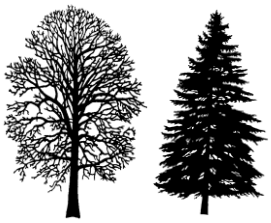


Minnesota
Forest
Stewardship
Program

FOREST MANAGEMENT PLAN

LANDOWNER:
City of Pequot Lakes
Mayo Lake Nature Preserve
4638 County Road 11, City Hall
Pequot Lakes, MN 56472
Phone: 218-568-5222

Prepared in September, 2013 by:
Dean Makey
Minnesota DNR – Division of Forestry
1601 Minnesota Drive
Brainerd, MN 56401
Phone: 218-833-8700

PROPERTY LOCATION and ACREAGE:

Crow Wing County = 11.3 acres
Parcel Numbers: 290273304A00009 and 290273304Z00009
Parts of Government Lot 4 and the SE1/4 SW1/4 of Sec. 27, Twp. 136 N., Rge. 29 W.

Cass County = 55.6 acres
Parcel Numbers: 22-028-4401 and 22-033-1100
Parts of Gov't. Lot 1 of Sec. 28 and Gov't. Lot 1 of Sec. 33, Twp. 136 N., Rge. 29 W.

THE GOALS YOU IDENTIFIED FOR MANAGING THE PROPERTY ARE:

- To use these lands for nonmotorized recreational activities.
- To develop recreational trails for hiking, snowshoeing, and cross-country skiing; to erect picnic tables and benches; to construct a small parking area for vehicles.
- To keep the lands as **rustic,** meaning no development of structural facilities.
- To maintain the environmental integrity of the Mayo Lake shoreline, including no development.
- To maintain big, colorful trees in a "park-like" setting over a long period of time.

Property Description

In 2004, the previous owner of this property, Ignatius A. O'Shaughnessy, conveyed a perpetual conservation easement to the Minnesota Land Trust. The conservation easement was recorded in the counties of Cass and Crow Wing.

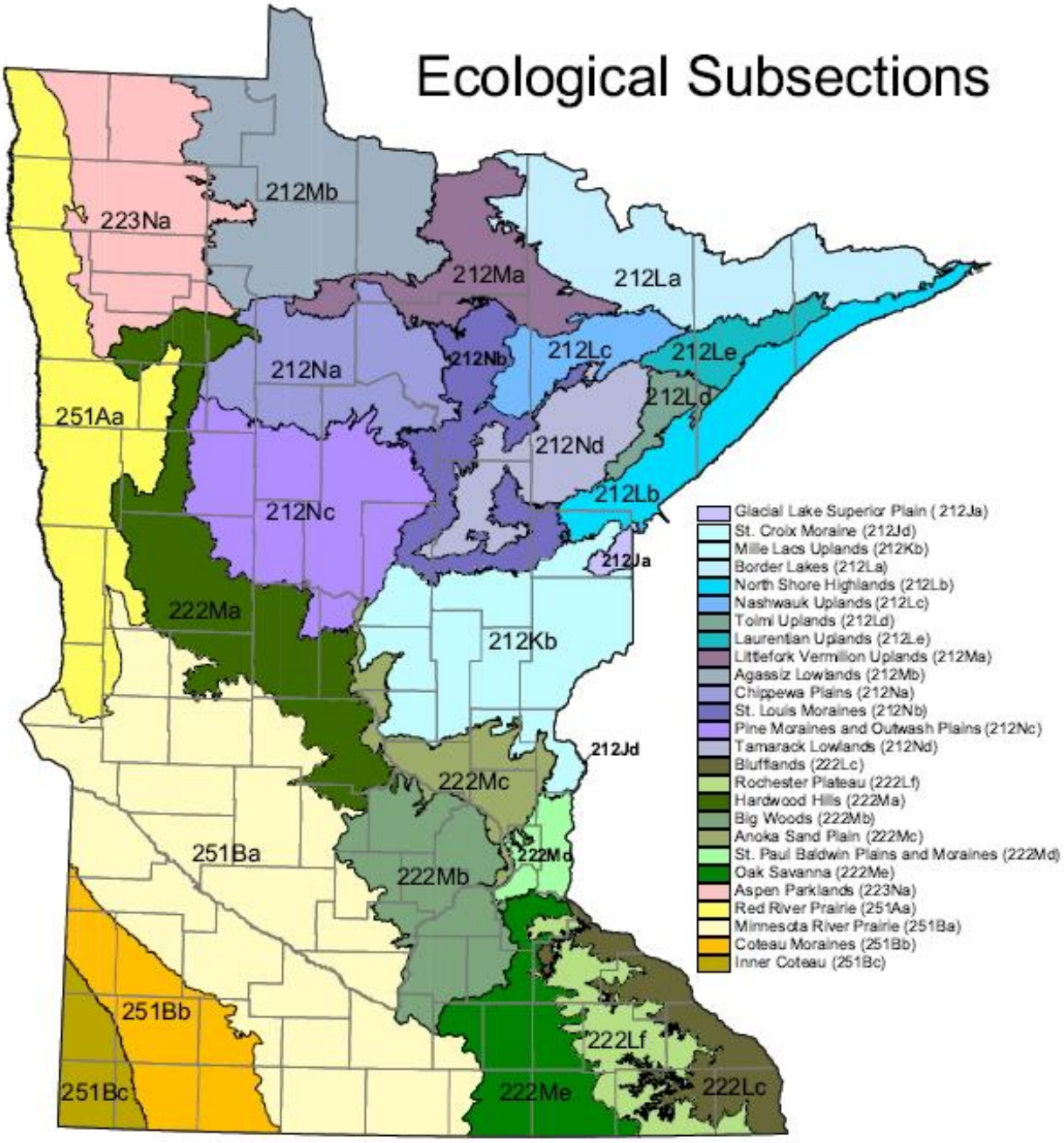
The new owner of these lands, the City of Pequot Lakes, is abiding by the restrictions of the easement with the preparation of this forest management plan, to be approved by the Trust. This forest management plan will describe the current conditions of the forest and wetland types and present management recommendations for consideration.

Landscape Region

The property falls within the **Pine Moraines & Outwash Plains** Ecological Subsection.

This subsection is a mix of end moraines, outwash plains, till plains, and drumlin fields. White and red pine dominated the majority of forest communities on end moraines and till plains. Jack pine barrens and jack pine woodlands were found on well-drained sites on outwash plains. Black spruce, tamarack, white cedar, and black ash were prominent tree

species in poorly to very poorly drained soils. Lakes are very common on the end moraines and some of the outwash plains. Current land uses include tourism, forestry, and some agriculture.



General Description:
The Itasca Moraine forms most of the northern boundary. To the west, the east side of the Alexandria Moraine is the dividing line. Rainy Lobe ground moraine and end moraines form the eastern boundary.

Property Description

Landform:
This subsection consists primarily of large outwash plains, narrow outwash channels, and end moraines (Hobbs and Goebel 1982). The moraines are relatively large and were formed from portions of several glacial lobes. Most of the glacial drift was sandy, but there is loamy drift to the north.

Geology:
Thick glacial drift covers bedrock over most of the subsection. Thicknesses range from 200 to over 600 feet. The greatest depths are in the southwestern portion (0lsen and Mossler, 1982). A diversity of Precambrian rock underlies the glacial drift (Morey 1976; Morey et al. 1981). There are also iron formations at the southeastern edge of the subsection, along with argillite, siltstone, quartzite, and graywacke. Cretaceous marine shale, sandstone, and variegated shale are localized in the southwest. (Albert 1993).

Bedrock Geology:
This subsection consists primarily of large outwash plains, narrow outwash channels, and end moraines (Hobbs and Goebel 1982). The moraines is relatively large and were formed from portions of several glacial lobes. Most of the glacial drift was sandy, but there is loamy drift to the north.

Soils:
The morainic soils are predominantly coarse to moderately coarse in texture (sands and sandy loams), although calcareous loamy soils are present on the Itasca Moraine and the Fosston Till Plain. (Dept. of Soil Science, Univ. of Minnesota 1969, 1980). On outwash plains, excessively drained sands are prevalent, but they are interspersed with numerous wetlands. Over 10% of the soils are organic. The soils are classified as Psamments and Aquents on outwash plains (Anderson and Origal 1984). Boralfs are most common on moraines.

Climate:
Total annual precipitation ranges from 23 inches in the northwest to 27 inches in the east, with about 40% occurring during the growing season. Only 12 to 16% of the annual precipitation falls during winter months (based on Midwest Climate Center 1992). Growing season length varies from 111 to 131 days.

Hydrology:
Kettle lakes are common on pitted outwash plains and within stagnation moraines. There are hundreds of lakes within the subsection that have a surface area greater than 160 acres. The headwaters of the Mississippi River (Itasca Lake in Itasca State Park) is in this subsection. Other large rivers flowing through the outwash plains of the subsection include the Pine and Crow Wing rivers.

Property Description

Pre-settlement Vegetation:
Jack pine, in a mix with northern pin oak, was the most common species on excessively drained portions of broad outwash plains. Large areas of the other landforms were dominated by aspen-birch and pine forests (mixed red and white pine). Red pine-white pine forests, occupied the rolling to irregularly sloped end moraines. Mixed hardwood and pine forests, dominated by a diverse mix of northern hardwoods and white pine, were found in the most fire-protected areas at the northern and eastern edges of the subsection. Fire protection was offered by irregular topography, broad wetlands, and relatively large lakes. Some of the hardwood-pine forests mapped by Marschner may have been dominated by northern red oak and basswood, without sugar maple (Albert 1993).

Present Vegetation and Land Use:
Forest management and tourism are the most important land uses. Agriculture is common in the west, where center pivot irrigation of corn and potatoes is common. Tourism is common where there are concentrations of lakes. Summertime swells the population of these areas significantly. Brainerd, a community of 14,000, absorbs more than ten times that number within a 30-mile radius during summer weekends.

Natural Disturbances:
Fire occurred on a 10 to 40 year rotation within much of the subsection, accounting for the dominance by upland conifers and quaking aspen-birch forests (Frissel 1973).

Conservation Concerns:
The Minnesota DNR planning team has recommended that 1) a certain percentage of each forest community be maintained in old growth conditions, 2) the amount of oak, northern white-cedar, and white pine within the subsection be increased, 3) that large areas of contiguous forest be maintained for forest-interior dwelling species, 4) semi-primitive (few or no roads) be maintained, 5) habitat be provided for endangered, threatened, and special concern biota, and 6) that cultural resources be protected. Other concerns include lake shore development, amount of timber harvesting, and water quality issues.

Interaction with Nearby Properties

The landscape around this property is a mixture of forested areas, wetlands, lakes, and streams. This property is in the heart of central Minnesota lake country where tourism is important. It has approximately 4500 feet of shore line on Mayo Lake, a General Development lake. There is some seasonal and permanent residential development on the lake. Protection of the shore line and adjacent land uses should consider their effect on the lake to maintain good water quality.

The ownership immediately surrounding this property is private. There is some public ownership, county administered lands, within ½ mile in Cass County. When managing this property, consideration should be given to the management activities being completed on adjacent lands.

Property Description

Natural Heritage Resource Information

The Natural Heritage data base lists plant and animal species that are endangered, threatened, or are of special concern. A search of this list did not find any features on this property, nor were any observed during the inventory for this plan. The search did find a record of a 2000 collection of a least darter from Mayo Creek, south of this property. In 2007, water willow was observed growing in Mayo Lake, about ½ mile to the north of this property. We urge you to become more familiar with rare plant and animal species, so you are able to identify them on your property.

Cultural Heritage Resource Information

Cultural resources are artifacts that are 50 or more years old and help us determine our cultural heritage. They are generally found within the top 16 inches of the ground. A search of the Cultural Heritage Resource data base showed there are no records of historical significance for your property. Although, there may be artifacts located on your property that have not been found. Finding them will help tell more about the history of your area. If you find any artifacts, protect them from damage and contact us to find out how to further protect and interpret them.

General Property Description

This property is located approximately 3 miles south and west of downtown Pequot Lakes, Minnesota. Access to the property is excellent as paved Hurtig Road borders the property on the east and gravel township roads border the south and west sides. Woods trails, recently used by ATVs, provide access to the interior of the property.

The topography of the tract is mostly gently rolling. There are some steep slopes down to the Mayo Lake shore line. The soil on the upland portions of the property is Menahga loamy sand. This is excessively drained soil. More detailed information about the soils can be found in the soil surveys for Cass and Crow Wing Counties.

A few survey monuments were found during the inventory for this plan. They were observed along the north property line, west of Mayo Lake. More searching could find other monuments, which would help to determine other property boundaries.

Property Description

Most of the property is heavily forested. The main tree species observed during the inventory for this plan are red and bur oak, paper birch, quaking and big tooth aspen, jack pine, and red pine. Many of the trees are considered mature to over mature with some of them declining.

There is a strip of lowland where the upland forest meets Mayo Lake. This shore line area has vegetation consisting of alder and willow, sedge grass and cattails, and a few black ash trees.

The property is divided into different vegetative cover types, which will be described and recommendations for management will be provided.

Mayo Lake

This property surrounds the south end of Mayo Lake. The Minnesota Department of Natural Resources lists Mayo Lake as Public Waters I.D. #18-408. It is 162 acres in size with a maximum depth of 22 feet. The lake occurs mostly in Crow Wing County with the south part in Cass County.

The Lake Finder link of the MN DNR web site (www.dnr.state.mn.us) has several reports of data collected for Mayo Lake. Printed reports of a fish survey done in July, 2007 and the Minnesota Biological Survey List of Plant Species Observed at Mayo Lake completed in June, 2009 are included in the appendix of this plan.

The **Mayo Lake Dam** is found at the south outlet of the lake. This dam was constructed by the federal Works Progress Administration (WPA) during the Great Depression era of the 1930s and 40s. This program employed millions of unemployed people to carry out public works projects, including infrastructure projects, such as public buildings and roads. The WPA operated its own projects in cooperation with state and local governments.

The Mayo Lake Dam was constructed in August – October of 1936. The cooperating agency was the Minnesota Department of Conservation – Division of Drainage and Waters. The structure is an old “Type C” dam with the purpose of controlling the water level of a lake. The Mayo Lake Dam was accepted by the State of Minnesota in 1938.

Oversight of the Mayo Lake Dam falls with the Minnesota Department of Natural Resources. Concerns about this dam and its maintenance should be addressed to the DNR Area Hydrologist, 1601 Minnesota Drive, Brainerd, MN, 56401. Currently, this position is held by Heidi Lindgren. She may be contacted at 218-833-8689 or by email at heidi.lindgren@state.mn.us.

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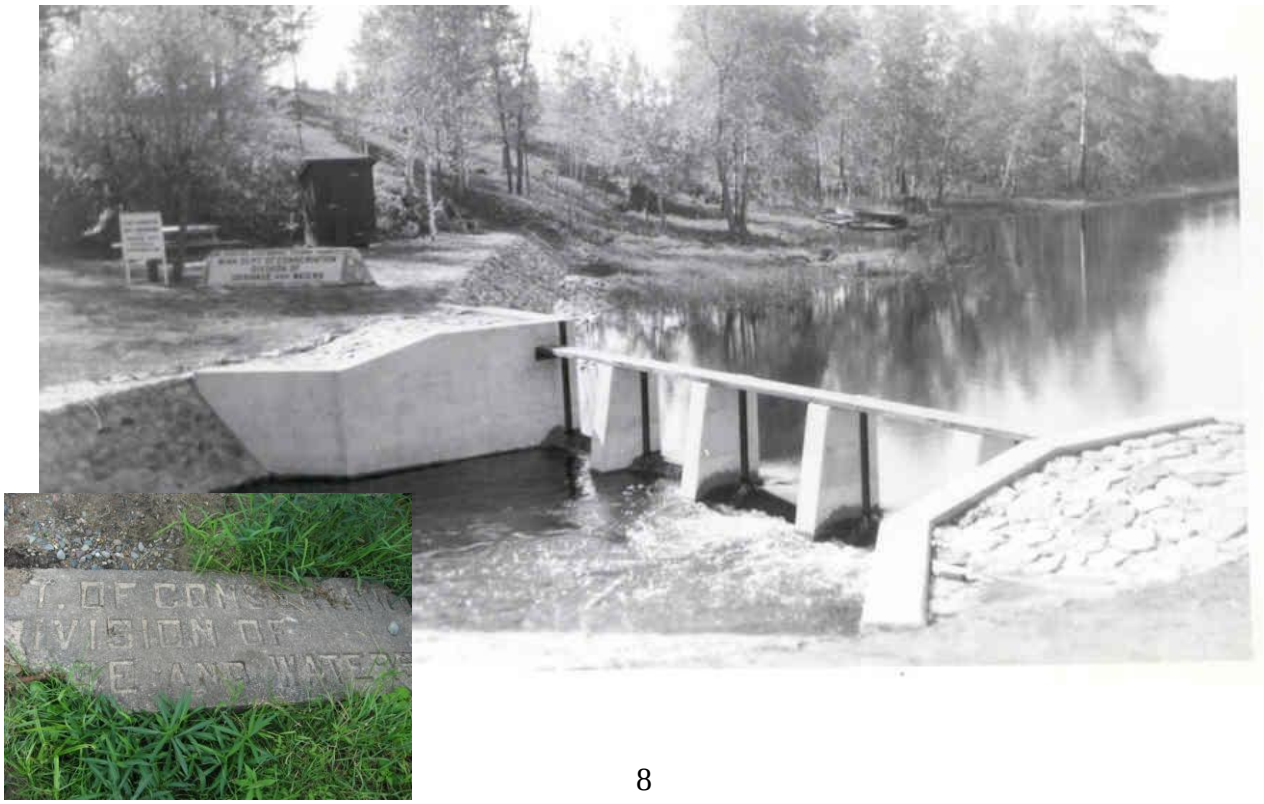
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Mayo Lake Dam as it looks today (August, 2013)

Woodland Stewardship Cover Types

Type #1 - Oak

Site Quality – Fair (red oak SI = 50)
Tree Density – Good (basal area = 95 sq. ft./acre)
Total Timber Volume – Good (20 cords/acre) *
Stand Age – Near mature (90 years)
*volume should not be used for purposes of selling timber

Stand Description: This type is found in the northeast part of the property. It consists mostly of red oak that is nearing or at maturity. Some of the red oak have already died or are showing some top dieback. The oak average 13 inches dbh and have 5 merchantable sticks per tree. Many of the red oak have heart rot in them (estimated 70%). This site will grow only fair quality red oak.

There are other tree species mixed with the oak, including bur oak, paper birch, aspen, and red maple. The aspen and birch are mature. In fact, nearly all of the birch are dead. There are a few large, red pine trees on the ridge near the south tip of type #2 (see map).

The understory in this type consists of a moderate density of shrubs, including mostly raspberry, gooseberry, hazel, hawthorn, and dogwood. Other shrubs observed were blueberry, cherry, black raspberry, and ironwood. The ground is covered with large leaf aster, bracken fern, tick trefoil, meadow-rue, wild sarsaparilla, hog peanut, bedstraw, and grasses. There is very little tree regeneration in the understory.

Beaver have cut many of the aspen along the west edge of this type, near the east shore line of Mayo Lake.

Red pine and white spruce have been planted on the edges of the roadway along the south line of this type. They appear to be in good health.

Recommended Management Activities:

- Salvage dead trees for firewood.

- Leave some dead trees standing for use by wildlife. These snags serve as feeding sites, perch sites, and possible nest sites for a variety of wildlife, such as squirrels, woodpeckers, wood ducks, chickadees, and bald eagles.

- Since there is little tree regeneration in the understory, identify spots with few shrubs and plant tree seedlings there. Choose tree species to plant that are tolerant to shade and long-lived, such as white pine or white spruce. In areas with full sunlight, red pine could be planted. If a pine species is chosen, it will probably need protection from deer browsing until they grow out of the reach of the deer.

Management Alternative:

- Regeneration in more of this stand could be accomplished with intense site preparation. In areas where planting is desired, elimination of the unwanted shrubs would be needed. This could be done by mechanical & chemical methods followed by hand planting of tree seedlings. Protection of pine from deer browsing would also probably be needed.

  Your forester is able to assist with planning this regeneration activity.

Woodland Stewardship Cover Types

Type #2 – Tamarack Lowland

Site Quality – Very Good (tamarack SI = 70)
Tree Density – Good (basal area = 120 sq. ft/acre)
Total Timber Volume – Good (25 cords/acre) *
Stand Age – Immature (55 years)
*volume should not be used for purposes of selling timber

Stand Description: This type is a unique part of the property. It is part of a larger, lowland conifer area that extends off the property to the north (see map). The trees found here are a mixture, consisting mostly of tamarack with lesser amounts of white pine, red oak, aspen, and red maple. As you go further north in the type off this property, the tamarack becomes more prevalent.

The tamarack averages 11 inches dbh and has 4 to 6 merchantable sticks per tree. An increment boring of a tamarack tree showed it has been having good growth and is not suppressed. This type has a good density of trees. This site will grow very good quality tamarack.

The understory of this type has Labrador tea, mosses, ferns, and grasses growing on the ground. Only a few red maple seedings were observed growing there, also.

Recommended Management Activities:

- Since this is just a small area of the property and the timber here is still immature, no treatment is necessary at this time. Monitor the trees for damage from insects, disease, and weather events.

- If hiking trails are constructed on this side of the property, establish one close to this type, so the unique characteristics of this lowland can be observed.

Woodland Stewardship Cover Types

Type #3 - Oak Saplings

Site Quality – Fair (red oak SI = 50, est.)
Tree Density – Good (1800 stems/acre)
Total Timber Volume – Low (5 cords/acre) *
Stand Age – Regeneration (10 years, est.)
*volume should not be used for purposes of selling timber

Stand Description: This type is a small area where regenerating oak saplings are prevalent. An old fire plow line was observed in the area of this type, so a wild fire is the possible cause of this young area of timber. There is a good density of red oak, bur oak, aspen, and paper birch saplings in the 1 to 5-inch diameter class. The saplings are about 20 feet tall. This type has a good density of trees. This site will grow only fair quality oak.

There are a few larger trees mixed with the saplings. They are jack pine and aspen averaging 8 inches dbh and larger red pine averaging 16 inches dbh.

A light density of hazel, raspberry, and cherry shrubs are found in the shrub layer. Grasses, ferns, and forbs cover the ground.

This young forest type adds to the tree diversity of the property, which helps to attract a wider variety of wildlife.

Recommended Management Activity:

- This area is in the process of regenerating itself and is in good condition. No treatment is necessary at this time. It will continue to provide its benefits to the environment. Monitor the area for damage from insects, disease, and weather events.

Woodland Stewardship Cover Types

Type #4 – Birch/Aspen/Oak Mixture

Site Quality – Very Good (paper birch SI = 75)
Tree Density – Good (basal area = 95 sq. ft./acre)
Total Timber Volume – Moderate (15 cords/acre) *
Stand Age – Immature (40 years)
*volume should not be used for purposes of selling timber

Stand Description: This stand is a mixture of immature paper birch, aspen, and red oak. In places, there are pure clumps of either birch, aspen, or oak. But for the most part, the tree species are mixed together. The trees range in size from 6 to 14 inches dbh and have 2 to 5 merchantable sticks per tree. This type has a good density of trees. These sites will grow very good quality paper birch.

A few stumps were observed during the inventory. It appears that someone has been cutting and removing some oak from this type.

The understory has a good density of tree saplings. There are several hundred stems per acre of paper birch, red oak, and aspen in the 1 to 5-inch diameter class. The shrubs are mainly raspberry, gooseberry, and cherry. The ground is covered by large leaf aster, wild sarsaparilla, bracken fern, hog peanut, and grasses.

Recommended Management Activities:

- In general, the trees in this type are immature, have a good density with plenty of tree saplings in the understory, and appear to be in good health. No treatment is necessary at this time. This type will perpetuate itself for many years to come.

- Monitor the trees found here for damages from insects, disease, and weather events.

Woodland Stewardship Cover Types

Type #5 – Mixed Hardwoods & Pine

Site Quality – Average (jack pine SI = 50)
Tree Density – Good (basal area = 130 sq. ft./acre)
Total Timber Volume – Good (25 cords/acre) *
Stand Age – Mature (65 years)
*volume should not be used for purposes of selling timber

Stand Description: This type occurs in several places and covers a large portion of the property. It is quite a mixture of older hardwoods and pine. The hardwoods are mostly paper birch and red oak with smaller amounts of aspen and red maple. These hardwoods range in size from 6 to 14 inches dbh. The pine is mostly jack and red pine ranging in size from 7 to 22 inches dbh. There are some large red pine trees scattered throughout this type.

There is some tree regeneration in the understory, mostly red and bur oak seedlings and saplings with some red maple, paper birch, and red pine saplings mixed with the oak.

Some spots have a heavy density of shrubs, mainly hazel, juneberry, blueberry, cherry, and poison ivy. The ground is covered with bracken fern, wild sarsaparilla, large leaf aster, hog peanut, Canada mayflower, wild strawberry, northern bedstraw, and grasses.

This type is quite variable with the mixture of tree species present and their sizes. This type has a good density of trees, but these sites will grow only average quality jack pine.

Recommended Management Activities:

- Promote the growth of the longer-lived red and white pine in this type. These pine species like full sunlight, so consider removing other trees that are overtopping and competing with these pine for sunlight. Removal of the trees would be selective and the cut trees could be utilized for firewood.

- Some of this type consists of pure red oak areas on steep slopes down to the Mayo Lake shore line. Reserve these areas from any activities, so the vegetation there may provide protection to this riparian zone.

Woodland Stewardship Cover Types

Type #6 – Red Pine

Site Quality – Good (red pine SI = 60)
Tree Density – High (basal area = 150 sq. ft./acre)
Total Timber Volume – Good (30 cords/acre) *
Stand Age – Immature (55 years)
*volume should not be used for purposes of selling timber

Stand Description: This type consists primarily of immature red pine. Many of these trees are in the small sawtimber class size averaging 11 inches dbh and have 5 and 6 merchantable sticks per tree. There are some very large red pine mixed throughout the type averaging 22 inches dbh and have 3 sawlogs per tree. These larger trees are quite majestic.

There are other tree species mixed in this type in smaller amounts, including aspen, jack pine, red oak, paper birch, and bur oak. These species range in size from 6 to 10 inches dbh. The aspen, birch, and jack pine are mature.

The understory has a good amount of tree saplings growing there, including red and bur oak, birch, red maple, and red pine. Shrubs found there include hazel, blueberry, and poison ivy. Bracken fern, large leaf aster, gooseberry, star flower, Canada mayflower, and grasses cover the ground.

The large red pine found here make this some of the most scenic forest area on the property.

Recommended Management Activities:

- Similar to mixed stand #5, the longer-lived red and white pine could be promoted by removing other tree species that are overtopping and competing with the pine. The aspen, birch, and jack pine would be good candidates for removal, since they are mature. This removal could be done selectively with the cut product being firewood.

Management Alternative:

- If the selective thinning is not done, there are plenty of trees in the overstory and understory for this type to last a long time.

Woodland Stewardship Cover Types

Type #7 - Aspen

Site Quality – Excellent (bigtooth aspen SI = 80)
Tree Density – High (basal area = 140 sq. ft./acre)
Total Timber Volume – Good (30 cords/acre)
Stand Age – Near mature (40+ years)
*volume should not be used for purposes of selling timber

Stand Description: This type consists of several areas of the property where mature and near-mature aspen is predominant. Many of the areas are small pockets or "clones" of aspen. The aspen is both the quaking aspen and the bigtooth aspen species. The aspen averages 11 inches dbh and have 5 and 6 merchantable sticks per tree. Most of the type is fairly pure aspen, but there is some jack pine, red oak, paper birch and red pine mixed in. This type has a high density of trees. These sites will grow excellent bigtooth aspen.

Some of the aspen have begun to deteriorate and are showing signs of white stem rot (60%). The strip of this type along the west side of Mayo Lake has some wind damaged trees there.

The understory of this type has a good density of tree seedlings and saplings, including red and bur oak, paper birch, and aspen. Shrubs growing there are hazel, blueberry, juneberry, and raspberry. The ground is covered with bracken fern, large leaf aster, Canada mayflower, wild strawberry, dwarf raspberry, wild rose, and poison ivy.

The scattered nature of these aspen pockets adds to the tree diversity of the property, making it more visually pleasing and attractive to a greater variety of wildlife.

Recommended Management Activity:

- As the old aspen trees die in this type, there are plenty of tree seedlings and saplings in the understory to take the place of the dead trees. This type should perpetuate itself over time. The aspen type will succeed to more of a mixture of hardwood species (oak, birch, aspen).

Management Alternative:

- To maintain this type as aspen, the mature trees should be harvested. The harvested areas will regenerate naturally with aspen suckers. This harvesting could be done as a commercial timber sale or possibly, as firewood cutting.

Woodland Stewardship Cover Types

Type #8 – Jack Pine

Site Quality – Average (jack pine SI = 55)
Tree Density – Good (basal area = 97 sq. ft./acre)
Total Timber Volume – Good (20 cords/acre) *
Stand Age – Mature (75 years)
*volume should not be used for purposes of selling timber

Stand Description: This type consists of areas on the property where mature to overmature jack pine is predominant. The jack pine average 11 inches dbh and have 4 to 6 merchantable sticks per tree. There are some small amounts of red oak, aspen, and red pine growing with the jack pine. This type has a good density of trees. These sites will grow average quality jack pine.

The understory has a good density of red and bur oak and red maple seedlings and saplings. Shrubs growing there include hazel, blueberry, and poison ivy. The ground is covered with bracken fern, Canada mayflower, starflower, and grasses.

The jack pine found here are declining with many of them being dead already (approximately 20%).

Recommended Management Activity:

- This type could be managed similar to aspen type #7. As the old jack pine trees die in this type, there are plenty of tree seedlings and saplings in the understory to take the place of the dead trees. This type should perpetuate itself over time. The jack pine type will succeed to more of a mixture of hardwood species (oak and maple).

Management Alternative:

- To maintain this type as jack pine, the mature trees should be harvested. The harvested areas will need to be artificially regenerated through site preparation and tree planting. Jack pine could be chosen to plant to perpetuate this species, or choose another tree species suited to the soils, such as red maple for its fall color.

- This harvesting could be done as a commercial timber sale or possibly, as firewood cutting. Your forester is able to assist with preparation and marketing of a timber sale.

Woodland Stewardship Cover Types

Type #9 – Upland Shrubs

Stand Description: This type is a small area along the gravel road and woods trail where there are few trees. The area has a good growth of sumac shrubs.

Sumac has great fall color. Its seed head provides food for songbirds. This dense clump of stems provides cover for wildlife.

Recommended Management Activity: Maintain this type as it is to provide its benefits to the environment and property users. No treatment is needed.

Type LB – Lowland Brush

Stand Description: This type is the lowland areas between the upland forest and the open water of Mayo Lake. The vegetation consists mainly of willow and alder shrubs and sedge grass and cattails. A few black ash trees were observed along the edge of the upland.

This zone of lowland vegetation provides a good buffer for the water from activities on the upland. These wetlands are important by providing basins to catch surface water runoff, recharging ground water supplies, trapping sediment and nutrients, providing wildlife habitat, and adding diversity to the landscape.

Recommended Management Activities:

- Protect this shore land from damage during other management activities and development of the land, so it may continue to provide its benefits to the property and the environment.

- Erect artificial nesting structures for wildlife, such as mallards and wood ducks. Maintain the nesting structures annually. Plans for construction of and tips for installation are included with this plan.

Property-Wide Considerations

Invasive Plants:

Be aware of common invasive plants, such as buckthorn, common tansy, spotted knapweed, etc., so you can identify them if they show up on this property. Early detection and measures, such as ensuring that equipment is clean before arriving for use on your land, will help prevent their spread and degradation of habitat.

More information about invasives is available at this web site: http://www.dnr.state.mn.us/invasives/index.html.

Nongame Wildlife:

Songbirds seem to be everywhere and offer many opportunities to assess forest health and dynamics. Here are some general guidelines to follow when managing for nongame wildlife.

- Maintain a mix of both young and old forests with a diversity of types. Extensive blocks of mature forest benefit some bird species, while other species do better in young forests with extensive edge habitats. Knowing the landscape context of the property can help with management decisions.

- Forest openings are used by grassland and forest bird species alike. Maintain permanent openings through periodic mowing or burning (avoid when managing forest interior species).

- Fruit-bearing trees and shrubs attract a lot of bird species in the fall. Pre-migration songbirds particularly favor highbush cranberry, Juneberry, elderberry, blueberry, flowering crab, cherries, dogwood and mountain ash.

- Reptiles and amphibians: Do not graze cattle in woodlands as they compact soil and congregate around forested wetlands. Thin hardwood stands to create more structural diversity. Create brush piles and down woody debris during management operations. Protect seasonal ponds and wetlands in forests.

- Northern Goshawk: Minimize disturbing activities during the critical nesting season (March 1 – August 30) within 40 acres of known nests. Manage foraging area for prey species by maintaining a mix of forest ages and types. These birds have large (6-15,000 acre) home ranges, so one landowner cannot protect this species.

- Be aware of Blanding's turtles, a state threatened species, that has been documented near this property. They may traverse this land and use the lake and creek, especially during the nesting period (June) when they nest as far as a mile from wetlands in open, grassy, or brushy, sandy soils.

- Snags and Den Trees: Dead and dying trees are very important for woodpeckers, squirrels, bats, waterfowl, furbearers and many other animals. Leave most dead trees or den trees standing during a forestry operation, with a goal to have 2-3 per acre. Also, reserve some live large diameter trees for future snags. You can create snags by girdling undesirable trees in stands.

- Coarse Woody Debris: Logs and rotting material on the forest floor provides important micro-habitat for mosses, lichens and fungi, as well as cover for small mammals, reptiles and amphibians. Brush piles can be an easy way to improve a stand's structural diversity.

- Riparian Areas: The zone around lakes, streams and wetlands are teaming with life, because this is the area where several habitats come together. As always, a diversity of forest types and age classes benefits a diversity of species. Older trees contain cavities for waterfowl, bats, birds, and small mammals. Brushy areas provide habitat for common yellowthroat, flycatchers, and American woodcock. However, care must be taken to not open up the canopy to the degree of warming the water, removing too much shade, or allowing sedimentation of the waterway. Consult the Minnesota Site Level Guidelines for additional land management guidance.

- Patch Size: There are entire suites of species adapted to each combination of forest type and patch size imaginable, from small disturbed areas to big patches of mature forest. It is important to consider your impacts upon the landscape around the property.

Recreation:

There is an existing system of woods trails that occurs throughout this property (see map). These trails are to be used for **nonmotorized** recreational activities, such as hiking, wildlife viewing, snowshoeing, and cross-country skiing. Some of the trails may be used as access for equipment to carry out management activities.

A picnic table has been installed near the Mayo Lake Dam.

Recommendations:

- Construct new trails as desired. A possible new trail has already been identified paralleling the southwest shore of Mayo Lake. This new trail could easily connect with the existing trails.

- Install additional picnic tables as desired.

- Install benches along the recreational trails as desired.

- Construct a vehicle parking area near the Sumac Type #9, as planned.

- Maintain the existing trails with periodic mowing to keep the shrubs and trees from invading the trail corridor.

Forest Management Summary

This forest management plan is prepared for 67 acres of land located near Pequot Lakes, Minnesota in Crow Wing and Cass Counties. There are many different vegetative cover types found on the property, including upland forests, and lowland shrub swamps. These lands surround the southern portion of Mayo Lake. The topography is mostly gently rolling with some steep slopes along the lake. The soil is loamy sand. Some of the property boundaries have been surveyed.

This property has an existing system of woods trails that are used for recreational activities and management access.

The City of Pequot Lakes has recently acquired this property. A perpetual conservation easement on this property was conveyed and recorded by the previous owner. Preparation of this forest management plan is a condition of this easement.

The City's main goals for managing this property are for nonmotorized outdoor recreation and to keep it in a rustic, park-like condition for a long period of time. There are no plans for development of structures on the property.

The following is a condensed summary of the cover type recommendations:

- **Maintain cover types #2, 3, 4, 7, 8, 9, and Lowland Brush as they are. No treatment is recommended in these areas of the property.**

- **Salvage dead trees for firewood from Oak type #1. Consider tree regeneration efforts for this type.**

- **Promote the growth of desired, long-lived tree species in types #5 and 6 by selectively removing trees that are competing with the desired trees.**

- **Alternative management recommendations for types #7 and 8 would be commercial timber harvesting.**

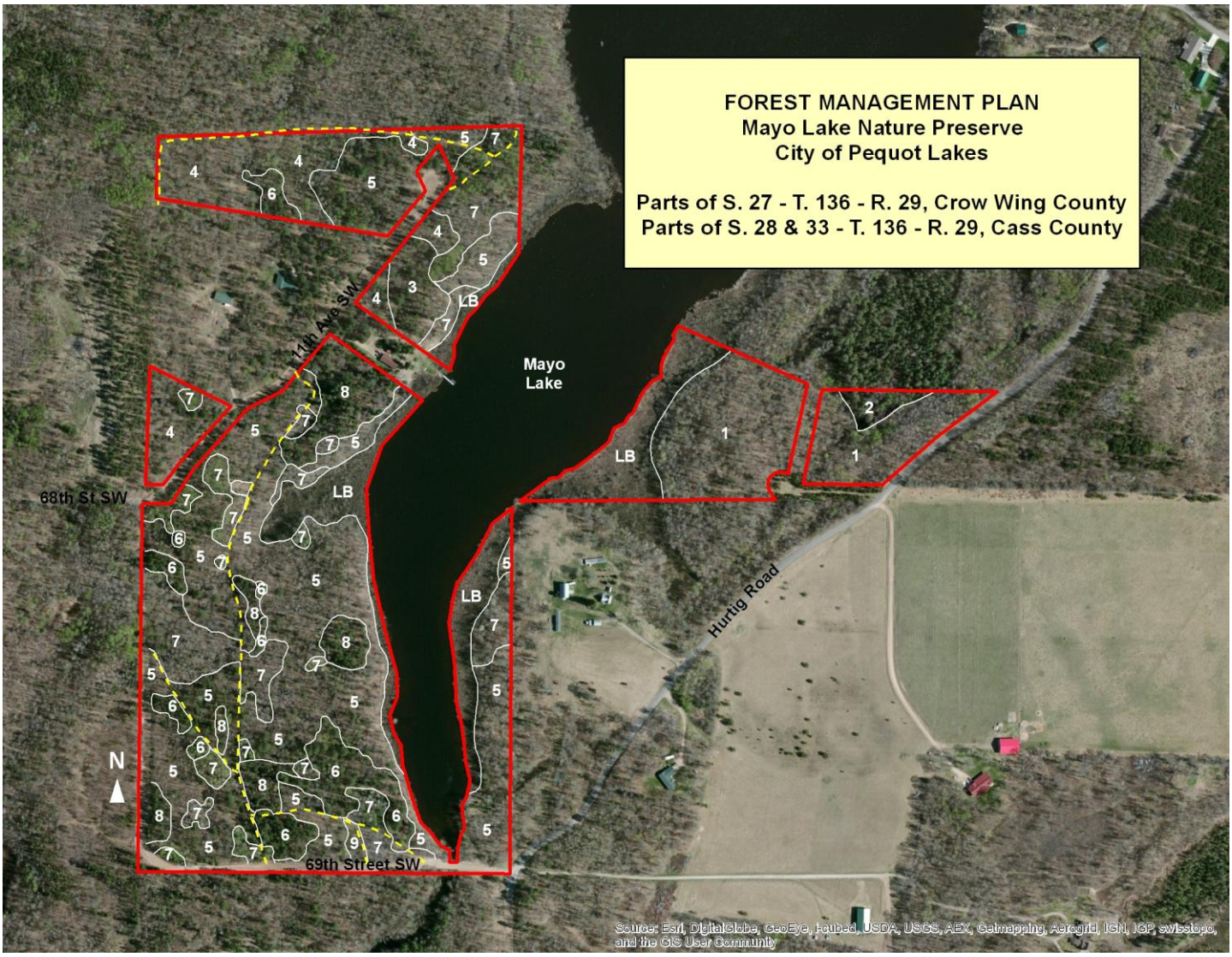
- **Protect the riparian areas along the Mayo Lake shore line from damage and development.**

- **Erect artificial nesting structures for waterfowl.**

- **Be aware of terrestrial and aquatic invasive species. Control them as necessary.**

- **Develop and maintain recreational facilities, including the trails, picnic tables, benches, and parking area.**

APPENDIX


FOREST MANAGEMENT PLAN
Mayo Lake Nature Preserve
City of Pequot Lakes
Parts of S. 27 - T. 136 - R. 29, Crow Wing County
Parts of S. 28 & 33 - T. 136 - R. 29, Cass County
Mayo Lake
11th Ave SW
68th St SW
69th Street SW
Hurtig Road
LB
N
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community