Railroad Point Natural Area

Management Plan

DRAFT OCTOBER 2013

Let Our Resources Work For You.

Northwest Michigan Council of Governments

Workforce • Business • Community

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Railroad Point Natural Area Management Plan

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Railroad Point Natural Area

The Railroad Point Natural Area consists of more than 200 acres of upland forest, wetlands, river frontage, and shoreline, with over 2700 feet of Crystal Lake frontage. The Natural Area offers spectacular views of Crystal Lake, and diverse forest, shoreline, and wetland areas which provide important habitat to a tremendous variety of plant and wildlife species.

The Railroad Point Natural Area includes about 66 acres that have been owned and managed by Benzie County as a public recreation area since 1998, along with about 143 acres that were included in a Michigan Natural Resources Trust Fund (MNRTF) grant award in December 2010.

Wetlands at Railroad Point Natural Area

The *Railroad Point Natural Area Management Plan* is intended to provide guidance for future activities and improvements in the Natural Area. The plan is designed to be consistent with, and to serve as an addendum to, the *Benzie County Recreation and Cultural Master Plan*. The *Benzie County Recreation and Cultural Master Plan* provides a formal vision of the County's recreation and cultural goals, objectives, and action strategies. Management objectives in the *Railroad Point Management Plan* are based on the *Recreation and Cultural Master Plan*'s goal to manage Railroad Point for recreational access, environmental education, and resources stewardship.

This plan should be reviewed often to ensure that goals are attained and that the park is being managed in accordance with the management goals and objectives.

Property Acquisition and History

In 1998, the MNRTF awarded funding to Benzie County in order to create a 66-acre Natural Area at Railroad Point. This original acquisition included 2700 feet of Crystal Lake shoreline and additional acreage to the south of Crystal Lake, consisting of steep slopes and upland forest. Three additional lakefront lots were added in 1999 to the northwest corner of the Natural Area.

In 2010, the Benzie County Parks and Recreation was awarded a MNRTF grant to

Plan Process

The Benzie County Parks and Recreation Commission began work on the Management Plan in the spring of 2013, with assistance from the Northwest Michigan Council of Governments (NWMCOG). The Railroad Point Committee, a committee appointed by the Parks and Recreation Commission, provided oversight in the development of the document. To obtain public and stakeholder input, NWMCOG interviews began with stakeholders including:

- Neighboring property owners
- Benzie Conservation District
- Betsie Valley Trail
- Conservation Resource Alliance
- Crystal Lake & Watershed Association
- Grand Traverse Regional Land Conservancy
- Hunting and fishing representatives
- Village of Beulah
- Benzie County Parks and Recreation Commission

In addition, public meetings were held to review draft documents and allow public comment on the following dates:

- May 6, 2013
- August 5, 2013
- September

The plan was adopted by the Parks and Recreation Commission on __.

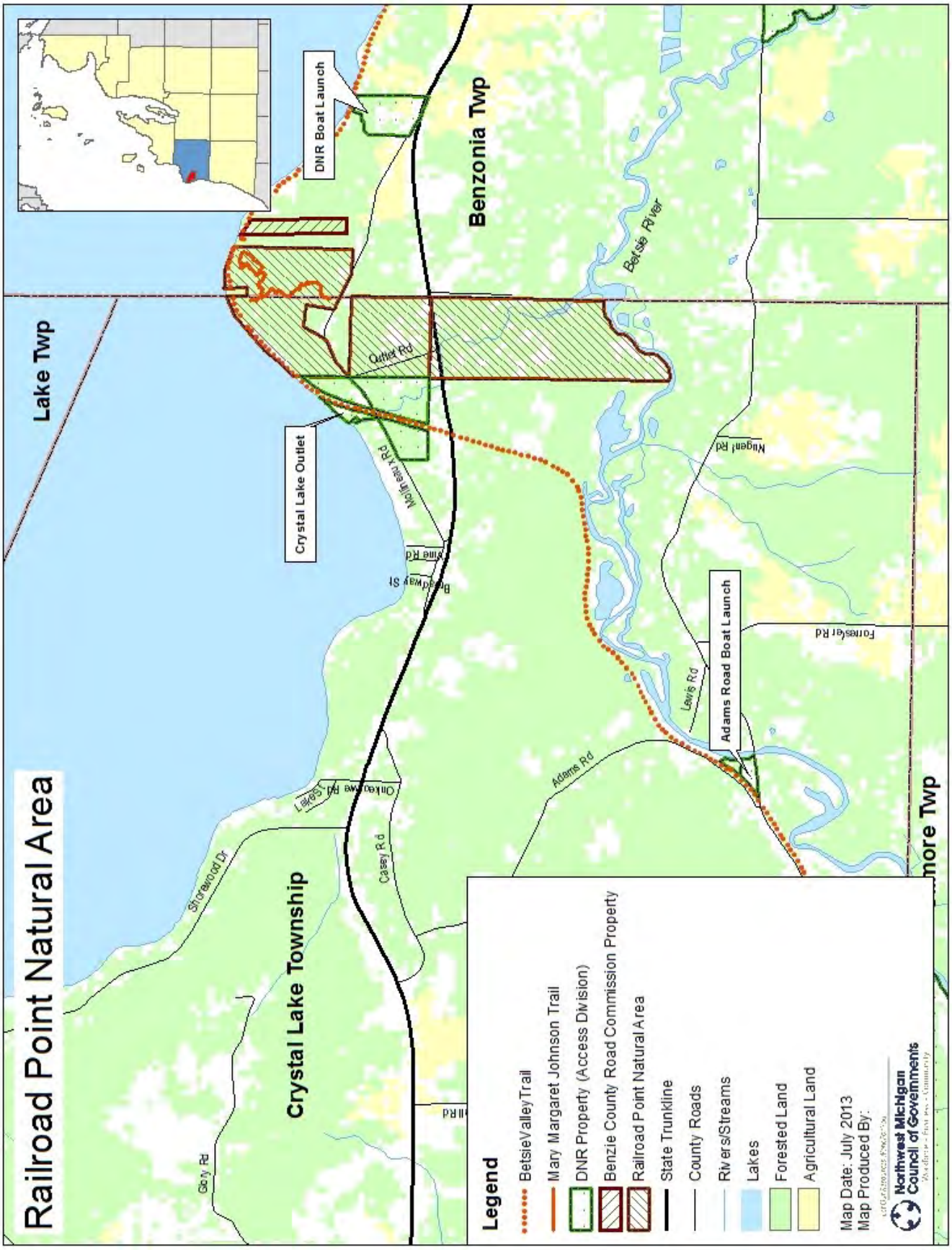
expand and enhance the Natural Area, through the planned acquisition of an additional 143 acres adjacent to the Natural Area. The additional acreage allows for more recreational opportunities and enhances the quality and quantity of hunting and fishing opportunities. Fundraising efforts for matching funds, acquisition, and operating costs were led by the Grand Traverse Regional Land Conservancy from 2011-2012.

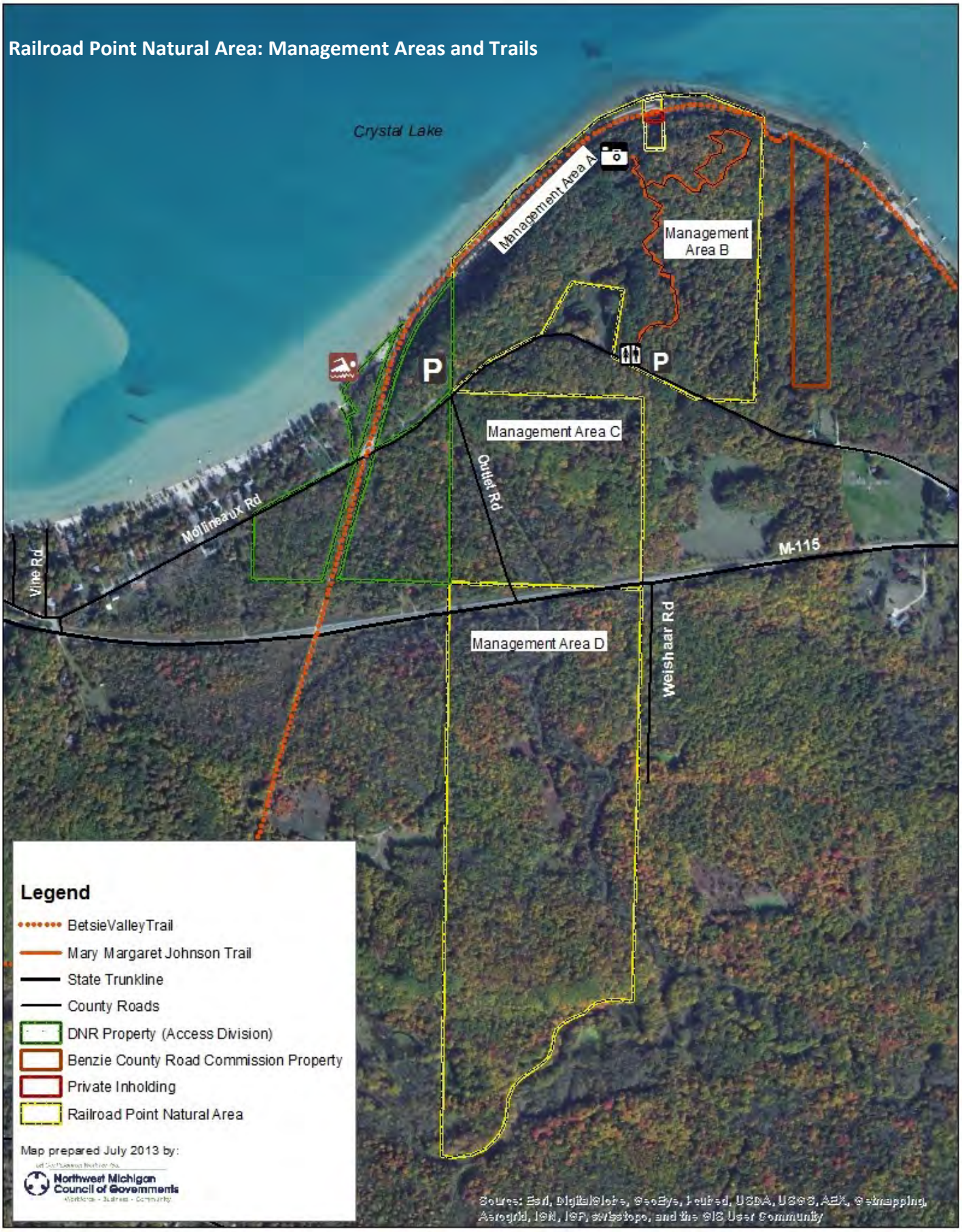
An endowment fund was established at the time of the original acquisition in 1997 to support management activities at the Natural Area. The endowment fund is held at the Grand Traverse Regional Community Foundation. Three members appointed by the Parks and Recreation Commission, and approved by the Community Foundation serve as an advisory board to the Railroad Point fund.

Natural Area Description

Railroad Point is located in the west central region of Benzie County, about 5 miles east of Frankfort and 2.5 miles from Beulah, in Crystal Lake and Benzonia Townships. The property includes a great variety of habitat diversity, including frontage along the Crystal Lake shoreline, forests, wetlands, and frontage along the Betsie River and Outlet Creek.

The Railroad Point Natural Area, along with the neighboring Crystal Lake Outlet property, constitute 57% of publically-owned shoreline on Crystal Lake. Crystal Lake is the ninth largest


Railroad Point Natural Area
Lake Twp
Benzonia Twp
Crystal Lake Township
DNR Boat Launch
Crystal Lake Outlet
Outlet Rd
Betsie River
Adams Road Boat Launch
Adams Rd
Lewis Rd
Casey Rd
Shorewood Dr
Gary Rd
Legend
Betsie Valley Trail
Mary Margaret Johnson Trail
DNR Property (Access Division)
Benzie County Road Commission Property
Railroad Point Natural Area
State Trunkline
County Roads
Rivers/Streams
Lakes
Forested Land
Agricultural Land
Map Date: July 2013
Map Produced By:
Northwest Michigan Council of Governments


Railroad Point Natural Area: Management Areas and Trails
Crystal Lake
Management Area A
Management Area B
Management Area C
Management Area D
P
P
Outlet Rd
Moilineaux Rd
Vine Rd
M-115
Weishaar Rd
Legend
BetsieValleyTrail
Mary Margaret Johnson Trail
State Trunkline
County Roads
DNR Property (Access Division)
Benzie County Road Commission Property
Private Inholding
Railroad Point Natural Area
Map prepared July 2013 by:
Northwest Michigan Council of Governments
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

inland lake in Michigan, covering about 15 square miles, and is known for its brilliant blue water, scenic views, and water clarity. Crystal Lake is popular with fishermen, pleasure boaters, and swimmers, and the scenic qualities of the lake have made it popular as a site for vacation and shoreline homes. Railroad Point and the Crystal Lake Outlet property together make up the longest stretch of natural shoreline on Crystal Lake—about 4300 feet.

In addition to Crystal Lake frontage, Railroad Point Natural Area also includes frontage along the Outlet Creek and the Bestie River. The Betsie River was the second river in the state to be designated a Michigan Natural River, and has a sub-classification as Wild-Scenic. The river serves as significant wildlife habitat and offers high-quality hunting, trapping, wildlife viewing, and fishing. The most recent DNR angler census estimated that between 40,000 and 65,000 angler hours were spent annually on the Betsie River between April and October, with fishing mainly concentrated on salmon and steelhead, along with white suckers, brown trout, northern pike, rock bass, and smallmouth bass. Although most species are naturally reproducing, brown trout and steelhead are stocked annually to supplement the fishery.

The Outlet Creek is a warm-water stream that connects Crystal Lake to the Betsie River. A dam is located at the creek's exit to Crystal Lake, which regulates water level in Crystal Lake and causes extreme variability in the flows of the Outlet Creek. Outlet Creek, due to historic dredging activity that altered the stream's habitat, features extensive marsh areas and several ponds that serve as habitat for a variety of bird, mammal, amphibian, and reptile species. A hardwood-conifer swamp and northern shrub are swamp found in areas along the creek, while other areas feature low sandy ridges with a mix of northern white-cedar and hemlock.

For the purposes of the Management Plan, the property is divided into four main sections (see map, page 4):

- **Management Area A** forms the northern boundary of the Natural Area and includes 2700 feet of Crystal Lake shoreline and a half-mile section of the Betsie Valley Trail. This section of the Natural Area includes the Crystal Lake frontage that was part of the 1998 Railroad Point acquisition, and also includes a recent 1/3-acre acquisition along Crystal Lake that includes an uninhabited lakefront cottage.
- **Management Area B** extends up a north-facing bluff from Management Area A to encompass the upland forest, Mary Margaret Johnson Trail, and Railroad Point Natural Area parking lot off of Mollineux Road. This area was included in the original 1998 Railroad Point acquisition. The steep slope located in this Management Area constitutes a fragile habitat with important aesthetic, soil erosion protection, water quality, and wildlife habitat values. Vegetation types

include a mix of northern hardwoods and upland grass.

- **Management Area C** includes the property acquisition to the south of Management Area B. This area consists primarily of cutover forested areas, shrubs, and forested wetlands, and is adjacent to property owned by the Michigan Department of Natural Resources.
- **Management Area D** includes wetlands and Betsie River and Outlet Creek frontage to the immediate south of Management Area C, across M-115. Habitat in this Management Area includes a northern hardwood forest that rises from surrounding wetlands. Also within Management Area D is the Betsie River floodplain. Management Area D makes up the southernmost boundary of the park, and was added to the Railroad Point Natural Area as part of the 2013 acquisition.

The Natural Area's diverse habitat of shoreline, river, upland and wetland, open field, mature forest, and thick brush acts as an important wildlife corridor and habitat for a variety of species, These include populations of whitetail deer, bobcat, black bear, otter, wild turkey, coyote, muskrat, beaver, and mink, along with endangered or special concern species such as the red-shouldered hawk, a threatened species in Michigan. Management Areas C and D serve as a wildlife corridor and habitat for numerous species, including wood duck, mallards wood turtle, great blue heron, and many others.

Current and Historic Use

Railroad Point Natural Area is used for a variety of activities including hiking, bird watching, hunting, snowshoeing, swimming, boating, and fishing, along with arts and cultural activities such as painting and photography.

Many visitors access Management Area A by foot or on bicycle along the Betsie Valley Trail, which is subject to its own usage restrictions. Dog walking is not permitted on the Betsie Valley Trail, but is allowed on the Mary Margaret Johnson Trail located in Management Area B; while bicycling is allowed on the Betsie Valley Trail but is not permitted on the Mary Margaret Johnson Trail or within other areas of the park.

The Natural Area's habitat creates an excellent opportunity to view a wide variety of birds, mammals, amphibians, and reptiles, and offers excellent conditions for hunting, fishing, and trapping. In Management Area D, hunters and fishers typically access the property via boat or canoe, often from the nearby DNR-owned Adams Road boat launch.

Neighboring Properties

Railroad Point Natural Area is located amidst a variety of other public recreational opportunities, including (see map, page 3):

- The **Crystal Lake Outlet** property is owned by the Michigan Department of Natural Resources Access Division, and is located

immediately adjacent to the western boundary of Railroad Point Natural Area. The property includes a dam that regulates water levels in Crystal Lake, along with a beach that is heavily used during the summer months for swimming. Many visitors access the Crystal Lake Outlet beach from their boats; others access the property from Mollineaux Road. A designated parking lot is currently available for the Outlet property; however, occasional overflow during the summer months leads to parking along Mollineaux Road. A parking area and restroom is planned for DNR-owned property along Mollineaux Road, enhancing the amenities of the system of public land.

- The **DNR boat launch** is located to the east of Management Areas A and B. The boat launch is accessed by a drive off Mollineaux Rd, just off M-115.

- The **Betsie Valley Trail** extends approximately 22 miles throughout Benzie County. This trail is widely used for both hiking and biking and serves as a connection between communities and parks throughout Benzie County. The Betsie Valley Trail spans about a half-mile inside the borders of the Natural Area along the Crystal Lake shoreline. Many Betsie Valley Trail users access Railroad Point Natural Area via the Betsie Valley Trail from the DNR parking lot along Mollineaux Road, or from trail access in nearby Beulah.

- The **Adams Road boat launch** is located to the southwest of Management Area D. The boat launch provides access to the Betsie River. A parking lot is located adjacent to the boat launch. In addition to providing access to the Betsie River, the parking lot is used as a staging area for the Betsie Valley Trail.

Dam at neighboring Crystal Lake Outlet property

Planning Considerations

Appropriate activities and uses in Railroad Point Natural Area will be defined in large measure by its natural environment. Management of the Natural Area must occur within the parameters of Michigan Natural Resources Trust Fund agreements, and should focus on enhancing and preserving the sensitive environmental areas, wildlife habitat, and other unique resources of the Natural Area, while ensuring public access. All activities and improvements at the Natural Area are to be consistent with the goals of the *Benzie County Recreation and Cultural Master Plan*.

Uses and Activities

Usage and activities at the Natural Area will primarily focus on passive recreation such as: hiking, snowshoeing, bird or wildlife watching, education, arts and culture, hunting and fishing, along with bicycling on the Betsie Valley Trail.

The habitat and river access in the wetlands portion south of Mollineaux Road are ideal for hunting, fishing, and birdwatching. Management areas A and B, originally acquired by the County in 1998, have also been used for guided hikes, educational events, and stewardship activities conducted by local organizations including the Michigan Department of Natural Resources, the Crystal Lake Watershed Association, the Benzie Conservation District, the Grand Traverse Regional Land Conservancy, and the Invasive Species Network. Education, volunteer, and stewardship activities have been important activities at the Natural Area and are encouraged to continue.

Entrance signage at Mollineaux Road parking lot, access to Management Area B.

Horseback riding and motorized vehicles are prohibited.

Mary Margaret Johnson Trail and Betsie Valley Trail

The Railroad Point Natural Area parking lot is the trailhead for the Mary Margaret Johnson Trail and provides for hiking and snowshoeing access to Management Area B. There is a gravel parking lot for ten cars and portable toilet facilities located off Mollineaux Road (see map, page 4). The Mary Margaret Johnson Trail system includes two sections of trail—a trail that extends about one-third of a mile north from the parking area to the bluff top, with an overlook area that provides views of Crystal Lake, and a quarter-mile loop that extends from the main trail to the northeast corner of the Natural Area. Together, the two trail sections make up a 1.5 mile round-trip hike through an upland forest habitat.

Additionally, a scenic, half-mile section of the Betsie Valley Trail runs along the shore of Crystal Lake through the RRPNA, situated between the Crystal Lake shoreline and the wooded bluff that parallels the lake shore. The Betsie Valley Trail (BVT) extends 22 miles through Benzie County.

Management Areas A and B offer opportunities for trail expansion. The existing Mary Margaret Johnson Trail could include low-impact trails to the western portion of the bluff. Another trail expansion idea would entail a connection with Management Area A at the bottom of the bluff, with stairs to provide access from the Mary Margaret Johnson Trail to Management Area A, and vice versa.

Railroad Point Natural Area parking lot

Connections between Management Areas A and B could provide a number of benefits to users of both trails. By creating access to the scenic overlook at the top of the bluff—an amenity not easily accessible from the Betsie Valley Trail—a connection would provide an introduction to the Natural Area for Betsie Valley Trail users, particularly visitors to the County, who may not be aware of the Natural Area.

Should such a direct connection occur, between Management Areas A and B, additional signage should be provided along both trails to provide wayfinding information and location of amenities such as parking and restrooms. Additionally, any decisions relative to a trail connection should also consider the long-term investment needs associated with the construction and upkeep of a trail or stairway up the bluff, and ensure safe crossings across the Betsie Valley Trail.

Management Area C

Management Area C, which is currently undeveloped, consists primarily of cutover forested areas and forested. This area was recognized for its quality hunting opportunities, and for its potential for trail expansion, with the potential to provide linkages to other parts of the Natural Area and nearby public properties.

Management Area D

The recently acquired wetland property south of M-115 is currently undeveloped. Visitors access to the property by boat from the Betsie River, or via Weishaar Road, a seasonal County road that acts as the eastern boundary of the property. The natural character of the property was recognized as a primary asset by the community.

Due to seasonal water levels Management Area D is likely to see less use in summer and is likely to be more appealing to users in winter, early spring, or fall. The wet, buggy conditions make it difficult to access by foot, and vehicle access and parking are limited.

To improve access for passive recreation, activities that may be considered include improvements to vehicle access and parking, and visitor access improvements throughout the property via boardwalk trails or bridges.

A boardwalk trail looping through the wetland areas could provide greater access to the property for the public, and could eventually be

Crystal Lake overlook from Management Area B

connected to adjacent public properties including adjacent parking areas.

Properly sited and constructed trails and boardwalks could prevent erosion and widening of the creek by funneling use to well constructed areas, providing access to the wetland and creeks. The Conservation Resource Alliance, a not-for-profit organization, could be a resource to support the Benzie County Parks and Recreation Commission in providing infrastructure in a way that minimizes impact to the creek and wetland and abides by Natural River laws.

Additionally, the property includes an upland ridge that may be accessible for hiking without boardwalk trails; however, to access this area of the property, park users need to cross the creek. A small bridge over Outlet Creek could provide access to the upland areas in the site and allow users to walk the property in winter or shoulder seasons for hunting, snowshoeing, fishing, or birdwatching, without additional trail construction.

To enhance vehicle access and parking, improvements could be considered for the end of Weishaar Road, such as a wider gravel area that could provide a better turn-around or parking area. Another vehicle access/driveway is available at a former homesite on the property, but is less conducive to access due to sensitive environmental conditions and poison ivy. Also, Weishaar Road provides access closer to the Betsie River, which is seen as a focal point for the property.

Mary Margaret Johnson Trail

To accurately identify and mark exact boundaries and property lines, a property-wide survey is strongly recommended.

Forestry Management

Forest areas make up a significant amount of the Natural Area. Forestry management at the Natural Area has been considered as an activity in order to maintain a healthy forest with varying species and age class diversity, as well as to address concerns regarding the impact of the emerald ash borer and beech bark disease on the health of the forest areas within the park. Revenue from forestry activities could be used for maintenance or park improvements. A forestry management plan was developed in

Entrance to Railroad Point from Betsie Valley Trail

2007 for Management Areas A and B, with the primary goal of creating a sustainable and healthy forest (see appendix).

However, some forestry management practices may impact the Natural Area's ecosystem or recreational values. As such, a number of considerations have been identified for consideration prior to any forestry management activities:

- Consider flora and fauna inventories to determine any areas of special concern.
- Consider the impact of forestry activities on the proliferation of invasive species.
- Minimize the visual impact to the Mary Margaret Johnson trail and consider trail buffers except for the removal of trees that could be considered unsafe to trail users.

Invasive Species

A number of invasive species have been identified on or near the property, including garlic mustard, honeysuckle, and phragmites. The property should continue to be monitored and assessed to determine invasive species issues and priorities to be addressed by management activities.

In the past, volunteer organizations including the Grand Traverse Regional Land Conservancy, the Benzie Conservation District, and the Crystal Lake Watershed Association have worked in partnership with the Benzie County Parks and Recreation Commission to address invasive species issues. However, limited organizational capacities require ongoing participation from these organizations and volunteers. Recently, a regional organization, the Invasive Species Network, has worked to address these issues. Participation from additional volunteer or stewardship groups should be encouraged. There are also a number of opportunities for partnerships with stewardship organizations in education and outreach in connection with invasive species.

Shoreline

While there are no designated beaches or swimming areas within the Natural Area, swimming is permitted along the shoreline of Management Area A. Increased usage of the shoreline area may necessitate some monitoring for any potential erosion issues.

Additionally, vegetation along the shoreline will help prevent erosion, and without a designated "stopping point," varied usage patterns will likely mitigate erosion and other impacts to the shoreline.

Access, Facilities, and Improvements

Parking access to Railroad Point Natural Area is located along Mollineaux Road, and vehicle access to Management Area D is available from Weishaar Rd.

Existing (portable) restroom facilities are located at the Railroad Point Natural Area Trailhead parking lot on Mollineaux Road, and are also located at the nearby DNR boat launch. Restrooms are also planned for the Crystal Lake Outlet parking lot that is planned by the DNR.

Benches are located along the Betsie Valley Trail, and a bench is also sited at the overlook along the Mary Margaret Johnson Trail.

Currently, the Betsie Valley Trail provides non-motorized access to shoreline areas of the park. Improvements and facilities will be focused on providing low-impact, non-motorized recreational opportunities.

Signage

Signage identifying Railroad Point Natural Area is currently located on the Betsie Valley Trail and at the Railroad Point Natural Area parking lot off Mollineaux Road. Additional signage for wayfinding and informational purposes may include:

- A State-approved recreation sign, on M-115, to direct people to the Natural Area
- Signs at parking lots showing Railroad Point Natural Area property boundaries, access points, trail routes, public property, and private property.
- Educational/interpretive signage to inform park users of the Natural Area's unique environmental features and items of historical interest.
- Any other required signage.

Signage within the Natural Area should be properly located and consider intrusions on neighboring private property.

Cottage

A small lakefront cottage is located on property that was included in the 2010 Natural Resources Trust Fund grant award, in Management Area A. A review and decision by the MNRTF relative to the use or removal of the cottage is currently pending. Depending on the MNRTF decision, the cottage may be adaptively reused by the County for recreational purposes.

Betsie Valley Trail and Crystal Lake Shoreline.

Maintenance and Enforcement

Ongoing maintenance and cleanup will be necessary in all management areas.

Illegal dumping occurs throughout Railroad Point Natural Area currently. Additional enforcement activities, signage, monitoring, and additional usage of the property may discourage illegal dumping.

Stewardship

All areas of the property offer tremendous opportunity for education and stewardship activities, including guided hikes, school trips, and nature walks.

To assist in coordinating stewardship activities, and to ensure appropriate usage of the Natural Area by all groups, the Parks and Recreation Commission may develop policies associated with the educational or other group usage of the park.

Natural Area Administration

The Railroad Point Natural Area is managed with oversight from the Benzie County Parks and Recreation Commission, a ten-member board created under PA 261 of 1965 (MDNR, 2006) that serves as the governing body of the majority of recreation assets and activities in the County. The Parks and Recreation Commission's works to achieve the goals of the *Benzie County Recreation and Cultural Plan* in line with its mission, as follows:

- To provide quality recreational opportunities for all residents and visitors
- To protect and maximize the existing resources of the County
- To foster stewardship and partnership for the expansion of recreational resources for future community benefit.

Many of the activities and improvements at the park, including the purchase, planning, and trail building, have been conducted in large measure by a partnership between County officials and the Grand Traverse Regional Land Conservancy (GTRLC). Following property acquisition, Benzie County Parks and Recreation is responsible for park activities, improvements, maintenance, and management.

Benzie County Board

The Benzie County Board of Commissioners is elected to adopt budgets, approve contracts, adopt policies, and oversee staff. Management activities, expenses, and decisions at the Natural Area will be reviewed and approved by the Benzie County Board of Commissioners.

Volunteers

Volunteer engagement and stewardship have historically been important in Natural Area activities, and will continue to be critical to long-term management of the property. Potential volunteer activities may include routine maintenance; trail improvements; park monitoring; and park programming.

Close coordination and strong working relationships between the County and existing friends or stewardship groups will be key in meeting Management Plan goals and objectives. Volunteer and stewardship partners may include organizations such as:

- Benzie Conservation District
- Betsie Valley Trail
- Crystal Lake & Watershed Association
- Conservation Resource Alliance
- Department of Natural Resources
- Grand Traverse Regional Land Conservancy
- Invasive Species Network

Additionally, "friends groups" are currently engaged and provide support for the management of two existing County recreational facilities, the Betsie Valley Trail and the Point Betsie Lighthouse. These groups are incorporated as 501(c)3 entities, and provide vital, ongoing support to these facilities. Activities include conducting fundraising activities, coordinating volunteers, and conducting management activities that ensure the long-term maintenance of these critical recreation assets. A similar approach in Natural Area management, with a "Friends of Railroad Point Natural Area" group, could provide important support and resources for meeting management goals and maintenance needs.

Funding

An Railroad Point Natural Area endowment fund was established as part of the original 1998 property acquisition to cover costs of management activities that protect and maintain the natural features of the Railroad Point Natural Area. The Fund is held at the Grand Traverse Regional Community Foundation. Distributions of the fund are paid to the Benzie County Treasurer. A three-member advisory board that is appointed by the Benzie County Parks and Recreation Commission works to grow and manage the fund.

Wetlands in Management Area D

Goals, Objectives, & Actions

Management Statement

The Railroad Point Natural Area will be managed as low-impact passive recreation area to preserve and protect its diverse, fragile, and unique environmental features. The Natural Area will provide for recreational and educational public access and usage. Activities may include hiking, bird watching, hunting, fishing, snowshoeing, bicycling along the Betsie Valley Trail, and arts and cultural activities such as painting and photography. Off-road motorized vehicle usage is prohibited within the natural area. All activities and improvements will be consistent with the goals of the *Benzie County Recreation and Cultural Master Plan*.

Management Area D

Management Goals

The Railroad Point Management Plan establishes and administers long-term guidelines for the careful management and perpetual protection of the Railroad Point Natural Area that meets all the provisions of the Michigan Natural Resources Trust Fund Grant Agreement. This plan will guide the Benzie County Parks and Recreation Commission in meeting the following management goals for the Railroad Point Natural Area:

1. Protect the diversity and fragile natural features found in the Natural Area.
2. Develop and manage public access for all users to the Natural Area for recreational uses consistent with preservation goals.
3. Facilitate environmental education experiences centered on the Natural Area's rich natural and historical features.

Goals & Objectives

Usage and Signage

Ensure that usage of the Natural Area is accessible to all users for non-motorized outdoor recreation.

- Increase access for persons with disabilities and other users to all areas of the park.

- Develop and install wayfinding/locational signage along M-115 and Mollineaux Rd.
- Develop and provide additional signage at parking lot, ridgeline, and shoreline areas to inform users of appropriate activities/ usage and rules, including:
    - ◊ Off-road motorized vehicles are prohibited.
    - ◊ Horseback riding is prohibited.
    - ◊ Dogs are not permitted on the Betsie Valley Trail. Dogs in other areas of the park must be leashed.
    - ◊ Fines/enforcement for litter and illegal dumping.
- Develop and provide signage to ensure privacy of neighboring properties.
    - ◊ Locate new informational signage away from private properties in order to minimize intrusion or trespass.
- Regularly monitor park activities and usage to determine where usage-related issues may arise and how they may be addressed.
- Consider enforcement options for violation of Natural Area rules.
- Provide information/signage, at entry points and along the trail, to identify trail routes.
- Provide information at entry points relative to hunting seasons.

Access

Ensure adequate and appropriate access for all users.

- Survey Railroad Point Natural Area to accurately identify all ownership boundaries.
    - ◊ Prepare and make available print and electronic maps showing all Natural Area properties, trails, amenities, and access points.
    - ◊ Mark park property boundaries to minimize trespass on neighboring private properties.
- Consider parking area or other improvements, such as a small turnaround, at the end of Weishaar Road, to provide for better vehicle access to the wetland property.
- Maintain and enhance the Railroad Point Natural Area Mollineaux Rd parking lot.

Improvements and Structures

Consider environmental conditions and the natural character of the park when siting and/ or designing park improvements.

- Consider additional benches along the Mary Margaret Johnson Trail.
- Continue to provide and maintain restroom facilities at the Railroad Point Natural Area parking lot.
- Conduct immediate and regular maintenance as funds allow.

Trails

Develop, maintain and monitor trails to ensure safe and appropriate usage.

- Provide ongoing maintenance and clean up of the Mary Margaret Johnson Trail and any future trails.
- Consider expanding the Mary Margaret Johnson Trail to offer users longer hiking loops and showcase the area's scenic views.
- Consider a trail linkage to connect the Mary Margaret Johnson Trail to the Management Area A.
    - ◊ Assess factors including cost, environmental impact, and long-term maintenance needs for any trail connection.
    - ◊ Design and install directional signage along the Betsie Valley Trail to direct users to the Mary Margaret Johnson Trail.
- Consider development of a bridge over the Outlet Creek in the wetlands property to provide access to upland areas within the wetland.
- Consider boardwalk trails for wetland property.
    - ◊ Assess factors including cost, environmental impact, seasonal water levels, and long term maintenance needs for any boardwalk trail development.
    - ◊ Plan and design trail routes in consideration of environmental constraints and potential impacts, including Betsie River Natural Rivers requirements relative to stream crossings and setbacks.
- Consider educational and interpretive signage along trails to highlight environmental features and points of historical interest.

Resource Conservation

Manage the Natural Area so as to preserve and protect the site's diverse, fragile, and unique natural resources.

- Develop and use flora and fauna inventories to identify areas for special consideration for management activities.
- Work with partners and volunteers to assess impact on natural features prior to implementation of park improvements.
- Update and implement the 2007 forestry/ timber management plan for the Natural Area in Management Areas A and B, and develop a forestry management plan for Management Areas C and D, in consideration of the approved Michigan State Forest Management Plan.

Neighboring Recreational Areas and Properties

Recognize neighboring recreational assets and properties that are critical components of the Railroad Point Natural Area experience .

- Consider management activities and improvements in the context of

neighboring and nearby recreational properties, including the MDNR-owned Outlet property, the Betsie Valley Trail, the DNR boat launch, Adams Road Boat Launch, and recreational amenities in nearby communities.

- Coordinate closely with MDNR, Friends groups, and other organizations to ensure efficient and cooperative management of all recreation assets within and surrounding Railroad Point Natural Area.
    - ◊ Ensure regular communication relative to Management Plan goals and planned activities.
    - ◊ Identify and implement opportunities to collaborate on shared management objectives.
- Identify neighboring recreational areas and activities in appropriate Natural Area informational signage.
- Consistent with the goals of the *Benzie County Recreation and Cultural Master Plan*, assess neighboring properties for the potential for acquisition and/or permanent protection or conservation easements that could enhance the resource protection and recreation goals of Railroad Point Natural Area.

Administration

Encourage volunteer and public engagement in Natural Area management activities.

- Continue to convene the Railroad Point Committee, a subcommittee of the Benzie County Parks and Recreation Commission, to review and advise on Natural Area management activities.
- Consider working with volunteers and stakeholder organization to create a "Friends of Railroad Point" group to assist in fundraising, management, and maintenance of the Natural Area.
- Work closely with stakeholders, community partners and stewardship groups to coordinate management activities and park improvements.
- Identify point-of-contact and/or process for the Railroad Point Committee to coordinate with volunteers, partner organizations, the Parks and Recreation Commission, MDNR and the County Board of Commissioners.

Adams Road boat launch

Appendix

2007 Railroad Point Forestry Stewardship Plan

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3 December 2007

Mike Okma
Grand Traverse Regional Land Conservancy
3860 North Long Lake Road, Suite D
Traverse City, Michigan 49684

Mike:

Here your copy of the final version of the Railroad Point Natural Area management plan. I have included everything, but the handouts listed in the Appendix. The signature pages are blank, so let me know if you want a copy with them. The next step is for the Parks & Recreation Department and the Benzie County Commissioners to review the plan once more, decide they want to hire me to mark and administer the sale and then see about finding some of the line. Jim Sheets said the east corners are supposed to be marked, but the area I am most concerned with is the small finger that projects southward into the middle of the property. I will let you know when things progress. Thanks again for your help.

Sincerely,

Stephen J. Begin
Registered Forester

Prepared For: Benzie County
Railroad Point Property

Section 21, Benzonia Township, Benzie County
Section 20, Crystal Lake Township, Benzie County

Plan prepared by: Stephen J. Begin

Registered Forester #629
1306 25th Street
Manistee, Michigan 49660
(231) 723-5532

Date: 29 November 2007

Table of Contents

Forest Stewardship Plan

Name: County of Benzie, Railroad Point Natural Area **Home Phone**:
Address: PO Box 398 **Work Phone**: (231) 889-9671
Beulah, Michigan 49617

Location of Parcel: **County**: Benzie
Township: Benzonia **Township**: 26N **Range**: 15W **Section**: 21
Legal description: Gov. Lot 3 north and east of Mollineaux Road except east 530 feet and begin on west line 200 ft. south of top of bluff, then east 100 ft., then north to Crystal Lake, then northwesterly along lake to a point north of pt. of begin, then south to point of begin
Township: Crystal Lake **Township**: 26N **Range**: 15W **Section**: 20
Legal description: Gov. Lot 1 north of Mollineaux Road except begin at southeast corner, then N2° 26'W 156.97 ft, then N66° 59.5'W 258.26 ft to pt of begin, then N9° 15'E 468.68 ft, then N85° 4'W 356.22 ft, then S30° 13'W 434.13 ft, then N81° 22'E 164.5 ft, then S66° 60'E to pt of begin; and 390 ft between Crystal Lake and middle of bluff in northwest corner of govt. lot 1

Total acres of land in parcel: 61 **Total acres in Stewardship Plan**: 51

Description of how to find the parcel from the nearest town: From Frankfort head east on MI-115 to Mollineaux Road; turn north and go 1¾ miles; turn north into the RPNA parking lot

Describe the Landowner's goals & objectives: Manage the property to protect the natural, scenic and forested condition of the property including species and habitat diversity, recreational usage and landowner education

MICHIGAN'S STEWARDSHIP ETHIC

Stewardship is an ethic recognizing that the land and its natural inhabitants have an inherent worth and that we have a responsibility to manage our actions as part of that. It guides us to manage our activities to the utmost of our abilities, to insure the future health, productivity and well being of the land, its natural communities and species, and to allow our successors opportunities at least equal to ours to use the land and its resources.

This plan is compatible with my goals and objectives. I understand that Landowner Stewardship Management Plans are voluntarily accepted. This acceptance represents a good faith, but non-binding commitment to implement strategies suggested in this Plan. As a non-binding commitment, private property rights cannot be jeopardized as a result of receiving a Plan.

_____ _____
County of Benzie, Landowner Date

_____ _____
Stephen J. Begin, Forester Date

Introduction

The Railroad Point Natural Area (RPNA) is located in the west central region of Benzie County about 4 miles east of Frankfort, Michigan. This area is part of the Manistee subsection of the northern lacustrine-influenced lower Michigan ecosystem. The subsection is a long narrow band along the shore of Lake Michigan stretching from southern Leelanau to northern Muskegon County and includes five islands. It contains a wide range of topography including steep sided sand dunes, plains, moraines and outwashes of glacial origin. Soil types are characterized by well-drained sands. Common land usages are agriculture, residential and industrial development and forest.

The 61 acre RPNA property was purchased by the County of Benzie in 1998 and a conservation easement was donated to the Grand Traverse Regional Land Conservancy (GTRLC) in 1999. It borders Crystal Lake and a small private inholding to the north, private property to the east, Mollineaux Road and a small private holding to the south and county and private land to the west.

This management plan covers the 51 acres south of the steep sided slope facing Crystal Lake. The latter is well stocked with a mixture of white cedar, white pine and mixed hardwoods. It was excluded because it is a fragile habitat and should be managed "as is" for its aesthetic, soil erosion protection, water quality and wildlife habitat values. The remainder of the property consists of four general vegetation types: aspen, red oak-northern hardwoods, sugar maple dominated northern hardwoods and upland grass. This area is part of a ridge and valley complex between the bluff facing Crystal Lake to the north and the flat, lowland area to the south.

Most of the property is covered by moderately to well-stocked forest composed of a mixture of 12 to 16 inch diameter sawlogs and 6 to 10 inch diameter poletimber trees. Units 1, 2 and 7 include a modest number of larger diameter (20+ inch) trees that, in places, lends an old growth character to the woods. The presence of numerous stumps in various stages of decay provides evidence of regular timber harvesting by the prior landowner. Other common characteristic is the presence of dead trees or trees with noticeable amount of dead branches in the crown.

Unit 5, on the other hand, is a small, but classic example of old reverting field well stocked with young sugar maple sapling less than 2 inches in diameter and a scattered amount of 6 to 8 inch diameter northern hardwood poletimber trees. Units 3 and 6 are predominantly open grassland with small patches of northern hardwoods and upland shrubs.

Two walking trails begin at the parking lot located in the southwest corner of Unit 1 and lead to a scenic overlook in Unit 3. An old 2-track road cuts diagonally across Unit 1 and continues onto the neighboring property. The entrance is located a short distance east of the parking lot and has been blocked off to restrict vehicle access.

The overall objectives of the easement are to preserve the long term natural and scenic condition of the property, protect species and habitat diversity, promote environmental education and to keep the property accessible to recreational use. The only threatened, endangered or special concern species found on the property is the red-shouldered hawk. This sighting is believed to be a transient occurrence because red-shouldered hawks usually nest in large expanses of unfragmented, mature deciduous forest.

A common perception of natural areas is they are or have been undisturbed and the present state is because nature has been allowed to take its course. The presence of numerous stumps in various stages of decay point to a history of repeated logging on the property. The last harvest probably took place no more than 10 years ago based on the number of solid stumps in Unit 1 that still have identifiable barked attached to them. These stumps suggest a selective harvest that included most of the aspen sawlogs in the southern portion of the unit.

The County faces two choices: do nothing and let nature continue to follow its own course or to initiate some type of periodic harvesting. The do nothing option will eventually lead to less species diversity as the shade intolerant, short lived aspen begin to decline, fall over and get replaced by shade tolerant northern hardwoods, a forest type that already dominates the property. This transition is taking place in the southern end of Unit 4. Trees that fall over onto the trail will need to be cleared and dying or dead trees near trails present safety risks to recreational users.

Red oak is another species that is likely to decline under a do nothing approach. Oak is a long lived species, capable of surviving for hundreds of year. However, young oak seedlings, while tolerant of some shade during the early years become increasingly intolerant of shade as they grow into saplings and require some type of stand disturbance to remain competitive.

Woodland with increasing amounts of standing dead or dying trees are often under stress. They are more susceptible to insect and disease problems and can become the focal point for sustained buildups or outbreaks.

While it may seem contradictory with the easement objectives, a modest selective harvest such as a 25 to 30% reduction in overall stand density, could be used to enhance species, wildlife habitat and structural diversity, maintain stand vigor and healthiness, accentuate or develop areas with an old growth feel to them, expand the existing walking trails and provide a valuable opportunity to demonstrate how timber harvesting can meet a wide array of stewardship objectives.

It will require careful planning and there are several issues that need to be addressed. The first is the lack of an open space for piling logs and loading trucks. The parking lot is a logical choice for the eastern portion of the property, but it would require some clearing a small amount of forest to make it usable and visitor parking would have to be restricted during the harvest. Harvesting in Unit 7 will require a separate landing. Clearing a small area (less than ¼-acre) adjacent to the old access road would be more than adequate for a landing area.

The second is the conflict between the requirement for limited, selective harvesting and the desirability of maintaining a health component of aspen forest. This could be met by strategically locating ¼-acre regeneration cuts or permitting small (1 or 2 acre) clearcuts. Shaping the latter with uneven, wavy edges will substantially reduce the visual impact than a small clearcut with straight edges.

Harvesting in the areas with moderate to steep slopes should be restricted to the lower slope to prevent post-harvest soil erosion problems from developing. Primary skid trails should be laid out and marked to flow with the terrain. Linking them to the existing trails will expand the accessibility to the property and be the basis for a self-guided, walking tour and education component.

It may be advantageous to restrict the time in which harvesting can be completed to the period between September and March or April. This will reduce the potential for logging damage during slippery bark season (spring) when sap is flowing and trees are easily bruised, reduce the potential for damaging Mollineaux Road when trucks pull out of the property, keep the property open during the spring wildflower season and summer visitation and it is more favorable to aspen regeneration.

Post-harvest aesthetics will be an important community and recreational user concern. The visual effect can be lessened by requiring the harvester to removal of all merchantable material from the property, knock down the unusable material to a depth of three feet or less, and clear and smooth out the primary logging trails and the landing area.

Revenue from the sale could be used to improve and maintain the trails, construct a small education center or kiosk, install benches at the scenic overlook and periodic maintenance activities such as gravelling the parking lot, removing down trees from the trails and poison ivy control.

Management Unit No. 1, 7 Acres: 34.8

===== Major Objectives =====

1. Maintain a healthy woods by periodically completing timber stand improvement cuts to remove unhealthy trees
2. Promote species and structural diversity by creating several small regeneration openings as part of each timber stand improvement cut. These openings can be used to favor sunlight demanding species, such as black cherry and aspen, or shade tolerant northern hardwoods.
3. Maintain an old growth character by leaving a wide range of diameter sizes including a mix of larger, overmature trees.
4. Expand and connect the existing network of trails by maintaining primary logging trails as hiking trails.
5. Establish an education center (small pavilion or bulletin board) to promote a better understanding of forest dynamics and to keep the community apprised of management activities.

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

Cover Type & Major Species: Northern hardwoods: Sugar maple, white ash, beech, basswood, aspen

Size Class: Sawlog-poletimber

Soil Type: Benzonia sand

Site Quality: High

Stand Quality: Good to poor

Stand Density: Medium, 115 sq. ft basal area

Volume per acre: 8.19 MBF & 7 cords

===== Unit Description =====

These units are located in a steep-sided ridge and valley complex and account for over half of the RPNA acreage. They are moderately well stocked with 12 to 16 inch diameter mixed northern hardwood sawlogs and 6 to 8 inch diameter sugar maple dominated northern hardwood poletimber. Small groups or pockets of aspen are scattered across both units and red oak is found in the northern end of unit 1.

Stand dynamics (larger diameter, low quality trees, thickets of sapling growth and areas with low stand densities) indicate a history of harvesting prior to the County's purchase of the property. A history that probably included selective high grading, or removal of the better quality, larger trees. The stumps in Unit 1 are solid with attached bark suggesting the last harvest took place no more than 10 years ago. Many of them can be identified as aspen and the size (14+ inches) suggest the unit was cherry picked for good quality trees.

A noticeable amount of larger diameter trees lends an old-growth quality to parts of the property. Tree quality varies widely across all of the diameter classes with most of the trees falling into the good to fair range. Old logging damage (scars at the base of the tree) is noticeable, especially along the old trails. Top dieback is also common in the larger diameter basswood and ash. Possible causes are environmental stress (drought), root rot disease, an ash virus and secondary infection or stress

from logging damage. Some of the large diameter beech is poor quality or rotten, have hollow centers and are being used by porcupines as den trees.

The understory vegetation varies widely in composition and density depending upon the slope, soil wetness and the density of the upper canopy. Common species include woodland wildflowers, forbs and other nonwoody plants, plus maple leaf viburnum, honeysuckle, witch hazel and a mixture of northern hardwood seedlings and young saplings. Poison ivy is very common along the southern edge of Unit 7 adjacent to Mollineaux Road.

Two walking trails and remnants of old logging trails provide access to most of the property. There is a graveled parking lot in the southwest corner of Unit 1. An improved 2-track road starts at Mollineaux Road a short distance east of the parking lot, cuts diagonally across Unit 1 and continues onto the private property east of the RPNA. It is blocked off at Mollineaux Road to prohibit vehicle traffic.

===== Discussion & Recommendations =====

If nothing is done, the ash and basswood will continue to decline, tree mortality will increase and the overall quality of the woods will begin to drop. The small aspen component will also disappear because it cannot regenerate under the shady conditions. While some dead trees are good for wildlife habitat, dead trees and live trees with dying tops are potential health hazards to recreational users. They also increase the need and cost of active trail maintenance.

A modest timber stand improvement cut would meet several of the long term objectives. It will lead to a healthier pest resistant forest, remove high risk trees near trails, increase wildlife habitat and plant diversity, and promote natural regeneration of sunlight demanding species, such as black cherry, and early succession shrub vegetation. Healthy trees can be retained for longer periods or rotations and grown to larger diameter sizes sooner than unmanaged stands and nurtured to accentuate a big tree or old growth character.

Regeneration openings are small clearcuts (40 to 60 feet across) designed to promote regeneration by substantially increasing the amount of sunlight reaching the forest floor in and around the opening. All trees within the regeneration opening, regardless of size, are marked for harvest. Regeneration openings can be used to favor specific species by locating them adjacent to a seed tree (maple, cherry or oak) or clearing an area to promote root sprouting (aspen). Larger openings, up to 100 feet across or ¼-acre, will favor sunlight demanding species (aspen, birch, cherry and oak), while smaller openings will favor shade tolerant species (ash and maple). Larger openings should be used sparingly and where the objective is to regenerate a sunlight demanding species.

Regeneration openings are also good for wildlife because they promote the growth of early succession vegetation and they increase the structural diversity of the woods by creating gaps or vertical change in the forest canopy. Many early succession species tend to produce a berry, fruit or seed (raspberry, viburnums, serviceberry, grasses) for forage and the dense vegetation provide nesting and escape habitat for a wide range of wildlife species. The grass-shrub stage will last for several years after the regeneration openings are created. Eventually it will give way to young seedlings and slowly disappear as the opening progresses from the grass-shrub to the sapling stage of growth.

Beech bark disease and emerald ash borer are growing concerns in northern hardwood management. Beech scale, an introduced sap feeding insect, is one half of the insect-disease complex known as beech bark disease. The other is *Nectria* canker, a wood rotting fungus. These pests do occur independently and will stress trees, but both must be present to complete the killing cycle. Emerald ash borer is an introduced beetle that attacks all ash species. Larvae feed and bore tunnels through the cambium layer between the inner bark and wood. This effectively girdles branches and stems cutting off the flow of water and nutrients and eventually the tree dies. There is no cost effective treatment for ash borer in woodland situations other than harvesting. No evidence of beech scale, *Nectria* canker or emerald ash borer was found during the collection of field data.

Strategic layout of primary skid trails can be used to expand and link the existing network of hiking trails The minimum requirement would be to clear logging debris from the trail and back-blade or smooth them out after the harvest is completed. Most logging companies will do this, but it should be listed as a required condition of the sale. Seeding the trails to a shade tolerant grass, such as creeping red fescue, or spreading them with wood chips or gravel will stabilize and keep them open, reduce the potential for soil erosion problems to develop, inhibit seedlings from getting established and reduce the need for active trail maintenance.

Visual aesthetics is a very important management concern. The harvest should exclude any of the steep sided slopes and primary skid trails should not be located on them to prevent post-harvest soil erosion problems. Uncut or lightly cut buffer strips could be centered around the existing trails to minimize the impact from and on the trail, but timber harvesting, even under the best of conditions is messy operation. A partial or uncut buffer strip should be left along the northern end of these units following the crest of the ridge that separates them from the north-facing bluff.

The post-harvest visuals can be improved by requiring the operator to remove all of the usable sawlog and pulpwood material from the property. Residual top or slash material should be knocked down to a depth of three feet or less because higher moisture levels and contact with the ground will encourage the growth of wood rotting fungi and insect activity.

The type of harvesting equipment used will have an impact on the sale, the potential for damage to the residual trees and post-harvest cleanup and visuals. There are three types of harvesting commonly in use tree length harvesting, log length and shortwood logging. In tree length operations the tree is cut down and then dragged to the landing area where it is cut up and stacked according to the product (sawlogs, pulpwood, etc.).

It is often used in clearcutting or "chipping" operations where the tops and other cull material are chipped and sent to a pulpmill or cogeneration energy plant. It can lead to substantial damage to the residual stand when it is used in selective harvesting operations because the wide tree tops repeatedly bang and rub against leave trees, knocking off bark and leave large wounds at the base of the tree. The wood around these wounds will discolor and dramatically lower the future value of the tree.

Log length operations are similar. The tree is cut in the woods, but the top is cut off and only the merchantable main stem is dragged to the landing and processed. The pulpwood component is often left in the woods in this type of harvest. It can lead to unwanted damage to the base of residual trees, especially when the trees have very long main stems and skid paths weave through the woods. The dragged stems dig ruts into the ground in the main skid trails. Most of the time they can be back-bladed to fill them in, but the soil is often loose and when it eventually compacts, leaves a noticeable channel in the middle of the trail.

Shortwood logging is substantially different. The tree is cut and processed to usable lengths in the woods, either by a machine or hand cutting. The pieces are picked up by a piece of equipment with an attached cart and carried to the landing where they are piled by product. No trees are dragged through the woods and it does not require as much room for a landing since the processing is completed in the woods. Most of the time this leads to a cleaner looking woods and fewer residual trees are banged up. Shortwood logging is best suited to flat and gently sloping terrain. A shortwood logging only operation is a viable option if the sale is carefully laid out and harvesting on the steeper side slopes is restricted to the lower slopes.

Another very important consideration is the location of a landing area to pile logs and load trucks. A separate landing area will be required for each unit. The gravel parking lot is the only open area near Mollineaux Road and using it for the landing area in Unit 1 would involve several tradeoffs. First, visitor access would have to be restricted or limited during the harvest to minimize the potential for personal injury. Second, some damage is likely to occur because a fully loaded logging truck can weigh up to 80 tons. This would become a serious problem if the ground was saturated during the harvest. Third, it would necessitate clearing a strip 10 to 12 feet deep on the east side of the parking lot to avoid stacking logs in the parking lot.

This area could be used to install a bulletin board type information center or permanent restrooms after the harvest. There has been discussion about building a small education pavilion on the property. The logical choice is adjacent to the parking lot and clearing a larger landing area could be the first step to meeting this objective.

The situation in Unit 7 is much clearer -- there is an old access road at the west side of the unit. This area was probably used as the landing area for prior logging operations and would not require clearing a significant area. It is ideally suited to a shortwood skidding harvest because logs could be piled on either side of the access road and log trucks could easily back into it.

The timing of the harvest is another important consideration. It may be desirable to restrict harvesting to the period between late summer (August) and early spring (March). This will avoid harvesting during the spring wildflower season, when spring road restrictions and the potential for damaging Mollineaux Road are highest, slippery bark season when trees are prone to logging damage and the peak summer months when higher visitation rates are more likely.

Slippery bark season occurs in late winter or early spring when sap begins to flow and forms a viscous layer under the bark. The bark of trees that are banged by logging equipment or falling trees are prone to sloughing or peeling off. These wounds are entry points for insect and disease problems, lead to stained wood and they can seriously lower the long term value of the tree. Shortwood harvesting is one method of reducing this type of damage, but excluding harvesting is the best preventative measure.

This is also the time when counties place weight limits on trucks to minimize road damage due to spring thawing and freezing. Excluding it will eliminate the potential for damaging the trucking access points to the property and the need for costly road repairs.

The recommendation, given this information, is a moderate timber stand improvement in both units. A common target in northern hardwood management is to thin to a target basal area, such as 80 square feet. This approach leads to a relatively uniform residual stand and conditions that are

favorable to a narrower window of wildlife usage. It thins some areas too much and little or nothing in locations where a light and very selective thinning could be used to meet long term objectives.

A nontraditional approach is to reduce the stand density by a targeted percentage, such as 30%. The percentage should be based on pre-harvest inventory data, stand densities and the desired intensity of the harvest. Under this plan high density areas get thinned more in absolute numbers, but proportional to areas with lower stand densities. The overall result is a forest with a variable density, a less "managed" feel to it and friendlier to a wider range of wildlife species.

In summary, the general guidelines are:

1. The overall target is a modest harvest that will reduce the overall stand density by 25 to 30 percent. The emphasis is to select damaged and high risk trees first, and then additional trees as necessary to meet the target reduction.
2. The residual stand should contain a range of stand densities and not be marked to a uniform, park-like condition.
3. Include one or two regeneration openings per acre to promote species, size class, successional and structural diversity. Consider several small (100 foot wide or ¼ acre) aspen regeneration clearcuts to retain and expand the amount of aspen forest type.
4. Harvest across all tree sizes, but leave groups or clumps of healthy, large diameter trees to foster an "old growth" character.
5. Retain minor species, such as black cherry, white birch, basswood and red oak, to promote species diversity and for their wildlife value (fruit or nut).
6. Retain some standing dead trees for wildlife usage. They should not be located near walking trails to reduce the potential for personal injury and trail maintenance.
7. Limit harvesting on steep sided slopes to the lower portion of the slope.
8. Consider a shortwood only timber sale because it does not need a large landing area and it usually results in less damage to the ground and residual trees.
9. Restrict timber harvesting to the period between September and the end of March or April.

Finally, this harvest should not be viewed as a one time deal, but the first of many modest improvement cuts spaced 10 to 15 years apart. This is a very important decision because the property lacks an adequate location for piling logs and loading trucks other than the parking lot. This location would not be usable if a small education building was located adjacent to it. The alternative would be to clear a small opening (¼ acre) east of the parking lot and adjacent to Mollineaux Road. This area should be seeded to grass after the harvest and maintained as open habitat. The entrance to the landing area should be gated to restrict vehicle access.

Management Unit No. 2 Acres: 5.1

===== Major Objectives =====

1. Promote red oak regeneration by harvesting competing trees around the existing large diameter oak to promote acorn production and scarify the soil.
2. Buffer zone along the crest of the ridge between the managed northern hardwoods in Unit 1 and the north facing slope of the bluff.

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

Cover Type & Major Species: Sugar maple-red oak: Sugar maple, red oak, beech

Size Class: Sawlog-poletimber

Soil Type: Benzonia sand

Site Quality: Medium

Stand Quality: Fair

Stand Density: Medium, 140 sq. ft basal area

Volume per acre: 4.42 MBF & 8 cords

===== Unit Description =====

This is a well-stocked stand of mixed hardwoods located on a ridgetop and south facing bowl. It is dominated by 14 inch diameter red oak, sugar maple and beech sawlogs intermixed with a moderate amount 6 to 8 inch diameter sugar maple poletimber and northern hardwood saplings less than 2 inches in diameter. The sawlog component includes a noticeable amount of 20+ inch diameter trees. Most of the beech, cherry and basswood sawlogs are poor quality, whereas there the sugar maple and red oak are fair to good quality trees. Some of the red oak sawlogs are over 30 inches in diameter and have broad, spreading crowns. White ash, black cherry and white birch are important, but secondary species in the poletimber size class.

===== Discussion & Recommendations =====

Red oak is a long lived, high value species that is often found in association with aspen and white birch. It is valued for its lumber, bark (tanning and cork), acorns (hard mast or forage), firewood, fall foliage and shade.

While it occurs on a wide range of sites, the best growth takes place on rich loamy soils. It is a difficult species to regenerate because young saplings are somewhat intolerant of shady conditions, it does not produce good acorn crops on a regular basis, young saplings are often heavily browsed by deer and it cannot compete with faster growing northern hardwoods on good sites unless the stand is substantially disturbed by clearcutting or heavy timber harvesting. Even under the best conditions red oak regeneration efforts can lead to a new stand with a lesser oak component.

Common damaging agents are oak wilt, two-lined chestnut borer and gypsy moth. Oak wilt is a vascular disease that kills oak trees by blocking their ability to move water and nutrients from the roots to the upper stem. Red oaks (red, black, scarlet and pin) are more susceptible than white oaks

and mortality is quick once the symptoms appear. Infected red oak rarely survive more than one year once symptoms appear. Trees can get infected when oak wilt spores come in contact with wounds, such as pruning cuts and logging damage. It can also be spread from oak tree to oak tree via grafts in the root system. There isn't a practical cure for oak wilt and the best approach is to reduce the potential for wounding red oak trees, such as timber harvesting restrictions, when the spores are active, from late April to mid August.

The larvae of two lined chestnut borer weaken and can kill trees by boring tunnels under the bark and girdling the tree. Infected trees are then prone to secondary infection from other insect and disease problems. Gypsy moth caterpillars weaken trees by eating oak leaves in early summer when trees are beginning to grow. While gypsy moth infestations are unsightly, and heavy populations can severely weaken trees, they are rarely the primary cause of oak mortality. Like the chestnut borer, they stress the tree, open them to secondary infection and the combination of problems can kill trees.

None of these forest pests are a problem at this time, but they should be given some consideration when planning any timber harvesting activities. The best prevention for keeping these pests in check is a stand of vigorous, healthy trees.

Like the aspen in Unit 4, the oak in this unit present several long term challenges if harvesting is excluded or restricted to light, selective cuts. A hands off policy will lead to diminishing amounts of oak and increasing amounts of sugar maple dominated northern hardwoods. This transition is already visible in many places.

An option is to focus on the larger diameter oak trees in the central and southern part of the unit. Rather than cutting these trees, the recommendation is to leave them as seed trees and to harvest the adjacent trees with overlapping crowns. This will free up valuable soil nutrients and moisture and expose more of the crown to direct sunlight. This combination will lead to increased photosynthesis levels as the number of leaves increases and produce larger crops of acorns.

Moderate thinning on the slopes below these trees will scarify the surface layer and increase the amount of sunlight reaching the forest floor. Two conditions that are critical to acorn germination and oak regeneration. The harvest in this area should focus on removing damaged and suppressed trees first and then others as necessary to meet density reduction targets following the guidelines listed in the discussion for Units 1 & 7.

The harvesting exclusion from mid-April to mid-August is strongly recommended to eliminate the potential for damaging the red oak during the oak wilt sporing period.

Management Unit No. 3, 6 Acres: 2.2

===== Major Objectives =====

1. Maintain the open and early succession wildlife habitat by periodically cutting the brush.
2. Maintain the scenic overlooks by cutting or trimming the surrounding trees.
3. Install 1 or 2 benches at the scenic overlooks in Unit 3.
4. Improve the accessibility of the walking trail through unit 6 by widening the path or periodically cutting the brush, herbicide treatment to control the poison ivy and using gravel or wood chips to reduce soil erosion problems from developing.

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

Cover Type & Major Species: Upland grass-upland brush: Upland grass, raspberry, sumac, honeysuckle, grape, northern hardwoods, aspen

Size Class: Open

Soil Type: Benzonia sand

Site Quality: Medium

Stand Quality: Not applicable

Stand Density: Low, 0 sq. feet of basal area

Volume per acre: Not applicable

===== Unit Description =====

These are relatively open areas dominated by grass and other upland vegetation. Unit 3 contains several clumps or thickets of honeysuckle and sumac. Their condition ranges from healthy to dead or dying. Unit 6 contains groups of young sapling northern hardwoods along the margins and a pocket of sugar maple saplings and small poletimber trees along the south property line.

===== Discussion & Recommendations =====

The two scenic openings in Unit 3 will need periodic maintenance to keep them open. Most of the time this should only require occasional trimming of side branches and brush. At some point, though, it will require cutting trees along the upper edge of the bluff if the vistas are to remain open. These locations are terminal points of the hiking trail and ideal locations for installing one or two wooden benches to rest or just take in the scenic view.

These units represent all of the open space on the property, it increases their importance for open and edge habitat wildlife species and they should be managed to keep them open. Unit 6 is relatively open and the easiest to maintain with a minimal of effort -- periodically cut down all invading woody vegetation in the center and along the outer margins. This should be completed once every 5 years or as necessary to prevent the transition to an early stage reverting field.

Unit 3 presents more of a challenge to keep in the grass/shrub stage because it includes several thickets of honeysuckle and sumac in various stages of growth from healthy clusters to dead and dying plants. These thickets provide excellent nesting, escape and roosting habitat for songbirds,

small mammal, snakes, reptiles and many other species of wildlife. Their flowers attract bees and butterflies, and their berries are a source of summer and fall forage. However, the partial shade condition in and around them keeps the ground cooler and moister during the spring and early summer growth season. Conditions that are very favorable to northern hardwood regeneration.

The shrub habitat is desirable and can be maintained or reinvigorated by periodically cutting all of the stems in a clump or 10 to 15 foot wide area to promote new sucker or sprout growth. One shrub regeneration cut should be completed every one to three years. Follow up cuts should not be located adjacent to the prior cut. The goal is to create an uneven vertical profile and avoiding the even, stair step effect that results when cuts are located one after the other. The varied profile is better wildlife habitat management and will attract a wider variety of wildlife.

The best time to complete this activity is from the fall to early spring. Spring regeneration cutting should be completed before bud break or leafing out begins. Cut material could be used to form wildlife brush piles along the outer perimeter of the unit. Brush piles are excellent wildlife habitat for snakes, reptiles, small mammals and many other species.

Invading hardwoods (saplings and bigger) along the outer margins should also be cut down to preserve the open grassy habitat of the unit. Stumps of the cut trees could be sprayed with an herbicide, such as Roundup, to reduce stump and root sprouting. These stems should be cut in the middle of summer if an herbicide will not be used. Summer cutting can be an effective deterrent to sprouting because the root system has been depleted of complex sugars and starches and the flow of nutrients is still from the roots upward and will not reverse until late summer.

There are two scenic openings on the north side of Unit 3 overlooking Crystal Lake. Over time the view will become blocked as surrounding growth, especially below the bluff, infringes on the openings. This will require periodic cutting of trees to maintain the view. These locations are also ideal spots for installing benches to rest and admire the view after the hike up the hill. The benches should be precut, carried up and assembled on site.

The brush (honeysuckle, raspberry, hardwood saplings, grass and other vegetation) in the southeast corner of Unit 6 is beginning to close off the walking trail and there is an abundant amount of poison ivy. The path should be cleared of all brush for at least 2 feet on each side of the trail to make it more accessible. The trail could then be covered with gravel or wood chips to define it, deflect water movement down the slope and to reduce the potential erosion problems to develop.

The poison ivy presents a problem to visitors and to anyone involved with improving the trail. Cutting the existing vines will promote sprouting. Several over the counter herbicides are labeled for poison ivy application, such as glyphosate (Roundup), amitrole and 2,4-D (Weed-B-Gone) and triclopyr (Garlon, Brush-B-Gone).

Except for 2,4-D these are unselective, broad base herbicides that will kill everything that gets sprayed. 2,4-D somewhat effective for controlling poison ivy and it does not kill grass. One application will not be enough. Multiple applications over the growing season are necessary to effectively kill the poison ivy and should be initiated well before moving to the manual control of the upland brush. Consult and read labels before applying any herbicide.

Management Unit No. 4 Acres: 5.6

===== Major Objectives =====

1. Diversify the vertical structure, enhance wildlife habitat and increase the range of aspen size classes by periodically clearcutting small aspen regeneration openings.

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

Cover Type & Major Species: Aspen-red oak: Aspen, red oak

Size Class: Sawlog-poletimber

Soil Type: Benzonia sand

Site Quality: High

Stand Quality: Good to fair

Stand Density: Medium, 140 sq. ft basal area

Volume per acre: 7.00 MBF & 16 cords

===== Unit Description =====

This unit is composed of several smaller stands of aspen in combination with northern hardwoods and red oak. The aspen component is dominated by 8 to 10 inch diameter poletimber and 12 to 14 inch diameter sawlogs. They are intermixed with 6 to 8 inch diameter red oak poletimber and lesser amounts of 12 to 14 inch diameter red oak sawlogs, 6 to 8 inch diameter northern hardwoods and, in places, a moderate amount of young sugar maple saplings. The southern end of the unit is dominated by larger diameter trees and it is in the early stages of decline. This is evidenced by the presence of down and dead trees, dying branches in the upper crowns and conks (fungal fruiting bodies) on the stems of live trees. The latter indicates an advanced stage of internal rot.

One of the two walking trails begins at the southern end of the unit, leads through the east side of Unit 4, crosses through the northern portion of the unit and continues into Unit 3.

===== Discussion & Recommendations =====

Aspen or popple is a fast growing, relatively short-lived, shade intolerant species. It is widely distributed across the United States and grows on a wide range of sites, from poorly drained lowlands to well-drained uplands. The best growth is obtained on well drained, loamy soils. While it can reach ages of 100 to 150 years, overmature trees are susceptible to heart rot and rapid deterioration. Under managed conditions it is usually grown on 50 to 70 year rotations.

Unlike northern hardwoods, aspen primarily regenerates by sprouting from the root system. Two conditions are required to trigger aspen sprouting: tree mortality or removal of the tree through cutting and a sudden increase in the amount of sunlight reaching the ground. Both conditions must be meet in order to achieve vigorous sprouting. Partial cutting will favor shade tolerant species such as maple and beech, rather than aspen. When the objective is to regenerate the aspen forest type clearcutting is the recommended method of harvesting. It removes all or most of the overstory competition and creates ideal conditions for sprouting -- full, direct sunlight.

The best sprouting also occurs when aspen is cut in the non-growing season, September through April. The explanation is simple. Spring and early summer tree growth are powered by the sugars and starches stored in the root system over the winter. By midsummer the tree has completed its annual growth and sugar and starch production from photosynthesis becomes available to replenish the depleted root system. By early fall the root system has been recharged and the tree sits dormant until the next growing season.

Sprouting and initial growth in the spring is a very energy consumptive activity for trees. This quickly depletes the sugars stored in the root system. If aspen is cut during the growing season when sugar levels are low, there simply isn't enough sugar left in the root system to promote sprouting. The result is fewer sprouts and less vigorous growth. If aspen is cut in the non-growing season, sugar levels in the root system are high. When spring comes all of the sugar is available for sprouting and remarkable first year growth can be achieved.

Aspen regeneration cuts are also good for wildlife. Within a few years aspen clearcuts will be lush with vegetation. Young aspen sprouts, other hardwood seedlings, upland shrubs, grasses, ferns, wildflowers and other shade intolerant plants will seemingly appear out of nowhere to take advantage of the sudden increase in sunlight. Many of these plants will form dense thickets of growth and produce a fruit, nut or seed. This growth is very attractive to open habitat dependent songbirds such as sparrows and warblers, as well as deer, grouse, turkey and woodcock. It will provide excellent nesting and escape cover for many years after the clearcut.

As the aspen reaches heights of 10 to 15 feet the canopy will close, the amount of sunlight reaching the forest floor will decrease and the shade intolerant species in the understory will begin to decline in numbers. There will be a corresponding shift in wildlife usage as the stand begins a transition from open habitat to a closed canopy, sapling-poletimber stand.

The next transition is to a mature, open woodland dominated by sawlog size trees (12 plus inches in diameter). This type of stand is favored by deer and grouse and the large trees provide nesting sites for songbirds, woodpeckers and squirrels. The final stage is an overmature stand characterized by large diameter trees (18 to 20 plus inches), standing or down dead trees and a shady understory. Deer, grouse, flying squirrel and pileated woodpeckers are commonly found in overmature aspen.

White birch is a fast growing, short lived species and a common associate of aspen. It is relatively intolerant of shade and the best regeneration requires full sunlight and exposed mineral soil. Its showy white bark is a sharp contrast from the grays and browns of most hardwood species and adds a visually appealing accent to the woods. It is also an important wildlife species because it produces abundant numbers of small nutlets that are eaten by many species of birds. Standing dead trees are used as perches, den trees and a source of wood boring larvae for forage.

While extensive clearcutting conflicts with the mandate for selective thinning, if nothing is done the aspen will eventually be replaced by northern hardwoods and a valuable forest type will be lost. A compromise solution would be to include several small regeneration clearcuts of ¼ to 1 acre. This approach would gradually regenerate the aspen over several harvests without severely altering the landscape. The cuts would be spaced 10 to 15 years apart and included in the timber stand improvement cuts in the other forested units. Irregularly shaped openings blend in with the surrounding woodland much better than straight or sharp-edged cuts. This should make them more acceptable to visitors.

The recommendation is to select one to three small areas for clearcutting each time the property is thinned. This will substantially improve the vertical structure and the edge habitat of the property, eventually create a wide spectrum of aspen age classes and it is very good long term wildlife habitat management. Clumps of healthy white birch should be left along the perimeter of any regeneration opening when they are present. This will highlight their visual accent and provide a seed source for white birch regeneration. Some of the red oak near these opening should be considered as leave trees because acorns are an important source of winter forage. Oaks with large, spreading crowns should be favored as leave trees because they produce more acorns more frequently than small crowned trees.

Management Unit No. 5 Acres: 3.3

===== Major Objectives =====

1. Early woodland habitat for wildlife.

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

Cover Type & Major Species: Northern hardwoods: Sugar maple, black cherry, white ash, red oak

Size Class: Sapling

Soil Type: Benzonia sand

Site Quality: Medium

Stand Quality: Good

Stand Density: High, 50 Sq. Ft Basal Area

Volume per acre: 7 cords

===== Unit Description =====

This is a classic example of the transition from reverting field to a dense, well-stocked stand of young saplings less than 2 inches in diameter with a modest number of small diameter (6+ inch) poletimber. Sugar maple dominates the new sapling growth, while the larger trees are a mix of northern hardwoods and a few red oak.

===== Discussion & Recommendations =====

No management is necessary for this unit. It provides very good escape and nesting habitat for wildlife and will continue to do so for many years. The poletimber category includes a mix of soft (fruit or berry) and hard (acorns) mast trees and produce wildlife forage from midsummer to the winter months. The high stem density in the sapling category is beneficial to long term timber management because it weeds out weak trees and leads to the development of straight, single stemmed trees.

Management Unit Summaries

Mgt. Unit	Acres	Site Quality	Cover Type	Description	Management Objectives	Management Activities
1	26.8	Mesic	Sugar maple dominated northern hardwoods	A moderately well stocked stand of northern hardwoods dominated by 14 to 16 inch diameter sawlogs and 6 to 8 inch diameter poletimber. A gravel parking lot is located in the southwest corner of the unit. Two hiking trails and a blocked off 2-track road are used for recreational access.	Maintain a healthy and diverse woodland; provide recreation opportunities to the community; and landowner education.	A selective harvest with small regeneration openings to improve the overall health of the woods, accentuate the old growth character of the woods, and promote species and habitat diversity; expand the existing trails by maintaining logging trails for recreational use; and promote landowner education.
2	6.6	Dry	Sugar maple-red oak	A well stocked stand of mixed hardwoods dominated by 14 inch diameter red oak, sugar maple and beech sawlogs intermixed with a moderate amount 6 to 8 inch diameter sugar maple poletimber and northern hardwood saplings less than 2 inches in diameter. It includes a modest number of large (20+ inch) diameter trees.	Maintain a healthy woodland; perpetuate the red oak forest type; promote white birch regeneration; visual aesthetics and wildlife habitat.	A selective harvest to improve acorn production, promote red oak regeneration and accentuate the old growth character of the woods.
3	0.7	Dry	Upland grass & brush	An open field of upland grass with patches of honeysuckle and sumac.	Maintain the scenic vista overlooking Crystal Lake; and preserve the open and shrub habitat for wildlife and improved recreational access.	Install 1 or 2 benches at the overlook; maintain the scenic vistas by periodic cutting of brush and trees; and perpetuate the open grassland and shrub habitat by periodically cutting.

Mgt. Unit	Acres	Site Quality	Cover Type	Description	Management Objectives	Management Activities
4	6.9	Dry-Mesic	Aspen	A well stocked stand of 12 to 14 inch diameter aspen sawlogs, 8 to 10 inch diameter aspen and 6 to 8 inch diameter red oak poletimber. The aspen in southern finger of the unit includes larger diameter trees and is in the early stages of decline.	Perpetuate the aspen forest type and early succession wildlife habitat.	Include several small (less than one acre) aspen regeneration clearcuts into the harvest when completing timber stand improvement cuts in the adjacent hardwood units.
5	0.7	Dry	Sugar maple dominated northern hardwoods	A segment of old reverting field that has transitioned to early woodland habitat. It is composed of a moderate amount of sugar maple saplings less than 2 inches in diameter with a modest number of 6 to 8 inch diameter northern hardwood and red oak poletimber trees.	Early woodland wildlife habitat.	No management activities are recommended.
6	2.3	Dry	Upland grass	An open field of upland grass with small amounts of northern hardwood saplings and poletimber.	Preserve the open grassland; and improve the access trail leading to the scenic vista in Unit 3.	Improve the trail leading to the scenic overlook by widening and upgrading the trail; herbicide control of invasive poison ivy .
7	7.1	Mesic	Sugar maple-aspen	A moderately well stocked stand of mixed hardwoods composed of 12 to 16 inch diameter northern hardwoods and aspen sawlogs with lesser amounts of 6 to 8 inch diameter poletimber.	Maintain a healthy and diverse woodland.	A selective harvest with small regeneration openings to improve the overall health of the woods, accentuate the old growth character of the woods, and promote species and habitat diversity.

Summary of Recommended Activities

Unit #	Acres, #, or Feet	Practice	Prescription	Year Planned	Year Completed
1, 7	30+ ac.	3, 8	A modest timber stand improvement harvest to improve stand health, promote diversity and maintain an old growth character.	2008 - 2010	
4	5+ ac.	3, 8	Timber stand improvement harvest to improve stand health, promote red oak and white birch regeneration and increase acorn production.		
1, 7	---	9	Clear primary logging trails and maintain them as recreational trails by seeding to grass or spreading gravel or wood chips.		
3	1 or 2	9	Install benches at the scenic overlooks.		
6	50+ feet	9	Widen and upgrade the trail and herbicide control of poison ivy.		
1	---	9	Build a small pavilion, kiosk or bulletin board at the parking lot to promote landowner education and property activities.	2009 - 2015	
3	---	8, 9	Control invading hardwoods around the perimeter of the unit to maintain open habitat; regenerate one small block (10+ feet across) of shrub habitat every one to three years; and create wildlife brush piles.	2009 - 2025	
1, 4, 7	35+ ac.		Follow-up timber stand improvement harvest.	2020 - 2025	

Key to Practices

2. Reforestation & Afforestation
3. Forest Improvement
4. Windbreaks & Hedgerows
5. Soil & Water Protection
6. Riparian & Wetland Protection
7. Fisheries Habitat
8. Wildlife Habitat
9. Other

Appendix

Table of Contents

Key to map symbols

Cover Types

Conifers

C White cedar
F Balsam fir, white spruce
Fb Balsam fir predominates
Fs White spruce predominates
H Hemlock
P Mixed pine
Pa Austrian pine
Pj Pine
Pr Red pine
Ps Scotch pine
Pw White pine
Q Swamp conifers: white cedar, hemlock, spruce, fir and tamarack (larch)
S Spruce
Sb Black spruce
Sn Norway spruce
T Tamarack
X Christmas trees: Scotch pine, blue spruce, white spruce, Douglas fir, Fraser fir, etc.

Hardwoods

A Aspen, white birch, and balsam poplar
At Trembling aspen predominates
Ag Big tooth aspen predominates
Ab Balsam poplar predominates
Aw White birch predominates
E Lowland hardwoods: ash, elm and red maple
Ea Ash predominates
Ee Elm predominates
Er Red maple predominates

Jw Black walnut
M Northern hardwoods: sugar & red maple, elm, beech, yellow birch, basswood and cherry
Ms Sugar maple predominates
Mr Red maple predominates
Me Elm predominates
Mb Beech predominates
My Yellow birch predominates
Mc Cherry predominates
O Oak
Ob Black oak predominates
Or Red oak predominates
Ow White oak predominates

Other

G Upland grass: grasses, blueberry, brackenfern & sweetfern
Gb blueberry predominates
Gbr Bracken fern predominates
Gs Sweetfern predominates
L Lowland brush: alder, dogwood, viburnum and willow
La Alder predominates
Ld Dogwood predominates
Lv Viburnum predominates
Lw Willow predominates
U Upland brush: briar, dogwood, hazel, Juneberry, sumac, thornapple and viburnum
Ub Briar predominates
Ud Dogwood predominates
Uh Hazel predominates
Uj Juneberry predominates
Ul Black locust predominates
Us Sumac predominates
Ut Thornapple predominates
Uv Viburnum predominates

Size & Stocking Levels

0 Nonstocked
1 Seedling-sapling, lightly stocked
2 Seedling-sapling, moderately stocked
3 Seedling-sapling, well stocked
4 Poletimber, lightly stocked
5 Poletimber, moderately stocked
6 Poletimber, well stocked
7 Sawtimber, lightly stocked
8 Sawtimber, moderately stocked
9 Sawtimber, well stocked

Diameter Ranges

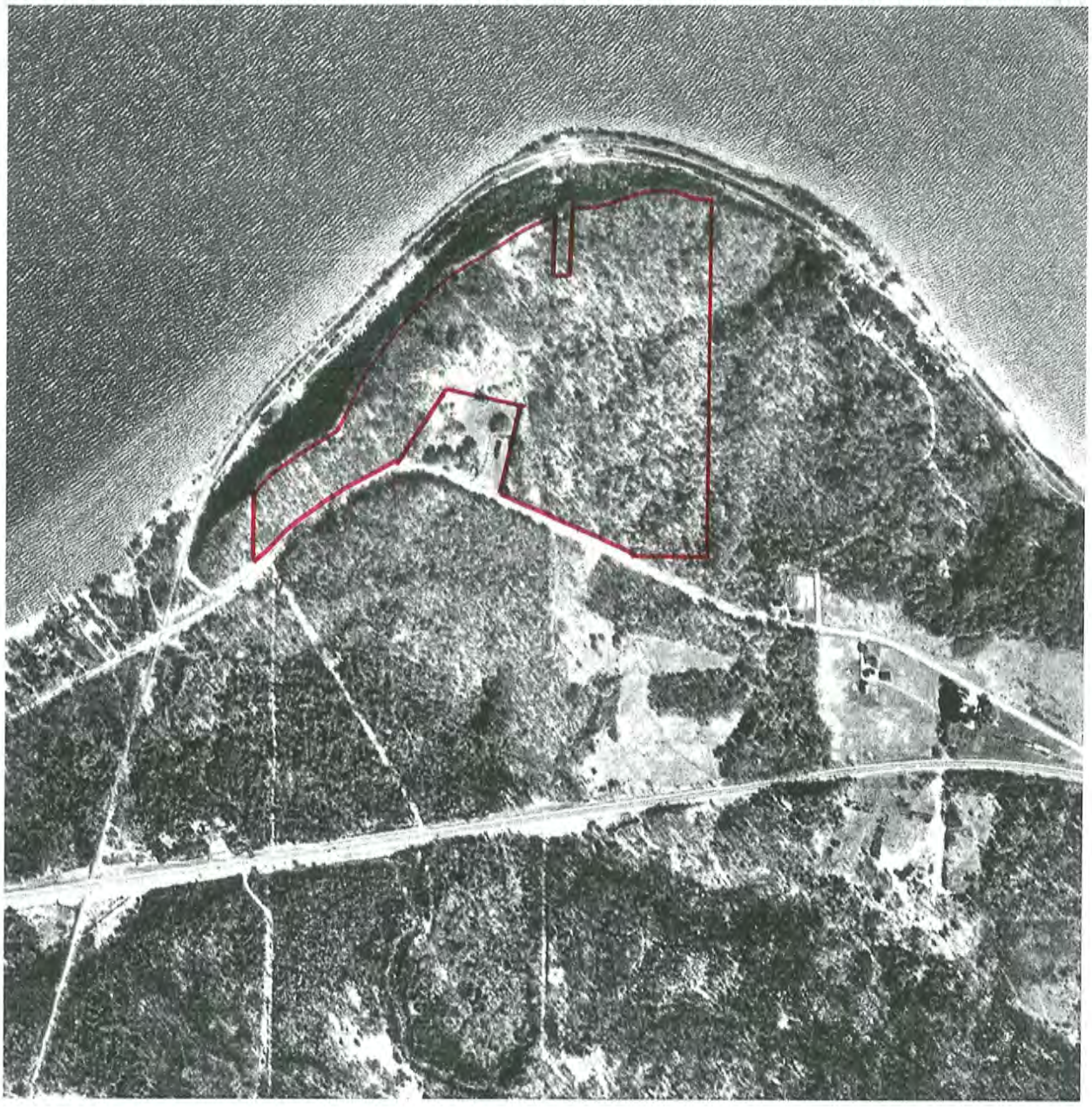
Seedling-saplings: 0 - 4.9 inches
Poletimber: 5.0 - 10.9 inches
Sawtimber: 11+ inches

Soil Types

Benzonia sand. The Benzonia series consists of very deep, somewhat excessively drained soils formed in sandy deposits on outwash plains, moraines, and lake plains. These soils have rapid permeability and the potential for surface runoff is low. Slopes range from 0 to 50 percent. Mean annual precipitation is about 31 inches and the mean annual temperature is about 48 degrees F. Most areas are forested or idle. Some are used for orchard crops.

Other Symbols

Paved road
Improved road
Two-track road or trail
Building
P Parking lot
① Management Unit Number

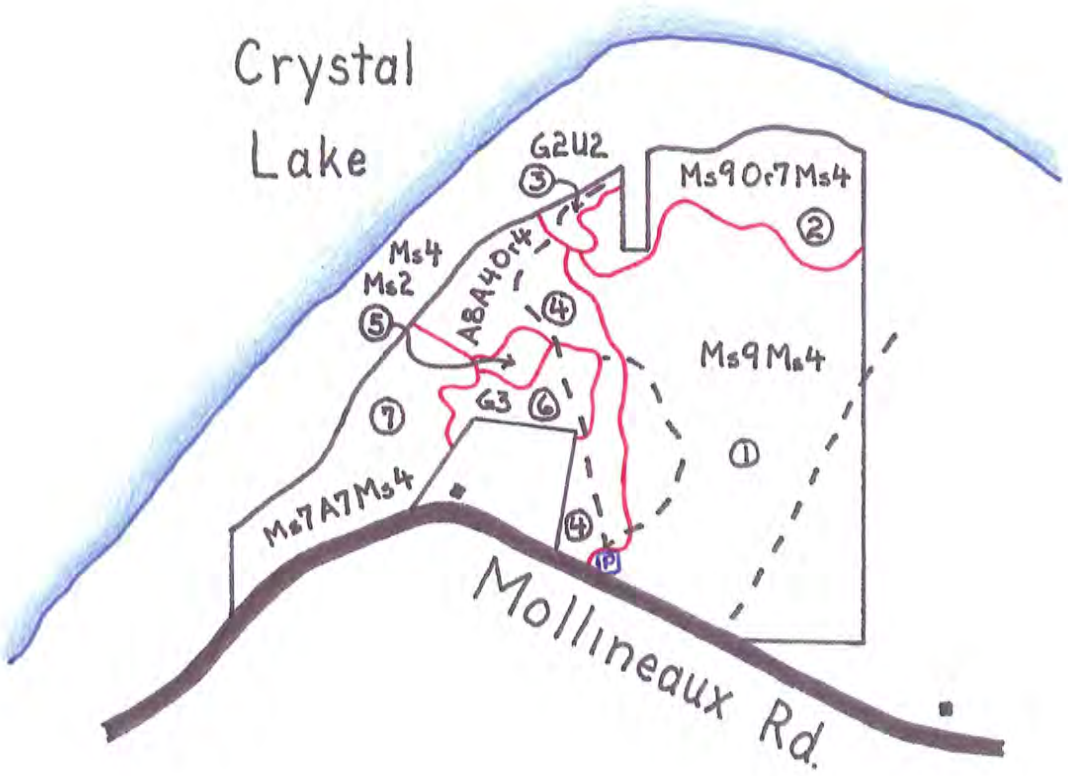


Landowner: Benzie County, Railroad Point Property

Property location: **County**: Benzie

Township: Benzonia	**Township**: 26N	**Range**: 15W	**Section**: 21
Township: Crystal Lake	**Township**: 26N	**Range**: 15W	**Section**: 20

Present Conditions



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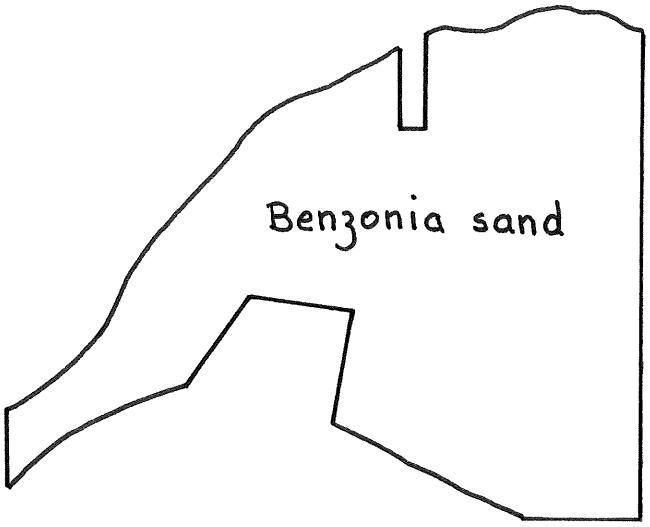
Scale 1: 7920

Landowner: Benzie County, Railroad Point Property

Property location: **County**: Benzie

Township: Benzonia	**Township**: 26N	**Range**: 15W	**Section**: 21
Township: Crystal Lake	**Township**: 26N	**Range**: 15W	**Section**: 20

Soil Map



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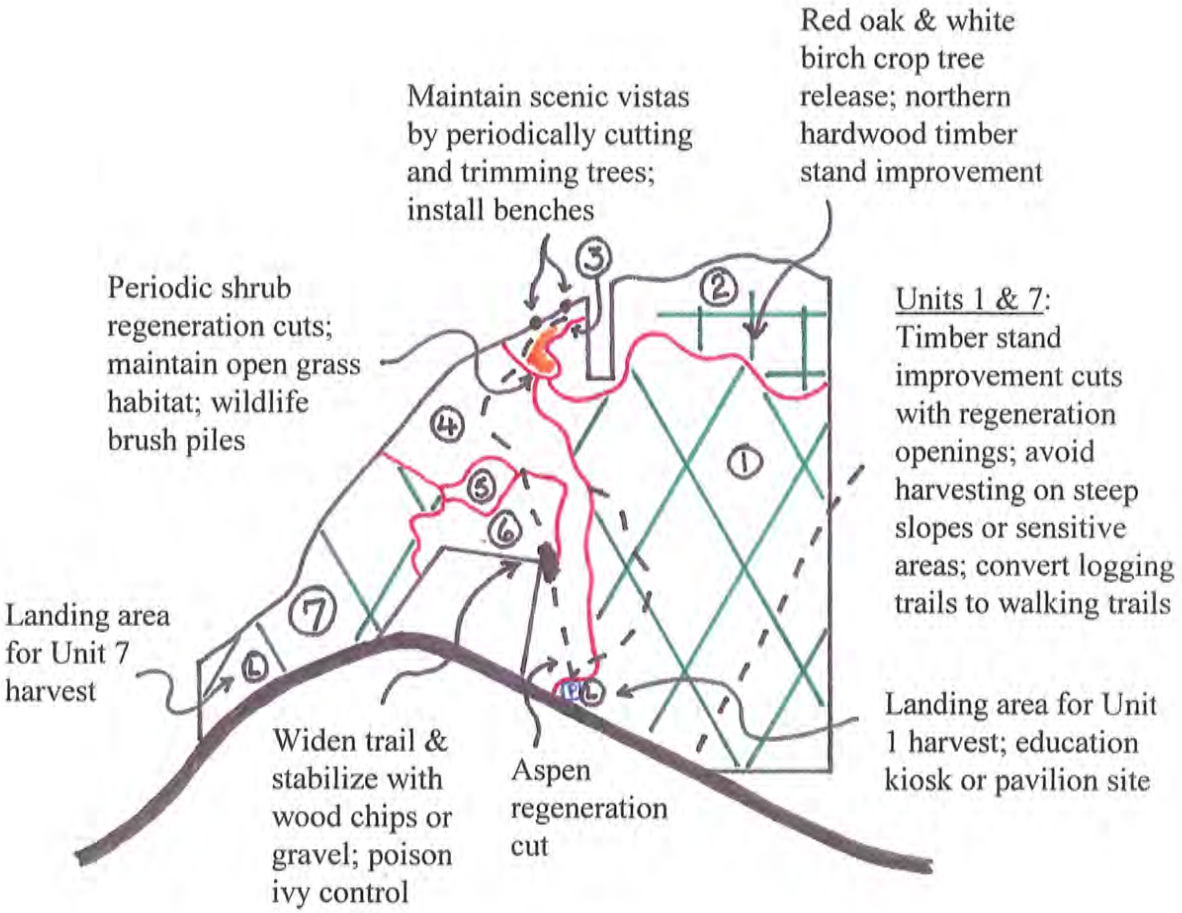
Township: Benzonia	**Township**: 26N	**Range**: 15W	**Section**: 21
Township: Crystal Lake	**Township**: 26N	**Range**: 15W	**Section**: 20

Recommended Activities



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