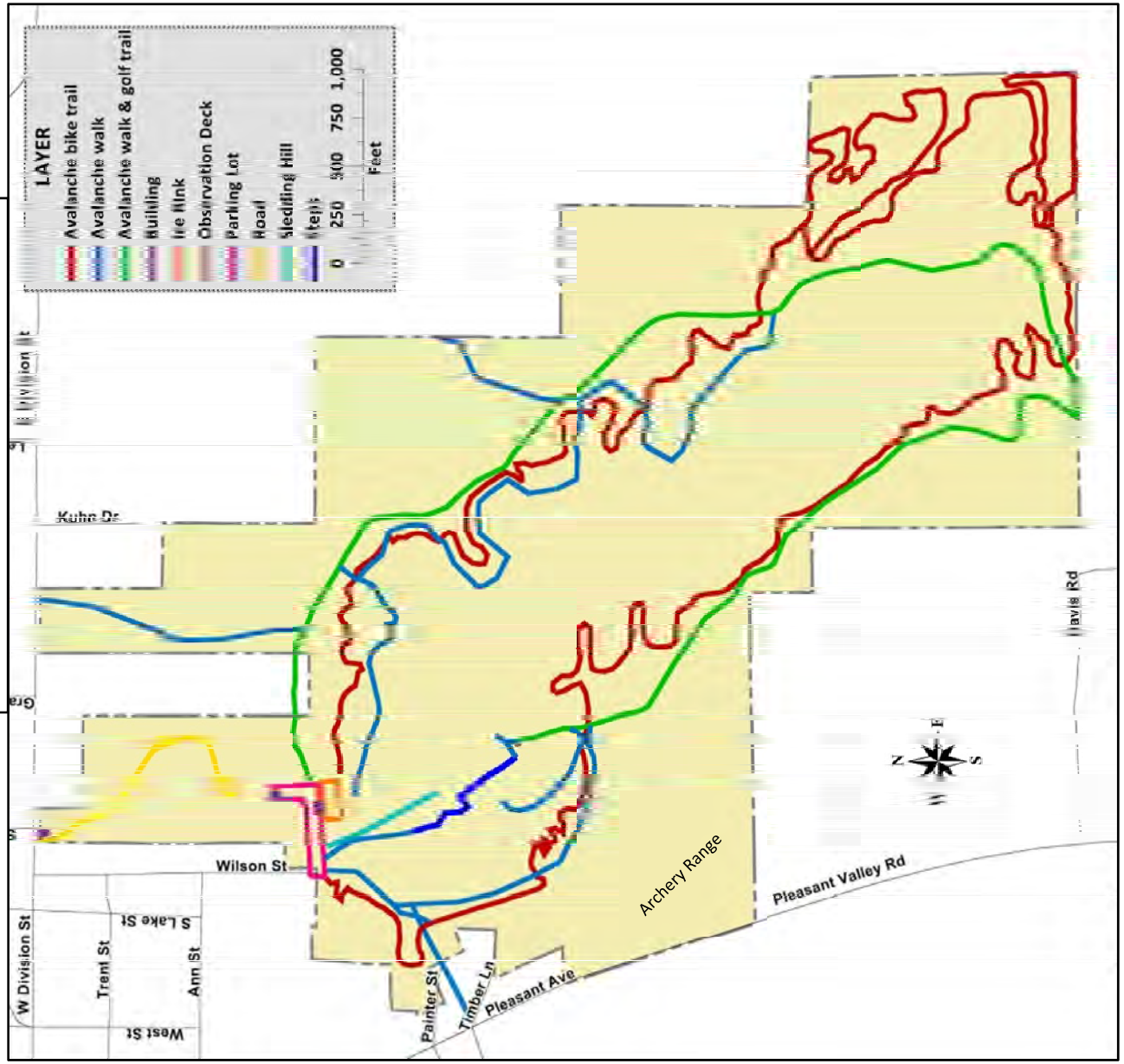
a. The first management plan was prepared by the City in 1979. The plan focused on recreational use, particularly winter sports on the property.
b. Forest Management Plan was developed in 1980. This plan called for actively managing Avalanche's forest cover for the development of "high quality northern hardwoods" and for wildlife habitat.
c. In 1989 the City Commission approved a Parks Plan. The plan proposed development of numerous recreational facilities with an increased focus on non-winter sports. The plan also proposed actions to address the natural resources on the property, including tree plantings, erosion control, wildlife food plots, and pruning and thinning of trees to keep the wooded areas in good condition.
d. The Parks and Recreation Commission completed the Avalanche Mountain Preserve Management Plan in 2001. Along with active recreation development the plan addressed use and management of the natural resources. The plan proposed the following: 1) inventory of natural resources, 2) development of a natural resource information packet, 3) implement a forest management/tree management/reforestation program, and 4) maintain existing and develop additional nature trails and recreation trails.

The **2010 Avalanche Master Plan** addresses passive recreation like trails and nature study; active recreation such as ice skating and sledding; recreation amenities and infrastructure; and resource protection. In an effort to determine the community's vision for the property, the planning process involved numerous committee meetings, public input sessions and commission meetings. Community consensus was to leave the forests untouched and allow the forests to evolve towards a climax northern hardwood type. The only exception is to allow tree clearing for maintaining views from the overlooks. Active management to eliminate exotic invasive species, control insect and disease outbreaks, and encourage climax forest development was not chosen as an option.

Existing Recreation Facilities

Avalanche Preserve provides active year-round outdoor recreation opportunities. Trails designed for hiking and mountain biking are extensively used spring, summer and fall. Those same trails are used for XC skiing and snowshoeing during the winter months. An 18-hole disc golf course begins just east of the parking lot, follows the main trail slowing climbing in elevation until it ends at the top north facing hill of Avalanche Mountain. Two observation decks are located at the top of the front hill and provide views of Boyne City and Lake Charlevoix. The old ski hill is used in the winter for sledding and the City operates a skating rink and warming house at the Preserve.

Figure 1: Facilities in Avalanche Preserve



Inventory Process

The resource inventory was conducted in July of 2015. Preliminary field analysis included reviewing community plans, Avalanche Preserve Recreation Area Conceptual Trail Design Report, USDA Soils Survey, Michigan Natural Features Inventory County Element List, USGS topographic maps, and digital color aerial photographs. Digital data sets were incorporated into a Geographic Information System (GIS) and used to support site analysis. Based on a preliminary cover type map, the locations of field plots were distributed across the property to gather information on each of the cover types. Field surveys were completed by traversing the Preserve to gather field data at each of the selected 60 plots. The inventory gathered information on forest species, forest health and condition, common shrubs and herbaceous vegetation, wildlife, presence of rare and special plants and animals, invasive species, resource conditions and resource concerns.

Resource Summary

Forests

Quality and health of the trees vary greatly in the forest. Since the forests have not been actively and properly managed for many decades, low quality trees that exhibit poor vigor and health can be found throughout the property. Most of the white ash trees have died from an Emerald Ash Borer infestation. Beech bark disease was found on the property. The beech trees will eventually be killed by the disease, but the progression and mortality rate will be slower than the Ash Borer. (See appendix for information on Emerald Ash Borer and Beech Bark Disease.) Most of the aspen is mature and declining. On better sites the aspen areas will convert to northern hardwoods and on drier sandy sites the areas will likely convert to oak, red maple and pine species. In summary the forest in the Preserve are in the state of transition. With the loss of white ash and eventual loss of beech and aspen, the primary tree species will be sugar maple, basswood, red maple, ironwood and red oak.

Beech Bark Disease

The community's long term goal, as outlined in the 2010 Avalanche Master Plan, is to manage towards an old growth forest. The chosen approach is "hand-off" and to allow the forests to evolve towards a climax northern hardwood type. This passive approach does not support active management to eliminate exotic invasive species, control insect and disease outbreaks, and encourage climax forest development. The exception is to allow clearing for maintaining views from the primary overlook.

In contrast to the Avalanche Master Plan, minor vegetation management is recommended in this plan. Removal of invasive and nuisance species, removal of dead, dying or weakened trees along trails, releasing desirable trees such as wild apple trees and clearing to improve views are recommended management activities.

An analysis of potential for timber harvesting should consider site constraints and community constraints. There is mature and marketable timber within the Preserve. Also, the presence of low quality and diseased trees would support a timber stand improvement thinning in the northern hardwoods.

An examination of soil constraints and steep slopes shows considerable areas with slopes 25 percent and greater, see soils constraints map. Timber harvesting on such step slopes is not a preferred practice due to high potential for erosion and resource impacts. Furthermore, in locations where slopes are less than 25 percent, both existing and proposed trails traverse the areas. Timber harvesting would have temporary impacts on recreational activities; it would raise concerns with park users.

If at some point the community chooses to manage the forest and conduct timber harvests, an outreach effort should be conducted to ascertain community understanding and support for timber management in the park. The community would be wise to hire a professional forestry consultant who would represent the City's interests and administer the timber sale. As well an education program prior to and after timber harvests would be advisable.

Forest Species

Abies balsamea, Balsam Fir
Acer spicatum, Mountain Maple
Acer rubrum, Red Maple
Acer saccharum, Sugar Maple
Alnus rugosa, Tag Alder
Amelanchier spp., Juneberry/Serviceberry
Betula papyrifera, Paper Birch
Cornus spp., Dogwood
Fagus grandifolia, American Beech
*Fraxinus nigr*a, Black Ash
Fraxinus americana, White Ash
Juniperus spp., Juniper
Larix laricina, Tamarack
Malus spp., Apple
Ostrya virginiana, Ironwood
Quercus rubra, Northern Red Oak
Picea mariana, Black Spruce
Picea glauca, White Spruce
Picea abies, Norway Spruce
Picea pungens, Colorado Blue Spruce
Pinus nigra, Austrian Pine
Pinus strobus, White Pine
Pinus resinosa, Red Pine
Pinus sylvestris, Scots Pine
Populus tremuloides, Quaking Aspen
Populus grandidentata, Bigtooth Aspen
Populus balsamifera, Balm-of-Gilead or balsam poplar
Prunus serotina, Black Cherry
Prunus virginiana, Choke Cherry
Rhus typhina, Staghorn Sumac
Salix spp., Willow Shrubs
Sambucus spp., Elderberry
Thuja occidentalis, N. White Cedar
Tilia americana, Basswood
Tsuga canadensis, Eastern Hemlock
Ulmus americana, American Elm
Ulmus thomasii, Rock Elm
Viburnum spp., nannyberry, highbush cranberry

Since the inventory was conducted end of July, the spring ephemeral wildflower plants were not apparent. The following are a list of plants commonly found in northern hardwood forests.

Common Herbaceous Plants

Osmorhiza longistylis, Sweet cicely
Polygonatum odoratum, Solomon's seal
Allium tricoccum, wild leeks
Trillium grandiflorum, Trillium
Clintonia borealis, Clintonia
Claytonia virginica, Spring beauties
Dicentra cucullaria, Dutchman's Breeches
*Erythronium americanum***,** Trout lilies
Dryopteris marginalis, Marginal Wood fern
Adiantum pedatum, maidenhair fern
Pteridium aquilinum, bracken fern

Recreational Features

The Preserve is a large tact of unbroken forest land, set aside for a variety of outdoor recreational activities. Its location within the City draws many users to the property year round and on a daily basis. The property offers opportunities for hiking, mountain biking, disc golf, nature study, sledding, ice skating, and X-C skiing.

Wildlife

The property size, topography, and mix of forest types provide ample habitat for a variety of woodland creatures. Long term, much of the forests are to evolve towards an old growth climax forest type of northern hardwoods dominated by sugar maple and basswood. Loss of aspen forests will reduce habitat for species such as ruffed grouse, white tailed deer and snowshoe hair, while favoring wildlife species that prefer old growth habitats. Several small openings add to habitat diversity and are important for recreation and wildlife. Management activities should focus on maintaining these openings. Conifers such as red pine, white pine, blue spruce and hemlock provide cover for mammals and birds.

Of particular interest is the presence of hemlock within the northern hardwood forests. Prior to extensive timber harvests in the early 1900's, hemlock was more common in the old growth northern hardwood forests of Charlevoix County. Cutting practices, land clearing and wildfires greatly reduced the amount of hemlock. As the forests mature in the Preserve, hemlock will again become more common and provide valuable year round cover for songbirds. Of the four basic needs for wildlife (food, water, shelter and space) water is clearly the limiting factor within the Preserve. Spring seeps are the only source of water and should be protected.

White ash trees have been killed by the Emerald Ash Borer. Eventually beech will succumb to beech bark disease and over mature aspen trees will die. It is important to note, nothing goes to waste in the forest. The abundance of large, dead-standing trees, called snags or den trees, will be a plus for woodpeckers and cavity nesting mammals and birds. The dead-

standing trees will eventually fall to the ground, and the decomposition process will continue. Wood-decaying fungus, salamanders, and insects will flourish in the rotting tree trunks and in turn provide food for animals. Finally, the decomposed wood will help replenish the forest soils.

A red oak forest stand is growing along the main ridge top. Large red oak trees are also scattered throughout the northern hardwood forests. The acorn mast crops are high energy food source for deer, squirrels and other wildlife species. These trees should be preserved when trails and other recreation facilities are constructed.

Resource Constraints

Analysis of existing data sets and completion of a field survey were used to identify potential constraints related to recreational development.

Threatened & Endangered Species

The Michigan Natural Features Inventory's Charlevoix County Element List was examined to determine if any threatened, endangered or special concern species might be found in the Preserve. Most of the species on the county list are associated with Great Lakes coastal and wetland ecosystems. None of the plants on the list have potential of growing within the Preserve. Two birds that might visit the Preserve are the bald eagle and northern goshawk. Given limited food availability for these raptors, sightings would not be likely.

Windfalls

Most of the white ash trees have died from an Emerald Ash Borer infestation. The beech trees will eventually be killed by the Beech Bark disease, but the progression and mortality rate will be slower than the Ash Borer. Most of the aspen is mature and declining.

When the trees die or even start to decline, the trees become weakened and are more susceptible to windthrow and ice-storm damage. Since the community is interested in letting natural forest succession to occur, there may well be situations where parts of forest are "knocked down." A blowdown will look unsightly in the short term, but the disturbance will create conditions for forest regrowth.

White Ash Windfalls

Spring Seeps

Spring seeps can be found on the steep eastern slope of Avalanche Mountain. Two were identified during the field

inventory, but there may be more since the entire slope was not scanned for seeps. The seeps begin mid slope and eventually filter back into ground on the lower slope. Small flows of water are found during springtime and after rains. A large spring and drainageway enters the southeast corner of the property and flows into a wetland complex identified on the cover map. It appears there is a minor flow of water during spring, summer and fall. Soils are wet, mucky and unstable within these seeps.

Of the four basic needs of wildlife (food, water, shelter and space) water is a limiting factor within the Preserve. Though small and seasonal, spring seeps are still an important water source for songbirds, small mammals and reptiles like tree frogs, American toad, salamanders and snakes. Since the seeps have soft, wet soils and are important wildlife features, they should be avoided when building trails and other recreational facilities.

Soils

When planning for types and intensity of land uses, soil types and slopes are two important factors that determine the carrying capacity of land. The construction of roads, trails and buildings on steeply sloped areas or areas with organic and hydric soils require special design considerations. While costs for developing these sensitive areas are greater than in less constrained parts of the landscape; if developed properly, the impacts to natural resources would be minimal.

The Natural Resource Conservation Service completed a detailed soil survey of Charlevoix County. A digital version of the soil survey maps was acquired from the State of Michigan Center for Geographic Information program. Using a computer-based Geographic Information System, the soils map was overlaid onto the site and analyzed for potential constraints related to step slopes and hydric soils, see **Figure 2**. A listing of soil types within the Preserve, acres covered by each soil type and constraints are found in **Table 1**.

Soils types with slopes ranging from 12-18 percent, 18-25 percent and 25-50 percent are classified as having slope constraints. There are 158 acres with slopes 18 percent and greater and 7 acres with slopes 12-18 percent. Hills and steeply rolling terrain may provide opportunities for spectacular views of the landscape. However, steeply sloped sites are more difficult and costly to develop; as well as having greater challenges for long-term maintenance. Maintenance costs tend to be higher on steeply sloped terrain. Special design standards should include erosion control measures, limiting size of disturbed areas, retaining natural vegetation,

re-vegetation, slope stabilization and on-site retention of water run-off from impervious surfaces all serve to minimize resource impacts.

An analysis of the soils survey found nearly 19 acres classified as hydric. Hydric soils are saturated, flooded or ponded during part of the growing season and are classified as poorly drained and very poorly drained. Carbondale muck, Linwood muck, Tawas muck soils are organic and support vegetation characteristic of wetlands. Hydric soils have poor potential for site development. Wetness, unstable soils and frequent ponding create conditions unfavorable for trails.

Erosion Sites

Sandy soils and steep slopes have a high prevalence for erosion. There are still unhealed minor erosion sites related to the old ski area and unmanaged past use. Additional plantings of suitable plants will stabilize erosion sites. New recreation development, like trails, will need to be designed to address erosion concerns on the sandy and steep slopes. As previously stated, regular monitoring of trail conditions and a proactive maintenance program will be necessary.

Table 1: Soil Types and Constraints

Symbol	Soil Type	Constraints
Bv	Brevort loamy sand	Wet
Ca	Carbondale muck	Wet
EaC	East Lake loamy sand, 6 -12% slopes	
EnB	Emmet-Leelanau complex, 2-6 % slopes	
EnC	Emmet-Leelanau complex, 6 -12% slopes	
EnD	Emmet-Leelanau complex, 12-18% slopes	Slopes
EnE	Emmet-Leelanau complex, 18-25% slopes	Slopes
EnF	Emmet-Leelanau complex, 25-50% slopes	Slopes
Ep	Epoufette sandy loam	Wet
IlB	Iosco loamy sand, 0-6% slopes	
KaB	Kalkaska sand, 0-6% slopes	
KaC	Kalkaska sand, 6 -12% slopes	
KaF	Kalkaska sand, 25-50% slopes	Slopes
LrB	Leelanau-Rubicon loamy sands, 0-6% slopes	
LrC	Leelanau-Rubicon loamy sands, 6 -12% slopes	
LrD	Leelanau-Rubicon loamy sands, 12-18% slopes	Slopes
LrE	Leelanau-Rubicon loamy sands, 18-25% slopes	Slopes
LrF	Leelanau-Rubicon loamy sands, 25-50% slopes	Slopes
Ls	Linwood muck	Wet
McB	Mancelona loamy sand, 0-6% slopes	
McC	Mancelona loamy sand, 6 -12% slopes	
McF	Mancelona loamy sand, 25-50% slopes	Slopes
NsC	Nester loam, 6 -12% slopes	
NsE	Nester loam, 18-35% slopes	Slopes
SaB	Saugatuck sand, 0-6% slopes	
Ta	Tawas muck	Wet
UbC	Ubly sandy loam, 6 -12% slopes	
WaC	Wallace sand, 0-12% slopes	

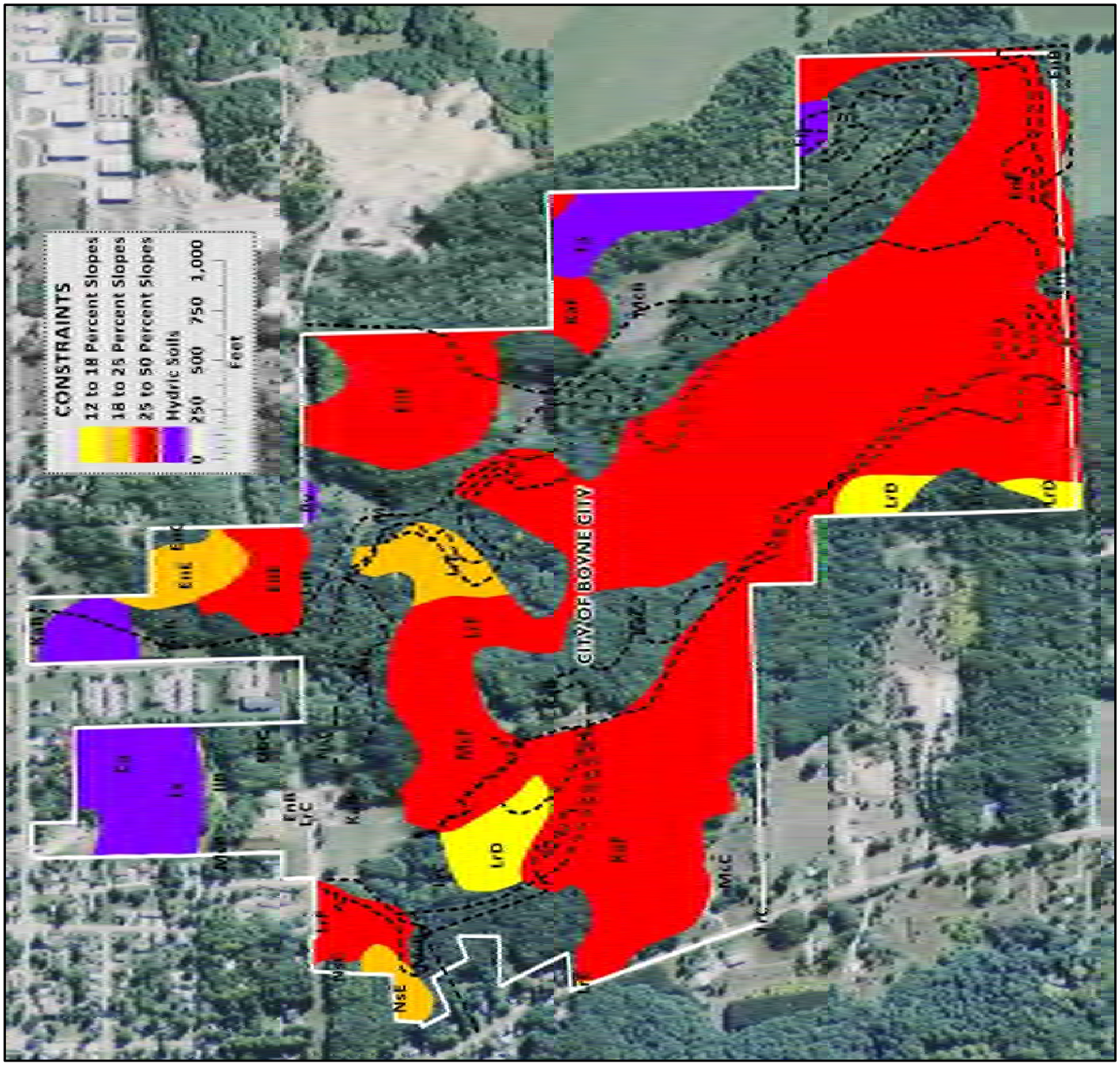


Figure 2: Soils Constraints Map

Mountain Bike Trail Development

In February 2015, the Avalanche Preserve Recreation Area Conceptual Trail Design Report was completed by International Mountain Bicycling Association's Trail Solutions Program. The effort was assisted by the Top of Michigan Mountain Bike Association. Staff from IMBA's Trail Solutions Program visited the site during November 2014 to evaluate current conditions and conceptualize future shared-use natural surface trail development opportunities at the site. The results were compiled into a report and presented to Boyne City.

According to the report: *The proposed system consists of a series of stacked loops and contains trail segments for users of all abilities (please see the Avalanche Preserve Recreation Area conceptual trail plan in the appendix). It can be accessed from the main trailhead developed with additional bicycle-specific amenities.*

The objectives of the proposed trail system are as follows:

1. *Create a stacked-loop, bike- optimized and shared-use single-track trail system that appeals to a wide spectrum of abilities, from families and beginners to users with advanced skills and fitness.*
2. *Create a trail system that is environmentally and socially sustainable and best highlights the natural beauty of Avalanche Preserve Recreation Area.*
3. *Create a trail system that interacts well with planned park infrastructure.*
4. *Create a bike-optimized, shared-use trail system that focuses on progressive skills development but favors beginner and intermediate level users in order to grow participation.*
5. *Create a small bike park located at the trailhead.*

The report recognizes constraints related to the sandy soils, which are more susceptible to erosion than clay-based soils. *Sustainable design standards must be strictly adhered to in order to prevent the degradation of Avalanche Preserve Recreation Area's natural resources.*

Field studies associated with this Resource Inventory and Management Plan have identified additional recommendations related to existing and proposed mountain biking trail development.

<u>Steep Slopes and Sandy Soils with Erosion Potential</u>

Hills and steeply rolling terrain may provide opportunities for spectacular views of the landscape and challenging mountain bike trails. However, steeply sloped sites are more difficult and costly to develop; as well as having greater challenges for long-term maintenance. There are 158 acres classified as having slopes 18 percent and greater.

The construction of roads, trails and buildings on sandy and steeply sloped areas should be engineered to minimize erosion both during and after construction. Special sustainable design standards should be employed to address erosion concerns. If developed properly, the impacts to natural resources would be minimal. Special design standards should include erosion control measures, limiting size of disturbed areas, retaining natural vegetation, re-vegetation, slope

stabilization and on-site retention of water run-off from impervious surfaces all serve to minimize resource impacts.

Regular monitoring of trail conditions and a proactive maintenance program should be employed. A process should be adopted whereby the community and/or organizations routinely survey the trails for potentially failing erosion sites and tree windfalls. When problems are identified, responsible parties should immediately perform needed maintenance.

Dead Standing Trees and Windfalls

Most of the white ash trees have died from an Emerald Ash Borer infestation. The beech trees will eventually be killed by the Beech Bark disease, but the progression and mortality rate will be slower than the Ash Borer. Most of the aspen is mature and declining. When the trees die or even start to decline, the trees become weakened and more susceptible to windthrow and ice storm damage.

Whether considering existing or proposed trails, removal of dead, dying or weakened trees along trails should be accomplished on a regular basis. When constructing new trails all dead standing trees adjacent to the trails should be cut down. The tree trunks can be left on the ground, and the tops should be cut and branches spread to minimize visual impacts.

Plants and Animals

Hiking and biking trails constructed using sustainable design standards would have minimal impacts to wildlife in the Preserve. Trails do not cause wide breaks in the forest canopy and therefore will not fragment the large intact Preserve forest.

The Michigan Natural Features Inventory Charlevoix County Element List was examined to determine if any threatened, endangered or special concern species might be found in the Preserve. There were no plant species on the list that would be found growing in habitats within the Preserve.

While no threatened and endangered species were identified during the field survey, there are certain trees that should be preserved when constructing recreational facilities such as trails. Large red oak trees (16” and greater in diameter) are scattered throughout the northern hardwood and aspen forests. These trees are quite spectacular and enhance the natural beauty of the forest. In addition, presence of large, acorn-producing red oak trees provides a high energy food source for wildlife. The large diameter, tall trees are visually attractive to park users and increase opportunities to view

wildlife feeding on acorns. The red oak should be avoided during trail construction.

Another important tree species is the eastern hemlock. Young hemlock trees are found throughout the northern hardwoods and aspen forests. As the forests mature in the Preserve, hemlock will again become more common and provide valuable year round cover for songbirds. Hemlock should be avoided during trail construction.

Seeps, Hydric Soils and Wetlands

Spring seeps can be found on the steep eastern slope of Avalanche Mountain and in the southeast corner of the property. Though small and seasonal, the spring seeps are still an important water source for songbirds, small mammals and reptiles like tree frogs, American toad, salamanders and snakes.

Since the seeps have soft, wet soils and are important wildlife features, they should be avoided when building trails and other recreational facilities.

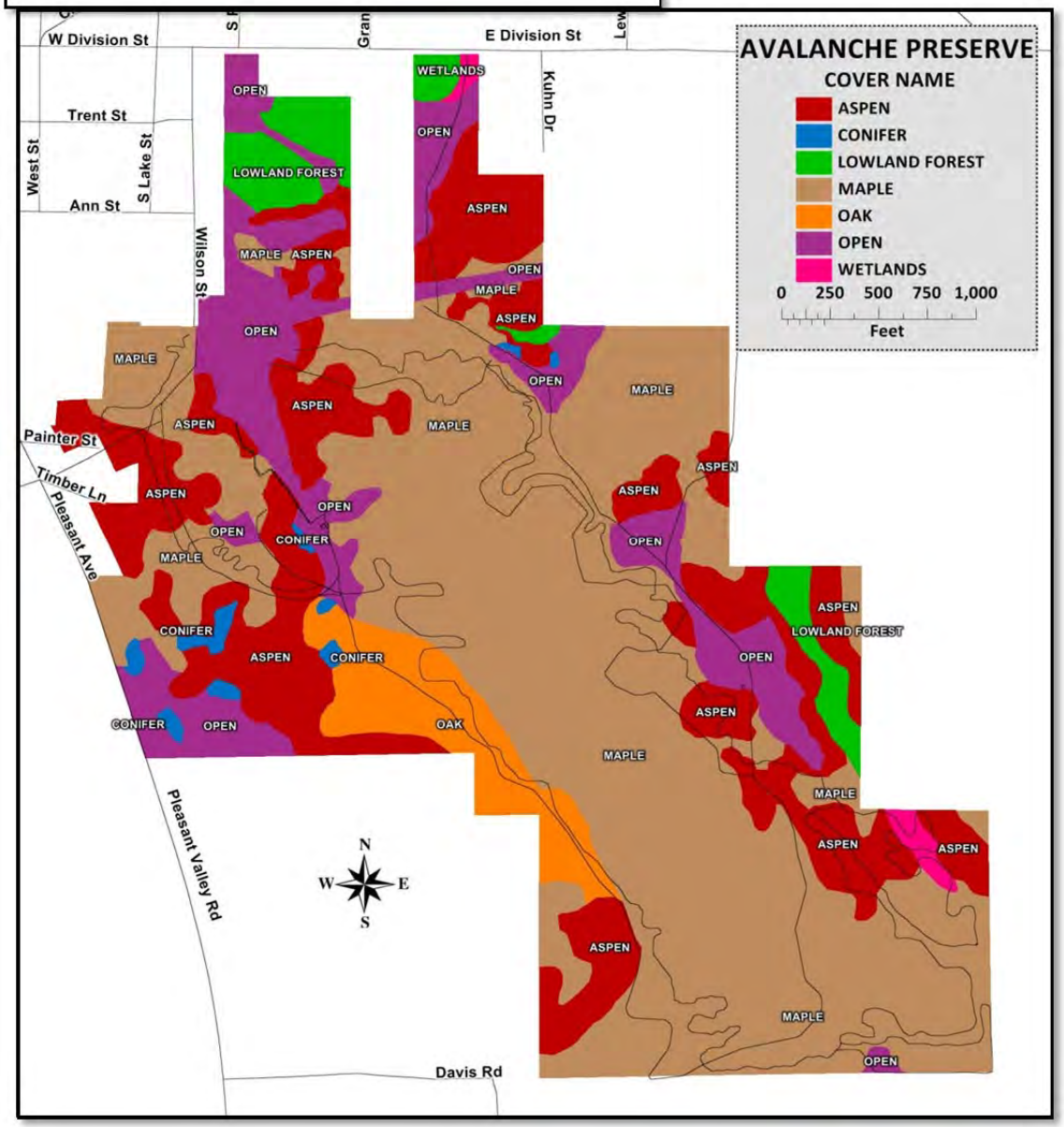
Hydric soils are saturated, flooded or ponded during part of the growing season and are classified as poorly drained and very poorly drained. Hydric soils have poor potential for site development. Wetness, unstable soils and frequent ponding create conditions unfavorable for trails. Lowland forests and non-forested wetlands are found in the southeastern and northern parts of the Preserve. Wetlands should be avoided when building trails and other recreational facilities.

Management Units

Unit 1 - Northern Hardwoods
Unit 2 – Aspen
Unit 3 – Red Oak
Unit 4 – Lowland Forest
Unit 5 – Conifers
Unit 6 – Wetlands
Unit 7 –Open
Unit 8 – Facilities

Cover Type	Acres	Percent
Northern Hardwoods	163	54%
Aspen	68	23%
Red Oak	16	5%
Lowland Forest	12	4%
Conifers	2	1%
Wetlands	2	1%
Open	40	12%
Total	**303**	**100%**

Figure 3: Cover Type Map of Avalanche Preserve



Northern Hardwood Forests - Unit 1

Fully stocked, sawtimber and poletimber-sized northern hardwood forest. Species composition varies with sugar maple being the predominate species. Tree species include: Sugar Maple (*Acer saccharum*), Basswood (*Tilia americana*), American Beech (*Fagus grandifolia*), Ironwood (*Ostrya virginiana)*, Bigtooth Aspen (*Populus grandidentata*), Quaking Aspen (*Populus tremuloides*), Red Oak (*Quercus rubra*), Red Maple (*Acer rubrum*), White Ash (*Fraxinus americana*) and Eastern Hemlock (*Tsuga canadensis*). Understory species are dominated by spring ephemeral herbaceous plants such as sweet cicely, Solomon's seal, wild leeks, trillium, clintonia, spring beauties, Dutchmen's britches, and trout lilies. Wood ferns and maidenhair ferns are common in the eastern flanks of the major ridge. Elderberry and mountain maple can be found in the understory. Bracken ferns are found on drier sites on the western flank of the main ridge.

Large specimens of Sugar Maple, American Beech, Basswood and Red Oak can be found growing throughout the forest. Large mature Bigtooth Aspen and dead-standing White Ash trees are also present in the forest. The trees add to the "big woods" character of the Preserve appreciated by the many park users. They give a glimpse into the future as the forest continues to age towards an old growth forest system.

The presence of aspen and red oak within the northern hardwood forest clearly indicates around 70 to 80 years ago there were major disturbances associated with intensive harvesting operations. It is likely that clearcutting and patch cuts created large openings that allowed aspen and oak to become established along with the northern hardwoods. Aspen trees are over mature and declining. Gaps in the forest canopy, created when the aspen trees die, will be replaced by shade tolerant northern hardwood species such as sugar maple and basswood. In the long term, unless there is a major natural disturbance such as a windstorm, aspen will be eliminated from the northern hardwood forest. Therefore, the trend will be for the forest to become a climax northern hardwood forest dominated by sugar maple, with basswood, red maple, red oak, ironwood and hemlock also present in varying amounts.

<u>Major Objectives for the Unit</u>

A. Manage for old growth northern hardwoods.
B. Under plant eastern hemlock seedlings in areas where pockets of white ash and aspen have died.
C. Manage habitat for song birds and woodland animals.
D. Maintain forest cover for wildlife, recreation and soil stabilization.
E. Remove dead and downed trees from trails.
F. Maintain road and trail system for recreational use and to provide access for accomplishing management activities.

<u>Existing Conditions</u>

Cover Type Species: Sugar maple, basswood, American beech, red oak, aspen, red maple, eastern hemlock, ironwood and white ash.
Number of Acres: 163
Size Class: Sawtimber[1] and Poletimber

[1] seedling - less than 1" dbh | sapling - trees 1" to 4.9" dbh | poletimber - trees 5" to 9.9" dbh | sawtimber - 10" and larger dbh

Average dbh[2]*:* 16 inches diameter
Site Quality: Very good
Stand Quality: Good quality

Forest Health and Management

The community's long term goal is to manage towards an old growth forest. The chosen approach is "hand-off" and to allow the forests to evolve towards a climax northern hardwood type. This passive approach does not support active management to eliminate exotic invasive species, control insect and disease outbreaks, and encourage climax forest development. The exception is to allow clearing for maintaining views from the primary overlook.

Most of the white ash trees have died from the Emerald Ash Borer infestation. Beech bark disease was found throughout the property. The aspen is mature and declining. Eventually aspen will be eliminated from the northern hardwood forest. With the loss of white ash and eventual loss of American beech and aspen, the forest will consists of sugar maple, basswood, red maple, ironwood and red oak.

Wildlife

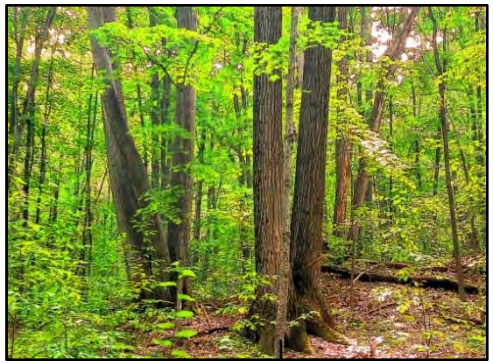
Many species of wildlife use the northern hardwood forest for nesting and feeding. The black-capped chickadee, yellow-bellied sapsucker, white-breasted nuthatches, gray squirrel and northern flying squirrel nest in hollowed out tree trunks. Ground-nesting species such as the ruffed grouse and oven bird use this cover type. The red-eyed vireo, scarlet tanager, black-throated blue warbler, and blue jay nest in the canopy, while the eastern chipmunk and woodland jumping mouse nest beneath the ground or debris. The northern grosbeak can

be seen in northern hardwoods only during the winter months. A closed canopy northern hardwood forest growing on rich soils tend to be cool and offer damp little pockets during the summer months. Red-backed and Wehrle's salamanders can be found in old rotting stumps and logs. If

[2] (dbh - tree diameter at 4.5' above ground)

standing water is present the Jefferson's and spotted salamander along with the gray tree frog and American toad will find such habitats inviting.

To provide cover and sites for cavity nesting birds and animals, leave dead standing trees, not located adjacent to hiking and biking trails. Snags or dead standing trees provide nesting sites, perches and food (insects) for many species of wildlife. For example, the pileated woodpecker chops huge rectangular holes in the trunks; these holes are further excavated by other wildlife species and used for nesting cavities. It is best to have both soft snags (aspen, basswood and conifer trees) and hard snags (maple, beech and ash trees). Optimum conditions are two to four dead standing trees per acre, which won't be an issue with the white ash, beech and aspen trees.



Eventually the dead trees will fall to the ground. When not obstructing trails, they should be left for wildlife cover. Tree trunks a minimum of twelve inches in diameter and lying on the ground, can benefit ruffed grouse. These "drumming logs" are used as perches by male ruffed grouse during their mating display rituals. Small branches in the tops will fall off and the tree trunks will come in contact with the ground, starting the long process of decomposition. As the logs rot, insects, salamanders and fungi inhabit the logs, which in turn, provide food for other woodland creatures. Eventually, the woody materials are recycled, returned as decomposed organic matter to the forest for use by woodland plants.

Another valuable wildlife feature is the presence of large, acorn producing red oak trees scattered throughout the forest stand. These trees provide a high-energy food source for deer and squirrels. In addition, the large diameter, tall trees are visually attractive to park users, while increasing opportunities to view wildlife feeding on acorns. The red oak should be avoided during trail construction.

Resource Protection

Spring seeps can be found on the steep eastern slope of Avalanche Mountain. Two were identified during the field inventory, but there may be more since the entire slope was not scanned for seeps. The seeps begin mid slope and eventually filter back into ground on the lower slope. A spring drainageway enters the southeast corner of the property and flows into a wetland complex identified on the cover map. Soils are wet, mucky and unstable within these seeps. The spring seeps, though small, are a water source for wildlife. Since the seeps have soft, wet soils and are important wildlife features, they should be avoided when building recreational facilities.

Construction of trails and recreation facilities on slopes of 25 to 50 percent should be engineered to minimize erosion both during and after construction. A system should be adopted whereby; the community and/or organizations routinely survey the trails for potentially failing erosion sites and tree windfalls. When problems are identified, responsible parties should immediately perform needed maintenance.

Aspen Forests - Unit 2

Nearly pure stands of aspen are growing in smaller patches of forests ranging in size from less than one acre to 15 acres. In general the aspen trees are sawtimber sized, mature and declining. Younger trees are found along the edges of openings where the where the forest is expanding into openings through root suckering. Primary species are Bigtooth Aspen, (Populus grandidentata) and Quaking Aspen, (Populus tremuloides). Other species present in minor amounts are Red Maple, (Acer rubrum), Sugar Maple, (Acer saccharum), American Beech, (Fagus grandifolia), Northern Red Oak, (Quercus rubra), White Ash, (Fraxinus americana), White Pine, (Pinus strobus), Red Pine, (Pinus resinosa), Paper Birch, (Betula papyrifera), Eastern Hemlock, (Tsuga canadensis) and Balsam Fir, (Abies balsamea).

Aspen in the Preserve is mature and declining. Aspen trees reach maturity and start to decline at around 60 years of age. Individual dead-standing trees and small pockets of windthrow were noted during the field inventory. The presence of aspen forests in the Preserve show a history of major disturbances associated with intensive harvesting operations around 70 to 80 years ago. Clearcutting and patch cuts created conditions that allowed aspen and oak to become established as nearly pure stands.

Aspen stands in the eastern side of the main ridge are mixed with sugar maple, beech and oak. This is attributed to sandy loam soils, available moisture and aspect. Understory plants are the same as those found in adjacent northern hardwood forests and include Solomon's seal, wild leeks, trillium, clintonia, spring beauties, Dutchmen's britches, trout lilies, wood ferns and maidenhair ferns. Whereas aspen forests on the west side of the property are growing on the steep west facing slope. Combined with sandy and sandy loam soils, the west facing hillside is hotter and drier than the east side. Healing erosion sites on the upper slopes expose the sandy, dry soils. The species component is aspen, red maple, red pine and red oak. Bracken fern, grasses, chokecherry, and serviceberry are found in the understory on the steep western facing slopes.

Major Objectives for the Unit

A. Allow the current forest type to convert to northern hardwoods or red oak-white pine forests, depending upon location and growing conditions.
B. Drier sites on the steep western facing slopes can be under planted with white pine and red oak. As aspen trees die, the white pine and red oak will recruit into the forest canopy and support the conversion to pine-oak forest.
C. Plant hemlock seedlings in the understory of the aspen forests in the eastern side of the Preserve.

D. Maintain forest cover for wildlife, recreation and soil stabilization.
E. Manage habitat for song birds and woodland animals.
F. Maintain road and trail system for recreational use and to provide access for accomplishing management activities.
G. Remove dead and downed trees from trails.

Existing Conditions

Cover Type and Major Species: Bigtooth aspen, quaking aspen, sugar maple, red maple, beech, white birch, balsam fir, and white ash.
Number of Acres: 65
Size Class: Sawtimber[3]
Average dbh[4]: 14" diameter
Stand Quality: Mature and declining
Site Quality: Very Good

Forest Health and Management

Aspen is very shade intolerant and requires full, open sunlight to naturally regenerate. Unlike the other species in the Preserve, aspen regenerates new crop trees by growing root sprouts or root suckers from the root systems of harvested trees. Therefore, mature trees are not needed as a seed source and, in fact, shade from large trees actually inhibits aspen seedling growth. Pre-settlement forests in Charlevoix County had minimal areas covered by aspen forests. Since aspen forests become established when there are major disturbances such as wildfires, windstorms and ice storms that clear large areas; and these types of large area disturbances were not common is this part of Michigan.

Given the community is not interested in actively managing the aspen via harvests and natural regeneration to maintain the forest type, eventually aspen forests will disappear from the property. What will take the place of the aspen forest?

[3]seedling - less than 1" dbh | sapling - trees 1" to 4.9" dbh | poletimber - trees 5" to 9.9" dbh | sawtimber - 10" and larger dbh
[4] (dbh - tree diameter at 4.5' above ground)

There are a number of factors, which include soils, slope, aspect, understory vegetation and size of gaps in the forest canopy. Baring a major disturbance, on better sites the aspen areas will convert to northern hardwoods and on drier sandy sites the areas will likely convert to red oak, red maple and pine species. Under-planting red oak and white pine seedlings on the drier sites will support conversions to other more desirable species. Under-planting hemlock in the aspen stands in the eastern side of the property will support re-establishment of the species.

Note: as the aspen matures and start to decline, the trees become weakened and more susceptible to windthrow and ice storm damage. Since the community is interested in letting natural forest succession to occur, there may well be situations where several acres of forest might be "knocked down." A blowdown will look unsightly in the short term, but the disturbance will create conditions for forest regrowth. Depending upon the location and understory species, a large windthrow area could regrow as a mixed aspen-oak forest type, aspen-northern hardwood forest type or northern hardwood forest type. Another scenario, particularly in the western facing drier sites, would be the dead and downed aspen trees cause fuel build-up and increased potential for wildfires.

Wildlife

Many woodland creatures use the aspen forest for nesting and feeding. Species such as the least flycatcher, red-eyed Vireo, rose-breasted grosbeak, and American redstart nest in the tree canopy. Ground-nesting species such as the ruffed grouse, veery, snowshoe hare, and white-tailed deer use aspen forest types. A few species of wildlife that nest underground or in debris include the eastern chipmunk, long-tailed weasel, marbled salamander, ringneck snake, and milk snake. Birds and mammals that nest in cavities of trees include black-capped chickadee, yellow-bellied sapsucker and northern flying squirrel. Elimination of aspen forests will reduce preferred habitat for certain species, while favoring wildlife species that prefer old growth.

Resource Protection

Construction of trails and recreation facilities on slopes of 25 to 50 percent should be engineered to minimize erosion both during and after construction. A system should be adopted whereby the community and/or organizations routinely survey the trails for potentially failing erosion sites and tree windfalls. When problems are identified, responsible parties should immediately perform needed maintenance.

Red Oak Forests - Unit 3

A stand of Northern Red Oak, (*Quercus rubra*) is growing along the main ridge top. Other species found in the forest are Sugar Maple (*Acer saccharum*), Basswood (*Tilia americana*), and American Beech (*Fagus grandifolia*). Soil types and past human activities resulted in the establishment of red oak on the property. Large red oak trees are also scattered throughout the other forests.

Major Objectives for the Unit

A. Maintain and expand the current forest type of red oak.
B. Expand the type on the steep western facing slopes by under planting with white pine and red oak. As aspen trees die, the white pine and red oak will recruit into the over story and support the conversion to an oak-pine forest.
C. Preserve individual oak trees growing in other forest types.
D. Maintain forest cover for wildlife, recreation and soil stabilization.
E. Manage habitat for song birds and woodland animals.
F. Maintain road and trail system for recreational use and to provide access for accomplishing management activities.
G. Remove dead and downed trees from trails.

Existing Conditions

Cover Type and Major Species: Red oak, basswood, beech and sugar maple.
Number of Acres: 16
Size Class: Sawtimber[5]
Average dbh[6]: 14" diameter

[5]seedling - less than 1" dbh | sapling - trees 1" to 4.9" dbh | poletimber - trees 5" to 9.9" dbh | sawtimber - 10" and larger dbh
[6] (dbh - tree diameter at 4.5' above ground)

Stand Density: Fully stocked
Stand Quality: Very good
Site Quality: Very good

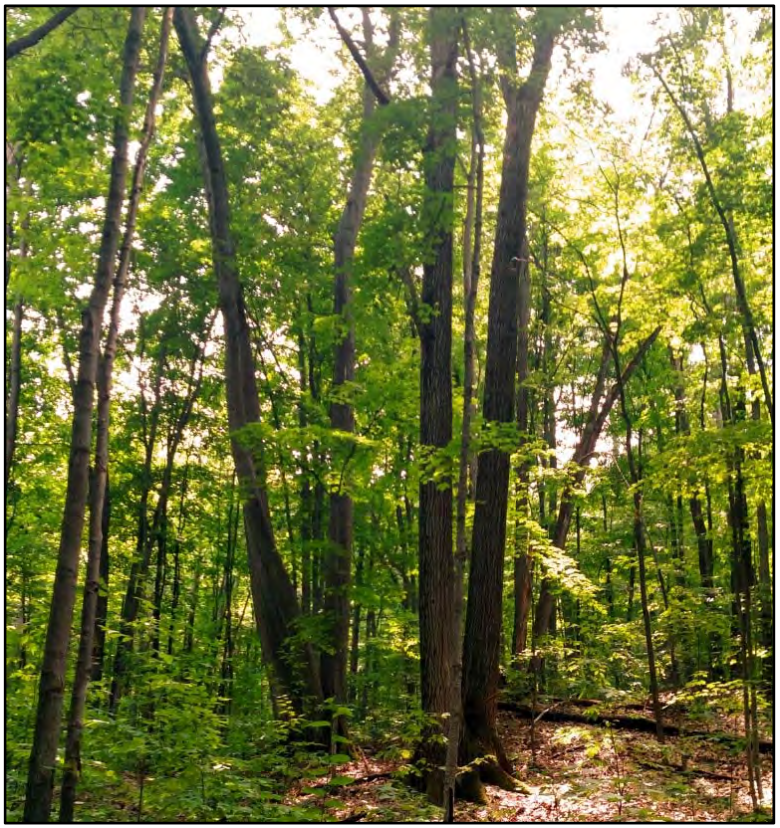
Forest Health and Management

The oak trees are in very good growing condition. Selective removal of lower quality trees would improve growth and vigor of the better trees. However, the community's interest in "letting the natural processes happen" would preclude this

type of management activity. As mentioned in the aspen section above, under-planting the aspen on drier sites on the western slopes would expand the oak forest.

Wildlife

Acorns production is the primary wildlife benefit. Though the acorn mast crops vary from year to year, they provide a high-energy food source for deer, squirrels and other wildlife species.



Whip-poor-will, red-eyed vireo, scarlet tanager, downy woodpecker, pileated woodpecker, blue jay, white-breasted nuthatch are a few birds that inhabit oak forests. Wild turkeys, gray squirrels, fox squirrels, black bear and white-tailed deer are typical game species found in the northern red oak forests. There are no recommended wildlife management activities in the oak forest types.

Resource Protection

Construction of trails and recreation facilities on slopes of 25 to 50 percent should be engineered to minimize erosion both during and after construction. A system should be adopted whereby the community and/or organizations routinely survey the trails for potentially failing erosion sites and tree windfalls. When problems are identified, responsible parties should immediately perform needed maintenance.

Lowland Forest - Unit 4

Wetland forest types are growing on soils, which are classified as hydric soils by the USDA Natural Resource Conservation Service. Trees species include the following:
Northern White Cedar, (Thuja occidentalis, Balsam Fir, (Abies balsamea), Eastern Hemlock, (Tsuga canadensis), Tamarack (Larix laricina), Balm-of-Gilead (Populus balsamifera), Black Spruce, (Picea mariana), White Spruce, (Picea glauca), Black Ash, (Fraxinus nigra), Quaking Aspen, (Populus tremuloides) and American Elm, (Ulmus americana).

The lowland forest in the southeastern part of the Preserve is an undisturbed forested wetland dominated by aspen, northern white cedar, hemlock, and red maple. The lowland forests in the north part of the property have been degraded by improper use, drainage alterations and dumping of materials.

Major Objectives for the Unit

A. Protect for wildlife habitat.
B. Do not develop recreational facilities within this area.
C. Clean trash, especially from the small creek.
D. Restore the riparian vegetation and wildlife habitat.
E. Improve drainage and water flow by replacing the culvert under the service road.
F. Remove invasive and undesirable plants such as autumn olive, Tartarian honeysuckle and box elder.

Existing Conditions

Cover Type and Major Species: Northern White Cedar, Balsam Fir, Eastern Hemlock, Tamarack, Balm-of-Gilead, Black Spruce, White Spruce, Black Ash, Quaking Aspen, and American Elm.
Number of Acres: 16
Size Class: Poletimber and sawtimber[7]
Average dbh[8]: 10” diameter
Stand Quality: Good

[7]seedling - less than 1" dbh | sapling - trees 1" to 4.9" dbh | poletimber - trees 5" to 9.9" dbh | sawtimber - 10" and larger dbh
[8] (dbh - tree diameter at 4.5' above ground)

Wildlife

The lowland forest type is limited on the property, yet it has high values for wildlife. The cover type provides important winter thermal cover, tends to have less snow on the ground, more protection from the cold winds and often a higher nighttime temperature than other cover types. The snowy owl, pine grosbeak, yellow finch, and boreal chickadee frequent lowland conifer stands during the winter months. The northern saw-whet owl, barred owl, red-headed woodpecker, pileated woodpecker, northern flying squirrel, and raccoon nest in hollowed out tree trunks. Ground-nesting species such as the American woodcock, short-eared owl, common snipe, and snowshoe hare use this cover type. The northern parula and solitary vireo nest in the canopy, while the northern waterthrush, arctic shrew, meadow vole, and lynx nest beneath the ground or debris. This cover type also offers opportunities for viewing migratory birds in the spring and fall. These species may include the olive-sided flycatcher, Swainson's thrush, Tennessee warbler, winter wren, Connecticut warbler, and white-tailed sparrow.

Resource Protection

The forested wetland in the northwest part of the property, adjacent to the community water wells has a small creek. The creek and adjacent forest have been degraded by improper use, drainage alterations and dumping of materials. Removal of trash, restoration of the creek and vegetation will improve the aesthetics and habitat quality.

Conifers - Unit 4

There are several small plantings of conifers in the Preserve. The plantings were intended to repair erosion sites and improve habitat. Red Pine (*Pinus resinosa*) was planted in small patches on the western slope of Avalanche Mountain. Other species planted to stabilize erosion and improve the visual character include White Spruce (*Picea glauca*) Blue Spruce (*Picea pungens*), White Pine (*Pinus strobus*), and Austrian Pine (*Pinus nigra*).

Major Objectives for the Unit

A. Maintain forest cover for wildlife, recreation and soil stabilization.
B. Expand the conifer-oak cover type by planting white pine and red oak in the understory of mature aspen forests. Preferred locations are drier sites with bracken fern in the understory that are located on the western flank of Avalanche Mountain.
C. Remove dead and downed trees from trails

Existing Conditions

Cover Type and Major Species: Red Pine, Blue Spruce, White Pine, Austrian Pine, Norway Spruce and White Spruce, Aspen, Red Oak, Red Maple and Beech.
Number of Acres: 2
Size Class: Poletimber[9]
Average dbh[10]: 8" diameter
Stand Quality: Very good

Wildlife

Conifers provide important winter (thermal) cover for wildlife, particularly, when located next to winter food sources. Since the Preserve is dominated by northern hardwood and aspen forests, conifer cover is a limited resource.

[9]seedling - less than 1" dbh | sapling - trees 1" to 4.9" dbh | poletimber - trees 5" to 9.9" dbh | sawtimber - 10" and larger dbh
[10] (dbh - tree diameter at 4.5' above ground)

Squirrels, deer, fox, and numerous species of song birds utilize pine forests for cover and food sources. The gray jay, pine grosbeak, evening grosbeak, purple finch, boreal chickadee, and pine siskin frequent upland conifer stands during the winter months. Many species of wildlife also use the upland conifer forest for nesting and feeding. The long-eared owl, solitary vireo, and evening grosbeak nest in the canopy, while the porcupine, long-tailed shrew, deer mouse, woodland jumping mouse and lynx nest beneath the ground or debris. This cover type also offers opportunities for viewing migratory birds in the spring and fall. These species include the Swainson's thrush, blackburnian warbler, Canada warbler, hermit thrush and winter wren.

Resource Protection

Construction of trails and recreation facilities on slopes of 25 to 50 percent should be engineered to minimize erosion both during and after construction. A system should be adopted whereby the community and/or organizations routinely survey the trails for potentially failing erosion sites and tree windfalls. When problems are identified, responsible parties should immediately perform needed maintenance.

Wet Meadow and Lowland Brush - Unit 5

There are two small open wet meadows and lowland brush areas located in the Preserve. An undisturbed wetland in the southeast corner of the property is feed by a spring seep that enters the southeast corner of the property. The soils are saturated much of the year, with standing water typically found in the spring and fall. Another small wetland is located at the northeast edge of the Preserve, adjacent to East Division Street. Wetland types are important components of the landscape and should be preserved. They add diversity, resting cover, nesting sites and feeding opportunities for many species of birds, mammals and reptiles.

Acres: 2
Site Quality: Very good

Major Objectives for the Unit

D. Protect wet meadow and lowland brush type.
E. Do not develop recreational facilities within this area.

Wildlife

Diverse cover types offer changing vistas and habitat for many species of wildlife, particularly nongame species.

The rose-breasted grosbeak, ruffed grouse, woodcock, veery, northern waterthrush, snowshoe hare, weasel, star-nosed mole, meadow jumping mouse, yellow warbler, common yellowthroat, house wren and black-capped chickadee use lowland types. There are no management activities that will improve the wildlife habitat; it is best to leave the area in a natural state.

Upland Openings - Unit 6

This management unit includes several openings within the Preserve, with each area having somewhat different characteristics and recommended management activities. There are a total of 40 acres in upland openings. Shrubs and trees are encroaching into the openings, if left alone the openings will eventually become forested.

Eastern Openings - Three upland openings in the eastern parts of the Preserve are relatively level with slopes ranging from 0 to 6 percent. The disc golf course and main hiking trail traverses these openings. The City mows parts of the openings

in an effort to maintain them for recreational use and to keep the forest from encroaching. Plantings of conifers and fruit bearing shrubs were noted along some of the edges of the openings and in rows in the south opening. Planted species are white pine, red pine, larch, white spruce, Scotch pine, roselow crabapple, and black walnut. Wild apple trees, staghorn sumac, blackberry and raspberry brambles are growing around the openings. Two less desirable species, Scotch pine and Autumn Olive, were found to be spreading into the openings. Actions to maintain the opening should focus on removing the seed sources of these less desirable species, as well as removing less desirable shrubs and trees encroaching into the openings.

Northern Openings - Openings on north side of the Preserve are associated with the old downhill ski area, which includes the slope (now a sledding hill) and the upper ridge that has observation decks with views of Lake Charlevoix. There are facilities associated with recreation and community water supplies located in openings. Areas mapped under this category cover 14 acres. Aspen, sugar maple, red pine and staghorn sumac are the primary species encroaching into the openings.

Western Openings - A large opening is located at the base of the slope on the western side of the Preserve. The primary use is an archery range and there are no hiking trails in this opening. The opening is covered with a mix of grasses (brome and timothy grass) and herbaceous plants (such as goldenrod, spotted knapweed). Aspen and red pine are spreading into the opening.

Major Objectives for the Unit

A. Maintain and improve openings for wildlife and to provide a diversity of visual opportunities.
    a. Mow and or brush hog the openings once per year to keep trees from encroaching. This should be accomplished each fall after the ground nesting birds and animals have completed their annual cycle.
    b. Scotch pine planted on north edge need to be removed.
    c. Remove juniper, Scotch pine, maple, autumn olive, and other non-wildlife value trees from openings.
    d. Cut trees on the old ski slopes that are blocking views from platforms and encroaching on the sledding hill. Since these are mainly aspen and sugar maple, the trees will regrow and require regular cutting every 10 years.
    e. Remove encroaching maples and other trees that are growing over the wild apple trees to keep them healthy and increase apple production for wildlife.
B. Plant fruit and nut-bearing shrubs in selected sites: serviceberry, crabapple, hawthorn, chokecherry, pin cherry, hazelnut, and wild plum. See Appendix for a comprehensive list of native shrubs and trees.
C. Leave blackberry and red raspberry bushes growing around the edge of openings.
D. Plant ground cover and low-growing shrubs and trees to stabilize erosion sites.

Wildlife

Openings are utilized by wildlife for food sources and nesting sites. Forest openings serve an important function in the spring; since being in the sun most of the day, openings are the first areas to loose snow and to green up. After a winter of eating twigs and seeds, browsing animals, big and small, seek out these spring green zones for a succulent nourishing fresh meal. Of course, predators like the red tailed hawk and fox understand this fact and keenly cruise these areas for a spring meal. Flowering plants throughout the growing season attract insects which in turn are devoured by birds. The loose soil, free of tree roots, is used by burrowing animals such as the woodchuck, fox, eastern hognose snake and meadow voles.

The red-tailed hawk, eastern kingbird, loggerhead shrike nest in the canopy of surrounding trees and feed extensively in open areas. Other species such as the American kestrel, eastern bluebird, and eastern screech-owl nest in the trunks of trees and snags in and around openings. A great number of animal species nest on the ground. These include the short-eared owl, killdeer, upland sandpiper, vesper sparrow, grasshopper sparrow, bobolink, eastern meadowlark and eastern cottontail. Shrews, woodchucks, ground squirrel, field mice, red fox, voles, and badgers along with the eastern hognose snake, smooth green snake and milk snake nest beneath the ground or in debris. These field dwellers also hunt for food in openings.

Erosion Control

For sunny areas plant a mixture of creeping red fescue, brome, orchard-grass, annual rye and perennial rye grasses, and red clover. For shaded areas use a mixture of 3 parts creeping red fescue and one part perennial rye grass and one-half part ladino or white Dutch clover. Both of these mixtures can be applied at a rate of 20 lbs. per acre or 1.5 lbs. per 100 feet of a 16 -foot-wide roadway. Planting in the spring or fall will improve success as will using straw mulch. Prior to planting

the site should be prepared by incorporating 2 pounds per 1000 square feet of 20-20-20 starter fertilizer into the soil. Broadcast seed the mixture. Mulch with straw held in place with staked down plastic netting or mulch with manufactured excelsior mats held in place with stakes.