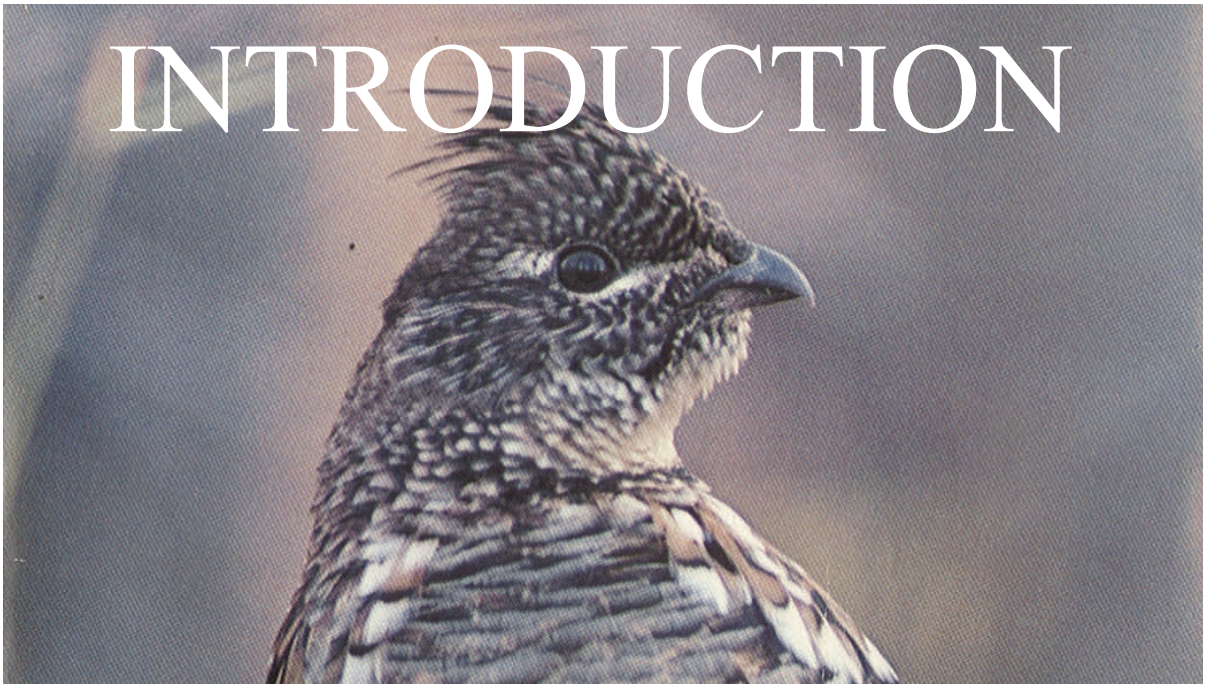
INTRODUCTION



The first Lake County Management Plan was published in 1983. The plan was written by Brian McCann from the Minnesota DNR. The plan contained 37 management recommendations that would guide the staff to the proper administration of the Lake County Forestry Department. These recommended actions have been instituted. The 1983 plan also called for the creation of a Standing Forestry Commission. This group, made up of people with Forestry interests from Lake County, was formed to advise the Forestry Department on policy matters. The Standing Forestry Commission (SFC) continues to advise the Forestry Department today.

The new plan for managing Lake County's tax forfeit lands utilizes information gathered from many different sources. The Forestry Department has collected biophysical data from its tax forfeit land to establish a system for determining site quality, species compatibility and silvicultural prescriptions. In 1994, the Minnesota Generic Environmental Impact Statement on Timber Harvesting and Forest Management (GEIS) was completed. In 1995, the Minnesota Sustainable Forest Resource Act (SFRA) was established by the state legislature which created the Resource Forest Resource Council and Partnership. Much of the information that is now used by the Forestry Department originated from the completion of the GEIS and the products that came from the SFRA. These products include the site level guidelines (Green and now Gold Book) and Northeast Minnesota Landscape Committee goals and recommendations. These new products are used in conjunction with the staff foresters many years of field experience. The first management plan laid out recommendations for the administration of the Forestry Department. The new plan describes how to manage the tax forfeit land base by recognizing the differences in landscapes and sites, moving towards the range of natural variability (RNV) of our native plant communities and working with the true potential of our diverse forest lands.

Lake County believes that forestry and wildlife management are inextricably linked. Forestry decisions directly impact wildlife habitat quality for non-game, small game and big game species. Lake County recognizes that large patch management, extended rotation forests and the range of natural variability are important goals for proper landscape management. With Lake County being made up of 82% public lands, there is generally an ample amount of set asides across the landscape. Lake County's management plan will address all of the landscape scenarios, keeping in mind what the other agencies are doing, while keeping its eye on sustainability, that is, the blending of the ecological, economic and social values of the county.

Lake County recently purchased over 6,200 acres of land in East Central Lake County from the Conservation Fund. This land was purchased to ensure continued forest production and public access and to protect and maintain wildlife habitat. Formerly part of an industrial forest, the land could have been divided and sold to private landowners. An agreement between Lake County, The Nature Conservancy, Minnesota DNR, and Minnesota Power ensures that the forestland will continue to be harvested sustainably, providing jobs for the local community and wood supply to the mills. At the same time, it guarantees public access, including hunting, fishing, hiking and snowmobiling and protects important habitat for a wide variety of wildlife species.

Executive Summary

1.1 Mission

It is the intent of the Forestry Department to protect, develop and administer Lake County's land and timber resources to best meet the needs of county residents by utilizing multiple-use, sustained yield principles to provide a diverse mixture of resource uses and outcomes.

The Lake County Forestry Department is currently staffed with 7 people, which include 4 Foresters, an Administrative Assistant, a GIS Specialist and a Land Commissioner.

1.2 The Resource

Lake County manages 151,000 acres of tax forfeit land, approximately 12 percent of the land base in Lake County. Over ninety five percent of this land is forested. The remaining percentage is made up of wetlands, brush, water, developed land (gravel pits and buildings), and rock outcrop. Nearly two thirds of the land lies within a corridor running within approximately 10 miles of Lake Superior. Most of this land lies within three Biophysical Regions; the Duluth Uplands, Superior Uplands and Cloquet Island Lake Plain. Three Native Plant Communities subsections represent most of this area; the North Shore Highlands, Laurentian Uplands and Toimi Uplands plant communities. The existing cover types on tax forfeit lands across the county is made up of approximately 50% Aspen, 12% Northern Hardwood, 20% White Birch, and the remaining cover types made up of Balsam Fir and White Spruce. Lake County is home to a significant portion of the state's moose population. Wildlife populations in this region are substantial due to favorable conditions including natural food supplies available during all of the seasons created by timber harvest and natural disturbances. Large game migrates into and through the region seeking sources of food and differing snow depths. Grouse, moose, beaver, deer, black bear, Lynx and timber wolves (Gray Wolf) occur throughout the region. The Gray Wolf is now occurring in large enough numbers where it is no longer considered a threatened or endangered species in Minnesota.

1.3 Management Principles

Full and proper utilization of this resource will be carried out consistent with generally

accepted social, economic and environmental principles, and within the confines of all applicable administrative and state statutory guidelines (Chapter 282). It is recognized that that the development of county lands and their resources to the fullest also requires close cooperation with other county departments, state and federal agencies, regional cooperators, private industry and with the local public.

Lake County became a third party certified, natural resource management organization in 2005. With the support of the Lake County Board of Commissioners, the Forestry Department sought certification to confirm to county residents and consumers of our wood products, that; products from the Lake County forest lands were being harvested in a sustainable manner, land management policies and guidelines are documented and followed, land management activities are inventoried and monitored in a data base and GIS mapped, and that Forest Stewardship Council principles will be followed. Lake County has been a Sustainable Forestry Initiative (SFI) licensee since 2001. As part of the responsibilities of a SFI licensee, the Forestry Department conducts a two and five year check of regeneration success, natural or artificial, on all managed forest acreage.

The health of Lake County's tax forfeit lands is dependant on proper forest management. Native plant Communities cannot be preserved by neglect. Disturbance dependant ecosystems must be managed to remain healthy and diverse, especially recognizing the suppression of naturally occurring fire.

Sustainable management includes the recognition of ecological, economic, and social factors. To manage lands with less than all three factors taken into consideration will not lead to sustainability. Constraints on each factor by the other two will help balance all.

Much of the information that is now used by the Forestry Department originated from the completion of the Generic Environmental Impact Statement of Timber Harvesting and Forest Management in Minnesota (GEIS) and the products that came from the Sustainable Forest Resource Act (SFRA). These products include the site level guidelines (Green and Gold Books) and Northeast Minnesota Landscape Committee goals and recommendations.

1.4 FSC Certification

Lake County Forestry is a third party certified, natural resource management organization and adheres to the 10 FSC principles as described in the Management Principles Chapter.

1.5 Planning Goals and Strategies

1.5.1 Manage by Native Plant Community – See Native Plant Community Map

Lake County shares the goal of the Northeast Landscape Committee to move towards the Range of Natural Variability for each NE Landscape Committee native plant community. See Forest Management Principles for Cover Type Management of Native Plant Communities

1.5.2 Rare, Threatened and Endangered Specie Habitats (RTE)

The data for known sites of Rare, Threatened and Endangered species are extracted from the Natural Heritage Information Data Base for proposed management sites. Sites will be acknowledged prior to any land management planning. Proper measures will be planned to maintain or enhance the existing habitats. The Minnesota State Historical Preservation Office (SHPO) will be contacted prior to earth disturbing management activities for a search for historical sites on historical known or suspected sites.

1.5.3 Information management and monitoring

Information tallied in the field will be entered by foresters on hand held personal digital assistants (PDAs). This information will be directly entered into the appropriate computer data base for GPS located timber inventory, timber cruises, and plantation inventory plots. Monitoring of the tax forfeit land base will be conducted by using the 128,371 Lake County predefined plots. The data for the Lake County predefined plots will be digitally recorded with PDAs as plots are inventoried for cruising timber and plantation success and regeneration surveys. All of the information gathered in these inventory efforts will be geo-referenced. The timber cruise, management prescriptions and timber scale information will all be documented in one of several data bases that can all be accesses and mapped to one display.

1.5.4 Recreation

The Forestry Department will work with the DNR, Forest Service, clubs and residents to maintain and improve the existing Grant-In-Aid and state snowmobile, ATV, and cross country ski trails in Lake County. Cooperation will continue with the DNR and Forest Service to establish a connected network of ATV trails from existing trails. A limited number of new connector trails or short permitted routes on roadways will be needed to connect some trails. Cooperation will continue with the Superior Hiking Trail Association to maintain its existing trail and to assist in the establishment of new trail segments. Efforts will be made to obtain permanent easement or ownership for these trail corridors. Existing roads and trails will be used for new trail routes. No new motorized trail corridors will be created.

1.5.5 Land Consolidation

Land exchanges and land sales will be utilized to consolidate tax forfeit land ownership. This is a part of the larger effort to keep forested landscapes in Northeast Minnesota intact and managed as forests rather than sold by 40 acre parcel and developed into residential ownerships. An equal value of tax forfeit land will be sold to offset private land purchases and to equalize the public/private land balance. Tax forfeit lands with undivided partial interests will be examined to determine if the private partial interest can be purchased or exchanged to make the tax forfeit parcel whole. In some cases, the tax forfeit undivided interest may be sold at public auction.

1.5.6 Timber Flow

It is the goal of the Forestry Department to provide a constant and reliable timber flow from tax forfeit lands. Lake County Forestry will offer a variety of timber sales at public auction to small and large operators.

1.5.7 Pesticide Use

Lake County Forestry endorses and uses the pesticide use guidelines established in the Voluntary Site Level Forest Management Guidelines manual. This document is intended to supplement those guidelines and more specifically state this department's goals and use of pesticides.

As a general rule Lake County Forestry uses herbicides at the lower label recommended application rates and only for conifer release. Rarely are herbicides used for site preparation prior to conifer establishment.

I. Economic, Social and Ecological Perspectives

The perceived value of tax forfeit land has in the past, generally been below that of other public and private lands. The lack of adequate staff and funding for most county land departments, and the low value of land and Aspen stumpage, led to an under appreciation of tax forfeit land resources. Several past and recent events have changed the perceived importance of tax forfeit lands. County Boards and tax forfeit management agencies have evolved to adjust to the changes. Listed below are some of the changes that have affected the value of tax forfeit land.

Past Changes:

- Increased use of aspen
- Aspen stumpage value gradually increases
- Increase in the number of mills and resulting increase in use of the timber resource
- Restraints placed on the Forest Service Timber Resource in Lake County by various agents
- Generic Environmental Impact Statement (GEIS) for Minnesota's timber industry is completed
- Site level guidelines are created from GEIS findings
- NE landscape goals are adopted by the DNR, USFS and Counties
- The majority of local Mills are sold to foreign companies
- Land values increase rapidly with the resulting increase of taxes on industrial timber lands
- The Global Economy arrives in northern Minnesota
- Entire Industrial Forests are sold to investors or take on different financial status's
- Lower Productive industrial lands are sold by 40 acre parcel over the internet
- The sale of former industrial lands within the public land base, creates problems including easement demands and loss of access
- Major International business's and area multi-national mills demanding a certified wood source
- County Biological Survey (CBS) is completed for Lake County

Recent changes:

- Legislative mandates for the storage of spent fuel rods requires power companies to produce a percentage of power from green sources
- Industrial lands are sold or become Real Estate Investment Trusts (REITs) or Timberland Investment Management Organizations (TIMOs).
- Perfect Storm of Wisconsin Mill closings, housing market declines, and high bid up stumpage sales result in Mill closings and market decline or collapse in Northern Minnesota
- Governor Pawlenty sets a goal that 25 percent of the state's electricity will come from next-generation power sources by 2025.
- Power companies begin using slash and fine woody debris for biofuel and announce plans to greatly increase use of biomass.
- Minnesota Forest Resource Council (MFRC) establishes bio-fuel utilization guidelines
- The value of forest land has stopped increasing and become relatively stable. Demand for vacant forest land has decreased.

Changes in County Board's point of view and policies:

- County tax forfeit land is now more valuable to the County because of its importance to Industry as a reliable timber resource
- No net loss of private land values in the County is still important, but consolidation of manageable forest land will be allowed to occur before values must be equaled
- It is desirable for development to take place in locations where timber resources are not diminished and public access is not lost
- It is important for county land departments to become third party certified to demonstrate that they are doing a good job and to be able to sell county resources to local mills
- Staffing is increased to include GIS specialists in Forestry Department

Changes in county land departments:

- Land departments are more actively documenting policies and practices and management activities to meet third party certification requirements
- Land departments are more actively using DNR information from CBS, SHPO, and other sources
- Land Departments are using electronic data collectors for inventory, cruising and plantation checks to record data for GPS specified points

The importance of tax forfeit land has increased because of the rise in the values of stumpage and land, and the decrease in the availability of federal stumpage in Northeast Minnesota. With the increase in value, also came an increase in the expectations for the proper management of tax forfeit lands.

II. The Resource - Tax Forfeit Lands

Past Land Use
Description by Biophysical Region
Land Use by Acreage
Cover Types by Acreage and Age Class

Past Land Use

The book **Minnesota Lands** was published in 1960. In the opening "Highlights" section of the book it states,

"The counties are relative newcomers as owners of large areas of forestland. As tax delinquency mounted, repeated efforts were made to discourage their forfeiture and to encourage their redemption. This "bargain" legislation failed to have the desired effect, and the depression years of the 1930's saw county ownership built up to the extent of millions of acres.

This unexpected and unwanted development found the counties unprepared to meet the new responsibilities thus thrust upon them. Their first reaction was to get the lands back into private ownership, an attempt

that met with little success. Cutover stump lands and abandoned farm

lands were a drag on the market."

A majority of the private lands in Lake County that were forfeited for non-payment of taxes in the past, were owned or leased by timber companies. Most of the valuable trees had previously been harvested off of these lands starting in the 1880's and ending in the 1920's. During especially dry years, natural and timber harvest slash wildfires were common. When these fires burned especially hot, valuable organic soil was consumed and a poorer site was created. The combination of large areas of land cleared of the most valuable timber and then burned, with exposed soil ready for seed germination with no seed from valuable species available, led to a second growth forest made up mostly of early successional species, with few white and red pine.

Some small homesteads were farmed but were given up after a few lean years. A short growing season and less than ideal soils meant certain failure for successful farming. After abandonment, most of these sites were quickly regenerated by early successional species such as aspen and birch.

DESCRIPTION OF THE TAX FORFEIT RESOURCE BY BIOPHYSICAL REGION

Based on extensive field reconnaissance, selected climate and geomorphic properties, Lake County was divided into seven biophysical regions (BPRs). Climate properties included but were not limited to mean annual precipitation and air temperatures, mean precipitation and air temperatures for period extending from May through August, and growing degree days based on 40 degrees Fahrenheit. Selected morphological properties of the land, glacial geology properties and earthen materials were used in part for characterizing the physical properties of the land. All biophysical regions extend into adjoining counties. The four Biophysical Regions with the most tax forfeit lands are described in detail. The other three regions are briefly described.

DULUTH UPLAND – DU

This biophysical region occupies 182,884 acres along the North Shore of Lake Superior and immediately inland for a few miles in the southwest portion of Lake County. This is the major population area of the county and is a mix of residents who live in the city and adjoining rural areas. Two Harbors is a major service center and has a small airport. Small farmsteads are still visible in the rural areas of the Duluth Upland. There is an influx of people into the region for a variety of employment opportunities. Hunting seasons for birds, small game and big game is responsible for a number of people traveling into and through the region. A significant number of summer and winter tourists travel through the region to various attractions and activities in the general area along Lake

Superior. Sugar maple occurs in sufficient numbers for support of small maple syrup operations. Most roads are paved and State Highway 61 and Lake County Highway 2 along with the rural gravel roads provide an effective transportation system. There is one mining company railroad in this region that brings mining products to the Two Harbors harbor for lake transportation to industrial centers.

Climate

Based on weather data from the weather station in Two Harbors, the average annual precipitation is 28 inches with 14 inches occurring May through August. Annual temperature averages 40 degrees and the average for May through August is 58 degrees. Climate in the Duluth Upland is strongly influenced by Lake Superior causing slightly cooler summer temperatures and warmer winter temperatures than inland regions beyond that influence. Off lake snow can produce several inches to several feet in a single storm. Fog off of Lake Superior can blanket the region for short periods especially during the spring and fall.

Temperatures in the summer can be 10 to 15 degrees higher a few miles inland than along Lake Superior and the reverse in the winter while Lake Superior is free of ice. Growing degree days is 3198*.

Glacial Geology

Glacial drift is mainly from the Superior lobe which moved through the area from the northeast and east. Silty and clayey materials occupy a significant portion of the land. Extensive areas of clayey materials are a signature of this region. Sand and gravel deposits occur in former glacial lake beaches and in stream channels which were discharge routes for melting glacial ice. Rock fragments and boulders occur in substantial amounts over large areas of the Duluth Upland where thickness of the glacial drift is very thin.

Terrain

Irregular exposures of bedrock create the ridge and valley terrain which is another part of the signature for this region. Local relief of several hundred feet is normal and angular slope forms are common. Drainage channels are angular in the bedrock and are rounded and smooth in the thick deposits of silt and clay. Rounded sand and gravel beaches inland at higher elevation and parallel to the shore of Lake Superior are significant features of the Duluth Upland. Numerous marshes and bogs have formed in depressions in the bedrock. Glacial deposits are rich in silt and clay. The shore of Lake Superior is mainly bedrock and clayey with isolated portions of wave produced pebbles.

Vegetation

Trembling aspen, northern hardwoods and balsam fir are the most common trees in the region. Black spruce, white spruce, black ash, northern white cedar and tamarack are common in lowlands. Less common are red oak, burr oak and yellow birch. Black spruce, white spruce, tamarack and white cedar are also found in dry uplands. Beaked hazel, mountain maple, mountain ash, dogwoods and bush honeysuckle are common shrubs and occur throughout the region. Tag alder, willow and grass often prevail in selected wet lowlands. Farmsteads scattered throughout this region offer contrasting plant communities ranging from hay fields to grass mixed with shrubs and tree seedlings Of all biophysical regions in Lake County, the Duluth Upland is estimated to have the greatest species richness and variety of individual plant communities.

Structure in plant communities is greatest in the dry uplands dominated by aspen, northern hardwoods and older pine stands. Older communities of pine typically have distinct layers of shrubs and forbs. Wet lowlands with prevailing black spruce or cedar have mainly short shrubs, grasses or mosses. A sharp contrast between dry upland communities and communities in adjoining wet lowlands is characteristic of this region.

Variations in plant communities are the direct result of the climate influence of Lake Superior, fire, wind, insects, diseases, beaver activities, timber harvest and plantation management. Farming, urban development and forest land management activities will be the main determinants of forest characteristics. There is a wide variety of plant species with some occurring in natural patterns while others are a result of prescribed management activities.

Water

Streams flowing through clayey flats, bogs and deep bedrock gorges are a significant signature of Duluth Upland. Headwaters of streams in this region are consistently within twenty five miles of their mouth at Lake Superior. Levels of streams are ex

tremely variable due to low storage capacity and steep slope gradient in watersheds. An estimated sixty percent of precipitation is runoff from this region and this region and the Superior Uplands are the highest of all of the biophysical regions in Lake County. Streams characteristically have flashy high spring levels and very low levels in mid-summer. Dry stream beds are common. High flows following a high intensity summer rain are a signature of this region. A significant contribution of silt and clay sediments into Lake Superior results from that type of flow. Extensive red water discharges at stream mouths are common along the shore of Lake Superior in this region. Flow is consistently southeast into Lake Superior and the entire region is within the Lake Superior watershed. Bogs are common along several streams and make up the flood plain in those instances. Inland lakes are sparse in this region.

Stream headwaters in many instances have substantial areas of peat bogs, marshes or clayey material. Those headwaters have low water storage capacity and current vegetation is typically tag alder, black spruce, black ash, tamarack, grass or combinations of all. A few bogs have a substantial amount of cedar. Most bogs have well defined outlets into perennial streams. Associated with the low slope gradient in the watersheds are wide annual flood plains before the streams reach the bedrock gorge sections. Overland flow is common in those flood plains during spring and fall recharge. It is also common following high intensity summer rains.

Management Analysis

Clay flats, bogs, steeply sloping bedrock, streams flowing through bedrock gorges, and Lake Superior provide a meaningful base of contrasting land features. Coupled with those features are contrasting plant communities which together render the Duluth Upland an extremely attractive area for a variety of outdoor recreation activities. Private and government agencies offer recreation opportunities ranging from boating, canoeing, camping, hiking and dispersed camping. During the fall there is woodcock and ruffed grouse and big game hunting in this region. Brilliant contrasting fall colors are a main attraction in the Duluth Upland. Northern hardwoods mixed with trembling aspen and conifers and bright colored shrubs produce a unique array of fall colors. Those colors include bright red, bright orange, bright yellow and rich green. Snowmobiling is a popular activity in a large portion of the region. Cross country skiing is a growing activity in the region.

Wildlife in the Duluth Upland is representative of an area influenced by Lake Superior, extensive areas of clay flats and broken bedrock terrain. It is a major migratory route for birds in the spring and fall. Hawk Ridge, located in Duluth, has international interest for observing birds during fall migration. Large game migrates into and through the region seeking sources of rich foods.

Grouse, moose, beaver, deer, black bear and timber wolves occur throughout the region. Wildlife populations in this region are substantial due to favorable conditions including all season natural food supplies created by timber harvest, farming, and natural disturbances. Mallards commonly nest in beaver ponds. However, the overall duck population in this region is low.

Road construction and maintenance plans will have to consider the extensive clay flats, bogs, marshes, steep slopes and bedrock at or near the ground surface. Sources of sand or gravel are sparse throughout this region. Road crossings will require a design that factors in the large volume and sometimes high velocity flow during flood stage. Late winter flooding often causes ice dams in culverts and small bridges within this region. Consequently, standard drainage features for stream crossings will have to be carefully evaluated for use in this region.

Quality pulpwood, bolts and logs can be produced in this region. Site quality ranges from low to high. Site quality increases with increased natural drainage in the silty and clayey flats and adjoining more sloping terrain. Site class quality decreases substantially with either an increase in wetness or decrease in depth to bedrock. Site quality is therefore highest in the dry somewhat sloping clayey areas and lowest in the very thin soils over bedrock. In the high quality site portion of the region, quality sawlogs can be grown in the northern hardwood, pine or spruce stands. In contrast, some of the lowest quality sites in the bedrock areas could be considered for non-forest production and dedicated to other uses. In the high site quality areas, the nutrient status will likewise be high along with the moisture holding capacity. Routine forest harvest cycles and current products removed from the forest will have little effect on the nutrient capital of the root zones. Season of forest operation will be guided by evaluating properties of the project areas for their capacity to support prescribed activities and maintain long term site quality and productivity. Operations without a prescription would be prone to high risk of causing adverse impacts on the land and site quality. Such impacts could be long term. A substantial portion of this region has a high risk for wind damage because of wet clayey conditions, local perched water in the root zone or shallow root zones over bedrock. Site quality in the wet lowlands is considered quite good as a result of favorable natural water movement and contributions of nutrients from the upland via ground water and surface flow. With normal precipitation, loss of trees due to wild fire will be small. Wild fire could be substantial during periods of severe drought. With the presence of forbs, grasses and shrubs in many plant communities, a potential fuel ladder exists for support of

crown fires during those drought periods. Normally, those layers of vegetation can function as a deterrent to ground fires becoming crown fires. Charcoal has been observed in the duff layers in selected areas.

From an economic standpoint, it would be appropriate to consider this region for adequate production of pulpwood, bolts and logs of moderate to high quality in the dry portion of this region. Pulpwood and bolts could be produced in the wet marshes and bogs, but sawtimber would be questionable due to the slow rate of tree growth and the high risk for wind damage. Overall, from an economic standpoint, net returns from wood crops in this region will probably be average to slightly above average. Pulpwood can be grown on most sites including many lowlands in the region and reasonable revenues can be anticipated. Economically acceptable crops of northern hardwood and conifer sawtimber can potentially be produced on all rich dry sites. Most rich upland sites in this region are candidates for producing high quality logs. Group tree management is feasible for a large portion of the dry sites. Additional potential forest products include birch bark, birch sap, harvest of sphagnum mosses, Christmas trees, spring and autumn mushrooms and selected medicinal plants.

This region contains sites that ought to be considered for removal from the land base for producing wood products because of their very low site quality, the risk of long term adverse impacts on their biophysical properties caused by harvest operations and the difficulty of correcting site conditions associated with long term adverse impacts. On some ridge tops and adjoining side slopes the root zones are comprised entirely of a thin cover of duff and mosses over igneous bedrock which supports small diameter stems. Fire burning through heavy concentrations of fuel and especially during droughts can completely destroy the root zone. The fire will consume the forest floor and water and wind erosion will remove the mineral portion of the thin root zone developed on bedrock. Subsequent bedrock exposures will remain bare for decades.

*** Growing Degree Days (GDD) Comparisons**

Houston County > Aitkin County > Clearwater County > St. Louis County > Lake County. Table 4 shows the site index and climate information for each County.

Table 4. *Red Pine site index-glacial outwash-climate values.*

County	Annual Precipitation mean (inches)	GDD's* mean (annual)	Temperature Summer mean (May-Aug)	Site Index
Lake**	29.2	**3,099**	58.7	53
St. Louis***	28.8	**3,356**	60.6	58
Clearwater	22.4	**3,700**	63.4	61
Aitkin	28.7	**3,750**	63.4	61
Houston	34.1	**4,900**	65.8	93

*GDD = Growing degree days. ** All climate values are averages for Isabella plus Two Harbors. *** All climate values are averages for Duluth plus Virginia.

Forest Soil-Climate-Site Index Relationships for Minnesota - U of M Extension

SUPERIOR UPLAND – SU

This biophysical region occupies 105,374 acres along the North Shore of Lake Superior and immediately inland for a few miles in the southeast portion of Lake County. There is no major population concentration in this region and residents live along State Highway 61 and Lake Superior and inland a few miles along rural roads. Small farmsteads are still visible in the rural areas of the Superior Upland. There is a major influx of people into the region for a variety of recreation activities and employment opportunities. Silver Bay is the nearest full service city and is located midway in this region along Lake Superior. Hunting seasons for birds, small game and big game finds a number of people traveling into and through the region. Sugar maple occurs in sufficient numbers for support of small maple syrup operations. Most roads are paved and State Highway 61 and several county highways provide an effective transportation system in this region. A mining railroad transports mining products to the Silver Bay harbor for refinement and shipping on the Great Lakes to industrial areas. A part of the Finland State Forest oc

curs in this region. Tettegouche State Park is located in this region and is a very popular attraction for local citizens and visitors to the region.

Climate

Based on data from weather stations in Two Harbors and Grand Marais, the average annual precipitation is 27 inches with 13 inches occurring during the months of May through August. Average annual temperature is 39 degrees and the average for May through August is 56 degrees. The average annual precipitation is probably higher near Lake Superior because of the local storms off the lake. Temperatures along the lake shore are cooler in the summer and warmer in the winter while Lake Superior is free of ice. Temperatures in the summer can be 10 to 15 degrees higher inland and the reverse in the winter. Average growing degrees is estimated to be 2890* and tends to decrease in an eastwardly direction.

Glacial Geology

Glacial drift is mainly from the Superior lobe which moved through the area from the northeast and east. Silty and clayey materials occupy a significant portion of this region. Extensive areas of clayey materials are a signature of this region. Sand and gravel deposits occur in former glacial lake beaches and in stream channels which were discharge routes for melting glacial ice. Rock fragments and boulders occur in substantial amounts over large areas of the Duluth Upland where thickness of the glacial drift is very thin.

Terrain

An irregular bedrock controlled ridge and valley terrain is another part of the signature for this region. Local relief of several hundred feet is normal and angular slope forms are common. Drainage channels are angular in the bedrock controlled and are rounded and smooth in the thick deposits of silt and clay. Rounded sand and gravel beaches inland at higher elevation and parallel to the shore of Lake Superior are significant features of the Superior Upland. Numerous marshes and bogs have formed in depressions in the bedrock and glacial deposits rich in silt and clay. The shore of Lake Superior is mainly bedrock and clayey with isolated portions of wave produced pebbles.

Vegetation

Trembling aspen, northern hardwoods and balsam fir are the most common trees in the region. Black spruce, white spruce, black ash, cedar and tamarack are common in lowlands. Less common are red oak, burr oak and yellow birch. Black spruce, white spruce, tamarack and white cedar are also found in dry uplands. Beaked hazel, mountain maple, mountain ash, dogwoods and bush honeysuckle are common shrubs and occur throughout the region. Tag alder, willow and grass often prevail in selected wet lowlands. Farmsteads scattered throughout this region offer contrasting plant communities ranging from hay fields to grass mixed with shrubs and tree seedlings Structure in plant communities is greatest in the dry uplands dominated by aspen, northern hardwoods and older pine stands. Older communities of pine typically have distinct layers of shrubs and forbs. Wet lowlands with prevailing black spruce or cedar have mainly short shrubs, grasses or mosses. A sharp contrast between dry upland communities and communities in adjoining wet lowlands is characteristic of this region.

Variations in plant communities are the direct result of climate influence of Lake Superior, fire, wind, insects, diseases, beaver activities, timber harvest and plantation management. Forest land management activities will be the main determinants of forest characteristics. A wide variety of plant species with some occurring in natural patterns while others will be in prescribed managed patterns is a special feature of this region.

Water

Streams flowing through clayey flats, bogs and deep bedrock gorges are a significant signature of Superior Upland. Headwaters of streams in this region are consistently within twenty five miles of their mouth at Lake Superior. Levels of streams are extremely variable due to low storage capacity and steep slope gradient in watersheds. An estimated sixty percent of precipitation is runoff from this region and this region and the Duluth Uplands are the highest of all of the biophysical regions in Lake County. Streams characteristically have flashy high spring levels and very low levels in mid summer. Dry stream beds are common. High flow following a high intensity summer rain is a signature of this region. Resulting from that type of flow is a significant contribution of silt and clay sediments into Lake Superior. Extensive red lake water at stream mouths is common along the shore of Lake Superior in this region. A substantial amount of that sediment results from accelerated runoff from farm fields, road construction and

maintenance, and scouring of clayey stream banks. Flow is consistently southeast into Lake Superior and the entire region is within the Lake Superior watershed. Bogs are common along several streams and make up the flood plain in those instances. Inland lakes are sparse in this region.

Stream headwaters in many instances have substantial areas of peat bogs, marshes, or clayey material. Those headwaters have low water storage capacity and current vegetation is typically tag alder, black spruce, black ash, tamarack, grass or combinations of all. A few bogs have a substantial amount of cedar. Most bogs have well defined outlets into perennial streams. Associated with the low slope gradient in the watersheds are wide annual flood plains before the streams reach the bedrock gorge sections. Overland flow is common in those flood plains during spring and fall recharge. It is also common following high intensity summer rains

Management Analysis

Clay flats, bogs, steeply sloping bedrock, streams flowing through bedrock gorges and Lake Superior provide a meaningful base of contrasting land features. Coupled with those features are contrasting plant communities which together render the Superior Upland an extremely attractive area for a variety of outdoor recreation activities. Private and government agencies offer recreation opportunities ranging from boating, canoeing, campgrounds, hiking and dispersed camping. During the fall there is some bird and big game hunting in this region. Brilliant contrasting fall colors are a main attraction in Superior Upland. Northern hardwoods mixed with trembling aspen and conifers and bright colored shrubs produce a unique array of fall colors. Those colors include bright red, bright orange, bright yellow and rich green. Snowmobiling is a popular activity in a large portion of the region. Cross country skiing is a growing activity in the region.

Wildlife in the Superior Upland is representative of an area influenced by Lake Superior, extensive areas of clay flats and broken bedrock terrain. It is a major migratory route for birds in spring and fall. Hawk Ridge, located in Duluth, has international interest for observing birds during fall migration. Large game migrates into and through the region seeking sources of rich foods. Grouse, moose, beaver, deer, black bear and timber wolves occur throughout the region. Wildlife populations in this region are substantial due to favorable conditions including all season natural food supplies created by farming, timber harvest and natural distur

bances. Mallards commonly nest in the beaver ponds. However, the overall duck population in this region is low.

Road construction and maintenance plans will have to consider the extensive clay flats, bogs, marshes, steep slopes and bedrock at or near the ground surface. Sources of sand or gravel are sparse throughout this region. Road crossing will require a design that factors in the large volume and sometimes high velocity flow during flood stage. Late winter flooding often causes ice dams in culverts and small bridges within this region. Consequently, standard drainage features for stream crossings will have to be carefully evaluated for use in this region.

Quality pulpwood, bolts and logs can be produced in this region. Site quality ranges from low to high for this region. That site quality increases with increasing natural drainage in the silty and clayey flats and adjoining more sloping terrain Site classes decrease substantially with either an increase in wetness or decrease in depth to bedrock. Site quality is therefore highest in the dry somewhat sloping clayey areas and lowest in the very thin soils over bedrock. In the high quality site portion of the region, quality sawlogs can be grown in the northern hardwood, pine or spruce stands. In contrast, some of the lowest quality sites in the bedrock areas could be considered for non forest production and dedicated to other uses. In the high site quality areas, the nutrient status will likewise be high along with the moisture holding capacity. Routine forest harvest cycles and current products removed from the forest will have little effect on the nutrient capital of the root zones. Season of forest operation will be guided by evaluating properties of the project areas for their capacity to support prescribed activities and maintain long term site quality and productivity. Operations without a prescription would be prone to high risk of causing adverse impacts on the land and site quality. Such impacts could be long term. A substantial portion of this region has a high risk for wind damage because of wet clayey conditions, local perched water in the root zone, or shallow root zones over bedrock. Site quality in the wet lowlands is fair as a result of favorable natural water movement and contributions of nutrients from the upland via ground water and surface flow. With normal precipitation, loss of trees due to wild fire will be small. It could be substantial during periods of severe drought. With the presence of forbs, grasses and shrubs in many plant communities, a potential fuel ladder exists for support of crown fires during those drought periods. Normally, those layers of vegetation can function as a deterrent to ground fires becoming crown fires. Charcoal has been observed in the duff layers in selected areas.

From an economic standpoint, it would be appropriate to consider this region for adequate production of pulpwood, bolts and logs of moderate to high quality in the dry portion of this region. Pulpwood and bolts could be produced in the wet marshes and bogs but sawtimber would be questionable due to the slow rate of tree growth and the high risk for wind damage. Overall, from an economic standpoint net returns from wood crops in this region will probably be average to slightly above average for Lake County. Pulpwood can be grown on most sites including many lowlands in the region and reasonable revenues can be anticipated. Economically acceptable crops of northern hardwood and conifer sawtimber can potentially be produced on all rich dry sites. Most rich upland sites in this region are candidates for producing high quality logs. Group tree management is feasible for a large portion of the dry sites. Additional potential forest products include birch bark, birch sap, harvest of sphagnum mosses, Christmas trees, spring and autumn mushrooms and selected medicinal plants.

This region contains sites that ought to be considered for removal from the land base for producing wood products because of their very low site quality, the risk of long term adverse impacts on their biophysical properties caused by harvest operations and the difficulty of correcting site conditions associated with long term adverse impacts. On some ridge tops and adjoining side slopes the root zones are comprised entirely of a thin cover of duff and mosses over igneous bedrock which supports small diameter stems. Fire burning through heavy concentrations of fuel and especially during droughts can completely destroy the root zone. The fire will consume the forest floor and water and wind erosion will remove the mineral portion of the thin root zone developed on bedrock. Subsequent bedrock exposures will remain bare for decades.

CLOQUET ISLAND LAKE PLAIN – CILP

This biophysical region occupies 56,233 acres in the southwest portion of Lake County. There are no population centers in this region and residences are located along the sparse road system. Two Harbors to the south on Lake County Highway 2 is the nearest full service city that also has a small airport. Lake County High

way 2 is the main paved road and there are a few gravel forest roads and those comprise the transportation system in this region. Farming has had minimum effect on the land and plant communities and forest management activities prevail in the region. There is a limited influx of tourists traveling to destinations beyond the region. Hunting seasons for birds, small game and big game attract a few hunters to the region. Within the Cloquet Island Lake Plain is a portion of the Finland State Forest.

Climate

Average annual precipitation is 29 inches with 15 inches occurring May through August. Annual temperature averages 38 degrees and the average for May through August is 60 degrees. Average growing degree days are about 3142*.

Those values are based on records for weather stations located in Cloquet and Duluth. The climate in this Cloquet Island Lake Plain region is influenced by Lake Superior and tends to be somewhat cooler in the summer and warmer in the winter while the lake is free of ice. However, this region is substantially warmer than the Duluth Upland that is immediately along the shore of Lake Superior. This region historically has had a series of high velocity winds as indicated by the numerous cradle and knoll features and downed trees or evidence of downed trees.

Glacial Geology

Glacial drift is mainly from the Lake Superior lobe which moved in the region from the east and south. There are local deposits of drift in this region that have properties representative of Des Moines and Rainey lobe materials. Rock fragments and boulders occur in local areas in this region. This region includes extensive glacial outwash deposits and local morainic deposits. Those deposits are commonly more than twenty feet thick and consistently occur as dry uplands. Extensive sand and gravel deposits are found throughout this region.

Terrain

An extensive dry plain with shallow depressions and scattered hills in local areas prevails in this region. Bogs and marshes have developed in selected shallow depressions. In the vicinity of Island Lake, there are deep depressions in the land caused by the melting of ice blocks contained in the original glacial drift. Water occurs in those depressions that are sufficiently deep to intercept the ground water

and the level of that water appears to be connected to changes in precipitation and the level of Island Lake. Selected local highs appear to be bedrock controlled and concentrations of rock fragments and boulders tend to be associated with those highs. Curving elongate rounded ridges are eskers with uniform slopes and are comprised of sand and gravel. Uniform rounded conical hills are kames with uniform side slopes and contain substantial amounts of sand and gravel.

Vegetation

Trembling aspen and balsam fir are the most common trees in the region. Black spruce is common in lowlands and a few dry uplands. Less common are paper birch, red maple, jack pine, red pine, white pine, black ash, tamarack, white cedar and white spruce. Scattered in the region are red oak and yellow birch. Beaked hazel and raspberry are the most common shrubs and mountain maple and dogwoods are less common in the dry uplands. Tag alder and grass are found in selected open wet lowlands.

Structure in plant communities is greatest in the dry uplands dominated by aspen, birch and sawtimber size pines. Wet lowlands with prevailing black spruce have mainly short shrubs, grasses7, or mosses. There is typically sharp contrast between dry upland communities and communities in adjoining wet lowlands.

Variations in plant communities are the direct result of fire, wind, insects, diseases, beaver activities, timber harvest and plantation management. Forest land management activities will be the main determinant of future forest characteristics. There will be a variety of tree species with some occurring in natural patterns while others will be in prescribed managed patterns.

Water

Lakes and a few streams are major signatures of the Cloquet Island Lake Plain. Flow is generally southwest into the Cloquet and St. Louis Rivers and finally into Lake Superior. Characteristically, seasonal water levels in lakes and streams are modified from event extremes due to the high storage capacity of the watershed. Several lakes are utility reservoirs and demand for generating electricity is a major factor in fluctuating water levels. Rocky rapids are present in most streams. All water bodies have dark colored water that results from inputs from bogs and iron and organic compounds from the porous sandy watersheds. Ground water levels adjoining reservoirs is believed to have corresponding fluctuations with

levels in the reservoirs. Sub-irrigation occurs in areas having ground water flowing about seven feet beneath the ground surface. Direction of that flow is believed to be southwesterly. The extent and thickness of this porous plain is estimated to be a substantial aquifer with water suitable for potable uses.

Bogs occupy many flood plains along selected streams. Many bogs are currently vegetated with tag alder, black spruce, tamarack, grass or combinations of all. Most bogs have well defined outlets consisting of over land flow, small meandering water courses and subsurface flow to adjoining streams. Due to the extensive porous sandy plain, the water level in some bogs could be connected to the level of regional ground water while others may be sealed from the porous sand by organic matter that combined with accumulations of silt.

Management Analysis

Scattered low uniform rolling hills and contrasting plant communities render the Cloquet Island Lake region an attractive area for a variety of outdoor recreation activities. Private and government agencies offer a wide range of recreation opportunities ranging from boating, canoeing, campgrounds, hiking and dispersed camping. Picking wild berries is a popular activity in selected areas of this region. During the fall there is a substantial amount of bird and big game hunting. Brilliant contrasting fall colors are a main attraction to this region. Trembling aspen and paper birch are the prevailing broadleaf trees and offer bright yellow colors that sharply contrast with the red of red maples, orange of mountain maples, and the green of the pines, spruces and balsam fir. Shrubs are present in many plant communities under the trees and provide red, orange and yellow fall colors at eye level. Snowmobiling is a popular activity in a large portion of the region. Cross country skiing is a growing activity in the region

Wildlife in the Cloquet Island Lake region is representative of the southern extent of the boreal forest. Grouse, beaver, deer, black bear and timber wolves occur throughout the region. There is a limited population of moose. Wildlife populations in this region are estimated to be average for the county. Plant communities have considerable variation, but due to low and moderate fertility, food biomass will require a disturbance that stimulates regeneration of new and denser plant communities. To be effective, the biomass must be distributed over the entire region. Those disturbances can be the result of forest management activities or natural such as wind or fire. Mature plant communities in old forests will have a significantly lower amount of food for wildlife and subsequent lower populations.

Those forests often have an elevated crown of aspen, birch, pine and spruce. The latter two will consistently have less food than the hardwoods. Bald eagles and osprey nest near the lakes. Eagles frequently nest in the large red and white pine along lake shores. Mallards commonly nest in the beaver ponds several bays in the lakes and more sheltered areas along rivers. However, the overall duck population in this region is low.

Road construction and maintenance plans will have to consider numerous streams, bogs, high content of boulders in selected areas and the silty surface present in many areas. Sand or gravel are quite plentiful and also underneath much of the silt surface materials. Certain standard of roads can be built in places where sand and gravel are at or near the ground surface. Standard drainage features for stream crossings will suffice in a majority of areas. Boulders must be removed from road beds to prevent future problems with frost heaving up into the driving surface.

Quality pulpwood, bolts and logs can be produced in this region. Site quality is medium to high for most uplands in the region. The site quality is associated with the moderate nutrient content and moderate to low moisture holding capacity in a majority of root zones in the dry uplands. Site quality will change significantly from ridge tops to the base of slopes because of the high prevalence of sandy materials and accumulation of nutrients and moisture at lower slope positions. Wind damage can be substantial in this region in those areas with perched water, marshes, and bogs. Because of the extensive porous sandy materials, fuels will dry out quickly during seasonally dry periods and especially during drought. With the presence of forbs, grasses and shrubs in a number of plant communities, a potential fuel ladder exists for support of crown fires during those drought periods. Normally, those layers of vegetation can function as a deterrent to ground fires becoming crown fires. Charcoal has been observed in the duff layers in numerous areas. Most duff layers in the region are about one and a half inches thick.

From an economic standpoint, it would be appropriate to consider this region for major inputs of pulpwood, bolts and logs of moderate to high quality. Levels of site quality in this region are average to slightly below average, but still high enough for economic considerations. Overall, from an economic standpoint net returns from wood crops in this region should be average for Lake County. A part of the economic potential is the favorable conditions for developing and maintain-

ing an all season transportation system. Closeness to stable markets is also a significant part of the economic viability of this region. Pulpwood can be grown on most sites including many lowlands in the region and reasonable revenues can be anticipated. Economically acceptable crops of sawtimber can potentially be produced on a major portion of this region. Those sites will support a majority of native conifers and hardwoods and thus offer broad options for selection of trees to grow for sawlogs. Group tree management is feasible for those sites as are mixed wood forests. Additional potential forest products include birch bark, birch sap, harvest of sphagnum mosses, Christmas trees, spring and autumn mushrooms and selected medicinal plants.

WHYTE LOWLAND – WL

This biophysical region occupies 303,780 acres in the southwest portion of Lake County. There is an extremely sparse population in this region and it is limited to remote cabins. Two Harbors to the south is the nearest full service city with an airport. One paved road, County Highway 2, traverses this region and there are few all season gravel roads. This region has a very limited transportation system and is second only to Border Lakes region. Railroad development in this region is used by mining operations on the Mesabi Iron Range in the adjoining county to the west for transporting products to ports on Lake Superior. Within the Whyte Region, forest management operations historically have been and currently are the dominant land management activities in this region. Abandoned railroad grades in this region are a record of past intensity of logging. Farming has played no role in land management operations in this region. Harvesting of native grass for horses in logging camps took place in limited areas during the peak of early logging operations. There is limited tourist traffic during the summer on the only paved highway that connects Two Harbors and Ely. Hunting seasons for birds and big game attract a limited number of people to the region. There are several miles of snowmobile trails in this region that traverse very remote areas. Within this region are portions of the Superior National Forest and Finland State Forest

Climate

Using data from weather stations in Babbitt and Isabella (there are no weather stations in this region.), the estimated average annual precipitation is 29 inches with 15 inches occurring May through August. Estimated annual temperature averages 37 degrees and for May through August is 60 degrees. Estimated average grow

ing degree days is 3190*. Because this region is an elevation high in the area and is comprised of extensive wet land, it may be cooler in the summer than those temperatures reflect. Extensive areas of local slope gradient result in a potential for accumulation of cold air and frost pockets. Micro climate areas associated with bedrock high points express a somewhat warmer situation as indicated by contrasting vegetation.

Glacial Geology

Brown and yellow glacial drift is mainly from the Rainey lobe which moved through the area from the north and northeast and limited deposits of brown and red brown drift from the Superior lobe that entered the region from the south and southeast. Those deposits are contained in moraines and limited outwash features. Deposits from both lobes are sandy and loamy with moderate to high content of rock fragments Rock fragments are more common along selected streams and the bedrock high points Materials richer in silt and clay occur is a few marshes and bogs. The boundary of Whyte Lowland region with regions to the east and south are at or near the contact of the Rainy and Superior glacial lobes.

Terrain

Extensive areas with low gradient and low local relief mixed with moist and dry sandy and loamy uplands form the major portion of this region and result in slow flowing water in streams and substantial areas of prolonged water saturated land. Marshes and bogs are common and thickness of peat varies from a few inches to more than five feet. Local bedrock high points in the vicinity of Mount Weber offer sharp contrast to those areas. General slope in the region south and west, but along the northern boundary are local slopes to the north and northeast. Curving elongate rounded ridges are eskers with uniform slopes and are comprised of sand and gravel. Uniform rounded conical hills are kames with uniform side slopes and contain substantial amounts of sand and gravel. Both eskers and kames are uncommon in this region. Eroded stream channels resulting from glacial melt waters determine the courses of many present streams.

Vegetation

Trembling aspen, paper birch, red maple, black spruce and balsam fir are common

trees in the region. Aspen is consistently found on dry sites and is mixed with paper birch, fir and yellow birch in the Mount Weber area. Paper birch is common in numerous wet and moist sites throughout the region and in several areas there is limited regeneration. Black spruce and to a limited extent white cedar and tamarack are common in moist and wet lowlands. Black ash is scattered throughout the region in moist and wet sites. Jack pine, red pine, and white pine occur sparsely throughout the dry sites in this region. Beaked hazel, mountain maple, and raspberry are common shrubs in the dry uplands. Tag alder and grass often prevail in numerous wet lowlands.

Structure in plant communities is greatest in the dry uplands dominated by aspen and birch overstories and where shrub densities are the highest. Plant communities with closed hardwood canopies in moist and wet areas consistently have low density shrub layers. Wet lowlands with prevailing black spruce have mainly short shrubs, grasses or mosses.

Variations in plant communities are the direct result of forest management activities, wind, insects, diseases, beaver activities, and to a lesser extent fire. Those disturbances result in a mosaic of rather large areas of individual plant communities and forest management activities contribute greatly to diversity in plant communities. Without forest management activities, plant communities in this region would result in a mosaic of large uniform lowland conifer communities with scattered islands of hardwoods on the drier sites and extensive mixed hardwood and conifer stands in dry upland. Forest management activities will significantly increase variation in plant communities in the dry uplands and the drier more fertile "islands" within a matrix of extensive moist and wet low areas. Those activities will also substantially increase the diversity of plant species in young plant communities and will increase the variation of ages of plant communities throughout the region.

Water

Large bogs and marshes with dry "islands" and extensive dry upland dominate this region and headwaters of the Cloquet River and contributing streams. Characteristic low slope gradients in this region result in slow flowing meandering streams.

Many stream channels have an abundance of rock fragments and boulders. Flow is generally west and south through the Lake Superior watershed collecting in the Cloquet and St. Louis Rivers and onto Lake Superior. This Whyte Lowland region has substantial amount of generally very wet forestland and water saturated conditions in many areas are permanently at or near the ground surface. The many marshes and bogs result in slow movement of water through the region producing dark water streams and lakes. Large marshes, bogs, and low slope gradient provide a significant water storage capacity and reduce the extremes in levels of lakes and streams from spring to fall except during periods of sustained drought. Dark water in all water bodies is a characteristic of this region.

Management Analysis

A combination of numerous extensive marshes and peat bogs combined with local dry "islands" and significant area of dry upland and contrasting changes in local land features offers an area for a variety of outdoor recreation activities in a rather remote area with limited vehicular access. Historically and currently this region is not thought of as a recreation area such as adjoining regions are. This region tends to be thought of as a pass through area to some other point of interest or opportunity for recreation activities. There are no developed recreation facilities in this region and dispersed recreation activities prevail. Snowmobiling and driving remote forest roads are the most popular recreation activities in this region. Bird hunting, small game and big game hunting are carried out adjacent and near remote access routes.

This area has unique features and potential for wildlife that favor habitats with extensive marshes, bogs, dry islands, dry uplands and bedrock "peaks" interspersed with streams and a few lakes. There are ruffed grouse, beaver, deer, black bear, moose and timber wolves in this region. Verified reports of cougar have also been recorded in this region over the past couple decades. Wildlife populations in this region are estimated to be quite small and depend on disturbances of plant communities for critical supply of food. Extensive marshes and bogs offer a limited amount of food and it is more concentrated on the dry "islands" within the large wet area. Spruce and fir are a major cover type in this region and offer effective cover and protection from extreme weather conditions. Dry upland plant communities can provide substantial amounts of all season food with prescriptive management that creates disturbances with predictable results of species richness and structure for plant communities.

Mallard population is low and restricted to beaver ponds, meandering streams, and scattered lakes with adequate food supplies.

Road construction and maintenance will be very high in the moist and wet portion of this region due to the extensive areas of water saturated marshes and peat bogs. Significant rise in road prisms above the surrounding water saturated land will be necessary to assure dry stable driving surfaces and minimize frost heaving of road beds. In selected dry ridges and islands, there are ample amounts of borrow suitable for road construction and maintenance. Standard drainage features for stream crossings will have to be adjusted to compensate for the large marsh and bog features. Crossings at sites with thick peat will require its removal for best permanent road results. Beaver activity in the many ditches and streams can also create costly road maintenance problems due to the unstable properties of the peat, the low slope gradient of the marshes and bogs, and extensive flooded areas. Road construction and maintenance in the dry upland will be substantially less costly. Suitable sources of borrow for roads and trails are also more frequent in dry upland.

Quality pulpwood and bolts would be reasonable products from the extensive marshes and bogs in this region. Pulpwood, bolts and quality sawlogs could be produced in the drier more fertile upland. This region ought to be considered for lowland hardwoods and conifer production of pulpwood and bolts and hardwood and conifer pulpwood, bolts and sawlogs in the dry upland. Wind damage will be substantial in this region because of the extensive wet areas. Fires will generally play an insignificant role in disturbance of plant communities in the moist and wet lowland. Forest harvest operations in a major portion of this region will be during periods with stable frost. Increasing the transportation system for forest management purposes would be costly to construct and maintain. Regeneration prescriptions will have to be designed to match the extensive areas of moist and wet land. Standard prescriptions can be used in the dry uplands.

From an economic standpoint, it would be appropriate to consider this region for inputs from the dry upland of pulpwood and bolts and sawlogs. The extensive wet marshes and bogs could be considered for supplies of pulpwood and bolts with a rotation that is substantially longer than for the uplands. Overall, from an economic standpoint net returns from wood crops in this region will be about average for Lake County. Pulpwood can be grown on most sites in the region and reasonable revenues can be anticipated.

Economically acceptable crops of sawtimber can potentially be produced on all dry upland sites. Those sites will support all native conifers and hardwoods thus offer broad options for selection of trees to grow for sawlogs. Group tree management is feasible for those sites as are mixed wood forests. Additional potential forest products include birch bark, birch sap, harvest of sphagnum mosses, Christmas trees, spring and autumn mushrooms and selected medicinal plants.

BORDER LAKES – BL

The Border Lakes biophysical region occupies 603,293 acres in the northern one third of the county and is bordered on the north by Canada. There are several hundred permanent residents in this region located in and around Winton and lakes with all season road access. There are several resorts located on lakes with all-season road access. Ely is located immediately to the west of Winton and is a full service community with a hospital, schools, a college, an airport, and numerous businesses Also located in Ely are federal, state and local government offices.

A majority of this region occurs in the federal wilderness Boundary Waters Canoe Area Wilderness.

ISABELLA UPLAND – IU

This biophysical region occupies 178,556 acres in central Lake County and is bordered on the north by Border Lakes and on the south by Whyte Lowland and Superior Upland. A sparse population is concentrated along State Highway 1 and in the vicinity of Isabella.

BRIMSON UPLAND – BMU

Xxx acres tax forfeit land

This biophysical region occupies 34,214 acres in the west central portion of Lake County. There are no major population centers in this region and rural residents are scattered throughout this forested region. Within Lake County, there are no towns or villages in this region

Published information and materials used in the preparation of the biophysical region descriptions and biophysical regions included:

USGS topographic maps with scales of 1:24,000 and 1:250,000.
Published bedrock and glacial geology information.
Aerial photography.
Climate information from certified weather stations.
Historical information for cultural developments, vegetation, fires and specific events.
Digital elevation models.
Watersheds and associated information.

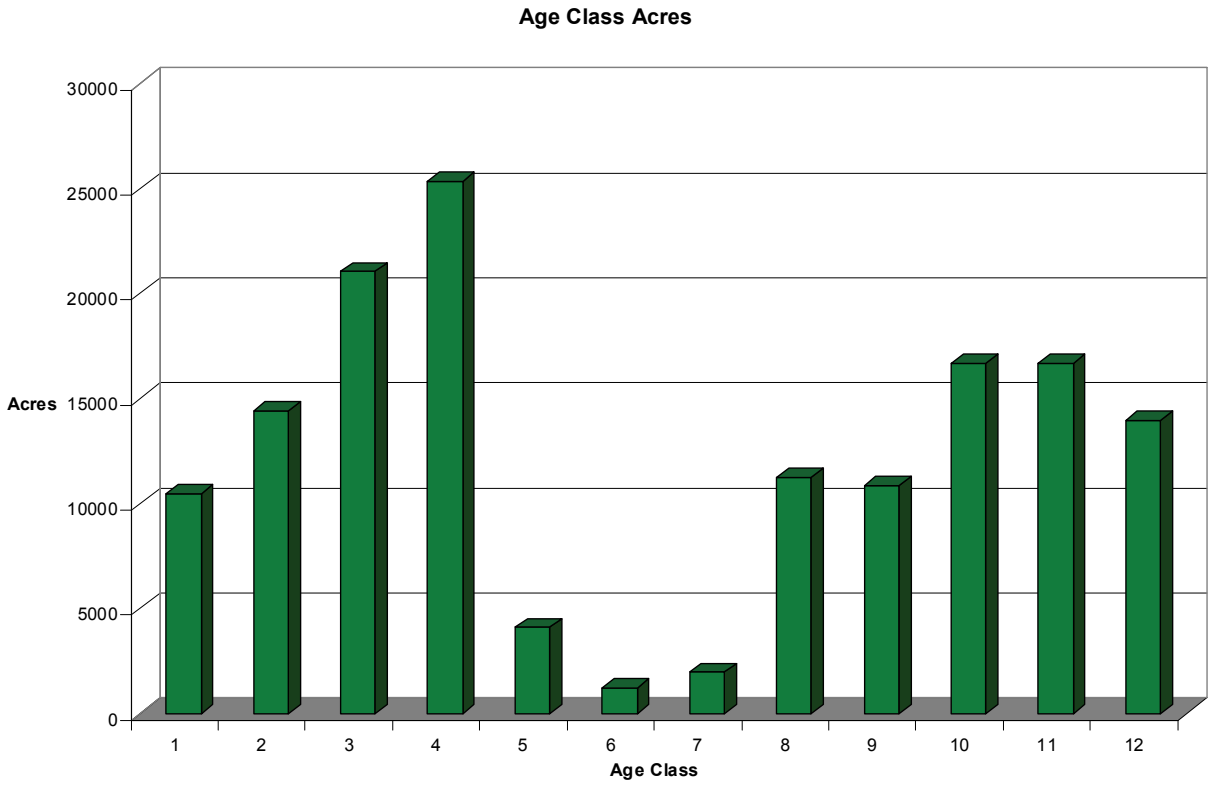
Land Use of Tax Forfeit Land

Land Use	Acres	% Total Area
Natural or Semi Natural Forest	121,848.43	80.6
Plantation	4360.68	2.48
Protected Area	13,221.92	8.7
Special Management Areas	10,880	7.2
Water	380	0.3
Infrastructure and other uses	145.5	0.1
Other Uses	375	0.2
Total Certified Area	151,211.53	100.0

Natural and Semi-Natural Forest		121,848.43 acres
Plantations	Regular	4352.33 acres
	Seed Tree Orchard	3.35 acres
	Progeny site	5 acres
	Total	4360.68

Land Use of Tax Forfeit Land (continued)

Protected areas	BWCA TF Land	2814.32 acres
	Sand Lake SNA	440 acres
	Riparian Zones	9967.6 acres
	Total	13,221.92
Special Management Areas		
	7 Beavers	2880 acres
	Manitou Area	8000 acres
	Total	10,880
Water		380 acres
Infrastructure and other uses		
	Gravel Pits	114 acres
	Buildings	7.5 (TH 2.5,Fin 2,Ware 3)
	Berry Fields	24 acres
	Total	145.5 acres
Other uses		
	Hunting Cabin Leases	375 acres
	TOTAL	151,211.53 acres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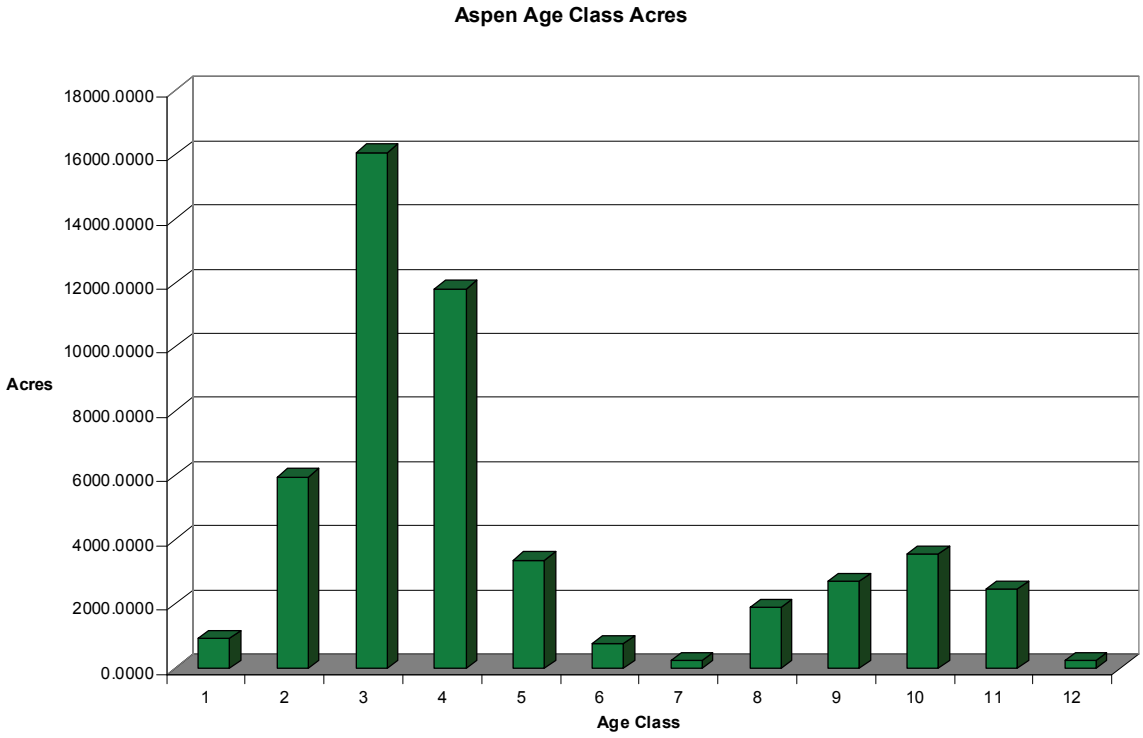
Age Class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Age Class

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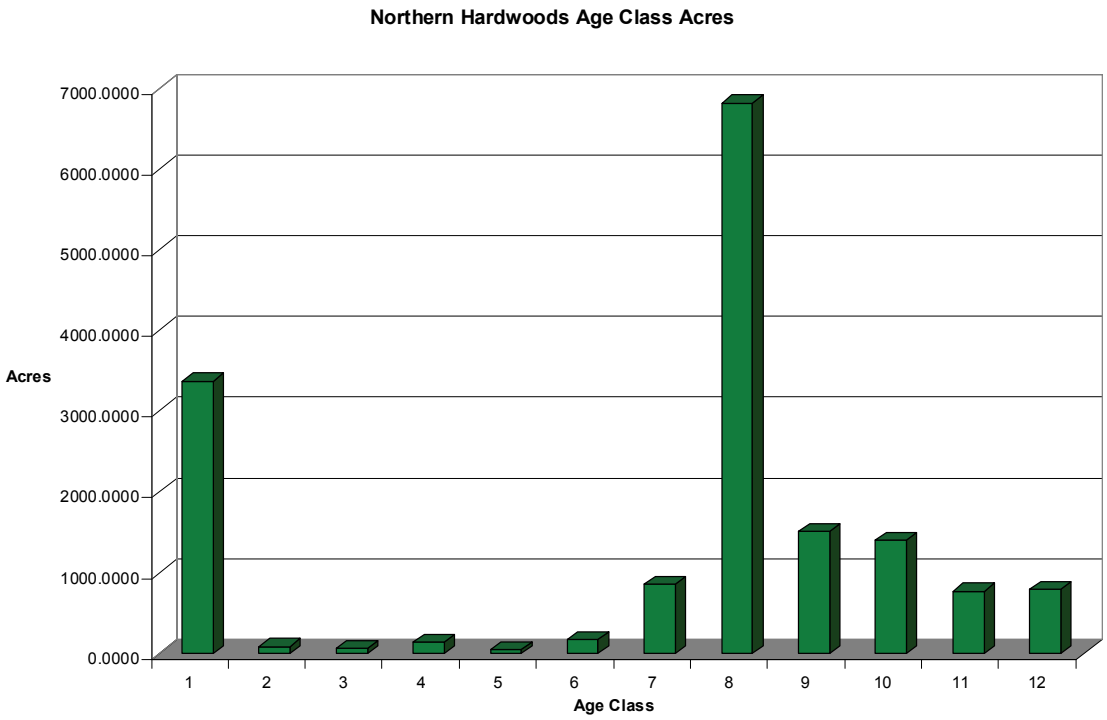
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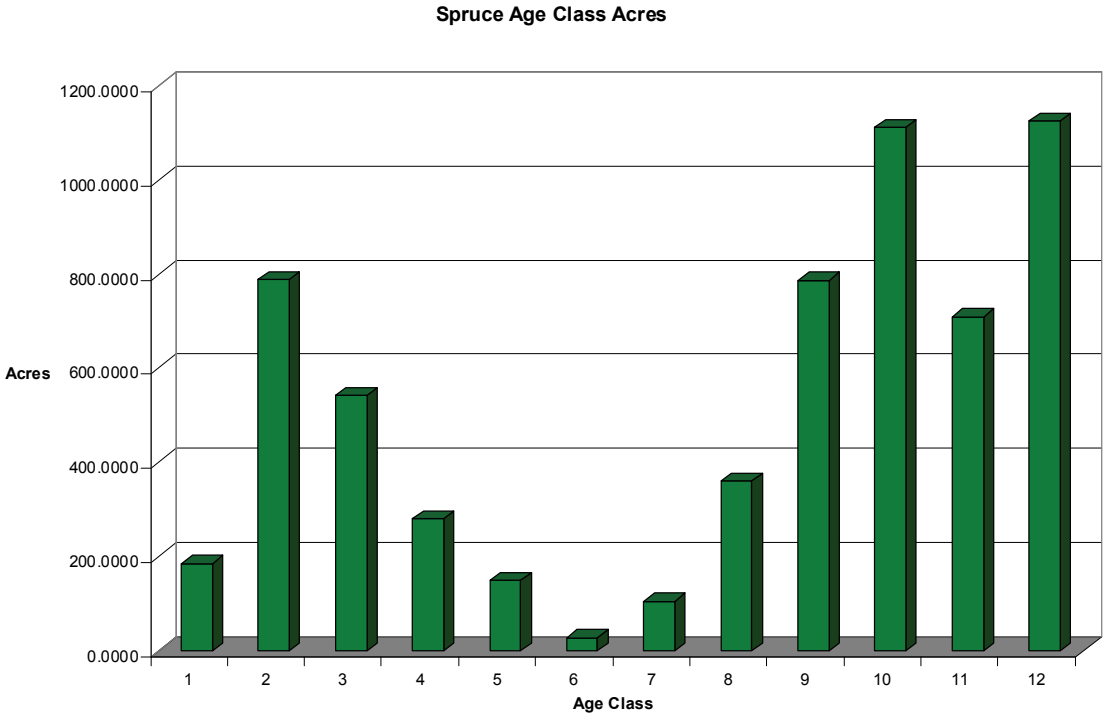
Age Class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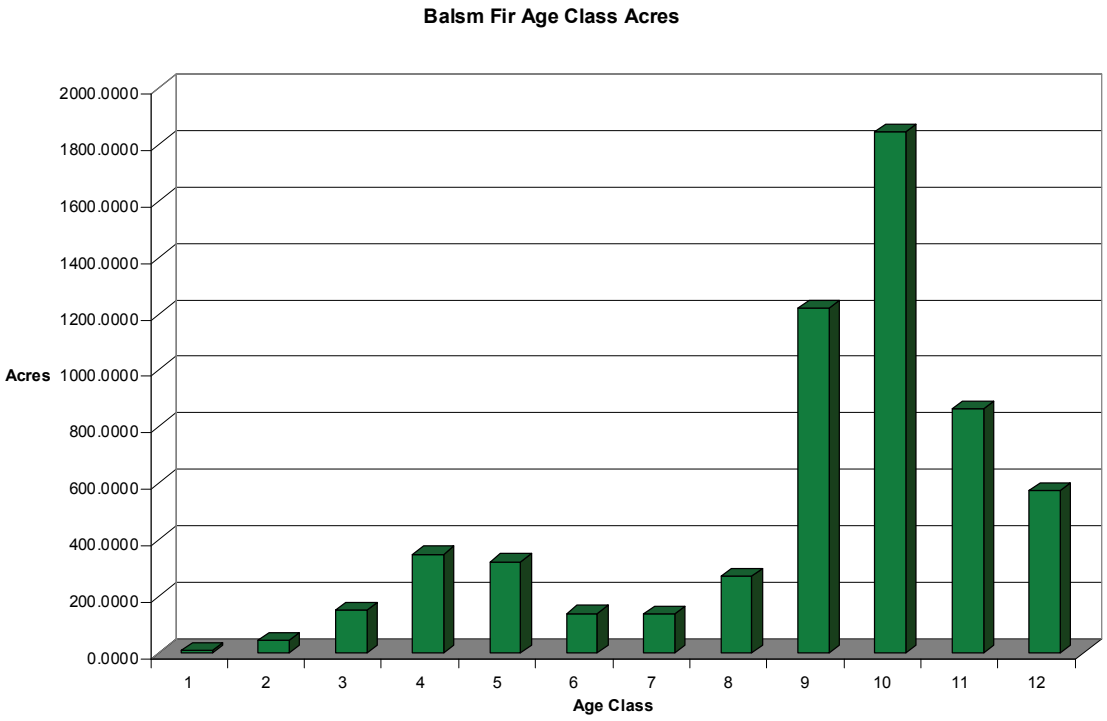
Age Class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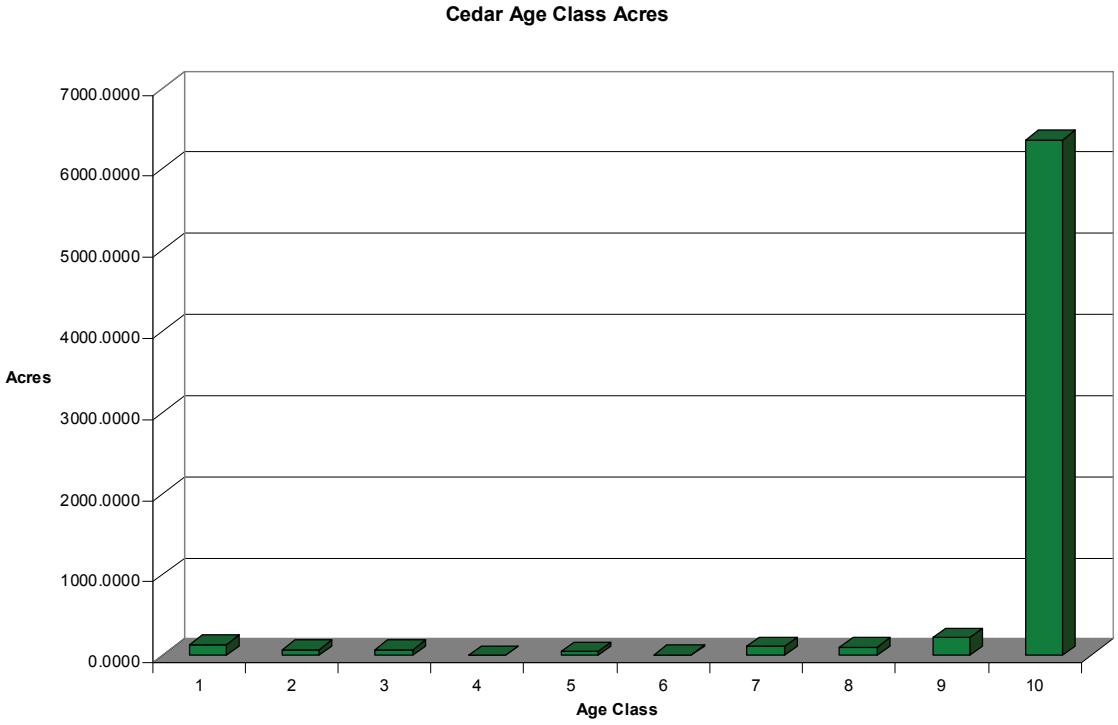
Age Class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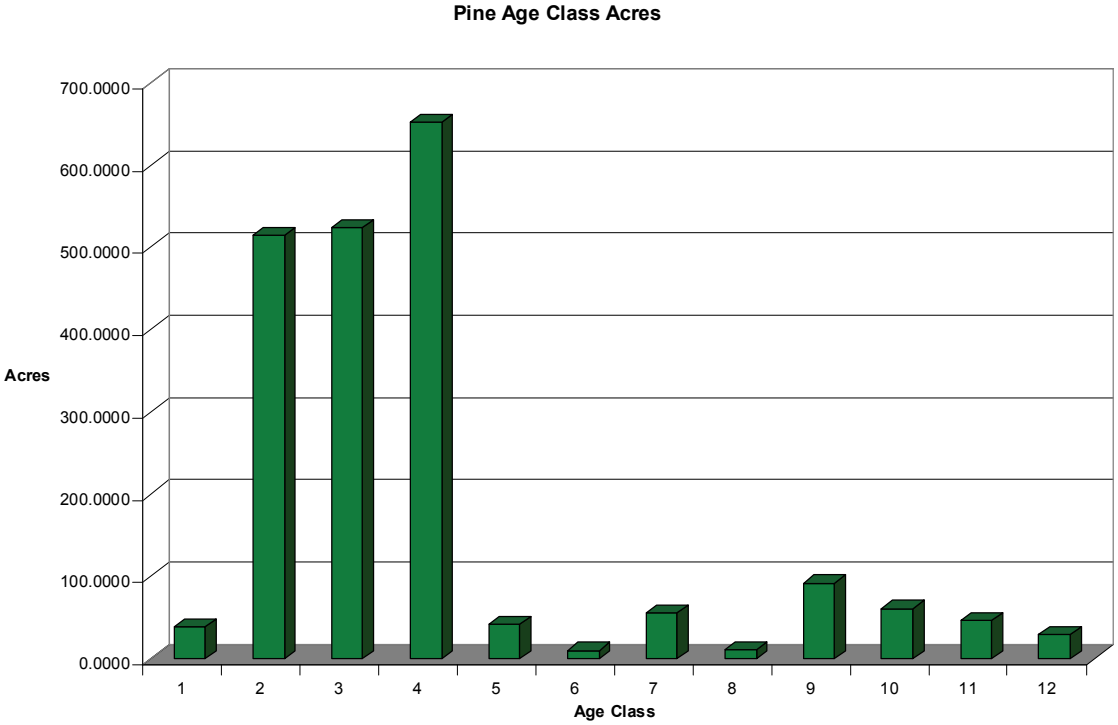
10
Age Class


Pine Age Class Acres
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Age Class

III. Land Management Principles and Policies

Mission Statement

The Lake County Forestry Department bears major responsibility for the administration and management of Lake County's approximately 151,000 acres of tax forfeited lands. The Forestry Department, one of several agencies under the direction of the County Board, is charged with the full range of land and timber resource management activities, including timber sales, forest management and development, and tax forfeited land administration.

It is the intent of the Forestry Department to protect, develop and administer Lake County's land and timber resources to best meet the needs of county residents. Natural resource management efforts will stress multiple-use, sustained yield principles, recognizing the important need to provide for a diverse mixture of resource uses and outcomes over time.

Full and proper utilization of this resource will be carried out consistent with generally accepted social, economic and environmental principles, and within the confines of all applicable administrative and state statutory guidelines (282). It is recognized that that the development of county lands and their resources to the fullest also requires close cooperation with other county departments, state and federal agencies, regional cooperators, private industry and with the local public. This is the mission statement taken from the 1983 plan.

The following statements describe the foundations of Lake County's land management principles:

Biophysical inventories specific to Lake County, and increasingly, NPC keys will bring into focus site level qualities and offer a finite number of variables and choices for management alternatives on tax forfeit lands across Lake County. These prescriptions become management practices that are documented and monitored; repeated if successful or altered if necessary and handed down to future foresters.

Forest management options will consider native plant communities. Management activities will be implemented to move the lands towards the range of natural variability (RNV) of

our native plant communities. Importance will be given to increasing the quantity of absent or limited species within communities during management activities and providing a representative distribution of vegetation growth stages within each native plant community.
Forest management activities will provide a variety of age classes across the landscape.

Forest management options will consider moving towards managing larger patches of forest for interior dependant species while recognizing that small cuts were recommended in the past. Large patch management will depend in some part on cooperation between Lake County, the Minnesota DNR and the U. S. Forest Service. Managing for disturbance dependant species will continue to be the dominant management tool in the near future with a gradual move towards some large patch management.

FSC Certification

Lake County became a third party certified, natural resource management organization in 2005. With the support of the Lake County Board of Commissioners, the Forestry Department sought certification to confirm to county residents and consumers of our wood products, that; products from the Lake County forest lands were being harvested in a sustainable manner, land management policies and guidelines are documented and followed, land management activities are inventoried and monitored in a data base and GIS mapped, and that Forest Stewardship Council principles will be followed. The FSC 10 Principles are as follows:

PRINCIPLE #1: COMPLIANCE WITH LAWS AND FSC PRINCIPLES
Forest management shall respect all applicable laws of the country in which they occur, and international treaties and agreements to which the country is a signatory, and comply with all FSC Principles and Criteria.

PRINCIPLE #2: TENURE AND USE RIGHTS AND RESPONSIBILITIES
Long-term tenure and use rights to the land and forest resources shall be clearly defined, documented and legally established.

PRINCIPLE #3: INDIGENOUS PEOPLES' RIGHTS
The legal and customary rights of indigenous peoples to own, use and manage their lands, territories, and resources shall be recognized and respected.

PRINCIPLE #4: COMMUNITY RELATIONS AND WORKERS' RIGHTS
Forest management operations shall maintain or enhance the long-term social and economic well-being of forest workers and local communities.

PRINCIPLE #5: BENEFITS FROM THE FOREST
Forest management operations shall encourage the efficient use of the forest's multiple products and services to ensure economic viability and a wide range of environmental and social benefits.

PRINCIPLE #6: ENVIRONMENTAL IMPACT
Forest management shall conserve biological diversity and its associated values, water resources, soils, and unique and fragile ecosystems and landscapes, and, by so doing, maintain the ecological functions and the integrity of the forest.

PRINCIPLE #7: MANAGEMENT PLAN
A management plan -- appropriate to the scale and intensity of the operations -- shall be written, implemented, and kept up to date. The long-term objectives of management, and the means of achieving them, shall be clearly stated.

PRINCIPLE #8: MONITORING AND ASSESSMENT
Monitoring shall be conducted -- appropriate to the scale and intensity of forest management -- to assess the condition of the forest, yields of forest products, chain of custody, management activities and their social and environmental impacts.

PRINCIPLE #9: MAINTENANCE OF HIGH CONSERVATION VALUE FORESTS
Management activities in high conservation value forests shall maintain or enhance the attributes which define such forests. Decisions regarding high conservation value forests shall always be considered in the context of a precautionary approach.

PRINCIPLE # 10: PLANTATIONS
Plantations shall be planned and managed in accordance with Principles and Criteria 1 - 9, and Principle 10 and its Criteria. While plantations can provide an array of social and economic benefits, and can contribute to satisfying the world's needs for forest products, they should complement the management of, reduce pressures on, and promote the restoration and conservation of natural forests.

Strategic Plan

Lake County Forestry is currently moving towards fulfilling its short and long term goals by working on these five fronts:

1. Forest Management
2. Land Consolidation

3. Geographic information Systems and Monitoring
4. Recreational Opportunities
5. Education

The following narrative briefly describes how the department's staff works toward achieving its goals

1. Forest Management

See Forest Management Chapter

Integrated Pest Management

Lake County's strategy for controlling plant and insect pests is to actively meet with our Region's lead agencies including the Forest Service, DNR, St. Louis County, MN Dept of Agriculture and the Nature Conservancy to identify forest pests and invasive species and to coordinate funds and management strategies to actively deal with common threats. Lake County does and will meet and cooperate with the Minnesota Department of Agriculture, Forest Service and DNR on controlling the spread of the Gypsy Moth. Control measures have so far taken place only in Cook County. Lake County has also met with the Forest Service concerning invasive vegetation species for future management options and plans. Lake County has met and shown North Central Experiment Station researchers upland black ash examples in preparation for the emerald ash borer invasion. Lake County has met with other counties and the DNR to discuss increased harvest levels of the white tailed deer that is destroying conifer plantation seedlings and preventing natural regeneration of northern white cedar, yellow birch and white pine. Lake County's strategy must be to cooperate with other agencies to provide a worthwhile effort to address pests across landscapes. Herbicide use for plantation release will be discussed in the Forest Management Principle Chapter.

Timber Access

Timber haul road construction, maintenance and improvement projects are completed as needed for timber sale access and other related land management activities. The Forestry Department annually receives approximately $22,000 from the state un-refunded gas tax fund for forest road development. A goal for the annual removal of 2 to 3 miles of brush along timber haul roads has been set for safety and road maintenance purposes. Additional funds for road purposes can also be taken from timber receipts and the Resource Development Fund.

Fuelwood

Permits are given out to salvage fuelwood from slash piles on closed timber sales. Harvesting fuelwood from standing living trees is discouraged because of the increased use of hardwoods for commercial purposes and lack of control over achieving desired silvicultural objectives.

Gravel

The Forestry Department assists the Highway Department in gravel exploration, line location, and timber removal on tax forfeit lands. The gravel that is extracted is used only for public uses (County, State, LGUs). After a gravel pit area has been opened and depleted, the Highway Department reshapes the pit area and the Forestry Department reclaims the area by planting trees that will be productive on the site. The revenue derived from the sale of gravel is shared by the Forestry and Highway Departments, 25% to Highway for pit preparation, administration and closure, 75% to the Forestry Department for reforestation and road access.

Commercially Harvested Non-timber Forest Products

Balsam Boughs, and to a lesser extent, birch tops, and balsam Christmas trees are harvested off of tax forfeit lands. Lake County meets and communicates regularly with the 14 northern forested counties, the DNR and the Forest Service to monitor any current or new harvesting of non-timber harvest products within the forest. Any non-timber forest products are monitored by consumer scale agreements when possible. The consumers of the product will sign an agreement to provide Lake County with the volumes of non-timber products delivered to them. If the consumer does not sign an agreement, the product will be handled as normal timber forest products. Products will not leave the site until volumes are recorded and paid for.

Special Management Areas

The Forestry Department cooperates with other public and private landowners with landscape management activities across ownership boundaries of forest lands where mixed ownership exists. The Forestry Department is a participant in the Manitou Landscape Collaborative and the Sand Lake Seven Beavers Memorandum of Understanding (MOU) group. Lake County is also the sponsor and participant in the development and implementation of the Lake County Community Wildfire Protection Plan. Cooperation between agencies, organizations and landowners includes land management planning, grant writing and administration, research and project cost sharing.

Lake County is inventorying representative systems through the Minnesota County Biological Survey (MCBS), DNR old growth stands, and Forest Service Research Natural Areas and other extended rotation forests (ERF). Foresters have also indicated ecosystems that should not be managed in their 10 year harvest plan. The size and extent of the representative samples will be determined by their spatial location to similar systems, the abundance of representative systems on the landscape, and the ability of the stands to withstand wind and wildlife damages and other disturbances.

Lake County also works collaboratively with the DNR, Forest Service, 1854 Authority and The Nature Conservancy on management plans for the 7 Beavers Area and Manitou Collaborative. The Manitou Collaborative is working to establish large patch harvest areas and modeling for spatial landscape management options.

Site level reserve areas are identified within or adjacent to timber sale areas when timber sale prescriptions are defined. These areas may be part of the stand to be managed, to develop into a different age class, or may be a different cover type or a buffer zone adjacent to a riparian zone or other unique feature. These areas are mapped on the GIS forest inventory. As cover types are inventoried for possible land management activities, they are classified by their Biophysical Landscape Ecological Unit (BLEU).

Lake County uses the County Biological Survey attributes for High Conservation Value Forests (HCVF) to identify HCVF sites on the land it manages. Lake County uses DNR and Forest Service information to locate and map DNR old growth, SNAs, and Forest Service RNAs. This information is used to locate tax forfeit candidate stands. Lake County has conducted several land exchanges with the DNR to transfer ownership of HCVF to the DNR in Tettegouche and Crosby Manitou State Parks. Lake County has conducted several land exchanges with the Forest Service to transfer ownership of HCVF to the Forest Service in the Boundary Waters Canoe Area Wilderness (BWCAW). Lake County cooperates with DNR and Forest Service and TNC on HCVF in Seven Beavers and Manitou areas. Lake County has purchased over 6000 acres in the Manitou area to prevent private conservation lands from being subdivided, and taken out of timber management.

2. Land Consolidation

The consolidation of the tax forfeit land base is essential to sustainable management. Land Consolidation is carried out through land exchanges, land purchases and land sales. The recent sale of corporate industrial forest lands within Northeast Minnesota has produced problems because of individual private ownership of land becoming interspersed through a largely public ownership land base. These land sales have produced a large amount of time consuming easement requests, legal issues, and unrealistic expectations of the timber road transportation system. Efforts will be made to consolidate public ownership away from private ownership and to consolidate government agency ownerships within their individual land bases. Land purchases will be made within the confines of Chapter 282, Minnesota Statutes, or special legislation may be sought under special circumstances.

Tax Forfeit Undivided Interests

When there are undivided interest ownerships in tax forfeited land and acquisition of the private undivided interest would serve to complement the long-term management goals and objectives of the tax forfeited land base, the County will attempt to obtain the private undivided interest through purchase, land exchange, or friendly partition action through the courts.

The other undivided tax forfeited interests should be disposed of by means of sale at public auction or exchanged. Undivided interest land, where tax forfeited ownership occurs, will be open for public use and will not be posted closed to public use by any undivided or common interest private owners.

When it is in the best interest of the public to manage tax forfeit lands with an undivided interest before a division action can take place, the owners of the other undivided interests will be contacted to describe to them the planned management activities and to gather their input and suggestions. A good faith effort will be made to contact all other owners when possible. If no contact can be made, by legal means including Sheriff notification, and if management activities have produced revenues after costs incurred to the County have been deducted, the applicable revenues will first be applied to any back taxes that the partial owner may owe as per state statute and the balance due the owners that could not be contacted will be placed in escrow in the Court Administrator's Office.

3. Timber Flow

It is the goal of the Forestry Department to provide a constant and reliable timber flow from tax forfeit lands. Lake County Forestry will offer a variety of timber sales at public auction to small and large operators.

4. Geographic information Systems and Monitoring

Lake County Forestry (LCF) has a well developed Geographic Information System (GIS). New technologies are being used to maximize the effectiveness of the GIS. GIS allows the foresters to more effectively and efficiently make decisions. GIS also creates a way to effectively monitor the historic and current condition of LCF lands. With the implementation of GIS, foresters are much more informed and can make efficient and effective decisions.

The GIS currently being used are some of the latest technology to be introduced. The GIS software currently being used is ArcView 3.3, ArcGIS 9.1 and ArcPad 7.0. These three software packages are more than suitable for LCF's needs. The data for the GIS is housed on a server making all the data available to the Two Harbors office. Data for the Finland office is updated on an as-needed basis. Field data is (will be) collected on a PDA loaded with ArcPad 7.0. Custom forms for field data entry have been created, standardizing the field data collected. This field data, all in the same digital format, can now be easily analyzed. The suite of software and technology makes LCF's GIS very efficient.

For the first 5 years of this plan (2006-2011), monitoring will address specific problem areas such as off site aspen stands. Through the monitoring process, current aspen sites will be evaluated as to their suitability for producing quality Aspen, and if not productive, the species that is most appropriate for the site. This selection will take into account the Native Plant Community and location on the landscape. Special effort will be made to restore longer lived conifers and other missing species to these sites.

IV. Forestry Management Principles

"…often times the things that foresters do by "accident" have greater benefit to wildlife than many of the things we wildlife managers do by intent. Often the problem is one of recognizing which of these "accidents" are good and should not be corrected." Gordon Gullion, *1.

Full and proper utilization of the forested resource will be carried out consistent with generally accepted social, economic and environmental principles, and within the confines of all applicable administrative and state statutory guidelines (Chapter 282). It is recognized that that the development of county lands and their resources to the fullest also requires close cooperation with other county departments, state and federal agencies, regional cooperators, private industry and with the local public.

Special attention will be given to maintaining or improving big and small game and non -game wildlife habitat through timber management activities and other cooperative efforts with State and Federal agencies and the 1854 Treaty Authority**. Loss of the aspen resource in other parts of country**

Lake County became a third party certified, natural resource management organization in 2005. With the support of the Lake County Board of Commissioners, the Forestry Department sought certification to confirm to county residents and consumers of our wood products, that; products from the Lake County forest lands were being harvested in a sustainable manner, land management policies and guidelines are documented and followed, land management activities are inventoried and monitored in a data base and GIS mapped, and that Forest Stewardship Council principles will be followed.

Forest management options will consider native plant communities. Management activities will be implemented to move the lands towards the range of natural variability (RNV) of our native plant communities. Importance will be given to increasing the quantity of absent or limited species within communities during management activities and providing a representative distribution of vegetation growth stages within each native plant community. Forest management activities will provide a variety of age classes across the landscape.

The Forestry Department will continue to utilize its tax forfeit Biophysical Inventory information, to manage its Northern Hardwoods, to determine off site aspen stands for possible conifer conversion and to aid in other future special projects.

The health of Lake County's tax forfeit lands is dependant on proper forest management. Native Plant Communities cannot be preserved by be managed to remain healthy and diverse, especially recognizing the suppression of naturally occurring fire.

Sustainable management includes the recognition of ecological, economic, and social factors. To manage lands with less than all three factors taken into consideration will not lead to sustainability. Constraints on each factor by the other two will help balance all.

Much of the information that is now used by the Forestry Department originated from the completion of the GEIS and the products that came from the SFRA. These products include the site level guidelines (Green and Brown Books) and Northeast Minnesota Landscape Committee goals and recommendations.

Forest management options will consider moving towards managing larger patches of forest for interior dependant species while recognizing that small cuts were recommended in the past. Large patch management will depend in some part on cooperation between Lake County, the Minnesota DNR and the U. S. Forest Service. **Managing for disturbance dependant species will continue to be the dominant management tool in the near future with a gradual shift towards some large patch management.**

The health of Lake County's tax forfeit lands is dependant on proper forest management. Disturbance dependant ecosystems must be managed to remain healthy and diverse, especially recognizing the suppression of naturally occurring fire.

Timber Sales

Foresters select candidate stands to manage from the **10 Year Management Plan, Stands Available for Harvest**. This report is (will be) listed on the internet and is updated bi-annually. The stands are chosen to be harvested if there is merchantable wood available for harvest and if the stand is declining in health due to negative effects such as advanced age, insects, disease, or blowdown. Two timber auctions are held each year where the stumpage on these sales is sold to the highest bidder. Sealed bid sales have been utilized in the recent past. Bidders for sealed bid auctions are limited to bidding on two sales only.

Prescriptions for these timber sales acknowledge recommendations derived from Biophysical Information and include management practices that follow site level guidelines and landscape goals. A plan for regenerating the forest stand following the harvest is described prior to the harvest and is documented on Timber Sale Information sheets.

After harvest, the forest stand is required to be successfully regenerated within 2 years for natural regeneration and 5 years for planted stands to meet FSC and SFI regeneration standards.

An Allowable Cut (harvest) amount for the major forest cover types has been established by dividing the number of acres of each cover type divided by the species rotation age. The Allowable Cut is the maximum number of acres per cover type available for harvest over one calendar year over the entire tax forfeit forest. Foresters are directed to achieve the allowable cut to maintain or improve forest health (ecological), supply fiber and timber to area mills and to provide jobs for local communities. The allowable cut will be adjusted if salvage harvesting is required following natural disturbances such as blowdown. Equal amounts of volume from salvage acres will be withdrawn from normal acres, but this will probably equal equal acres also because of workloads. Allowable cut information is listed in Chapter x, page x.

Natural Regeneration

Natural regeneration of forest species on harvested sites is chosen if the species that is regenerating will be productive on the site, will regenerate within a specified time frame and will survive insects and disease and other natural disturbances to provide a future forest cover type.

Artificial Regeneration

An average of 200 acres per year are site prepped for conifer planting on previously harvested sites where no regeneration will naturally occur or if the natural regeneration will not be productive on this particular site. Foresters identify the sites needing artificial regeneration and mark them physically or provide GPS boundaries. The site prep can be achieved by several methods including disc trenching and winter shearing. Proposals for doing the site prep are sent out to contractors for bids.

An average of 200(?) acres of seedling conifers per year are released from hardwood and grass competition by aerial spraying of herbicide. The areas needing herbicide application are located by GPS coordinates supplied by department Foresters. The Forestry Department contracts the helicopter applicators through a DNR administered contract. Plantations where herbicide is applied by helicopters must be at least ½ mile from private lands with seasonal or residential occupants. Plantations where herbicide is applied by ground application must be at least ¼ mile from private lands with seasonal or residential occupants. All private landowners, with the exception of industrial forest owners, will be contacted within 1 mile of herbicide applications. Specific guidelines for the use of chemical pesticides are listed at the end of this chapter.

Conifers are planted in amounts varying from x to x acres per year. The planting prospectus is sent out and the successful bid is usually provided by a firm from the Southern U.S. Seedlings or transplants are usually obtained from a DNR nursery within the state or Canada. Foresters work with the tree planters in locating the prepared sites, transporting the trees to the site and inspecting for proper spacing and planting of the trees. Well defined planting specifications must be met for full payment.

LAKE COUNTY ALLOWABLE CUT

Steps taken in determining the Annual Allowable Harvest

1. Classify the land base.
2. Examine the inventory of the available land base. From the Phase II inventory, find cover types, stand age acreages.
3. Project growth and yield.
4. Identify management activities and requirements that may positively or negatively affect timber availabilit
5. Set an allowable harvest.

Species and annual allowable cut

Botanical name	Common trade name	Annual allow-able cut	Actual harvest year average 2001-05	Projected harvest for future years
Populus Tremuloides	Aspen	1021 acres	514 acres	1000 acres
Betula Paperifera	White Birch	490 acres	486 acres	490 acres
Acer Saccharinum	Northern Hardwoods	219 acres	346 acres	200 acres
Abies Balsamea	Balsam Fir	127 acres	90 acres	125 acres
Picea Mariana	Black Spruce	51 acres	77 acres	50 acres
Fraxinus Nigra	Black Ash	74 acres	136 acres	100 acres
Populus Balsamifera	Balsam Poplar	51 acres	4 acres	50 acres
Total	2033 acres	1653 acres	2015 acres	
Total annual estimated log produc-tion: Total annual estimates production of NTFP: (list all NTFP by product type)	26,245 cords pulp and bolts 500 cords bolts 76 MBF logs			

Land Use Acreage

Land Use	Acres	% Total Area
Natural or Semi Natural Forest	121,848.43	80.6
Plantation	4360.68	2.48
Protected Area	13,221.92	8.7
Special Management Areas	10,880	7.2
Water	380	0.3
Infrastructure and other uses	145.5	0.1
Other Uses	375	0.2
Total Certified Area	151,211.53	100.0

Native Plant Communities

1. The Forestry Department will m**anage by Native Plant Community t**o attempt to move towards the Range of Natural Variability for each community. The following goals have been set for each native plant community:

<u>Mesic White Pine Red Pine - ?% of Tax Forfeit Land</u>

Long-term Goals:
- Increase the white and red pine component.
- Increase the 101+ growth stage of red and white pine.

<u>Mesic Aspen Birch- ?% of Tax Forfeit Land</u>

Long-term Goals:
- Increase the 81+ multi-aged conifer growth stage.
- Increase the white pine, white spruce, and tamarack component.

<u>Dry Mesic White Red Pine- ?% of Tax Forfeit Land</u>

Long-term Goals:
- Increase the red and white pine and white spruce components.
- Increase the older growth stages (121+yrs).

Northern Hardwoods-11% of Tax Forfeit Land

Long-term Goals:

- Increase the white pine, yellow birch, white spruce and white cedar components.
- Move every growth stage toward RNV over the next 150 years.

There are not enough Jack Pine Black Spruce plant communities on tax forfeit lands to set goals.

Using biophysical information and recognizing native plant communities, these cover types will be silviculturally managed as follows:

- Aspen

Productive aspen stands will be harvested in a way that ensures regeneration of aspen while also encouraging other desired species. Retaining conifers or seed tree harvests are several methods to increase species diversity. Off site aspen will be converted to conifers or species suitable within the native plant communities. Some aspen stands may be commercially thinned prior to final harvest.

- Paper Birch

Paper Birch regeneration will be encouraged on suitable sites and within other cover types. Paper Birch regeneration within conifer plantations will also be encouraged or tolerated. Special efforts may be taken to encourage Paper Birch regeneration or to establish birch on appropriate soils because Lake County soils and climate can produce high quality White Birch.

- Pine and Spruce

There has been and will be an effort to increase pine and spruce on tax forfeit lands. Pine and spruce will be retained on most productive aspen and birch sites and may be planted on unproductive hardwood sites. Pine will be under planted on hardwood sites.

- Northern Hardwoods

The Northern Hardwood cover type has been inventoried and mapped by Biophysical Landscape Ecological Units (BLEUs). Hardwood stands will be managed according to the quality of site. Productive sites will be managed in an uneven aged status for high quality and quantity timber. Medium quality sites may be managed for hardwood pulp or may be converted to conifers. Low productive sites may be converted to conifers. Some sites, high and low quality, will be managed for aesthetics or old age qualities.

- Black Ash

Black Ash will be encouraged to regenerate from sprouting on recently harvested areas. Some areas will also be inter-planted with White Spruce when possible.

- Yellow Birch

Yellow Birch will be under planted within some hardwood sites and encouraged whenever possible.

- Northern White Cedar

All cedar stands within 1 mile of Lake Superior will not be managed. Most cedar stands on tax forfeit lands will not be managed. Some cedar will be under-planted within hardwood stands.

Chemical Pesticide Use

Lake County Forestry endorses and uses the pesticide use guidelines established in the Voluntary Site Level Forest Management Guidelines manual. This section is intended to supplement those guidelines and more specifically state this department's goals and use of pesticides.

As a general rule Lake County Forestry uses herbicides at the lower label recommended application rates and only for conifer release. Rarely are herbicides used for site preparation prior to conifer establishment.

Site Field Reconnaissance Procedures for Pesticide Use:

Foresters are required to check the Natural Heritage website and to ground visit ALL sites requiring pesticide use to look for sensitive species (Natural Heritage Database and ground identification) and areas (vernal pools, wetland inclusions, RMZ's, adjoining property, etc.) that require protection from pesticide application. All sensitive areas will be GPS traversed and flagged to be excluded from pesticide application.

Risks and Benefits to Pesticide Use:

Following the field recon the forester is required to analyze information and consider all options, risks and benefits to using pesticides.

GLOBAL POSITIONING SYSTEM

All application equipment shall be equipped with a Global Positioning System (GPS) and

GLOBAL POSITIONING SYSTEM (continued)

- GPS system shall be capable of logging equipment coordinates and trip data when the spray system is turned on. A pressure-activated on/off switch mounted downstream from the 3-way valve will provide the signal that the spray system is in operation.

- GPS system shall be capable of updating position information at the minimum rate of five times per second and shall be capable of positional accuracy of 5 feet.

- GPS system shall be capable of logging travel data at the rate of at least once per second while spraying. The system shall also allow for the instantaneous logging of spray on and spray off positions. All operational trips will be logged from beginning to end.

- GPS equipment shall include a moving map display located inside the equipment.

- GPS equipment shall include a light bar or other visual track guidance indicator. The indicator shall be located so the operator can see the guidance information while looking through the forward windscreen.

- Differential correction capability must be activated during operational trips. The GPS system shall be equipped with an indicator to show and to log the loss of signal for differential correction.

- The system shall be capable of storing trip data for one day=s work and be able to download information data daily.

- Upon request, the Contractor will provide the Agencies with electronic files in the format of Arcview Shapefiles, NO1 files, or DXF files in NAD 83 datum.

- Contractor may need to consult with DNR Technical Specialists in order to facilitate conversion of the electronic file to appropriate format.

- All application aircraft shall pass a GPS equipment and software proficiency

trial if requested by the agency.

REQUIRED AERIAL APPLICATION EQUIPMENT

Herbicide will be mixed in water to make a finished solution, which will be applied at the rate of 10 gallons per acre.

The delivery system shall be a microfoil boom design, and shall be capable of evenly distributing a standardized 10 gallons of solution per acre. Nozzles with orifices of 0.028 inch will be used.

The delivery system must be equipped with an emergency jettison load-dumping system, non-leaking dump valves, and a positive action, leak-proof distribution system.

The following listed pesticides are available for use on Lake County Tax Forfeited lands:

Accord	Glyphosate
Garlon	Triclopyr
Oust	sulfometuron-methyl
Entrée 5735	surfactant
Entry II	surfactant
Plantskyyd	deer repellant

Personnel Safety:

All pesticide labels will be read and strictly adhered to prior to and during all application operations. Lake County employees will follow all DNR safety procedures when assisting on aerial or ground pesticide operations.

V. Forest and Land Management Administration Policies

The 1983 plan contained 37 management recommendations that would guide the staff to the proper administration of the Lake County Forestry Department. These recommended actions have been instituted. The 1983 plan also called for the creation of a Standing Forestry Commission. This group, made up of people with Forestry interests from Lake County, was formed to advise the Forestry Department on policy matters (See appendix for membership). The Standing Forestry Commission (SFC) continues to advise the Forestry Department today. The management recommendations described in the 1983 management plan were course filter level recommendations. Since these policies have been implemented, there has been a continual evolution of improvements to these policies. As economic, social and ecological factors change over time, administration policies will be altered as needed and appropriate. Changes will be promulgated as needed for proper management and administration of tax forfeit lands. The plan will continually be revised as needed, but in addition, the plan will be looked at especially hard after 5 years for necessary updates. After 10 years, the necessity for a new plan will be evaluated. The following recommended actions are from the 1983 plan but are still current in today's management of Lake County's tax forfeit lands:

Recommendation 1-5 Develop and propose a long-range land adjustment plan designed to consolidate land holdings and further county land management objectives.

Recommendation 2-3 Review and revise timber sales policies and administrative procedures to reflect changed needs and management objectives.

Recommendation 2-5 Maintain current inventory information on Lake County's land and timber resource; its extent, condition and potential for development.

Recommendation 4-9 Continue the development of management plans, programs and long-range policy objectives to guide the future use and development of Lake County's land and timber resources.

The 4 recommendations listed above all concern the adapting of administrative policies to continually changing conditions. The changing conditions range from social to economic to technological.

Lake County's publicly owned lands are open to the public. Timber access roads are open to the public unless wet conditions make closing the road necessary.

Disputes concerning the management of county tax forfeited land, including timber harvesting, land sales and easements, are handled in this manner:

The public may appeal decisions for strategic timber sale plans (10 year harvest plan) or regarding the prescriptions of specific timber sale prescriptions as well as subsequent significant changes in plans or prescriptions. The process described below must be followed for all such appeals:

a. Appeals will be submitted to the Lake County Land Commissioner

b. To be accepted, an appeal must state how the decision violates laws, regulations, or policies.

c. Emergency including salvage operations are not subject to normal processes for notification, review, and decision making, and are not subject to appeal. They include matters affecting public safety or welfare, or significant potential loss of resources, such as salvage after fire, storm, or insect and disease outbreak; or for emergency wildlife feeding. This does not preclude the desirability of scheduling a mini-review when time permits, nor the need for evaluation of whether there may be more value or less impact in simply allowing the effects of natural disturbance to remain as is.

Appeals will be reviewed as follows:

a. The Land Commissioner will be the sole appeal deciding officer.

b. The Land Commissioner may at his/her discretion extend the appeal decision date for an additional 30 calendar days by notice in writing to the appellant.

c. The Land Commissioner will render a decision in writing to the appellant including the basis for denying or granting the appeal.

The above appeal process constitutes the final administrative opportunity for the public to influence a County forest prescription prior to implementation. The Land Commissioner's decision represents the final administrative determination by the County. Any person with standing who has followed the above process who is still unsatisfied with the decision, may appeal the decision to the Lake County Board of Commissioners.

a. The County Board will send the appeal to the Lake County Standing Forestry Commission which will conduct a hearing. Based upon that hearing and other in vestigations, the Standing Forestry Commission will submit its recommendations to the County Board for its consideration.

b. The County Board will act upon the findings and recommendations submitted by the Standing Forestry Commission.

c. Any appeal must be postmarked not later than 45 calendar days after the stra tegic plan is announced and posted on the Lake County internet site, or within 15 calendar days after the date of the advertisement and posting for sealed bid or oral auction timber sales.

d. The appeal must be decided within 15 calendar days after the closing of the 45-day strategic plan appeal period for the 10 year harvest plan, or in the case of timber sale auction, before

Indigenous People's Rights

Lake County manages approximately 151,000 acres of land that has been forfeited to the State of Minnesota for non-payment of taxes. The State of Minnesota directs counties to manage this forfeited state land to make up for the loss of taxes for the local taxing units. The 151,000 acres are included in the lands described in the Treaty of 1854. The Forestry Department promptly replies to surveys and questionnaires sent to them by the 1854 Treaty Authority. A representative of the 1854 Authority has been approved by County Board Resolution to serve on the Standing Forestry Commission.

The management of Lake County's tax forfeit lands will not harm or lessen the resource values of the lands specified in the Treaty of 1854. The 1854 Treaty Authority will be contacted annually and given the opportunity to comment on proposed management activities. Tribal resources will be protected generally by BMPs and site level guidelines, and specifically by site, when contacted by the Treaty Authority, relating to, most specifically, the rights to fish, hunt or gather on tax forfeit land.

Cultural and ecological sites important to indigenous people will be identified and protected. The Guidelines (Cultural Resources, pages 1-24 and General Guidelines, Operational Activities P. 67-68) stress two major outcomes related to forest management practices:

These guidelines are from the Site Level Book:

When practical or feasible, avoid management activities within cultural resource areas.

Delineate cultural resource areas using flagging, signs or other appropriate methods.

Communicate with loggers and equipment operators to assure clear understanding that there is to be no work in the marked area when it is not practical or feasible to avoid cultural resource areas during forest management activities, protect resources by applying one or more of the following procedures:

Use temporary fencing, barricades or other measures to restrict the movement of heavy equipment and machinery in the cultural resource area.

• Temporarily brace walls and board up windows and doors of historic buildings.

• Prevent potential structural damage or deterioration of historic buildings and structures that might result from heavy equipment operation.

• Avoid felling trees directly onto historic buildings, structures, or surface features of archaeological sites.

• Use temporary protection such as slash, corduroy, tire mats or fill over geotextile.

• Place fill over archaeological sites to prevent soil compaction and erosion.

• Revegetate archaeological sites to prevent erosion.

For cultural resources that cannot be protected from damage, consider data recovery (professional excavation of archaeological sites or documentation of above-ground cultural resources).

If a human burial site is accidentally discovered during operations, cease operations immediately in the vicinity of the discovery. Contact the Office of the State Archaeologist and your local law enforcement agency.

For accidental discovery of other types of cultural resources (such as archaeological artifacts), temporary suspension is not required, but it is recommended. Suspending operations in the immediate vicinity of the cultural resource will allow time to contact a cultural resource professional or develop plans to initiate procedures to avoid or reduce damage to the cultural resource.

When cultural resources are discovered during forest management activities:

- Safeguard the condition of the cultural resource by preventing further damage, loss or deterioration.

- Investigate and document the cultural resource in order to determine its significance and conservation potential.

- Adjust work schedules to allow time for data recovery or other mitigation measures.

Monitor the effectiveness of cultural resource management practices during forest management operations.

Lake County staff has met on site with the State Archeologist on suspected cultural sites. No sites have been found on tax forfeit land and no sites in Lake County are listed on the Natural Heritage database. Logging camps, or other cultural sites, if found, are protected by 100 foot buffers.

The 1854 Authority will be contacted if cultural sites of significance to indigenous peoples are found, and these sites will be incorporated into management plans. Cultural site locations will be remain confidential and not made public but will be shown on a GIS layer for office use only.

VII. Recreational Facilities and Opportunities, Existing and Future

The majority of tax forfeit lands are concentrated in the Southern one-third of Lake County but the remaining parcels are scattered throughout the county. These lands are interspersed among other government agency lands and also private lands. The majority of the North Shore State Snowmobile Trail and Superior Hiking Trail are on tax forfeit lands. As more trail routes are considered and proposed, it is the Forestry Department's policy to place proposed trails on existing trail corridors and limit any new trail corridors when possible.

Lake County is the sponsor for numerous DNR Grant-In-Aid (GIA) snowmobile, ATV and Cross country ski trails. The Forestry Department works with the Minnesota DNR and local clubs to provide xx miles of groomed snowmobile trails, xx miles of ATV trails and xx miles of cross country ski trails within Lake County. The majority of the trails are located on tax forfeit land. A staff person within the department is the designated county recreational trail administrator. The administrator gathers Grant Applications, project proposals, and requests for reimbursements from county clubs and determines whether the County Board should pass resolutions to support the grant applications and grant payments. The County Board can also provide funds from the Resource Development Recreational Fund to area clubs for costs that are not covered by the GIA program.

Portions of county GIA trails are occasionally used for special event recreational races such as the John Beargrease Sleddog Race. Permission for such events must be granted by the Land Commissioner after initial consultation with the County Board and County Attorney for first time events. The event sponsor must name the County as co-insured with a minimum liability premium of $1,000,000.

The Superior Hiking Trail crosses xxx tax forfeit parcels within Lake County. Lake County is the Superior Hiking Trail Association's (SHTA) sponsor for federal grants for trail construction and associated facilities. The Forestry Department works with the SHTA to determine new trail and trail reroute locations on tax forfeit lands, and to address other trail issues.

There are many miles of timber haul roads that can be used for hunting, trapping, berry picking, bird watching and to provide access to other recreational activities. These roads are kept open except during wet periods when they may be gated to protect the roads, mainly from rutting.

The Forestry Department meets with other government agencies, non-profit organizations and local clubs to plan for future recreational facilities and to cooperate on ongoing maintenance and trail relocation.

VIII. Natural Heritage Information Use – ETS

Lake County Forestry contacts SHPO before each timber sale or site disturbing activity (when no check was previously made) to query their data base. The state archeologist has visited the demonstration forest to determine historic significance several times before management activities commenced.

Lake County has a license with the state Natural Heritage database. The information concerning RT&E species is placed on timber inventory maps which are used to develop prescriptions for land management activities. These maps are in paper form and on GIS software seen on monitors.

RT&E species and Species of Special Concern are identified on inventory management maps. General guidelines are provided by the Minnesota Forest Resource Council (MFRC) site level guidelines. If the Forester thinks that more specific guidelines are needed, the Forester talks to the Land Commissioner and a DNR or Forest Service expert (usually DNR) can be reached for guidance if needed.

IX. Timber Management – Silviculture

The timber sale preparation paper is shown below. It displays Silviculture methods used, site level considerations and landscape level strategies for the Forester to consider and use.
Specific Silviculture prescriptions for specific cover types within Native Plant Communities and Biophysical regions will be added by the end of 2006 for SFC consideration.

TIMBER SALE INFORMATION

Desc. _____ **Sec**._____
Twp._____ **Rg**._____

Sale Administrator:_____ **Sale #**(name) _____

Physical Condition of Management Area:

Management Goal:

Visual Sensitivity Classification: (circle one) High Moderate Low

Sale Type: A - auction **Topography**: _____
B - special blow down auction
I - intermediate **Access**: P - public V - private R - regular
S - over-the-counter **Access**: W - winter S - summer

Timber Type and Acreage (up to 3 species)

01 Ash _____	20 Northern Hrdwd_____	61 White Spruce_____
09 Lowland Hardwood_____	30 Oak_____	62 Balsam Fir_____
12 Aspen_____	51 White Pine	71 Black Spruce Lowland_____
13 Birch_____	52 Red Pine_____	72 Tama-rack_____
14 Balm of Gilead_____	53 Jack Pine_____	73 Northern White Cedar_____

Regeneration: A - artificial N - natural

Regeneration Species: (choose one)

01 Ash _____	20 Northern Hrdwd_____	61 White Spruce_____
09 Lowland Hardwood_____	30 Oak_____	62 Balsam Fir_____
12 Aspen_____	51 White Pine	71 Black Spruce Lowland_____
13 Birch_____	52 Red Pine_____	72 Tama-rack_____
14 Balm of Gilead_____	53 Jack Pine_____	73 Northern White Cedar_____

Timber Sale Regulations: (circle all applicable) **BMPs ARE MANDATORY!**

Clear Cut	Concentrate Slash at Landings	Leave All Snag/Nest Trees
Select Cut	Access Responsibility of Owner	Leave All Marked Pine/Spruce Seed
Thinning	Recreational Trail Regs. Apply	Leave All Marked Balsam/Spruce Cover

Full Tree Skid Observe Buffer Areas Keep Out of Aspen Regeneration

Reserve All Cedar Observe Reserve Strips or Areas Leave Old Growth Standing

Reserve All Conifers Avoid Felling onto Private Land Other:

LAND MANAGEMENT PROCEDURES

Biophysical region

Border Lakes Brimson Upland Cloquet Island Lake Plain
Duluth Upland Isabella Upland Superior Upland
Whyte Lowland

Any RTE species present? Describe protection plan on attached sheet if management is still planned.

Yes
No

Any Historical/Cultural sites present? Describe protection plan on attached sheet if management is still planned.

Yes
No

LANDSCAPE MANAGEMENT

Check off Potential Ecological Plant Community and describe how management plan will move toward returning to plant community species and age structure.

Mesic Aspen-Birch-Fir-Spruce Mesic White Pine-red Pine
Dry Mesic White Pine-Red Pine Northern Hardwoods
Lowland Conifer

RNV graphs. Check off species that will be retained in stand.

White Pine Yellow Birch White Cedar White Spruce
Red Pine Tamarack Jack Pine

Describe other activities that may be used to encourage absent species.

Scarification Underplant absent species Stand Conversion

Landscape Goals

Procedure: Check off on procedures to use to move towards landscape goals.

Mesic White-Red Pine
Harvest mature aspen and birch out of mature growth stage.
Retain conifers where present
Salvage wind damaged trees in growth stages over 50 years where conifers are present

Mesic Aspen-Birch
Seed Tree Harvest Mimic Natural Disturbance
Harvest and Underplant Encourage Tamarack
Retain Conifers

Dry Mesic White-Red Pine
Harvest mature deciduous trees Retain Conifers
Maintain Red and White Pine in existing stands
Underplant Conifers Clearcut deciduous and plant conifers

Northern Hardwoods
Manage by uneven-age management
Apply even-age management to pole-mature growth stage to maintain younger age classes.

Lowland Conifers
Retain White Cedar Other

2. Biophysical Key Used

Brimson Upland	Cloquet Island Lake Plain
Duluth Upland	Isabella Upland
Superior Upland	Whyte Lowland

Procedure: Note the BLEU from the appropriate key.
BLEU # _____
Biophysical BLEU - List any information from the BLEU that has an extraordinary effect on the silvicultural prescription

3. **Biophysical Tables** - List any information from the tables that will have an effect on the silvicultural prescription.

Table 1: Potential Growth and Yield
Table 2: Guidelines for timing equipment operations
Table 3: Reforestation
Table 4: Wildlife Opportunities
Table 5: Autumn Color Opportunities

4. Voluntary Site-level Forest Management Guidelines

a. Forest Soil Productivity

The site level management plan maintains forest soil conditions to favor regeneration, survival and long term growth of desired forest vegetation.

b. Riparian Areas

A riparian zone exists, width and basal area specification by type of water body, riparian area site condition and management objectives have been recognized.

No riparian area.

c. Water Quality and Wetlands

The site level management plan prevents or minimizes non-point source pollution, erosion and subsequent sedimentation of water bodies from forest management activities.

d. Wildlife Habitat

Suitable leave trees and snags are to be retained.

Course woody debris and slash are to be retained or created during management.

Conifers for food, nesting and cover in mixed deciduous/coniferous stands are to be retained and regenerated.

A variety of sizes and shapes for harvest units are used to provide site-level wildlife habitat.

Endangered, threatened and special concern species are present. The site will be managed to maintain or enhance existing populations of these species.

The appropriate phase II inventory map has been checked for sensitive communities and sites as well as a visual inventory for sites during cruising.

Application of leave tree guidelines around wetland inclusions and seasonal ponds to provide site-level wildlife habitat features for terrestrial species have been applied.

Leave trees (5%) have been retained to maintain the biological continuity of a harvested site.

Procedure: Consider how to implement the principles listed above in management activities. Consult the site-level green book when specific questions occur.

5. Visual Sensitivity Classifications – Lake County map and guide book

Procedure: Verify visual sensitivity classification from map and adjust prescription accordingly.

High Moderate Low

6. Silvicultural Bulletins – USFS North Central Experimental Station, DNR

Procedure: Look at guide books for silvicultural problem solving.

ON-SITE PRE-HARVEST MEETING CHECK-LIST

Logger safety training requirement - LogSafe

Insurance requirements?

Spill kits on site

Issue tickets

Sale paid in full

Sale boundaries

Reserve areas

Go over guidelines

Garbage, oil containers removed from site when sale is completed

Other

TIMBER SALE ADMINISTRATION CHECKLIST

1. Roads, landings, and skid trails
   a. Appropriate size? Yes No Comment _____
   b. Appropriate location? Yes No Comment _____
   c. Erosion problems? Yes No Comment _____

2. Leave Trees
   a. Scattered Clumped Both Comment _____
   b. 5% leave trees? Yes No Comment _____
   c. Blowing over? Yes No Comment _____
   d. Leave tree species? _____

3. Lakes, rivers, seasonal ponds, wetlands and lowland conifer forest
   a. Adequate RMZs? Yes No Comments _____
   b. Adequate filter strips? Yes No Comments _____

4. Cultural Resources
   a. Does one exist? Yes No Comments _____
   b. Adequately protected? Yes No Comments _____

POST HARVEST CHECKLIST

Forester _____ Date _____ Sale Permit # _____

Operator _____

Date Sale Closed _____

Summer Winter Frozen Ground Only

A. To be filled out within 1 year after harvest

5. Roads, landings, and skid trails
   a. Appropriate size? Yes No Comment _____
   b. Appropriate location? Yes No Comment _____
   c. Erosion problems? Yes No Comment _____

6. Leave Trees
   a. Scattered Clumped Both Comment _____
   b. 5% leave trees? Yes No Comment _____
   c. Blowing over? Yes No Comment _____
   d. Leave tree species? _____

7. Lakes, rivers, seasonal ponds, wetlands and lowland conifer forest

LAKE COUNTY FORESTRY

a. Adequate RMZs? Yes No Comments _____
b. Adequate filter strips? Yes No Comments _____

8. Cultural Resources
a. Does one exist? Yes No Comments _____
b. Adequately protected? Yes No Comments _____

B. To be filled out after the fifth post harvest growing season.

Inspector _____ Date _____

1. Stand condition
a. Condition acceptable? Yes No Comment _____
b. Treatment needed? Yes No Comment _____
c. Another visit needed? Yea No Comment _____

Regeneration Methods Natural + Hand Plant *

Site Prep $ Seeding – Aerial # Scarification <

Herbicides ~ Suppress ◊

LAKE COUNTY FORESTRY