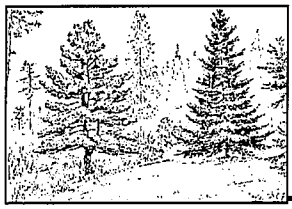

Timber Management: General

12.1 Assessment

The following statements highlight key findings based upon the description of Carlton County's resource presented in Chapter 3.

a. Not quite two-thirds (61%) of Carlton County's 72,400 acres of tax forfeited lands possess a forested cover. Lowland brush and grass account for 10,300 acres (14%) – these are lands that essentially will not be actively managed but represent valuable habitat and ecological systems. Roughly 220 acres are in upland grass.

b. In general it appears that the forest cover types are appropriate for the underlying native plant communities (land's ecological potential). There are no high levels of obvious stands that should be converted to other cover types in order to be better aligned with the land's ecological potential.

c. Aspen represents the major cover type, lying on 24,000 of the roughly 44,000 acres of forested land. Nearly 2,300 acres, however, are on land that cannot be actively managed through forestry – this land lies on the steep slopes and red clay valleys of the Nemadj River basin. Most of the County's aspen resource is a mixed forest generally dominated by aspen trees but including a sizeable amount of quality fir, spruce and hardwoods.

d. Approximately 13,300 acres of Carlton County's tax forfeited lands lie within the Nemadji River basin. Of this amount, almost 4,500 acres are on the highly erodible red clay steep slopes and valley bottoms. Another 2,000 acres of the high ground is covered by alder swamps. The remaining 6,800 acres, although identified with a variety of cover types, is basically a boreal hardwood conifer mixed forest ecological type. The erodible slopes and valleys are being removed from future management activity. The complex nature of managing the boreal hardwood conifer forest will necessitate experimentation to insure quality regeneration and prevent conversion to alder dominated stands.

e. In general, Carlton County's forests reflect the forest inherited across northern Minnesota – a forest shaped by massive logging followed by fire and conversion to agriculture followed by reconversion of poor agricultural lands back to forest and highgrading of certain forest types. Only in the past 30 years has the aspen-birch forest been professionally managed and were pine regeneration efforts undertaken.

f. The County's aspen resource reflects roughly 25 years of management. The under 20 year old resource is in good shape and at appropriate levels of acres. Most of the remaining stands are old,

needing harvest. There are low amounts of intermediate age classes that will require strategic management to insure a relatively even flow of product for area mills.

g. The birch resource is dominated by older age classes and needs immediate attention in order to secure reasonable regeneration. Birch is also a major component as a species within aspen stands.

h. Northern hardwoods are just entering the ages where active management can be undertaken. These stands need improvement to upgrade vigor and quality and to set the stage for future, uneven-aged, multi-species management.

i. 70% of the County's white spruce and one-third of its balsam fir resource lies within the special concern areas of the Nemadji River basin. There is a considerable amount within other cover types, especially aspen.

j. The County has a considerable ash and lowland hardwood resource but it presents management issues. This is an older resource but has erratic markets and lies on wet sites which seriously restrict options for harvest.

k. Over the past 30 years the County has planted nearly 1,400 acres of red pine. This is the County's only red pine resource (as a cover type). There is little white pine as a cover type on County lands although it is found as a species within other stands.

l. Tamarack is an older resource with a mix of younger stands. At just over 2,000 acres this represents some of the County's best conifer resource.

m. Roughly 3,700 acres are covered with black spruce and northern white cedar. Most of these stands are older. While the cedar has not been harvested due to regeneration problems, some stagnant black spruce tips are harvested for ornamental trees.

12.2 Policies

Objective: *Carlton County intends to produce and make available a viable mix of merchantable timber species at sustainable levels within limits set by sound silvicultural and ecological practices.*

The following are the policies of Carlton County regarding general timber management:

1. Adopt the "Managers Handbook" series prepared by the North Central Experiment Station of the US Forest Service as the basic management guidelines for tree species and type.

2. Prepare on-going five-year tactical management plans. These plans are to describe total acres by cover type to be managed, identify specific stands to be considered for management, anticipated harvest volumes, non-timber management actions (e.g., new roads, trails), and similar information.

3. Provide one or more accessible sites for individual and commercial

fuelwood harvesting.

4. Sell timber through auctions and over-the-counter sales in conformance with state law and market demand. There will be a deliberate effort to make sales available to all sizes of logging operators.

5. Seek the efficient utilization of harvested trees and resources.

6. Diversify the size of timber sales to better accommodate varying capacity of area logging operators.

12.3 General Silvicultural Practices

This section presents the basic silvicultural practices applied by the Land Department.

Site Level Activities

The County has adopted the *Voluntary Site-Level Forest Management Guidelines for Landowners, Loggers and Resource Managers* (February 1999) adopted by the Minnesota Forest Resources Council. These guidelines direct forest management activities across a range of topics including harvest, riparian zones, forest road construction, and more.

Stand Evaluation

All stands being considered for the sale of timber will undergo a thorough, standardized evaluation. Stands may also be evaluated as part of re-inventorying, research, and similar efforts.

Part of the evaluation process is to type the site in terms of biophysical land units and native plant community. Stands will be evaluated as to soil productivity. These steps are taken to better align the future forest to the potential of the land.

The evaluation will specifically define the type of regeneration process to be utilized.

Evaluations will provide guidance to the logger regarding utilization of harvested materials. This will include description of the degree of removal of merchantable material including low grade material. This may include suggested markets for species to be removed during harvest. The County will seek to identify the destination of materials after harvest.

Other items to be considered in a stand evaluation include: presence of rare, threatened and endangered species; historical and cultural values; coordination with other landowners; visual management qualities and recreational values; larger landscape level management objectives; timing and season of harvest; all appropriate Site-Level Guidelines; check for exotic species to remove; and riparian zone issues.

Harvest Intensity

The intensity of harvest for a given stand is determined by the cover type, the forest ecological system, patch characteristics, and overall management objectives (e.g., conversion, maintenance of type, etc.). The following table identifies the range of harvest intensity used by the County; the narratives on management for each specific cover type identifies the level of intensity used for each type.

Harvest Intensity Key	
High Intensity	
Type I ■ Even age - clearcut	Type II ■ Even age clearcut with residuals
Harvest removes over 90% of the trees in an area larger than 10 acres in order to regenerate shade intolerant trees.	Harvest removes between 65-90% of the trees in an area larger than 10 acres in order to regenerate shade intolerant trees. Residual trees will enhance the diversity of the future forest stand.
Moderate Intensity	
Type III ■ Even age patch cut	Type IV ■ Even age partial cut
Same as Type I or II except area treated is smaller than 10 acres.	Harvest removes between 35-65% of the trees in an area larger than 10 acres. Generally the reserved trees will be the major component of the future forest stand.
Low Intensity	
Type V ■ Even age thinning	Type VI ■ Uneven age selection
Harvest removes less than 35% of the trees to enhance growth on the desired trees in the stand, which is comprised of shade intolerant or mid-tolerant trees.	Harvest removes less than 35% of the trees to encourage a desired balance of tree ages and sizes in a forest stand comprised of shade tolerant trees.

Fire

Primary responsibility for fighting fire lies with the Minnesota Department of Natural Resources. The County coordinates fire fighting with the MnDNR. The County will support MnDNR fire fighting efforts.

The County will consider the use of prescribed fire for certain management activities. Burns will designed in coordination with the MnDNR, Fond du Lac Reservation, and others as appropriate. All burns will follow standards and procedures modified from both State and Federal guidelines.

Pest Control

The County monitors its lands for signs of pest infestations. Primary control of pests lies with the MnDNR which has extensive resources for tracking and managing pest outbreaks. In the event an infestation is identified County staff will work with MnDNR Forest Health specialists to devise an appropriate response.

The County utilizes up-to-date Integrated Pest Management (IPM) strategies to reduce potential for pest infestations.

Exotic Species

The County monitors its lands for the presence of undesired exotic plant species. When such plants are discovered, the County will contact MnDNR specialists to assess the situation and devise an appropriate response.

Reforestation

Unless the management objectives for a harvested area specifically identify a non-forest new use, all harvested areas will be prepared, as appropriate to the intended future forest type, for immediate regeneration.

As noted in the cover type summary sheets, reforestation depends upon the cover type / species. Natural regeneration is relied upon whenever possible or viable; this includes monitoring for advanced regeneration prior to harvest.

Artificial regeneration (planting, seeding) will be used when appropriate for the target species. Artificially regenerated stands will have stand specific management objectives. These will address the need for artificial versus natural regeneration, long-term objective for the stand, the use of artificial planting to mimic natural regeneration processes, and the stand's desired characteristics throughout its developmental cycle. Trees chosen to be planted will be indigenous species appropriate to the forest ecological system. Among the possible measures to be used to allow artificially regenerated stands to better achieve the characteristics of a natural forest are:

- Plant conifers at densities less than 400 trees per acre or leave openings within planted areas.
- Leave areas of natural vegetation untreated by herbicides in the understory;
- Where possible, leave live trees and snags;
- Leave coarse woody debris;
- Leave select strips or patches untreated to enhance diversity;
- Use herbicides at rates that allow for establishment of the target cover type species yet allow others to regenerate naturally;
- Allow occurring tree species to survive to enhance diversity.
- Use planting and chemical application techniques which focus disturbance and application on just the immediate area of each planted seedling.
- Preserve hardwood tree and shrub components when thinning.
- Release desirable hardwood species with good growth characteristics when thinning.
- Reduce canopy coverage over unique or high diversity areas when thinning.
- Allow non-target pine regeneration to accumulate under target pine trees (ex: white pine within a red pine stand).

Stands will be converted based on the native plant community (and/or Biophysical Land Unit if it has been determined) on which they lie. For example, pine will be planted only on sites which are appropriate for pine forests.

Certain species require site preparation for successful regeneration or conversion. The County uses mechanical scarification wherever appropriate and viable.

The use of chemicals to prepare a site or release a regenerating forest is kept to the minimum. All applications are in accord with pertinent instructions and

regulations. Aerial applications may be used as and where appropriate.

Certain species of significance to Carlton County are difficult to successfully regenerate. Key among these are jack pine and white pine both of which fall prey to browsing by deer. Carlton County intends to use a variety of approaches to regenerate these species. These will include: focusing regeneration on ecological systems that best support the species; using physical methods such as bud-capping to prevent browsing; using non-toxic chemical means to discourage browsing; and to work with the DNR on focused culling of the deer herd to give young trees a chance to grow past the high risk browsing stage.

As part of the inventory update process, all harvested stands will be re-visited within 1 year of harvest and then again between the ages of 2 and 7 depending upon species type and method of regeneration.

Inclusions

The County has a general objective of retaining and maintaining inclusions in order to enhance species and site diversity and retain mix of merchantable timber. Inclusions to be managed will vary but include upland conifer within deciduous stands and aspen clones within hardwood stands. Among the practices to be considered for inclusion management are:

b. Apply crown release or selective thinning to target species where they co-occur in merchantable size classes;
c. Apply seedling release, canopy reduction, or over-story removal where target species are well-developed and suitable for release;
d. Apply crop tree or seedling release, bud capping, or other non-commercial treatments as resources allow;
e. Leave mature inclusions on unique micro-sites unharvested; and
f. Identify stands with managed inclusions in the forest inventory.

Habitat

Stands to be managed will be reviewed within the context of landscape habitat concerns (e.g., travel corridors, patch size, etc.), species specific issues, and defined management areas (e.g., relationship to state Wildlife Management Areas, etc.).

Staff will use the stand level habitat checklist noted in the habitat section of this plan as the basis for evaluating a timber sale for general habitat-related issues.

Planned Retention

The County has the general objective to retain undisturbed patches within harvest units in order to: retain structure, den sites, and food sources for wildlife; provide refugia for sensitive plants, invertebrates, and micro-organisms allowing quick recovery and recolonization; provide a seed source; and maintain tree species diversity. Among the practices to be considered are:

1. Retain roughly 5% of harvest unit in undisturbed clumps, strips, or islands. Patches are to be scaled to size of harvest unit.
2. Favor areas with diverse or intact plant communities and/or unique micro-sites.

3. Avoid any equipment operation within retained areas especially in summer harvest.
4. Retain equivalent number of scattered leave trees where retaining patch is not feasible.

Riparian Resources

In general, the County will follow Best Management Practices for riparian areas as provided in the *Voluntary Site-Level Forest Management Guidelines.* On a stand by stand basis the County will consider applying extended rotation ages for any harvesting that occurs in or adjacent to riparian zones. Further, the County will systematically reduce its harvest estimates to account for the reduced harvest potential of stands in riparian zones.

Natural Disturbance

After a fire or wind event, County staff evaluates the stand according to the following general procedures:

- Assess the stand for immediate and future management actions. This assessment involves consideration of the Forest Ecological System, surviving trees (type, condition, age), and defined management objectives (including recreational activities) for the area. Based on this assessment the County will prepare an action plan that integrates strategic and tactical considerations.

- Salvage merchantable timber. If the action plan determines that salvage is desired and feasible, a salvage timber sale will be designed and implemented.

- Revise inventory and management schedules. As part of the County's annual inventory update, information reflecting the stand's new condition and status (e.g., change in cover type) would be entered into the database. Staff would also re-examine its management schedules (strategic and tactical) to determine if and how they should be revised to reflect the impacts of the natural disturbance and any timber salvage that occurs.

Chemicals

County will follow Voluntary Site-Level Guidelines regarding use of chemicals.

If chemicals are used for forest management, the type and amount used will be the least toxic, most specific (narrowest spectrum), and minimum amount required to meet objectives.

Applicators must have appropriate training.

Chemical use will be according to label instructions and requirements.

Detailed records will be maintained concerning use of chemicals (where, what, how much, for what purpose, who, etc.).

Excess chemicals, containers, and associated materials will be disposed in a proper and legal manner.

As appropriate, the County will post areas to be treated and notify adjacent

landowners or nearby residents of planned applications.

Special Guidelines:

Special guidelines for specific sites, cover types, or management situations will be adopted as necessary as policy.

12.4 Area Specific Management

The County may determine from time to time that specific geographic areas require unique management strategies.

Nemadji River Basin
This area requires special management approaches for several reasons.. The red clay slopes and river bottoms in this area will receive no active management in the form of timber harvesting, stand improvement, or recreational facility (including trails) development. The forests will be allowed to succeed into spruce-fir dominated stands that should help provide the type of vegetation and ground cover conducive to minimizing erosion and sedimentation processes.

The upland areas will undergo active forest management but with precautionary measures taken to prevent erosion and cover type conversion (to alder swamp). The non-alder swamp uplands will be managed as a mixed species boreal hardwood-conifer forest. Various management techniques will be experimented with to determine the best approaches for managing and regenerating stands.

Habitat Management
The sites listed in Chapter 7 will be managed primarily to promote habitat for target animal species and to provide appropriate recreational opportunities.

12.5 Ecological Unit Management

The following statements identify general management objectives County tax forfeited lands on each native plant community. It must be noted that it most cases County ownership represents a minor amount of any given NPC within the county. When the County defines and maps biophysical land units, similar strategic statements will be presented for them as well.

Poor Mixed Woodland [FDn32]
The limited number of acres in this native plant community will be managed for aspen-birch with plantings of red and white pine created as opportunities arise.

Mixed Woodland [FDn33]
Much of this landscape will be retained in aspen-birch but opportunities for planting, either as stands or inclusions, red and white pine will be aggressively sought.

Hardwood Forest [MHn35]
While aspen cover type will continue to dominate this native plant community, efforts will be made to retain the mix of hardwoods within the stands. Further, opportunities for creating quality hardwood stands will be sought. Red and

white pine and white spruce may be planted as underplantings or inclusions within this area.

Mixed Forest [FDn43]
This native plant community represents Carlton County's largest resource base. Management will seek to retain the general mix of cover types on it with emphasis on aspen-birch. Hardwood stands will be retained; may be managed as even-aged or two-cohort stands. Opportunities for increasing pine presence, probably as component within stands, will be sought. Efforts will be made to retain species mix within stands.

Rich Northern Hardwood Forest [MHn47]
Manage the few acres within County's holdings for older-looking northern hardwood forests.

Boreal Hardwood-Conifer Forest [MHn44]
Much of this resource lies within the uplands of the Nemadji River basin. Stands will be managed for multiple species succeeding through the life span of the stands – aspen-birch, balsam fir, and white spruce. White pine may be introduced as underplantings within stands.

Wet/Dry Boreal Hardwood-Conifer Forest [MHn44b]
This land will not undergo active management. In addition, no recreational trail will be built across these lands nor will additional cabin leases be issued for them. The forests will be allowed to naturally succeed in most cases into old growth white spruce or conifer dominated boreal hardwoods.

Wet Ash Swamp [WFn55]
Sustain cover types (most change in these stands will be through natural disturbance).

Wet Cedar Forest [WFn53]
Sustain cover types.

Wet Spruce Bog [APn80]
Sustain cover types. Areas with appropriate access may have stagnant black spruce tips harvested.

12.6 Cover Type Management

This section provides key information regarding the County's strategic management direction for each of the major forest cover types.

"Cover type" is the term used by foresters to describe individual forest stands. A stand is typed by the dominant tree species but in most stands there are many other tree species. Usually the dominant species comprises over half the trees; the exact mix varies with cover type and the successional phase of the stand.

The information provided for each cover type is:

Age Class Distribution: number of acres within broad age classes in the base year.

General Management Objective: a short statement of the basic purpose

of County management for this cover type.

Featured on Native Plant Community: most cover types can occur on a wide variety of Native Plant Communities, but they do best or are best suited on a smaller number. Checks are placed by those systems on which the County will stress the particular cover type.

Rotation Age: the average age at which stands of this cover type would be harvested. This age may vary by ecological system as the trees may be able to sustain older ages on certain systems. The average rotation age may be varied to account for stand conditions, coordination with adjacent stands, location within visually sensitive areas, and the like.

Harvest: checks are placed by the harvest techniques generally used for this cover type (the techniques are described in the general timber management chapter). The notes provide additional information regarding timing and intensity of thinning and final harvest.

Regeneration: checks are placed by the regeneration techniques generally used for this cover type. The notes provide additional information.

Other Notes: additional information to help explain management objectives and actions.

The following pages present Carlton County's general strategic management concepts for each major forest cover type.

Strategic Management:

TIMBER MANAGEMENT: ASH-LOWLAND HARDWOODS

Age Class Distribution: 2003

	0-20	21-40	41-60	61-80	81-100	101-120	121+	Total
Ash	28	56	312	684	1,554	624	796	4,054
Low Hdwds	0	0	48	81	0	0	16	145

General Management Objective:
Maintain the amount of cover type acres.

Cover Type Featured on Native Plant Community:
Check marks identify the ecological systems on which ash and lowland hardwoods are emphasized as a cover type.

Rotation Age:
The target rotation (harvest) age is listed for each native plant community.

Dry Mesic	Poor Mixed Woodland [MNn32]		*
	Mixed Woodland [FDn33]		*
Mesic	Hardwood Forest [MHn35]		*
	Mixed Forest [FDn43]		*
	Rich Northern Hdwd [MHn47]		*
Wet Mesic	Boreal Hdwd-Conifer [MHn44]		*
	Boreal Hdwd-Conifer [MHn44b]		*
Wet	Wet Ash Swamp [WFn55]	✔	*
	Wet Cedar Forest [WFn53]	✔	*
	Spruce Bog [APn80]		*

Harvest:
Check marks identify the level of harvest intensity used for this cover type.

- ✓ Even age clearcut
- ✓ Even age clearcut with residuals
- ✓ Even age patch cut
- ✓ Even age partial cut
- ✓ Even age thinning
- ✔ Uneven age selection

Notes:
Reserve all ash and lowland hardwood inclusions in other cover types.

Regeneration:
Usual methods of reforestation and regeneration are checked.

- ✔ Natural regeneration
- ✓ Scarification
- ✓ Burning
- ✓ Hand planting
- ✓ Direct seeding
- ✓ Herbicides
- ✓ Other

Notes:

Other Notes:
*Currently, these types have not been routinely harvested or deliberately managed because markets are small and erratic. Harvesting will be done on a select tree basis.

Strategic Management:

TIMBER MANAGEMENT: ASPEN

Age Class Distribution: 2003

	0-20	21-40	41-60	61-80	81-100	101-120	121+	Total
All	6,856	2,696	11,498	2,745	138	83	0	24,016
Excluding MHn44b	6,807	2,574	10,100	2,048	109	83	0	21,721

General Management Objective:
Maintain acres of cover type on quality sites — balance age classes; convert stands on Nemadji River Basin slopes to spruce-fir; balance age classes.

Cover Type Featured on Native Plant Community:
Check marks identify the ecological systems on which aspen is emphasized as a cover type.

Rotation Age:
The target rotation (harvest) age is listed for each native plant community.

Dry Mesic	Poor Mixed Woodland [MNn32]	✔	**
	Mixed Woodland [FDn33]	✔	**
Mesic	Hardwood Forest [MHn35]	✔	**
	Mixed Forest [FDn43]	✔	**
	Rich Northern Hdwd [MHn47]		**
Wet Mesic	Boreal Hdwd-Conifer [MHn44]	✔	**
	Boreal Hdwd-Conifer [MHn44b]		
Wet	Wet Ash Swamp [WFn55]		**
	Wet Cedar Forest [WFn53]	✔*	**
	Spruce Bog [APn80]		

Harvest:
Check marks identify the level of harvest intensity used for this cover type.

- ✔ Even age clearcut
- ✔ Even age clearcut with residuals
- ✓ Even age patch cut
- ✓ Even age partial cut
- ✓ Even age thinning
- ✓ Uneven age selection

Notes:
Rotation age will be established by site index of stand. On FDn43 Mixed Forest sites the rotation age may be adjusted upward to account for higher site quality.

Regeneration:
Usual methods of reforestation and regeneration are checked.

- ✔ Natural regeneration
- ✓ Scarification
- ✓ Burning
- ✓ Hand planting
- ✓ Direct seeding
- ✓ Herbicides
- ✓ Other

Notes:

Other Notes:
* Aspen in the Wet Cedar Forest NPC is an anomaly caused by suspect definition of certain Wet Cedar Forest stands – this will require field checking to clarify the actual NPC.
No management will occur within the MHn44b native plant community in the Nemadji River basin; these stands will most likely succeed to white spruce-balsam fir.

Strategic Management:

TIMBER MANAGEMENT: BALSAM FIR

Age Class Distribution: 2003

	0-20	21-40	41-60	61-80	81-100	101-120	121+	Total
All	0	0	157	1,021	127	0	0	1,305
Excluding MHn44b	0	0	94	736	46			876

General Management Objective:
Maintain number of acres of cover type and increase component within other types.

Cover Type Featured on Native Plant Community:
Check marks identify the ecological systems on which balsam fir is emphasized as a cover type.

Rotation Age:
The target rotation (harvest) age is listed for each native plant community.

Dry Mesic	Poor Mixed Woodland [MNn32]		
	Mixed Woodland [FDn33]		
Mesic	Hardwood Forest [MHn35]		
	Mixed Forest [FDn43]		
	Rich Northern Hdwd [MHn47]		
Wet Mesic	Boreal Hdwd-Conifer [MHn44]	✔	45-55
	Boreal Hdwd-Conifer [MHn44b]	✔	
Wet	Wet Ash Swamp [WFn55]		
	Wet Cedar Forest [WFn53]		
	Spruce Bog [APn80]		

Harvest:
Check marks identify the level of harvest intensity used for this cover type.

✔ Even age clearcut
✔ Even age clearcut with residuals
✔ Even age patch cut
✓ Even age partial cut
✓ Even age thinning
✓ Uneven age selection

Notes:
Residuals left in these stands will not be balsam fir.

Regeneration:
Usual methods of reforestation and regeneration are checked.

✔ Natural regeneration
✓ Scarification
✓ Burning
✓ Hand planting
✓ Direct seeding
✓ Herbicides
✓ Other

Notes:

Other Notes:
Balsam fir will gain in acres on slopes in the Nemadji River Basin; these stands will not be harvested. Merchantable-sized balsam fir trees will not be retained as residuals due to susceptibility to blowdown. Smaller specimens will be retained.

Strategic Management:

TIMBER MANAGEMENT: BIRCH

Age Class Distribution: 2003

	0-20	21-40	41-60	61-80	81-100	101-120	121+	Total
All	0	0	440	1,231	158	34	0	1,863
Excluding MHn44b	0	0	440	1,031	123	34	0	1,628

General Management Objective:
Maintain number of acres of cover type.

Cover Type Featured on Native Plant Community:
Check marks identify the ecological systems on which birch is emphasized as a cover type.

Rotation Age:
The target rotation (harvest) age is listed for each native plant community.

Dry Mesic	Poor Mixed Woodland [MNn32]		*
	Mixed Woodland [FDn33]		*
Mesic	Hardwood Forest [MHn35]		*
	Mixed Forest [FDn43]	✔	*
	Rich Northern Hdwd [MHn47]		*
Wet Mesic	Boreal Hdwd-Conifer [MHn44]		*
	Boreal Hdwd-Conifer [MHn44b]		
Wet	Wet Ash Swamp [WFn55]		
	Wet Cedar Forest [WFn53]		
	Spruce Bog [APn80]		

Harvest:
Check marks identify the level of harvest intensity used for this cover type.

- ✔ Even age clearcut
- ✔ Even age clearcut with residuals
- ✓ Even age patch cut
- ✓ Even age partial cut
- ✓ Even age thinning
- ✓ Uneven age selection

Notes:
* Rotation age will be 10 years older than site index of stand.
Residuals include birch seed trees.

Regeneration:
Usual methods of reforestation and regeneration are checked.

- ✔ Natural regeneration
- ✔ Scarification
- ✓ Burning
- ✓ Hand planting
- ✔ Direct seeding
- ✔ Herbicides
- ✓ Other

Notes:
Summer harvest with scarification will be used to enhance regeneration.

Other Notes:
Birch will be retained as component within other cover types.
Birch stands will not be harvested on the MHn44b native plant community in the Nemadji River basin; these stands will likely succeed into white spruce-balsam fir.

Srategic Management:

TIMBER MANAGEMENT: LOWLAND CONIFER

Age Class Distribution: 2003

	0-20	21-40	41-60	61-80	81-100	101-120	121+	Total
Bl. Spruce	113	110	195	1,281	761	236	385	3,081
Tamarack	130	126	118	634	673	162	216	2,059
Wh. Cedar	0	28	0	74	416	101	6	625

General Management Objective:
Maintain number of acres of cover type.

Cover Type Featured on Native Plant Community:
Check marks identify the ecological systems on which lowland conifer is emphasized as a cover type.

Rotation Age:
The target rotation (harvest) age is listed for each native plant community.

Dry Mesic	Poor Mixed Woodland [MNn32]		
	Mixed Woodland [FDn33]		
Mesic	Hardwood Forest [MHn35]		
	Mixed Forest [FDn43]		
	Rich Northern Hdwd [MHn47]		
Wet Mesic	Boreal Hdwd-Conifer [MHn44]		
	Boreal Hdwd-Conifer [MHn44b]		
Wet	Wet Ash Swamp [WFn55]		
	Wet Cedar Forest [WFn53]	✔	*
	Spruce Bog [APn80]	✔	*

Harvest:
Check marks identify the level of harvest intensity used for this cover type.

- ✔ Even age clearcut
- ✔ Even age clearcut with residuals
- ✔ Even age patch cut
- ✓ Even age partial cut
- ✓ Even age thinning
- ✔ Uneven age selection

Notes:
Tamarack rotation age will be 100 years. Black spruce will be around 100 years but may vary depending upon presence of mineral soil.

Regeneration:
Usual methods of reforestation and regeneration are checked.

- ✔ Natural regeneration
- ✓ Scarification
- ✓ Burning
- ✓ Hand planting
- ✓ Direct seeding
- ✓ Herbicides
- ✓ Other

Notes:

Other Notes:
There are many species of concern located in lowland conifer areas; management will be sensitive to these species.
Much of the harvest will be salvage cuts in areas with insect, disease, and damage.
White cedar will be essentially unharvested because of regeneration issues.

Srategic Management:

Timber Management: Black Spruce Tip Harvesting

There are roughly 3,100 acres of stagnant black spruce on Carlton County administered tax forfeited lands. These are not considered "merchantable" forested lands but there is a market for the tips for use as ornamental Christmas trees. The spruce bogs are a special ecological system and contain rare, threatened, and endangered species.

General Management Objective:
Retain the cover type and ecological functions of the spruce bogs while undertaking sustainable harvest of spruce tips.

Guidelines for Black Spruce Tip Harvesting

1. Potential harvest areas are designated by Carlton County.
2. Specific harvest area is selected by County or requested by a potential harvester. There must be a minimum of 9 years between harvests on the same site unless County determines that the degree of new growth permits a shorter interval.
3. Sale is set up with an appraisal and established boundaries are per normal timber sales.
4. Only informal sale process will be used; auction process will not be used.
5. Shortly after purchasing the sale, the harvester must conduct an on-site meeting with County staff prior to any cutting. This meeting will reaffirm harvest guidelines, site boundaries, skid trails, landings, access to site, scaling days, and other key requirements.
6. The preferred method of harvest is through use of bypass-type pruning shears; no bow saws are to be used. Not all trees within stand are to be harvested.
7. Skidding or forwarding can only be done on pre-determined days to facilitate scaling by County staff. Tree tips forwarded out of the harvest area on any other day shall be treated as timber trespass.
8. Harvest cut must be made just above at least one live branch (to provide basis for future regrowth of new tips).
9. Equipment requirements: width cannot exceed 60"; total weight cannot exceed 1,500 pounds; vehicles must be tracked.
10. The minimum distance between main skid trails must be 400 feet.

Strategic Management:

TIMBER MANAGEMENT: JACK PINE

Age Class Distribution: 2003

	0-20	21-40	41-60	61-80	81-100	101-120	121+	Total
Jack Pine	7	13	0	3	0	0	0	23

General Management Objective:
Jack Pine will be converted to Red Pine.

Cover Type Featured on Native Plant Community:
Check marks identify the ecological systems on which jack pine is emphasized as a cover type.

Rotation Age:
The target rotation (harvest) age is listed for each native plant community.

Dry Mesic	Poor Mixed Woodland [MNn32]		
	Mixed Woodland [FDn33]		
Mesic	Hardwood Forest [MHn35]		
	Mixed Forest [FDn43]		
	Rich Northern Hdwd [MHn47]		
Wet Mesic	Boreal Hdwd-Conifer [MHn44]		
	Boreal Hdwd-Conifer [MHn44b]		
Wet	Wet Ash Swamp [WFn55]		
	Wet Cedar Forest [WFn53]		
	Spruce Bog [APn80]		

Harvest:
Check marks identify the level of harvest intensity used for this cover type.

- ✔ Even age clearcut
- ✔ Even age clearcut with residuals *
- ✓ Even age patch cut
- ✓ Even age partial cut
- ✓ Even age thinning
- ✓ Uneven age selection

Notes:
*Residuals must be red or white pine.

Regeneration:
Usual methods of reforestation and regeneration are checked.

- ✔ Natural regeneration
- ✔ Scarification
- ✔ Burning
- ✔ Hand planting
- ✔ Direct seeding
- ✔ Herbicides
- ✔ Other

Notes:

Other Notes:
Jack Pine stands will be converted to Red Pine at time of harvest (at about age 70).

Strategic Management:

TIMBER MANAGEMENT: NORTHERN HARDWOOD

Age Class Distribution: 2003

	0-20	21-40	41-60	61-80	81-100	101-120	121+	Total
No. Hdwd	17	358	788	1,826	291	29	0	3,309

General Management Objective:
Keep the number of acres of this type; increase quality of stands.

Cover Type Featured on Native Plant Community:
Check marks identify the ecological systems on which northern hardwoods are emphasized as a cover type.

Rotation Age:
The target rotation (harvest) age is listed for each native plant community.

Dry Mesic	Poor Mixed Woodland [MNn32]		*
	Mixed Woodland [FDn33]		*
Mesic	Hardwood Forest [MHn35]	✔	*
	Mixed Forest [FDn43]	✔	*
	Rich Northern Hdwd [MHn47]	✔	*
Wet Mesic	Boreal Hdwd-Conifer [MHn44]		
	Boreal Hdwd-Conifer [MHn44b]		
Wet	Wet Ash Swamp [WFn55]		
	Wet Cedar Forest [WFn53]		
	Spruce Bog [APn80]		

Harvest:
Check marks identify the level of harvest intensity used for this cover type.

- ✓ Even age clearcut
- ✔ Even age clearcut with residuals
- ✓ Even age patch cut
- ✔ Even age partial cut
- ✔ Even age thinning
- ✔ Uneven age selection

Notes:

Regeneration:
Usual methods of reforestation and regeneration are checked.

- ✔ Natural regeneration
- ✓ Scarification
- ✓ Burning
- ✓ Hand planting
- ✓ Direct seeding
- ✓ Herbicides
- ✓ Other

Notes:

Other Notes:
Higher quality sites will be managed to develop on-going characteristics of multi-aged, multi-species mature forest.
Other sites will be managed as even-aged, multi-species hardwoods. Harvest age will be roughly age 80.

Strategic Management:

TIMBER MANAGEMENT: OAK

Age Class Distribution: 2003

	0-20	21-40	41-60	61-80	81-100	101-120	121+	Total
Oak	0	0	0	116	31	97	0	244

General Management Objective:
To maintain or increase extent of this cover type; improve quality of stands.

Cover Type Featured on Native Plant Community:
Check marks identify the ecological systems on which oak is emphasized as a cover type.

Rotation Age:
The target rotation (harvest) age is listed for each native plant community.

Dry Mesic	Poor Mixed Woodland [MNn32]		
	Mixed Woodland [FDn33]	✔	100
Mesic	Hardwood Forest [MHn35]	✔	100
	Mixed Forest [FDn43]	✔	100
	Rich Northern Hdwd [MHn47]		
Wet Mesic	Boreal Hdwd-Conifer [MHn44]		
	Boreal Hdwd-Conifer [MHn44b]		
Wet	Wet Ash Swamp [WFn55]		
	Wet Cedar Forest [WFn53]		
	Spruce Bog [APn80]		

Harvest:
Check marks identify the level of harvest intensity used for this cover type.

- ✓ Even age clearcut
- ✓ Even age clearcut with residuals
- ✔ Even age patch cut
- ✔ Even age partial cut
- ✔ Even age thinning
- ✓ Uneven age selection

Notes:
Shelterwood cuts will be used extensively to provide enough light for regeneration while sustaining stand as a oak type.

Regeneration:
Usual methods of reforestation and regeneration are checked.

- ✔ Natural regeneration
- ✔ Scarification
- ✓ Burning
- ✓ Hand planting
- ✓ Direct seeding
- ✓ Herbicides
- ✓ Other

Notes:
Signs of advance regeneration will be preferred prior to harvest.

Other Notes:

Strategic Management:

TIMBER MANAGEMENT: RED PINE

Age Class Distribution: 2003

	0-20	21-40	41-60	61-80	81-100	101-120	121+	Total
Red Pine	843	504	32	0	0	0	0	1,379

General Management Objective:
Slightly increase the number of acres of this cover type; increase stand quality; maintain as a component within all other cover types.

Cover Type Featured on Native Plant Community:
Check marks identify the ecological systems on which red pine is emphasized as a cover type.

Rotation Age:
The target rotation (harvest) age is listed for each native plant community.

Dry Mesic	Poor Mixed Woodland [MNn32]	✔	120
	Mixed Woodland [FDn33]	✔	150
Mesic	Hardwood Forest [MHn35]	✔	150
	Mixed Forest [FDn43]	✔	150
	Rich Northern Hdwd [MHn47]		150
Wet Mesic	Boreal Hdwd-Conifer [MHn44]		150
	Boreal Hdwd-Conifer [MHn44b]		
Wet	Wet Ash Swamp [WFn55]		
	Wet Cedar Forest [WFn53]		
	Spruce Bog [APn80]		

Harvest:
Check marks identify the level of harvest intensity used for this cover type.

- ✔ Even age clearcut
- ✔ Even age clearcut with residuals
- ✓ Even age patch cut
- ✓ Even age partial cut
- ✔ Even age thinning
- ✓ Uneven age selection

Notes:
Early thins will occur between ages 30 and 60. Mature thins will occur as growth allows / requires.

Regeneration:
Usual methods of reforestation and regeneration are checked.

- ✓ Natural regeneration
- ✔ Scarification
- ✔ Burning
- ✔ Hand planting
- ✓ Direct seeding
- ✔ Herbicides
- ✔ Other

Notes:

Other Notes:
Red Pine is a highly desired species. Harvested stands will remain as red pine cover type. Red pine component in other stands will be retained.
Conversion of other cover types to new red pine stands will occur as opportunities on good sites arise.

Strategic Management:

TIMBER MANAGEMENT: WHITE PINE

Age Class Distribution: 2003

	0-20	21-40	41-60	61-80	81-100	101-120	121+	Total
White pine	0	0	0	0	10	29	38	77

General Management Objective:
Maintain number of acres of this cover type; increase as a component in all other cover types.

Cover Type Featured on Native Plant Community:
Check marks identify the ecological systems on which white pine is emphasized as a cover type.

Rotation Age:
The target rotation (harvest) age is listed for each native plant community.

Dry Mesic	Poor Mixed Woodland [MNn32]	✔	
	Mixed Woodland [FDn33]	✔	
Mesic	Hardwood Forest [MHn35]	✔	
	Mixed Forest [FDn43]	✔	
	Rich Northern Hdwd [MHn47]	✔	
Wet Mesic	Boreal Hdwd-Conifer [MHn44]		
	Boreal Hdwd-Conifer [MHn44b]		
Wet	Wet Ash Swamp [WFn55]		
	Wet Cedar Forest [WFn53]		
	Spruce Bog [APn80]		

Harvest:
Check marks identify the level of harvest intensity used for this cover type.

- ✔ Even age clearcut
- ✔ Even age clearcut with residuals
- ✔ Even age patch cut
- ✔ Even age partial cut
- ✔ Even age thinning
- ✔ Uneven age selection

Notes:
No set rotation age for white pine. Harvest will only occur on a salvage basis (if then).

Regeneration:
Usual methods of reforestation and regeneration are checked.

- ✔ Natural regeneration
- ✔ Scarification
- ✔ Burning
- ✔ Hand planting
- ✔ Direct seeding
- ✔ Herbicides
- ✔ Other

Notes:

Other Notes:

Strategic Management:

TIMBER MANAGEMENT: WHITE SPRUCE

Age Class Distribution: 2003

	0-20	21-40	41-60	61-80	81-100	101-120	121+	Total
All	230	31	38	60	582	174	0	1,115
Excluding MHn44b	230	41	27	1	61	20	0	380

General Management Objective:
Maintain or increase the number of acres in this cover type.

Cover Type Featured on Native Plant Community:
Check marks identify the ecological systems on which white spruce is emphasized as a cover type.

Rotation Age:
The target rotation (harvest) age is listed for each native plant community.

Dry Mesic	Poor Mixed Woodland [MNn32]		100
	Mixed Woodland [FDn33]		100
Mesic	Hardwood Forest [MHn35]		100
	Mixed Forest [FDn43]		100
	Rich Northern Hdwd [MHn47]		100
Wet Mesic	Boreal Hdwd-Conifer [MHn44]	✔	100
	Boreal Hdwd-Conifer [MHn44b]	✔	
Wet	Wet Ash Swamp [WFn55]		
	Wet Cedar Forest [WFn53]		
	Spruce Bog [APn80]		

Harvest:
Check marks identify the level of harvest intensity used for this cover type.

✔ Even age clearcut
✔ Even age clearcut with residuals
✔ Even age patch cut
✓ Even age partial cut
✔ Even age thinning
✓ Uneven age selection

Notes:
Even age clearcuts will be used as final harvest in natural stands.
Even age thins will be done in artificially planted stands.

Regeneration:
Usual methods of reforestation and regeneration are checked.

✓ Natural regeneration
✔ Scarification
✓ Burning
✔ Hand planting
✓ Direct seeding
✔ Herbicides
✓ Other

Notes:

Other Notes:
White spruce is expected to increase on the slopes and bottoms of the Nemadji River Basin. These stands will not be harvested.

Table 12: Summary of Management by Cover Type (Generalized Management Guidelines as Applied in ForestView© Growth Model; actual management may vary to some degree).

Cover Type	Mgmt Year	NPC	Condition	Mgmt Action Max. Ac./Yr.	Stand Conversion†
Aspen (& Balm of Gilead)	2004-2103	All lands outside of Nemadji basin	Age > 55	Harvest 278 ac.	
	2004-2019	Nemadji uplands	Age > 40	Harvest 128 ac.	
	2020-2029	Nemadji uplands	Age > 40	Harvest 60 ac.	
	2030-2103	Nemadji uplands	Age > 40	Harvest 89	
	2004-2029	Nemadji uplands	Age > 50	Harvest 115 ac.	To White spruce & Balsam Fir
Paper Birch	2004-2103	All*	Age > 65 SI ≤ 59	Harvest 40 ac.	
	2004-2103	All*	Age > 75 SI ≥ 60	Harvest 40 ac.	
Northern Hardwoods	2004-2103	All*	Age >80 BA > 186 SI ≥ 65	Select Hvst 300 ac.	
	2004-2103	All*	Age >120 SI ≥ 65	Select Hvst (no limit)	
	2004-2103	All*	Age > 80 SI < 65	Harvest 75 ac.	
Oak	2004-2103	All*	Age > 100	Harvest (no limit)	
White Pine	2004-2103	All*	Age > 29 & < 70 BA > 140	Thin (no limit)	
	2004-2103	All*	Age ≥70 & ≤ 110 BA > 180	Thin (no limit)	
Red Pine	2004-2103	All*	Age > 29 & < 70 BA > 140	Thin (no limit)	
	2004-2103	All*	Age ≥70 & ≤ 110 BA > 180	Thin (no limit)	
	2004-2103	All*	Age > 150	Harvest 50 ac.	
Jack Pine	2004-2103	All*	Age > 70	Harvest (no limit)	To Red Pine

Table 12: Summary of Management by Cover Type (Generalized Management Guidelines as Applied in ForestView© Growth Model; actual management may vary to some degree).

Cover Type	Mgmt Year	NPC	Condition	Mgmt Action Max. Ac./Yr.	Stand Conversion†
White Spruce Black Spruce, upland	2004-2103	All*	Age > 29 & < 60 BA > 130	Thin (no limit)	
	2004-2103	All*	Age ≥60 & ≤ 85 BA > 150	Thin (no limit)	
	2004-2103	All*	Age > 100	Harvest 100 ac.	
Balsam Fir	2004-2103	All*	Age > 50	Harvest 100 ac.	
Black Spruce, low Tamarack	2004-2103	All*	Age > 110	Harvest 90 ac.	
Ash / lowland hdwds	No programmed harvesting (although minor amounts of select tree cutting will occur); only natural disturbance.				
Cedar	No harvesting.				

* "All" does not include the Nemadji Basin slopes and valleys where no harvesting is to occur.
† In addition to the listed conversion, stands are converted to white spruce and balsam fir on the Nemadji River basin slopes and valleys.

12.7 Strategic Actions

Carlton County will undertake the following actions relative to general timber management to implement this strategic plan:

1. Continue use of a mix of auction and informal sales as means of providing opportunities to a mix of logging operators and meeting needs of specific sales.

2. Support forest research intended to improve the health, productivity, and management of all forests within or affecting the County. This support may be through funding or in-kind assistance.

3. Generally manage the timber resource according to the following table (for the first decade estimates are provided for volume based upon current inventory figures).

Table 13: Projected Harvest Schedule by Decade							
Cover Type	2004-2013			Acres Harvested / Thinned			
	Acres Harvested	Acres Thinned	Est. Volume (cd)	2014-2023	2024-2033	2034-2043	2044-2053
Aspen	4,873		93,430	4,992	3,907	3,433	3,580
Birch	627		14,905	700	299	0	0
Northern Hardwoods	750	30	20,978	774	271	533	415
Oak	101		2,594	36	65	40	0
White Pine	0	0	0	0	0	0	0
Red Pine	0	110	2,569	0	204	66	981
Jack Pine	3		30	0	0	13	0
White Spruce	39	14	1,156	45	14	482	538
Balsam Fir	1,199		23,245	0	0	531	669
Black Spruce	595		2,984	269	640	741	531
Tamarack	307		2,227	628	198	223	475

Note: Table 13 identifies the maximum number of acres that could be considered for harvesting or thinning. However, site-specific conditions (e.g., habitat, slope, cultural resources, riparian zone, access, etc.) will reduce the number of acres actually harvested.