

# Minnesota's Forest Resources



**Department of Natural Resources  
Division of Forestry  
September 2004**

**500 Lafayette Road  
St. Paul, Minnesota 55155**



# Minnesota's Forest Resources

Revised 10-11-04

## Preface

This report is compiled annually by the Minnesota DNR – Forestry Division Utilization & Marketing staff. Publication was begun in the mid 1980s by John Krantz, former Utilization & Marketing Program Coordinator. The report is intended to answer frequently asked questions about Minnesota's forest resources such as: current conditions and trends in forest resources and forest resource industrial use. Foresters, other resource managers, planners, people in forest industry and policy makers will find items of interest in these pages.

We thank those who cooperated in providing and updating information for this report. They include many of Minnesota's wood product companies and the USDA Forest Service Forest Inventory and Analysis (FIA) unit. Without their cooperation we would be unable to gather or disseminate much of this information.

Most of the figures and charts are based on the Minnesota 2002 inventory figures (currently only four years of data are available, of a five-year inventory project). *The 2002 data are reliable enough to use for many analyses, however readers should be aware that some of the numbers will change and reliability will improve as the final inventory information becomes available next year.* The new, complete FIA data set should be available in late 2004.

## Highlights:

- *Timber imports of pulpwood into the state continued to increase in 2002, driven largely by increasing stumpage price in Minnesota. This continues to be an important factor affecting harvest levels from Minnesota timberlands.*
- *Tight aspen timber supplies in Minnesota are the biggest reason for several mills continuing and expanding their efforts to utilize several formerly "underutilized" species such as tamarack, maple, basswood and ash pulpwood. The development of markets for maple, basswood and ash pulpwood will require increasing assistance efforts on private lands to ensure that these species are properly managed.*
- *Forest Certification continued to raise its profile as a forest management issue as several large purchasers of wood products such as Time, Inc. committed to the use of 3<sup>rd</sup> party certified wood and fiber. The state of Minnesota has committed to achieving third-party certification of its timberlands by the end of 2005.*
- *Boise announced the sale of the International Falls mill and approximately 300,000 acres of timberland to a new company formed by Chicago investment firm Madison Dearborn Partners in July 2004. The new company will retain the Boise Cascade name.*
- *Potlatch announced the sale of sold its three Minnesota OSB mills to Ainsworth Lumber in August 2004.*

## Contact Information

Questions or requests for additional information can be directed to:

Keith Jacobson

Minnesota DNR Wood Utilization & Marketing Program Leader

500 Lafayette Road

St. Paul, MN 55155-4044

Phone: (651) 296-6491

Email: [keith.jacobson@dnr.state.mn.us](mailto:keith.jacobson@dnr.state.mn.us)

# Table of Contents

	Page
Preface	3
Resource and Industry Highlights	3
Contact Information	3
Wood-Using Industry Overview	5
Forest Resources Overview	11
Harvest Levels	15
Sustainable Harvest Levels	23
Wood Supply and Demand Information for Important Cover Types and Species	29
Aspen/Balm	31
Birch	35
Balsam Fir	37
Spruce	39
Tamarack	43
Northern Hardwoods	44
Maple	46
Basswood	47
Oak	49
Lowland Hardwoods	51
Ash	52
Red Pine	54
Jack Pine	55
White Pine	57
White Cedar	59
Timber Price Information	61
Forest Certification	65
Glossary	71
Conversion Factors	72

# Wood-Using Industry



**A brief overview of Minnesota's wood-using industry, including mill location and product information for many of the larger mills, and total industry economic impact.**



# Minnesota Wood Industry – 2004

## Annual Economic Impact

- Value of Forest Products Manufacturing Shipments 2002: 6.48 Billion (estimated)\*\*
- 4th Largest Manufacturing Industry in Minnesota Based on Employment (#1 Computer & Electronic Equipment, # 2 Fabricated Metal Products, #3 Food Manufacturing)\*
- Generates 11% of dollars of all manufacturing shipments\*
- Value-Added impact attributable to Minnesota timber = \$4.3 Billion that stays in Minnesota\*

## Employment

- 53,200 Employees (Primary Processing [including logging]= 29,200, Secondary Manufacturing = 24,000)\*\*
- 1.9 Billion in wages paid (10% of all manufacturing in Minnesota)
- **Important Industries Include:** Cabinets and Cabinet Parts, Window & Door Components (MN # 2 in U.S.), Store Fixtures, Office & Residential Furniture, Pallets, Crating & Pallet Parts, Millwork, Wood Shavings (for poultry industry).
- **Non-Traditional Industries Dependent on Forestry:** Balsam Boughs for Wreath Industry (annual sales of \$20 Million+), Wood “flour” energy for taconite industry, 6 co-generation facilities utilizing wood for energy production.

## Industry

- 5 Pulp and Paper Mills
- 3 Recycled Pulp & Paper
- 3 Hardboard & Specialty
- 6 Oriented Strand/Structural Board
- 500+ Sawmills
- 150 Associated Industries
- Over 850 Secondary Manufacturers

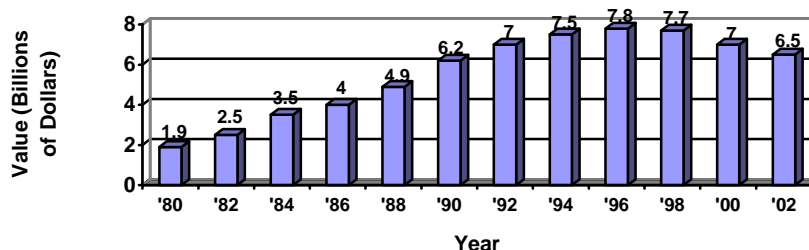
## Annual Volume of Timber Harvested

- Pulpwood = 2,907,000 Cords (2002)
- Sawlogs = 288 Million Board Feet (2001)
- Fuelwood = 656,000 Cords (149,000 from timberland. 2002-03)
- Veneer = 8.0 Million Board Feet (domestic)  
= .5 Million Board Feet (exported)
- Chips = 9,000 Cords (fuel & mulch)
- Shavings = 14,000 Cords (animal bedding)
- Posts & Poles = 9,100 Cords

\*Minnesota Department of Employment & Economic Development analysis

\*\*Minnesota Forest Industries estimates based on 2001 data

**Value of Forest Products Manufactured in Minnesota**



## Minnesota Pulp and Paper – 2004

Firm	Wood Used	Product
UPM - Kymenne Blandin Paper Company Grand Rapids	Aspen, Balsam Fir and Spruce	Lightweight coated paper used in Magazines, Catalogs
Boise International Falls	Aspen, Balm, Pine, Spruce, Balsam Fir, Birch, Tamarack, Ash, Maple	Business, Xerox, Envelope, Computer papers
International Paper Sartell	Aspen, Balsam Fir, Spruce	Lightweight coated paper used in Magazines, Catalogs
Stora Enso Duluth	Balsam Fir, Pine, Spruce	Coated paper used in Advertising Supplements
Sappi Fine Paper Company Cloquet	Aspen, Balm, Maple, Basswood, Tamarack, Pine	Business & Printing paper
Recycling Mills		
Rock-Tenn Company St. Paul	Recycled Paper & Corrugated	Cardboard & Corrugated Boxes
Stora-Enso Recycled Fiber Mill Duluth	High Grade Office Paper & Computer Paper	Market Pulp for Paper
Liberty Paper Company Becker	Recycled Paper & Corrugated	Cardboard & Corrugated Boxes

## Minnesota Oriented Strand Board and Engineered Wood Products – 2004

Firm	Wood Used	Product
Ainsworth Lumber Grand Rapids	Aspen, Balm, Birch, Pine, Maple, Tamarack, Ash	OSB – “Potlatch Select”
Louisiana-Pacific Two Harbors	Aspen, Balm, Birch	OSB – Siding “Inner Seal”
Northwood Panelboard Bemidji	Aspen, Balm, Birch, Maple	OSB – “Norboard”
Ainsworth Lumber Bemidji	Aspen, Balm, Birch, Pine, Maple, Tamarack, Ash	OSB – “Oxboard”
Ainsworth Lumber Cook	Aspen, Balm, Birch, Pine, Maple, Tamarack, Ash	OSB – “Oxboard”
Trus Joist a Weyerhaeuser Business Deerwood	Aspen, Balm, Birch	Laminated Strand Lumber “Timberstrand”

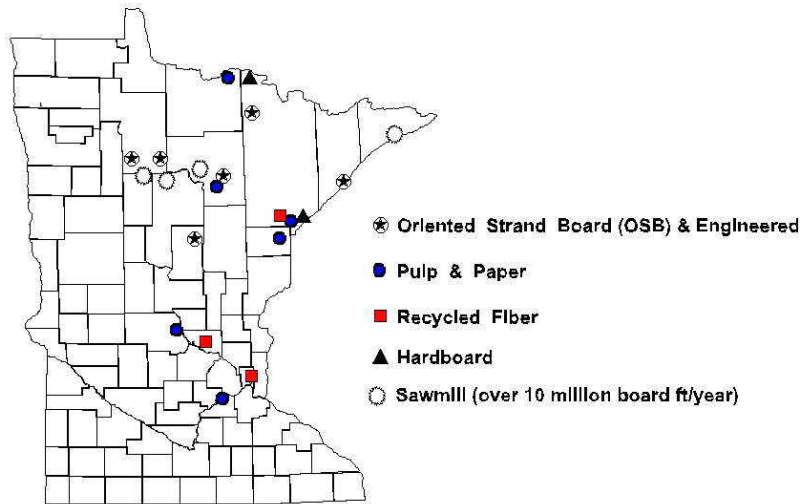
## Minnesota Hardboard and Specialty – 2004

Firm	Wood Used	Product
Certaiteed Corporation Shakopee	Aspen, Mixed Hardwoods & Recycled Paper	Roofing Felt
International Bildrite International Falls	Aspen, Balm & Recycled Paper	Sheathing
Georgia-Pacific Corporation, Superwood Division Duluth	Aspen, Pine, Mixed Hardwoods	Industrial Hardboard



**OSB & ENGINEERED, PULP & PAPER, HARDBOARD, RECYCLING MILLS  
and LARGE SAWMILLS**

Minnesota 2004



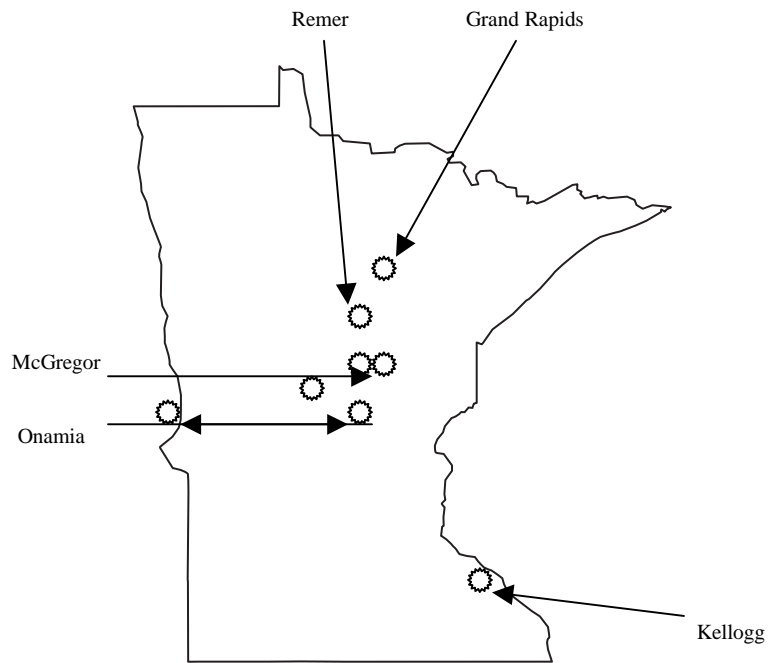
Location of mills is an important factor in determining markets for wood. The map above shows the OSB, Pulp & Paper, Recycled Fiber, Hardboard, Sheathing and large sawmills in Minnesota. These mills utilize various species of wood material, with aspen pulpwood being by far the largest component.

**Minnesota – New and Expanding Large Wood Industry**

1975-2003	Product	Capital Investments (\$Millions)
Potlatch (now SAPPI) - Expansion	Paper	\$100
Potlatch (now Ainsworth Lumber) – Bemidji	OSB	40
Potlatch – (now Ainsworth Lumber) - Cook	OSB	40
Northwood Panelboard	OSB	45
Champion International (now International Paper)	Paper	250
Blandin (now Ainsworth Lumber)	OSB	50
Louisiana Pacific	OSB	30
Blandin (now UPM)	Paper	350
Potlatch (now SAPPI) – Modernization	Paper	100
LSPI (now Stora-Enso)	Paper	404
International Bildrite	Sheathing	12
Boise	Paper	990
MacMillian Bloedel (now Trus Joist - a Weyerhaeuser Business)	Laminated Strand Lumber	70
Potlatch – (now Ainsworth Lumber) Bemidji expansion	OSB	35
Potlatch	Lumber	22
Potlatch (now SAPPI)	Pulp Mill	525
Potlatch – (now Ainsworth Lumber) Cook expansion	OSB	60
<b>Total</b>		<b>\$3.123</b> <b>=\$3,123 Billion</b>

Source: MN DNR - Forestry

## Minnesota Sawmills Utilizing Small Diameter Hardwoods – 2004



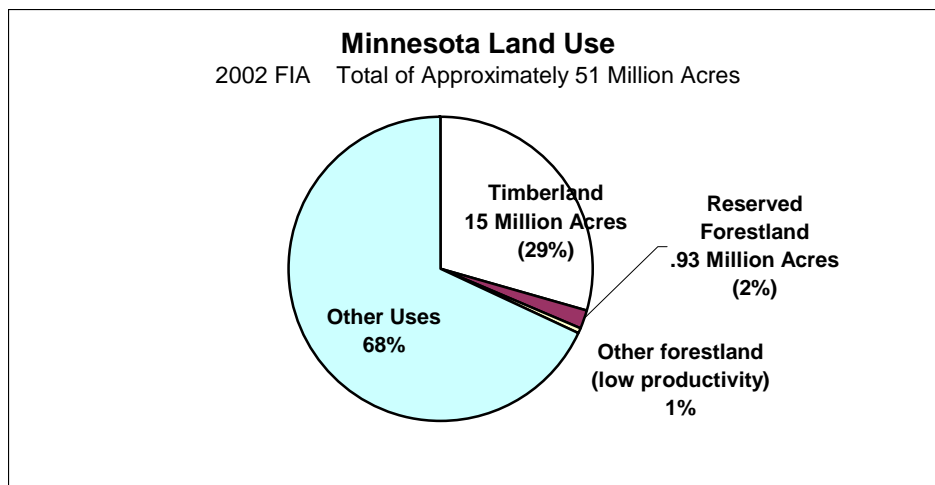
Recently, several Minnesota sawmills have invested in equipment that enables them to efficiently utilize smaller diameter hardwoods. ***Additionally, many pulpwood-using mills have expanded their species mix to include hardwoods in the last 5 years.*** This has greatly improved markets for most small-diameter hardwoods, giving landowners more income for their timber and giving forest managers more management options.

# Forest Resources



**A brief overview of Minnesota's forest resources, including total forestland and timberland acreage, cover type percentages and an ownership breakdown for timberland.**

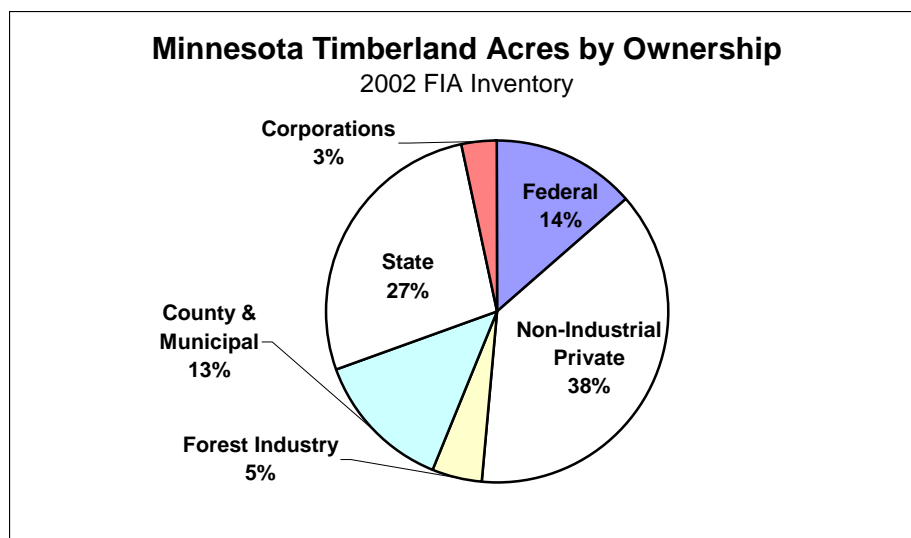




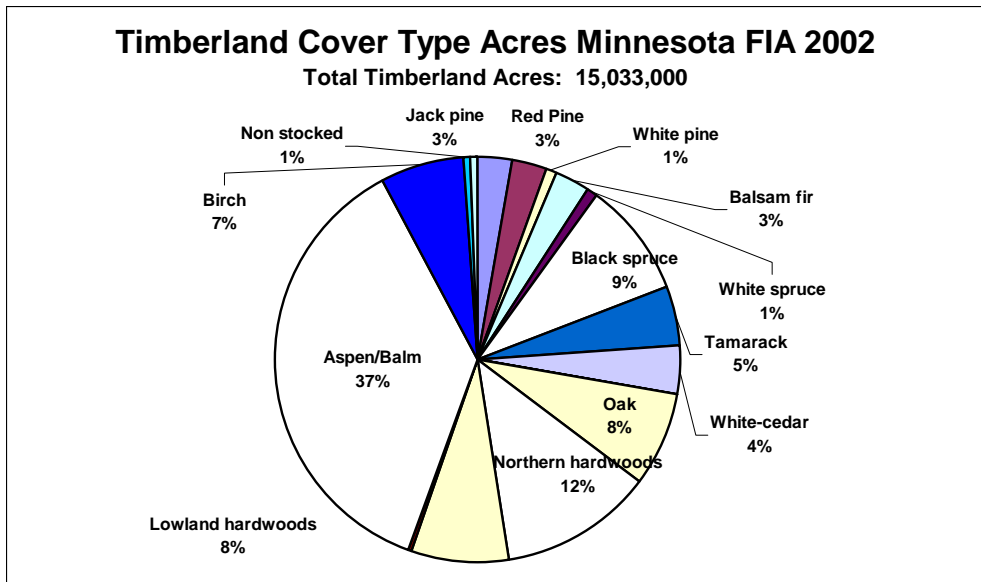
**Source: Minnesota FIA 2002 Eastwide Database Provided by USFS North Central Forest Experiment Station**  
 Minnesota has approximately 15 million acres of forest land that is classified as “timberland”. Timberland is forest land that is productive enough to produce a commercial crop of trees and is not reserved from harvesting by policy or law. Forest land reserved from harvest by policy or law include designated wilderness areas like the Boundary Waters Canoe Area (BWCA), Old Growth reserves and others.

**Some highlights:**

- In the 1990 FIA inventory, forestland was reported as 16.7 million acres, timberland was 14.8 million acres, productive reserved was 1.1 million acres and unproductive forestland was .8 million acres.
- It is unlikely that productive reserved forestland has actually decreased since 1990, as is indicated by the 2002 FIA figures.
- The reported FIA *timberland* increase in spite of *forestland* decrease was most likely caused by a definition change in the inventory, causing some *forestland* that was considered unproductive in 1990 to now be considered productive.
- Total *forestland* has been reduced a bit since 1990, due to conversion to house sites, roads and other urban development. The reduction has been from 16.7 million to in 1990 to 16.3 million acres in 2002.



**Source: Minnesota FIA 2002 Eastwide Database Provided by USFS North Central Forest Experiment Station**  
 Ownership of timberland is an important factor in assessing many factors, including timber supply. For instance, national forestland harvest levels have dropped dramatically in the last 10 years. Since society continues to demand more raw materials including wood, the difference has been made up largely by private forestlands and imports from Canada and Wisconsin. Minnesota is just beginning to benefit from fiber produced by intensive management, such as that from red pine plantations planted 25+ years ago. Continued and improved management and productivity of our forests will become even more critical in the future.



**Cover Type:** A classification of forest land based on the species forming a plurality of live tree stocking.

**Source:** Minnesota FIA 2002 Eastwide Database Provided by USFS North Central Forest Experiment Station.

It is worthwhile to note that aspen is by far the largest cover type in Minnesota.

**Some notable trends since 1990:** Balsam fir cover type acres down (due mostly to spruce budworm mortality), northern hardwoods acres up (possibly due in part to inventory design change, in part to a natural tendency for more shade tolerant species to become dominant over time) cedar acres down (possibly due in part to inventory design change, but also due in part to associated species gaining in volume compared to cedar).

#### Area of Timberland in Minnesota by Forest Type – 2002

Forest Type	Acres (in Thousands)
Jack Pine	400.9
Red Pine	442.7
White Pine	97.2
Balsam Fir	444.6
White Spruce	107.6
Black Spruce	1,373.8
Cedar	581.8
Tamarack	714.8
Other Softwoods	21.0
Oak/ Hickory	1,139.6
Lowland Hardwoods	1,183.9
Northern Hardwoods	1,805.2
Aspen	5,053.4
Birch	1,034.3
Balm of Gilead	459.1
Cottonwood/ Willow	24.2
Non-Stocked & Other	148.7
<b>Total All Types</b>	<b>15,032.8</b>

Source: USDA Forest Service Eastwide FIA Database

# Harvest Levels



**Information on 2002 timber harvest in Minnesota by product category and estimation of contribution by timberland ownership.**



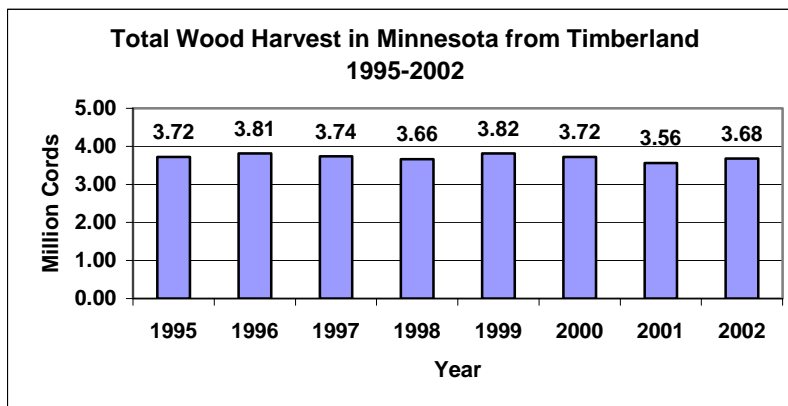


**Total Wood Harvested and Utilized by Industry and Fuelwood Users in Minnesota  
(In Thousand Cords - by Species – From Timberland)  
(Pulpwood 2002; Sawtimber 2001; Fuelwood 2002-03)**

Species	Pulpwood	Sawlogs & Others	Fuel		Total
			Residential*	Commercial	
Aspen	1964.6	120.6	16.7	.6	2102.5
Birch	165.9	32.4	41.0	6.3	245.6
Balm of Gilead	102.2	.9	0	.1	103.2
Ash	3.7	10.9	15.1	.2	29.9
Oak	.3	94.2	45.1	1.0	140.6
Basswood	21.6	24.5	1.3	0	47.4
Maple	72.2	11.8	15.8	4.7	104.5
Cottonwood	.4	7.7	0	0	8.1
Other Hardwood	1.4	9.1	8.1	0	18.6
Sub-Total Hardwood	2332.3	312.1	143.1	12.9	2800.4
Pine					
Red Pine	41.0	95.9	2.9	0	139.8
White Pine	1.7	13.2	1.4	0	16.3
Jack Pine	120.0	151.8	1.7	0	273.5
Spruce	214.8	12.8	0	0	227.6
Balsam	169.5	7.6	0	0	177.1
Tamarack	27.5	1.8	.7	0	30
Cedar	0	5.3	.4	0	5.7
Other Softwood	0	4.9	0	0	4.9
Sub-Total Softwood	574.5	293.3	7.1	0	874.9
<b>Total</b>	<b>2906.8</b>	<b>605.4</b>	<b>150.2</b>	<b>12.9</b>	<b>3675.3</b>

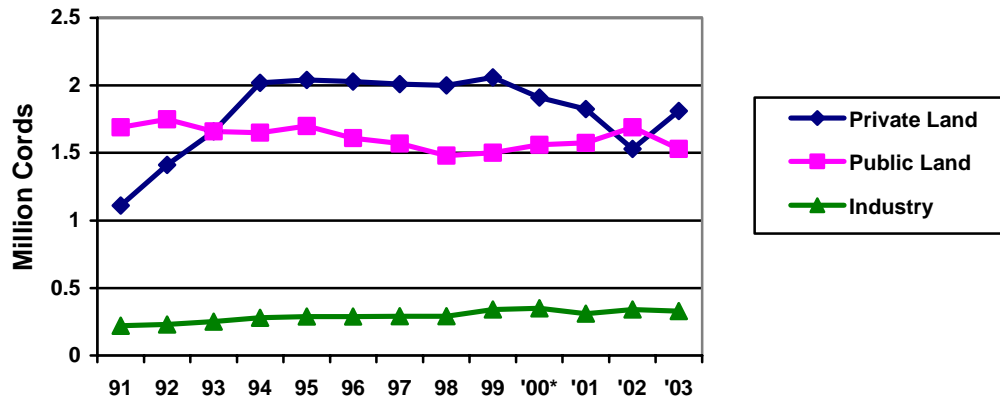
Figures include pulpwood exported to Wisconsin: Aspen: 24,357 cords, Spruce: 56,209 cords, Red Pine: 2,227 cords, Tamarack: 12,956 cords, Birch: 21,160 cords. \* This is fuelwood removed from growing stock.

Sources: Pulpwood (USDA Forest Service, North Central Forest Experiment Station), Sawtimber & Fuelwood (MN DNR surveys).



Sources: Pulpwood (USDA Forest Service, North Central Forest Experiment Station), Sawtimber & Fuelwood (MN DNR surveys).

## Estimated Volume of Timber Sold by Ownership - Minnesota -

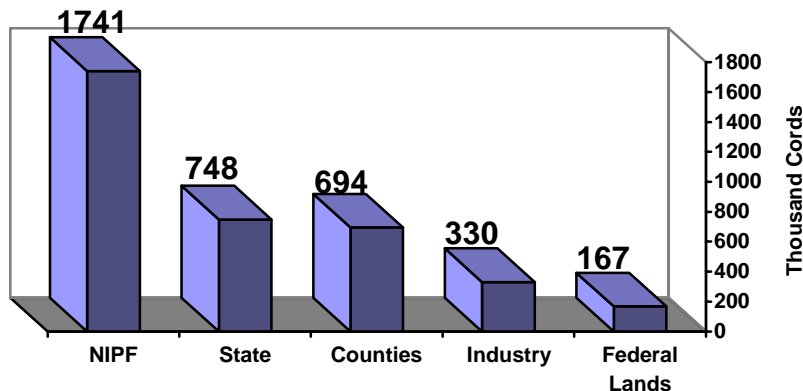


\*2000 figures corrected from original versions of this graph. Original version used projected figures.

**Source:** Public Lands: Public Stumpage Price Review. Industry Lands: Minnesota Forest Industries survey. Private Lands = An estimate figured as follows: Total estimated harvest, minus public volume sold, minus industry volume harvested.

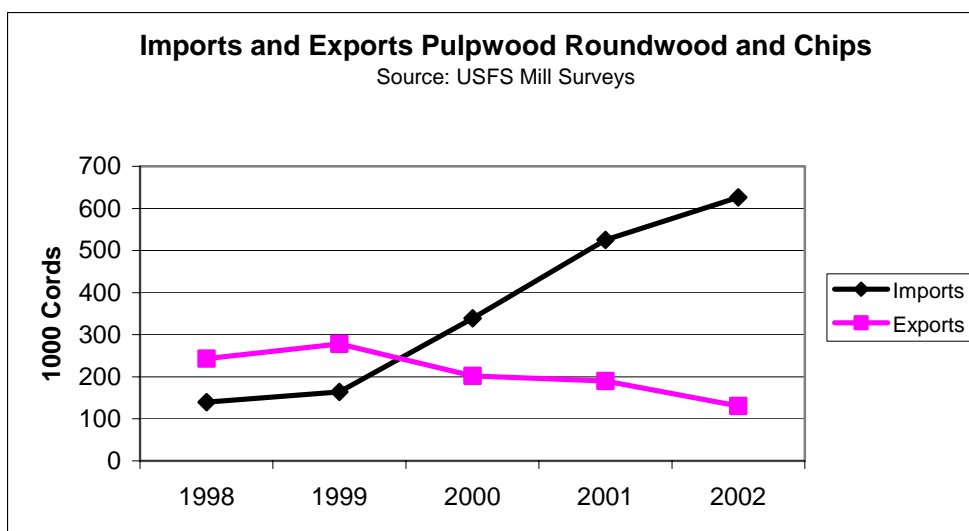
Probably of greatest interest here is the recent trend toward a slight reduction in the private lands harvest level from its height in 1999. More of Minnesota's total industrial wood demand is now supplied through imports of pulpwood, mostly from Canada and Wisconsin.

### Contributors to Estimated Harvest in Minnesota - 2003 Total Estimated Harvest = 3.68 Million Cords, all sources



**Source:** State Lands: FY 2003 Harvest, DNR Timber Sales Annual Report, Doug Ford Author. National Forest: Superior National Forest Timber Statistics, and Chippewa National Forest Timber Statistics, 8/10/2004. County Lands: Public Stumpage Price Review *timber sold 2003* used as an estimate for harvest. Industry Lands: Minnesota Forest Industries survey. Private Lands = An estimate figured as follows: Total estimated harvest 2002 (Most recent figure available) used as estimate for 2003 harvest, minus state and national forest volume harvested, minus county volume sold, minus industry volume harvested.

Ownership of lands has a large impact on policy regarding forest management and timber harvest. For example, forest management and harvest activity on national forests declined drastically over the last 10 years, with much of the slack picked up by increased harvest and management of private lands.



Source: USFS North Central Station FIA Unit Survey of Industrial Wood Using Industry.

Exports are mainly to Wisconsin mills. Imports are largely from Canada and Wisconsin, with a modest volume from Michigan.

Minnesota has become a large net importer of wood over the last several years, as our stumpage prices have increased, and offerings of timber from federal lands have been reduced. Mills have increasingly looked outside of Minnesota's borders in order to meet their raw material needs, especially for aspen and maple.

### Estimate of Increases/Decreases 2002 to 2005: Minnesota Harvest (In Cords)

	Aspen/ Balm	Pine	Spruce	Balsam Fir	Tamarack	Ash	Birch	Maple	Basswood
<b>OSB/ Engineered Mills</b>	(-)45,000	35,000	7,000	4,000	46,000	20,000	(-)20,000	13,000	13,000
<b>Pulp &amp; Paper Mills</b>	(-)45,000	5,000	(-)20,000	6,000	10,000	20,000	40,000	30,000	4,000
<b>Sawmills/ Specialty</b>	(-)5,000	10,000	10,000	0	2,000	0	0	0	0
<b>Export</b>	0	0	0	0	(-)8,000	0	0	0	0
<b>Totals</b>	(-)95,000	50,000	(-)3,000	10,000	50,000	40,000	20,000	43,000	17,000

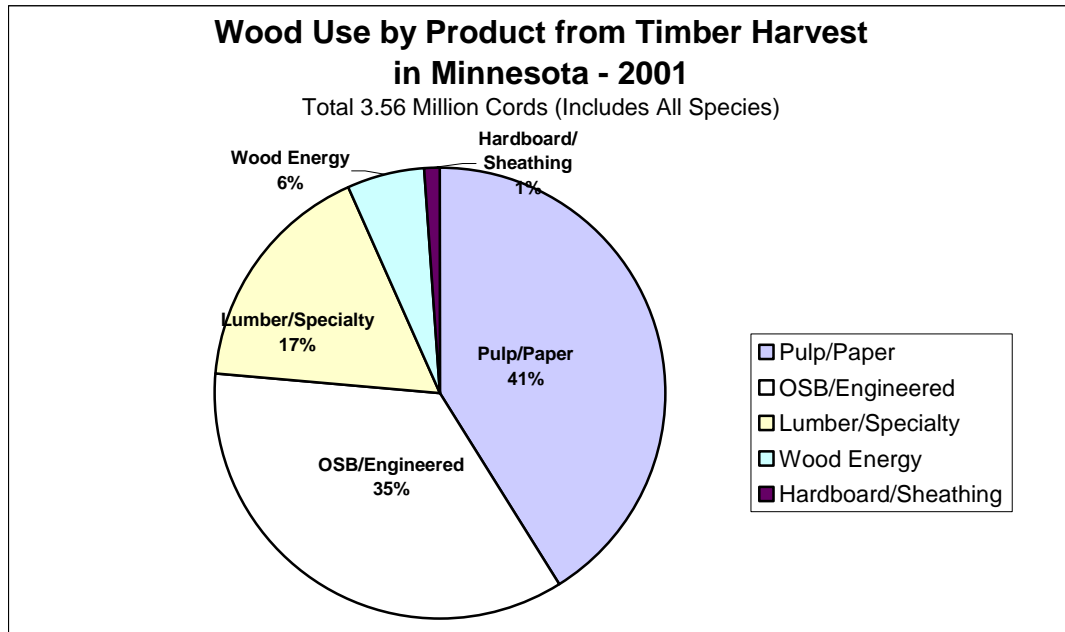
1) 2002 harvest figures are used as a basis for determining estimated harvest in 2005.

#### NOTES

Projected 2005 based on announced expansions and industry interviews

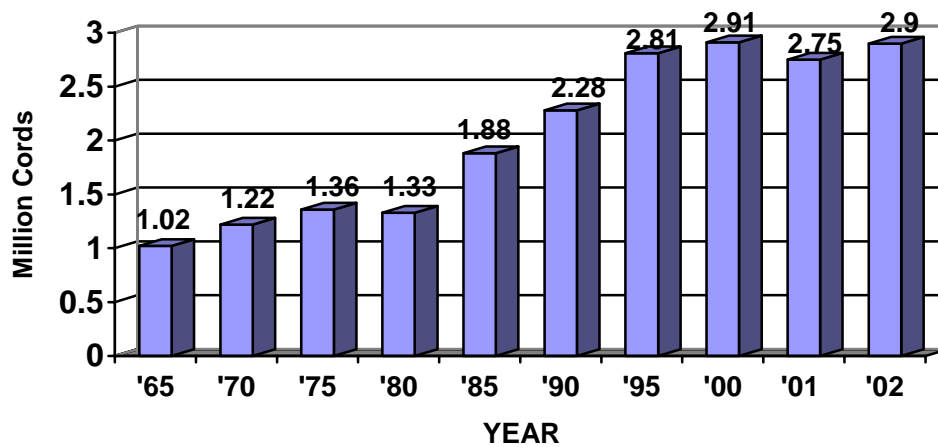
Adjustments mainly due to:

- SAPPI pulp mill in Cloquet species mix change.
- A portion of Boise Cascade proposed increase.
- Species changes at Ainsworth Lumber OSB mills and installation of new dryer line at Bemidji mill.
- Shutting down 2 paper machines at UPM-Blandin.



**Source:** Harvest Data Compiled by USDA Forest Service, North Central Forest Experiment Station & DNR  
Specialty products include veneer, posts & poles, shavings & landscape chips

### Timber Harvested from Minnesota Timberlands & Utilized by Minnesota Pulpwood Mills 1965- 2002

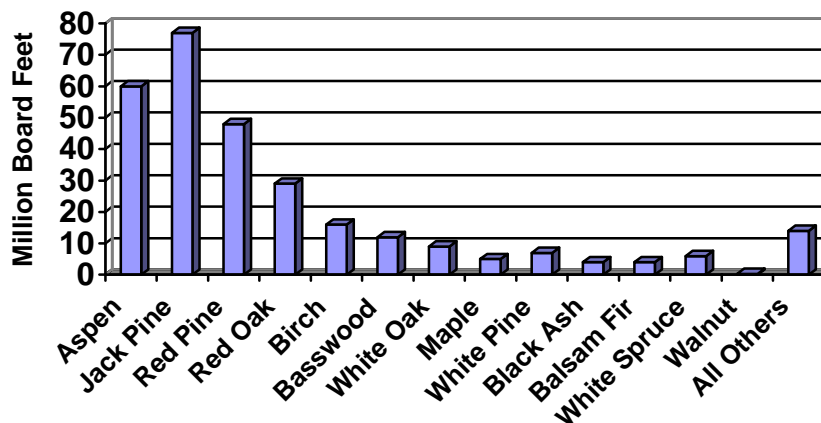


**Source:** USFS, North Central Forest Experiment Station Surveys

There was a nearly steady increase in pulpwood harvest from 1965 to 2000. 2001 showed the first decrease in many years. A major reason for the 2001 decrease in Minnesota pulpwood harvest is increasing imports, most of which is aspen and maple from Wisconsin and aspen from Canada. This means fewer logging, trucking and support jobs here in Minnesota. 2002 saw a modest increase in Minnesota pulpwood harvest over 2001.

## Timber Harvested From Minnesota Timberlands & Utilized by Sawmills - 2001 -

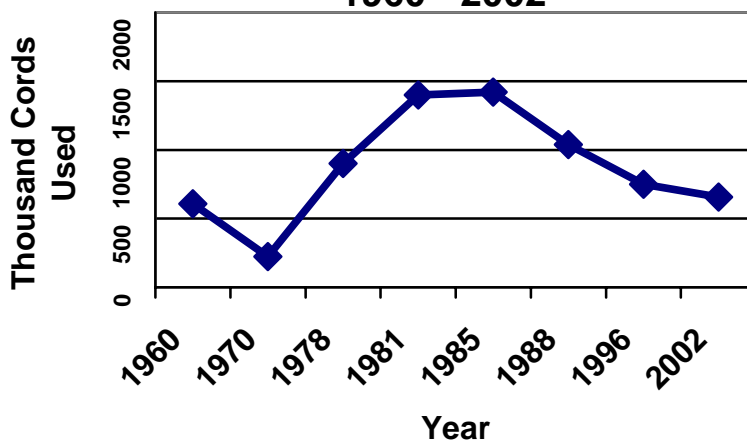
(Lumber, Posts/Poles, Shavings, Veneer, Energy & Landscape Chips)  
Total 300 Million Board Feet



Source: MN DNR Sawmill Survey.

Sawtimber is generally the highest value product for wood that meets merchantability requirements. Generally speaking, a log needs to be at least 8 feet in length and 8 inches minimum diameter inside bark at the small end in order to be of merchantable sawlog size (There are an increasing number of sawmills that can utilize smaller diameter material profitably).

## Fuelwood Demand in Minnesota 1960 - 2002



Source: DNR Fuelwood Surveys

Fuelwood is a relatively small portion of total timber harvest. Additionally, it is important to note that only a portion of fuelwood comes from timberland. The remainder is from sawmill residue, urban tree waste, land and powerline clearing.



# Sustainable Harvest Information



## Sustainable Harvest Levels

**This section contains information on estimated sustainable harvest levels for many of Minnesota's most significant tree species.**

Note to readers: There is no direct correlation between current harvest levels and long term sustained harvest levels because there are many options for moving towards a fully regulated forest age class structure (which is simply an equal acreage of forest in all age classes over a rotation). Normally, transitions from the current structure to a target age class structure require several rotations. The choice of amount and timing of harvest can vary considerably by decade. Harvest plans are typically assessed periodically as changes to the resource, markets and other conditions dictate.

There is no one best way or time period to reach a target age class structure. Transition harvests may at some time be either lower or higher than the long-term sustained yield. Additionally, it is important to note that it is possible to raise future timber availability through intensified forest management resulting in fewer losses to mortality and improved timber productivity.

**DNR sustainable harvest levels** are an indication of *potential* wood available annually on a sustainable basis, averaged over a rotation. They are calculated based on available "timberlands" only, but they are still not exactly the same as *available* wood. Lands where harvesting is restricted by policy or low site productivity are excluded from the calculations, but the figures are not further adjusted downward for potential timber supply restrictions that can apply to timberlands (such as riparian, access, operability, extended rotation & other). Therefore actual *available* timber is likely to be somewhat lower than indicated by the DNR long-term annual *sustainable* figures.

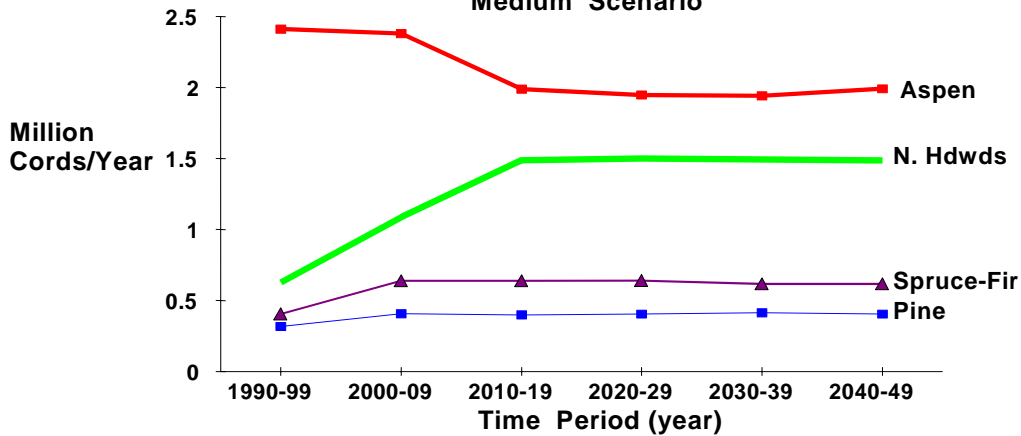
DNR sustainable harvest levels are averages over an entire rotation. Generally therefore, for cover types with old age-class imbalances, current timber availability is likely to be *above* long-term sustainable levels. This is due to a need to manage many old stands on timberlands before their health and available timber volume deteriorates. For cover types with young age-class imbalances, current timber availability is likely to be below long-term sustainable figures.

*With the completion of the 5<sup>th</sup> year of FIA inventory next year, it should be possible to calculate updated sustainable harvest figures for the 2005 edition of this publication.*



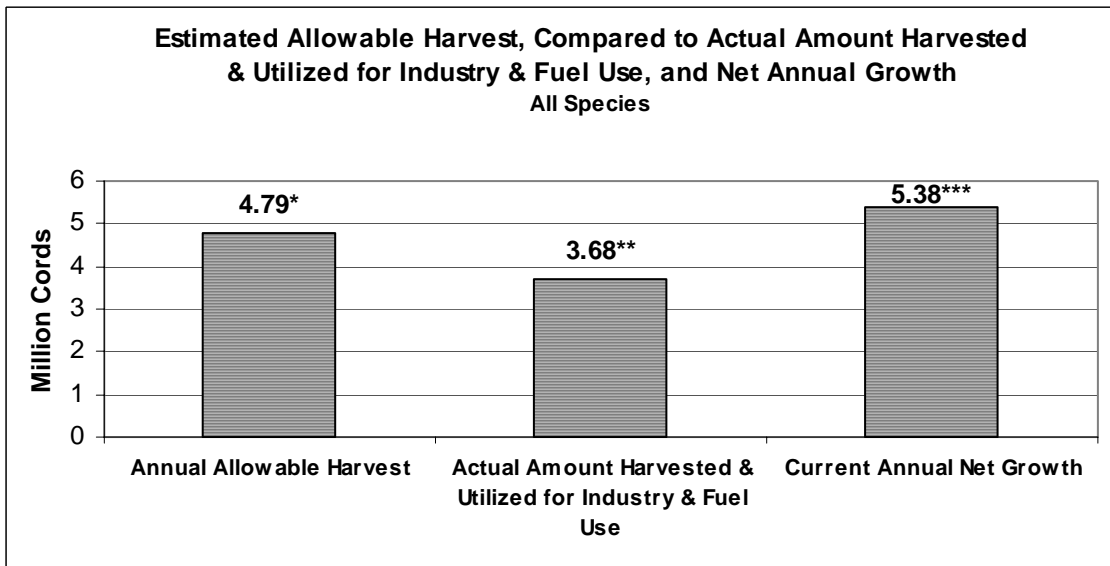


**SCHEDULING HARVEST by MODEL for PRODUCT GROUP  
Minnesota Northern Region, All Ownerships  
Medium Scenario**

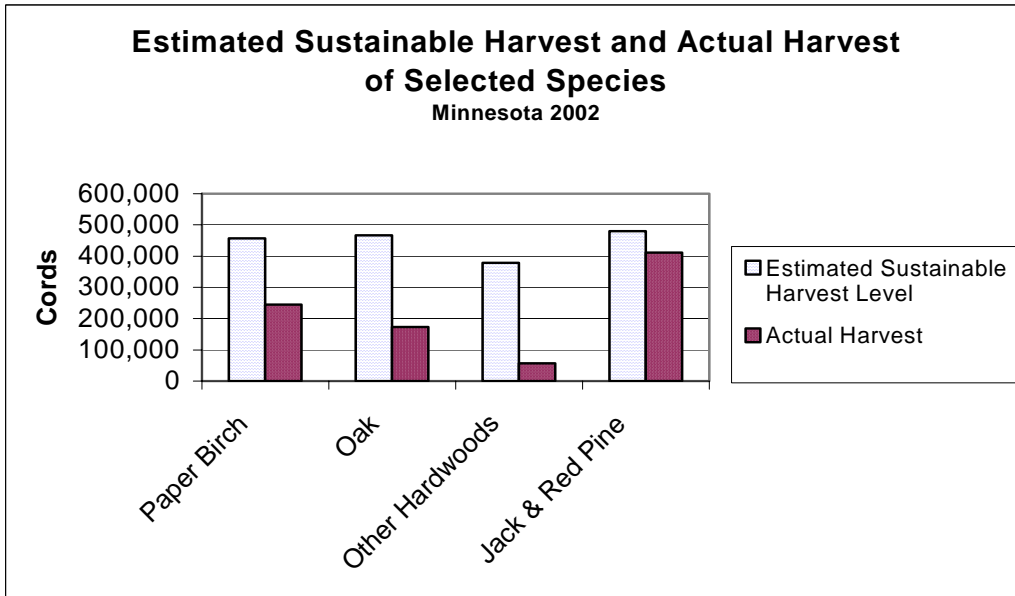


Source : GEIS table 6.8 medium scenario, 2nd run ( p210 of M.P. & F. Reso. Base, 12/1992 )  
Assumptions used : Ownership constraints (riparian lands & old growth forests, etc.)

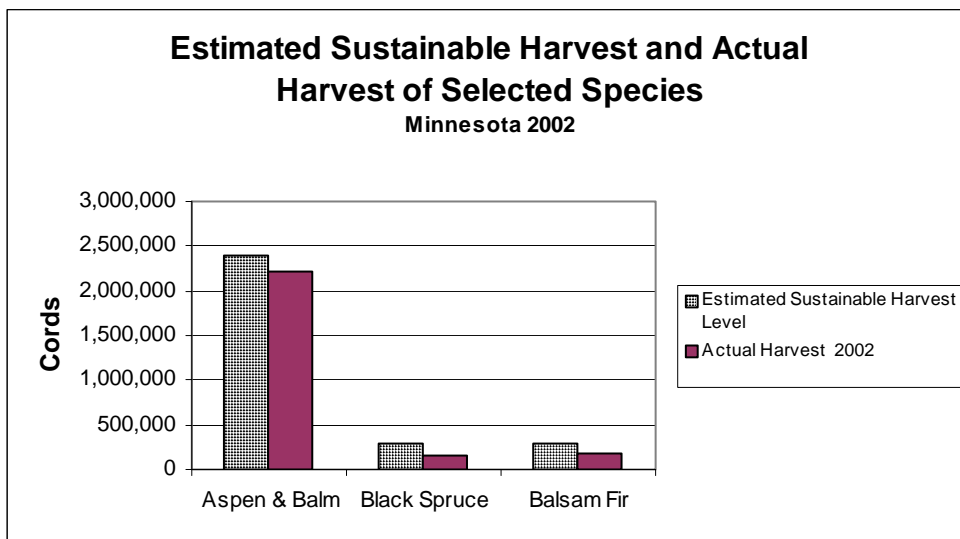
1994 saw the completion of Minnesota’s Generic Environmental Impact Statement on Timber Harvesting and Forest Management in Minnesota (GEIS). This study was commissioned by the Minnesota Environmental Quality Board in response to a citizen petition. The GEIS assessed how three levels of statewide timber harvesting activity relate to Minnesota’s environmental, economic and social resources. Base, medium and high harvesting scenarios were looked at: 4 million cords annually, 4.9 million cords annually, and 7 million cords annually. Each scenario was projected over a 50 year planning horizon. They are not recommended in the GEIS as levels of harvest to follow, nor should their development and analysis be considered a plan. Rather, they are levels the GEIS study was given to analyze to determine impacts if they were to occur.



\* Table 6.25, GEIS, Medium Level, Maintaining Forest Productivity & Resource Base Tech. Paper, Dec. '92  
\*\* 2002 NCFES Pulpwood Survey (DRAFT), 2001 DNR Sawmill Survey, 2002-03 Fuelwood Survey. For Harvest comparisons to Net Growth, it is necessary to add annual logging residue of approximately 275,000 cords to this figure  
\*\*\*USFS Eastwide FIA Database, 2002



**Source:** Harvest data for 2002 from NCFES pulpwood survey & DNR 2001 sawmill & 2002 fuelwood survey. The chart above is based on DNR method of calculating allowable harvest, which consists of area regulation with growth contribution of all live trees (based on MN 1990 FIA).



**Source:** Harvest data for 2002 from NCFES pulpwood survey & DNR 2001 sawmill & 2002 fuelwood survey. Aspen/Balm sustainable harvest based on GEIS (Table 6.5, medium level, Dec. 1992) Spruce and Balsam Fir sustainable harvest based on DNR method of calculating allowable harvest, which consists of area regulation with growth contribution of all live trees (based on MN 1990 FIA). Balsam fir sustainable harvest reduced 32% in 2000 due to mortality since 1990 inventory.

**Current and Projected Wood Harvest from Timberland**  
- Minnesota Statewide -

Species	In Thousand Cords	
	2002	Projected 2005*
Aspen/Balm of Gilead	2,205.7	2,110.0
Birch	245.6	265.6
Ash	29.9	71.0
Oak	140.6	145.0
Basswood	47.4	64.0
Maple	104.5	147.4
Cottonwood	8.1	10.0
Other Hardwoods	18.6	30.0
Pine	429.6	479.6
Spruce	227.6	225.0
Balsam Fir	177.1	189.0
Tamarack	30.0	80.0
Cedar	5.7	6.0
Other Softwoods	4.9	5.0
<b>Total</b>	<b>3,675.3</b>	<b>3,827.6</b>

**Source:** 2002 Harvest data compiled by NCFES and DNR

\*Projected 2005 based on announced expansions and industry interviews

Adjustments mainly due to:

- SAPPi pulp mill in Cloquet species mix change.
- A portion of Boise Cascade proposed increase.
- Species use changes at OSB mills and installation of new dryer line at Ainsworth Lumber Bemidji mill.
- Shutting down 2 paper machines at UPM-Blandin.



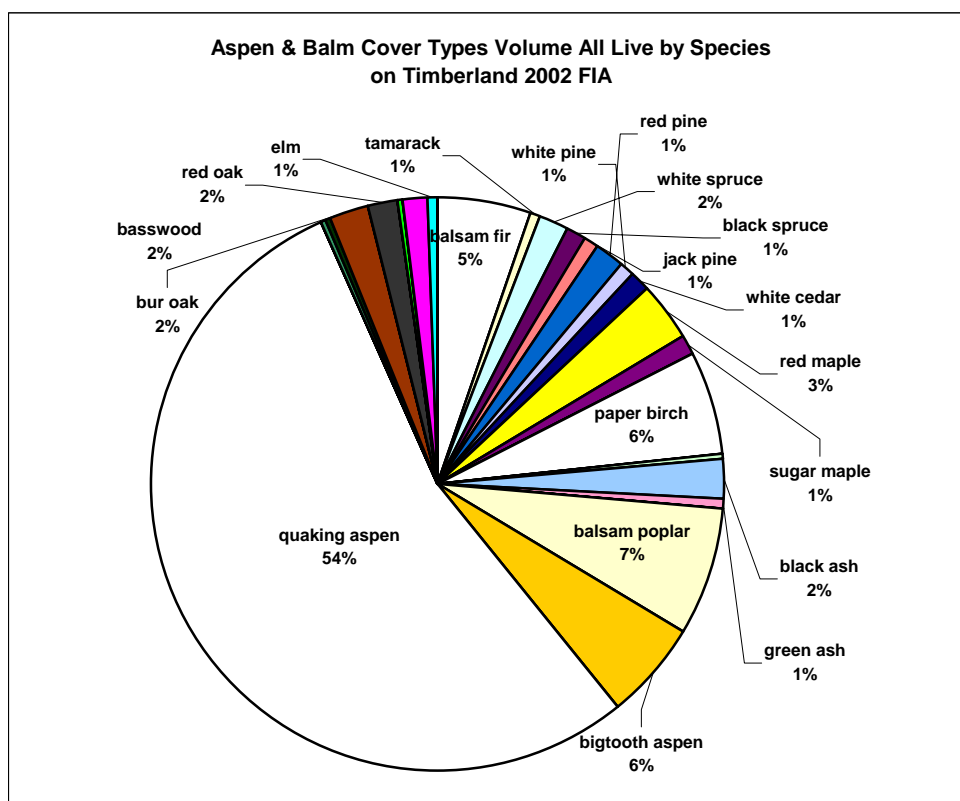
# **Wood Supply and Demand Information for Important Minnesota Cover Types and Species**



**Forest resource and harvest level information for Minnesota's most significant cover types and tree species.**

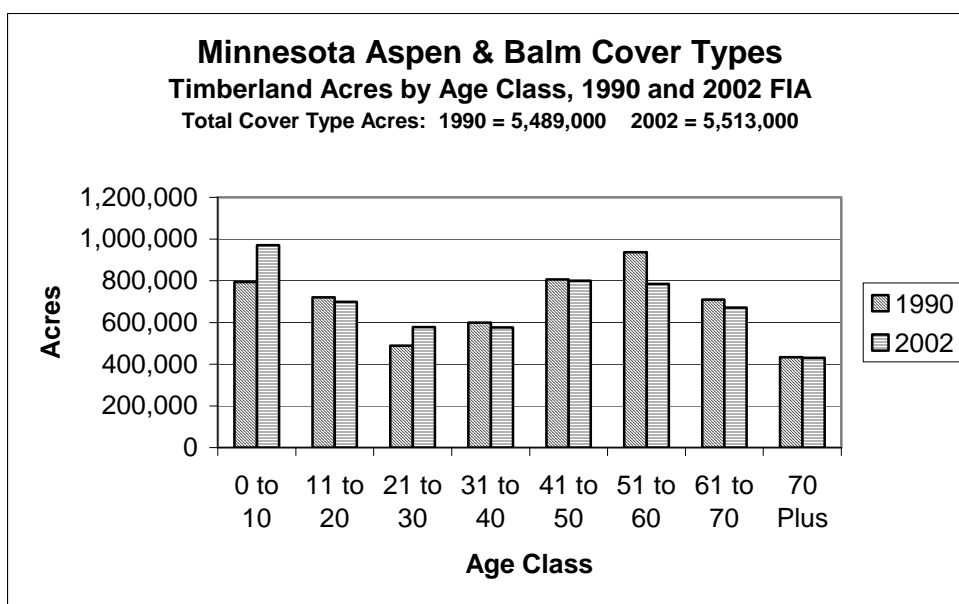


# Minnesota's Aspen Resource



**Source:** 2002 FIA Database provided by USFS, North Central Research Station

The aspen cover type is made up of a wide mixture of species. Predominant secondary species include balsam fir and paper birch.



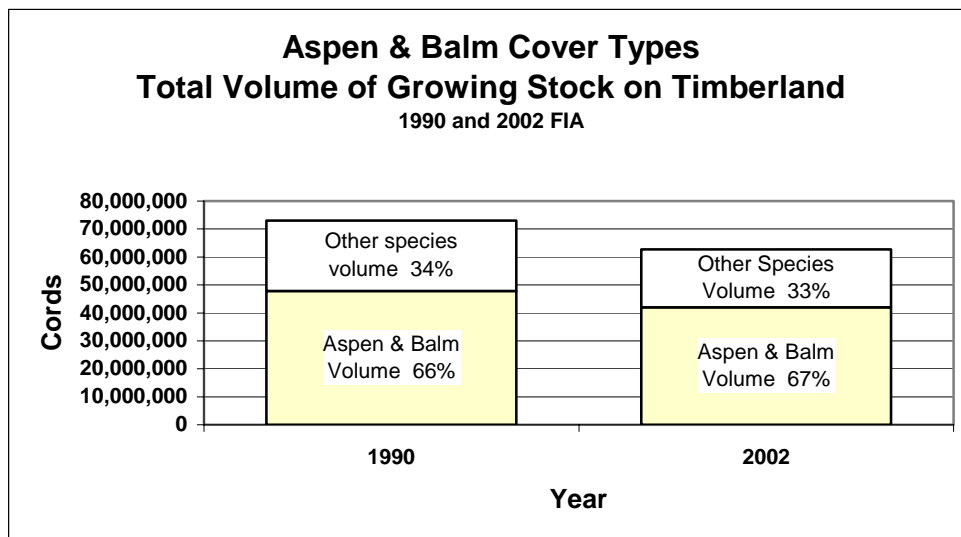
**Source:** FIA Database provided by USFS, North Central Research Station

Probably of greatest note: The cover type age class picture has, as a whole, “evened out” more than would have been expected. Based on an average of 12 years passing between inventory data gathering, the 2002 “31 to 40” year age class is about 100,000 acres larger than expected, since the 1990 “21 to 30” year age

class should have approximately become the “31 to 40” age class in 2002. A similar thing appears in the 1990 “31 to 40” year age class. Conversely, the 1990 “11 to 20” age class went down about 100,000 acres from expected as we look at the 2002 “21 to 30” age class.

What could cause this? First, the inventory’s method of assigning stand ages based on measuring different site index trees between inventories probably accounts for a large part of what we are seeing. Second, since cover type is essentially determined by a preponderance of species volume, the heavy balsam fir mortality since the last inventory has undoubtedly caused many mixed stands classified as balsam fir in 1990 to now be classified as aspen cover type in 2002. Third, there are 12 years average between inventories instead of 10, so the transfer to the next age class has an overlap.

What does this mean? Well, for one thing, it may mean at least a bit less of a “roller-coaster” in the aspen supply picture than was previously anticipated. Aspen supplies will still be very tight, but at least they should be a bit more evenly distributed than was thought earlier.



**Source:** FIA Database provided by USFS, North Central Research Station

Total volume in the aspen and balm cover types has gone down rapidly from 1990 to 2002. Average volume per acre fell from around 15 cords per acre in 1990 to approximately 11 cords in 2002. The percentage of aspen and balm in the cover type remained quite stable, at 66% to 67%.

The volume drop is likely caused by several factors, including:

More 2002 cover type acreage in very young age classes (containing little or no merchantable volume).

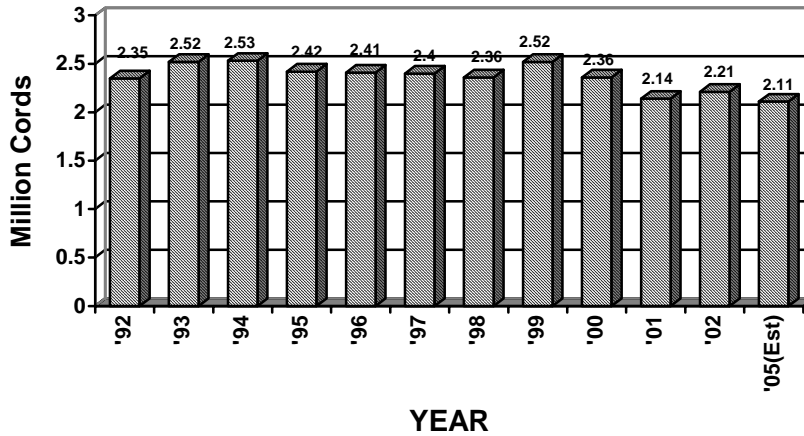
Many of the unharvested older stands of aspen that remain contain lower volumes per acre. In fact, average volume of stands greater than 40 years of age dropped around 11%, from 21.6 cords in 1990 to 19.2 cords in 2002.

Aspen and balm species volume contained in other cover types has undergone a significant drop from 1990 to 2002 as well. Aspen and balm volume contained in all other cover types fell from over 13 million cords in 1990 to just over 10 million cords in 2002, which is greater than a 20% drop.

In a nutshell, there is aspen out there, but the supply will continue to go down for the next 10 years or so. For at least the next 10 years, much of it is likely to be found in lower volume stands. This is tough on efficiency of loggers and mills.



**Aspen & Balm Harvest in Minnesota: Actual & Projected**  
(Includes pulpwood, sawtimber, wood for energy & specialty products)



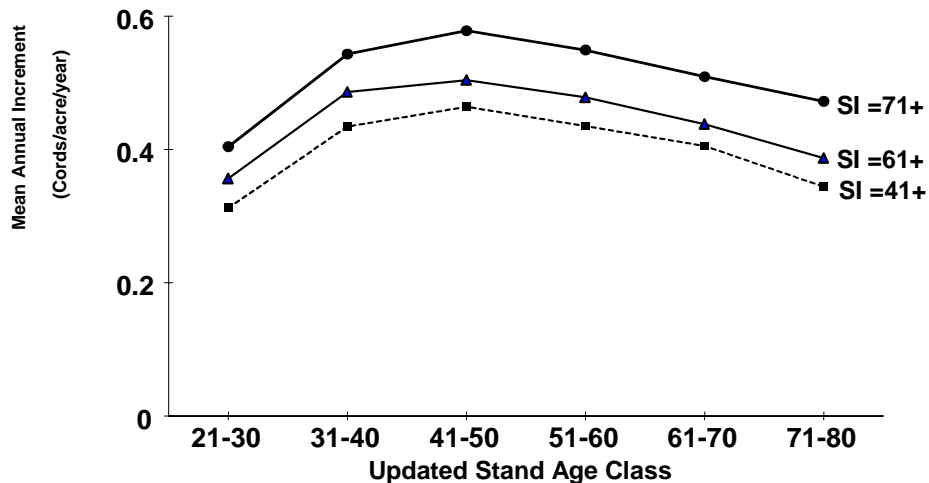
**Source:** Harvest data compiled by NCFES & DNR

Annual sustainable yield= 2.4 million cords based on Table 6.5 GEIS, medium level, Dec. 1992  
Harvest data compiled by NCFES and DNR.

Several factors are influencing the reduction in aspen and balm harvest from its peak in 1999:

- Rising stumpage prices, which have resulted in increased imports of aspen pulpwood, especially from Canada.
- Substitution of alternative species by most large mills.

**Aspen Type Mean Annual Increment by Updated Age**  
CSA Statewide : Based on Volume Yield Model



\* The CSA biological yield model based on stands at the time of survey age.  
Gross volume including net & cull volume of live trees

DNR-Forestry 11/30/95

Mean Annual Increment (MAI) is the average annual increase in volume of a stand at a specified point in time. MAI changes with different growth phases in a tree's life, generally being highest in the middle ages & decreasing with age. The point at which MAI peaks is sometimes used as a guide to identify biological maturity and a stand's readiness for harvesting. This chart shows MAI for several different site indices (site index is a measure of site productivity).

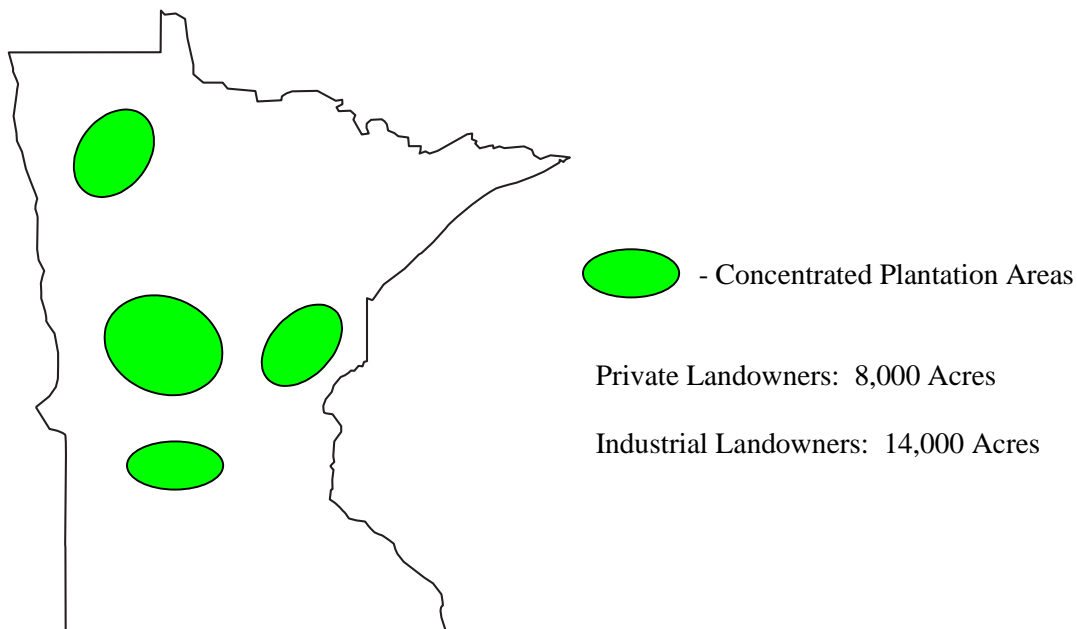
## Current and Projected Demand for Aspen/Balm of Gilead from Minnesota Timberlands



	Cords
2002 Harvest.....	<b>2,205,200</b>
• Minnesota Pulpwood Industries .....	2,040,600
• Pulpwood Export.....	26,200
• Sawlogs & Other.....	121,500
• Fuelwood (from growing stock).....	17,400
 2005 Projected Harvest.....	 <b>2,110,000</b>
• Minnesota Pulpwood Industries.....	1,950,000
• Pulpwood Export.....	26,000
• Sawlogs & Other.....	116,000
• Fuelwood (from growing stock).....	18,000

Figures include a shift to use of alternative species by several existing OSB & pulp companies.

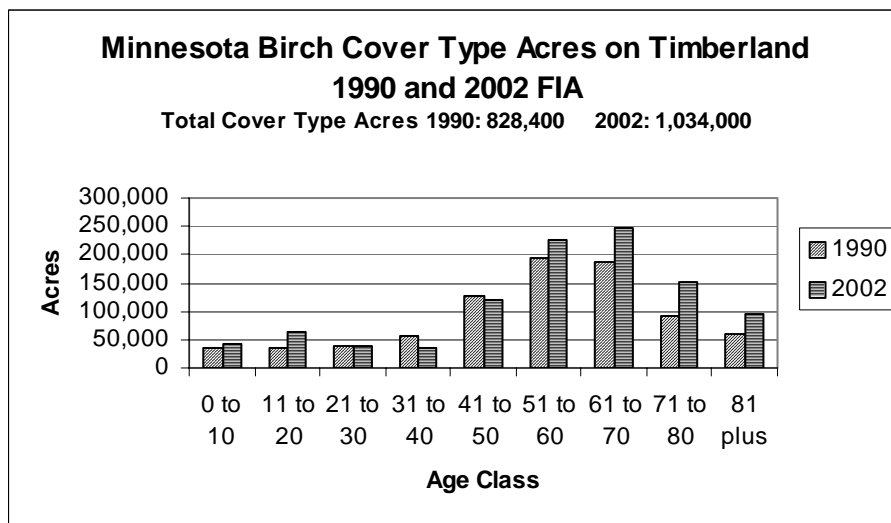
### Hybrid Poplar in Minnesota - 2004



Hybrid Poplar has been found to be an excellent substitute for aspen fiber in papermaking and Oriented Strand Board (OSB) production.

- Hybrid Poplar can reach merchantable size in 7 to 12 years.
- Intensive culture is required for the first 3 years in order to grow hybrid poplar.
- It is commonly grown on marginal agricultural fields.

# Minnesota's Birch Resource



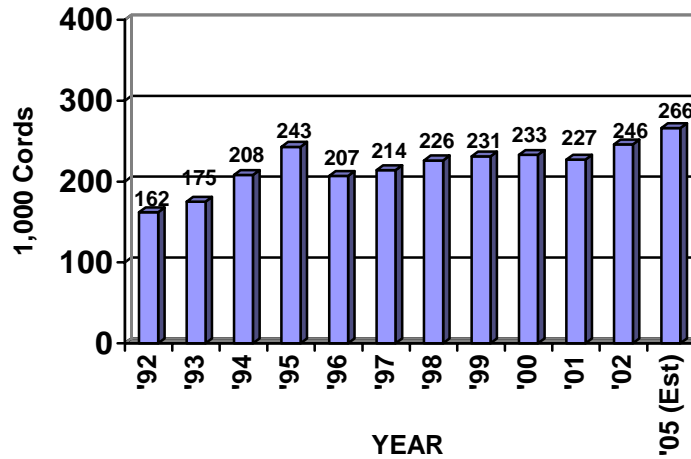
**Source:** FIA Database provided by USFS, North Central Research Station

**Of greatest note are two things:** The increase of over 20% in birch cover type acreage since 1990, and the extreme age class imbalance. This is clearly an old resource, in need of management. A likely significant factor causing increased birch cover type acreage is that, as aspen has been harvested from mixed stands, birch has become the species of predominant volume in some stands classified as aspen in 1990. Inventory design modifications are also probably responsible for part of the cover type acreage change shown.

Average volume in the birch cover type has been dropping as the type ages. Total average volume of all species dropped from 17.7 cords in 1990 to 14.9 cords in 2002 - a 16% drop. There was a bit more total volume in the birch cover type in 2002 due to increased cover type acreage, but stands contained less volume per acre.

Birch has been a neglected resource for too long in Minnesota, but markets are improving as many larger mills widen their species use to include some birch. This should help greatly. There is also a clear need to increase efforts aimed at improving our ability to consistently regenerate birch stands.

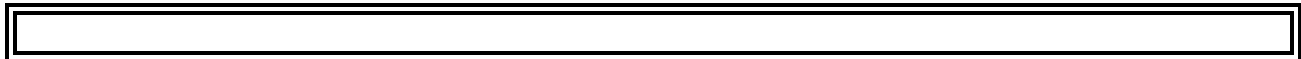
**BIRCH HARVEST IN MINNESOTA: ACTUAL & PROJECTED**  
 (includes pulpwood, sawtimber, wood energy & specialty products)



Source: Harvest data compiled by NCFES & DNR

**Sustainable harvest 457,000 cords/year**, based on DNR method, which consists of Area regulation with growth contribution of all live trees (based on MN 1990 FIA). Figure was adjusted downward 30% due to heavy mortality since 1990 inventory. Sustainable harvest not adjusted for restrictions (riparian & other). Estimated average net annual growth of birch growing stock: 7,310 cords, based on 2002 USFS FIA database. Estimated average annual mortality of birch growing stock: 514,141 cords, based on 2002 USFS FIA database.

**Current and Projected Demand for Birch from Minnesota  
Timberlands**



	<b>Cords</b>
2002 Harvest.....	<b>245,600</b>
• Minnesota Pulpwood Industries.....	144,700
• Pulpwood Export.....	21,200
• Sawlogs & Other.....	32,400
• Fuelwood (from growing stock).....	47,300
2005 Projected Harvest.....	<b>265,600</b>
• Minnesota Pulpwood Industries.....	165,600
• Pulpwood Export.....	20,000
• Sawlogs & Other.....	33,000
• Fuelwood (from growing stock).....	47,000

Concerns:

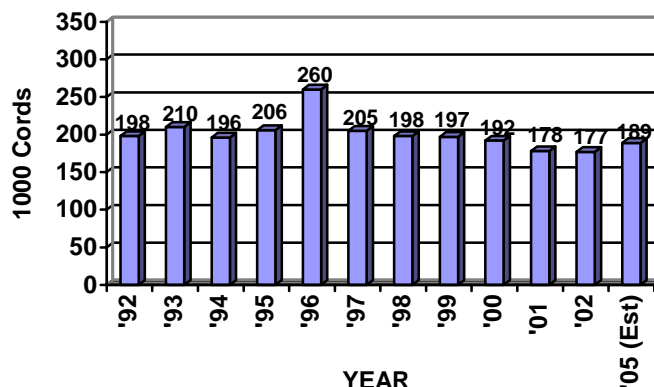
- Consistency in achieving adequate regeneration.
- Wood quality (lots of rot in old birch).
- Major age class imbalance.

Figures include increases in OSB and pulp & paper use by currently operating companies

Source: NCFES & DNR Surveys      Projections based on DNR interviews/Industry announcements

# Minnesota's Balsam Fir Resource

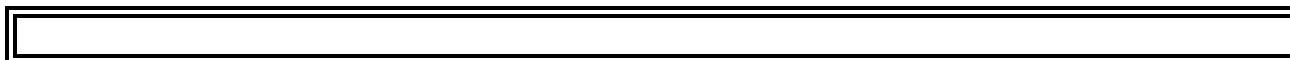
## BALSAM FIR HARVEST IN MINNESOTA: ACTUAL & PROJECTED (includes pulpwood and sawtimber)



Source: Harvest data compiled by NCFES & DNR.

**Sustainable harvest 291,000 cords/year**, based on DNR method, which consists of Area regulation with growth contribution of all live trees (based on MN 1990 FIA). Figure was reduced 32 % since 1989 due to mortality from spruce budworm. Sustainable harvest not adjusted for restrictions (riparian and other).  
 Estimated average net annual growth of balsam fir growing stock: 73,900 cords, based on 2002 FIA database.  
 Estimated average annual mortality of balsam fir growing stock: 429,000 cords, based on 2002 FIA database.

## Current and Projected Demand for Balsam Fir from Minnesota Timberlands

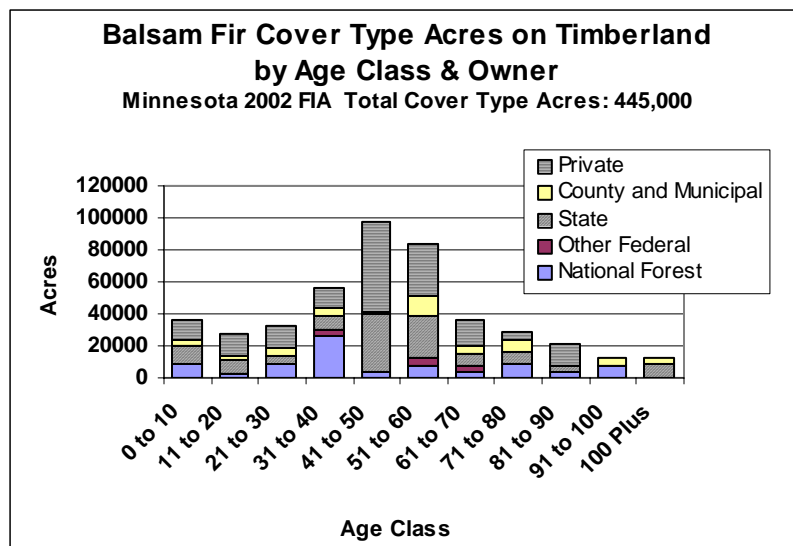


	Cords
2002 Harvest.....	<b>177,100</b>
• Minnesota Pulpwood Industries & Export (Export 200 cords).....	169,500
• Sawlogs & Other.....	7,600
• Fuelwood.....	0
2005 Projected Harvest.....	<b>189,000</b>
• Minnesota Pulpwood Industries & Export.....	179,000
• Sawlogs & Other.....	10,000
• Fuelwood.....	0

Concerns:

- Balsam availability dependent on harvest of aspen (45% of balsam in aspen type).
- Summer access wood: 30 to 50% maximum.
- Spruce budworm impact.
- Age class imbalance

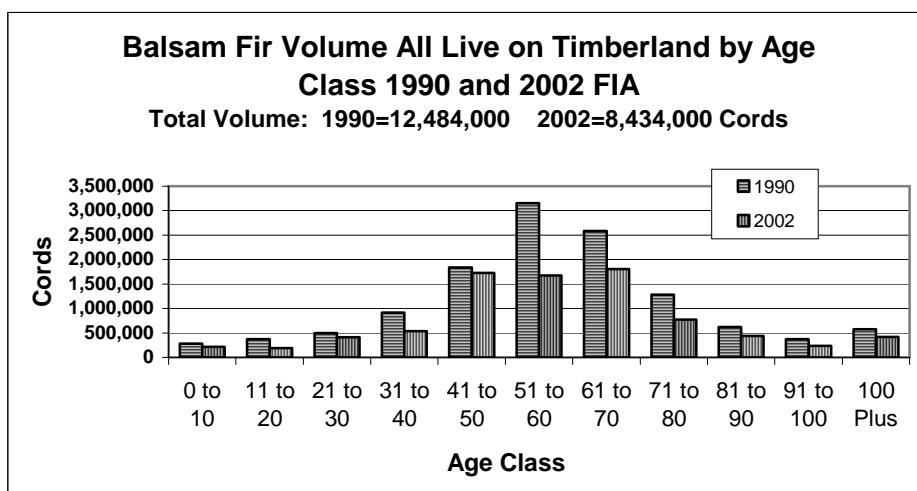
Source: NCFES & DNR Surveys  
 Projections based on DNR Interviews/Industry Announcements



Source: FIA Database provided by USFS, North Central Research Station

The balsam fir cover type has undergone some major changes since the 1990 inventory, due mainly to high mortality caused by spruce budworm defoliation. Cover type acreage went down approximately 39% from 1990 to 2002 (733,000 acres to 445,000).

Most of the balsam fir cover type is privately owned, followed in decreasing order of ownership acreage by our two national forests, the state, and counties. The cover type is dominated by stands at and above 40 years, so it is a relatively old resource for such a short-lived species. Recommended rotation ages can vary with stand productivity and site condition, with 50 years a common average (stands managed as extended rotation are carried beyond this age). Much of the balsam volume in Minnesota (51%) is found mixed in with the aspen and birch cover types, and is therefore tied to aspen and birch harvest.



Source: FIA Database provided by USFS, North Central Research Station

Balsam fir industrial use is similar to that of spruce. It is used largely for making of high quality paper, where it is prized for its excellent fiber qualities. Some is also used by the sawmill industry, mostly in making studs but also in small quantities for other types of lumber. A very small amount of fir is also used in making OSB.

## Some Management Issues or Concerns:

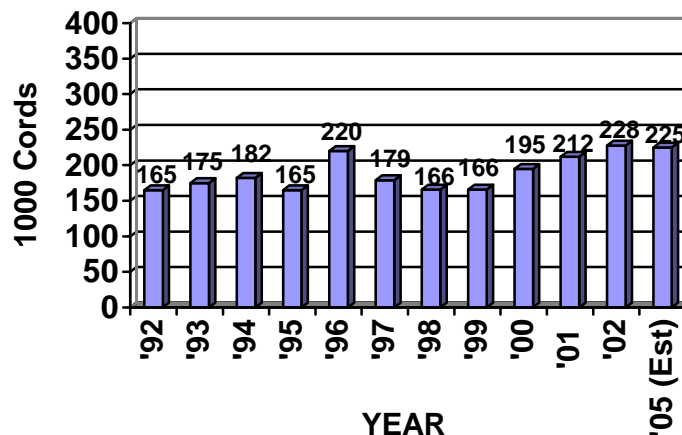
**Spruce budworm:** Spruce budworm is a native defoliator that has balsam fir as its preferred host. We have had budworm defoliation every year for the past 50 years somewhere in northeastern Minnesota. Defoliation from the most recent major outbreak peaked at over 500,000 acres in 1995, and has since declined to just over 34,000 acres in 2003. Much of northeastern Minnesota has been impacted. The prognosis is that budworm populations will eventually increase again in the future, causing an increase in mortality. When there are concentrations of balsam fir over 45 to 50 years of age, spruce budworm will increase to take advantage of their preferred food source. If management favoring more conifers in stands, more extended rotation ages, more reserve trees and more mixed stands result in more balsam fir of older ages, then budworm populations will periodically build up to outbreak levels.

**Rot:** As with black spruce, red rot can be prevalent on some sites, especially in older stands. High levels of rot can have a major impact on stand merchantability, and therefore our ability to manage these stands. Wood with a high percentage of rot is undesirable or unusable for many higher-value wood products, of course.

**Season of Harvest:** Though not as big of an issue as with black spruce, there is a fair amount of balsam fir volume that is accessible only during frozen conditions.

## Minnesota's Spruce Resource

### SPRUCE HARVEST IN MINNESOTA: ACTUAL & PROJECTED (includes black and white spruce pulpwood and sawtimber)



Source: Harvest data compiled by NCFES & DNR

Estimated sustainable harvest = 298,700 cords/year based on DNR method, which consists of Area regulation with growth contribution of all live trees (based on MN 1990 FIA). Sustainable harvest not adjusted for restrictions (riparian & other).

Estimated average net annual growth of spruce growing stock: 273,800 cords, based on 2002 FIA database.

Estimated average annual mortality of spruce growing stock: 545,900 cords, based on 2002 FIA database.

# Current and Projected Demand for Spruce from Minnesota Timberlands

	Cords
2002 Harvest.....	<b>227,600</b>
• Minnesota Pulpwood Industries.....	158,600
• Pulpwood Export.....	56,200
• Sawlogs & Other.....	12,800
• Fuelwood.....	0
2005 Projected Harvest.....	<b>225,000</b>
• Minnesota Pulpwood Industries.....	146,000
• Pulpwood Export.....	56,000
• Sawlogs & Other.....	23,000

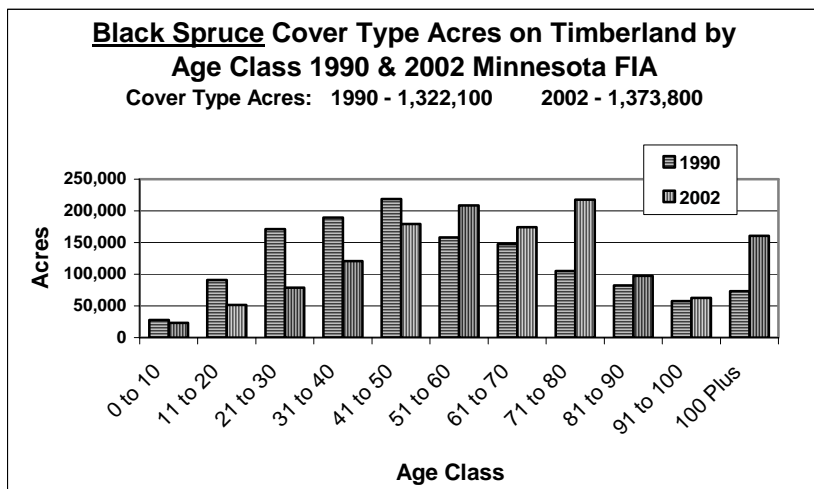
**Concerns:**

- Forest types with low volume/acre of spruce.
- Little summer access.
- Increasing competition for sawbolts.

**Source: NCFES & DNR Surveys**

Projections based on DNR Interviews/Industry Announcements

## Black Spruce



**Source:** FIA Database provided by USFS, North Central Research Station

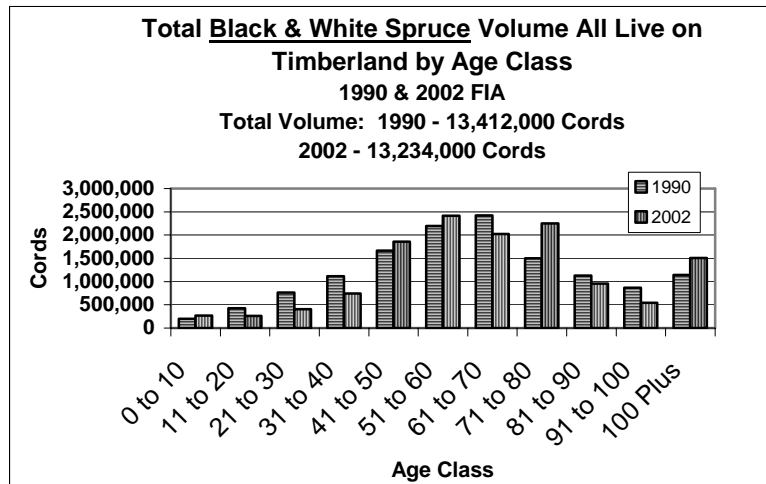
Black spruce cover type acreage is heavily weighted to ages 40 through 80, with a fair amount of acreage also above age 100. Recommended harvest or “rotation” ages can vary with site productivity and site condition from 75 to 120 years of age, with 100 years an “average” figure. Stands managed as “extended rotation” are carried beyond these ages. Black spruce exists largely on lowlands, often in nearly pure stands, or mixed with tamarack and/or white cedar and a variety of minor associated species.

The State of Minnesota is by far the largest owner of black spruce cover type acres, but counties, private owners and our two national forests all have significant acreage.



The 2002 FIA inventory indicates stable cover type acreage of about 1,374,000 acres, up very slightly from 1,322,000 acres in the 1990 inventory.

The vast majority of black and white spruce in Minnesota (over 92%) is used in the making of high quality paper, where it is prized for its excellent fiber qualities. Some is also used by the sawmill industry, mostly in making studs but also in small quantities for other types of lumber. A very small amount of spruce is also used in making Oriented Strand Board (OSB).



Source: FIA Database provided by USFS, North Central Research Station

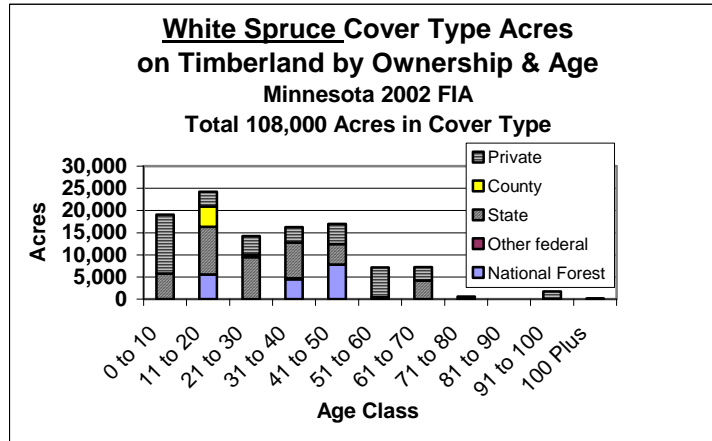
**Some Management Issues or Concerns:**

Since black spruce is normally found on lowland sites only accessible during frozen conditions, accessibility of the resource is a major issue.

There is often low volume per acre in black spruce stands. This increases logging costs, which not only affects logger profitability, but can also impact production costs all the way to finished product. It can also impact our ability to manage some stands.

Red rot can be prevalent in wood on some sites, especially in older stands. High levels of rot can have a major impact on stand merchantability, and therefore our ability to manage these stands. Wood with a high percentage of rot is undesirable or unusable for many higher-value wood products, of course.

## White Spruce



**Source:** FIA Database provided by USFS, North Central Research Station

White spruce is a relatively young resource. The cover type is dominated by stands below the age of 50, many of which are in the form of plantations. Recommended rotation ages can range from 60 to 90 years, depending on site productivity and condition (again, some stands managed as extended rotation are held beyond these ages). White spruce is located most often on upland sites, where in natural stands it is commonly found mixed in as a component in aspen, birch, balsam fir & pretty much all upland cover types.

The 2002 FIA inventory indicates cover type acreage of about 108,000 acres, up nearly 7% from the 1990 inventory.

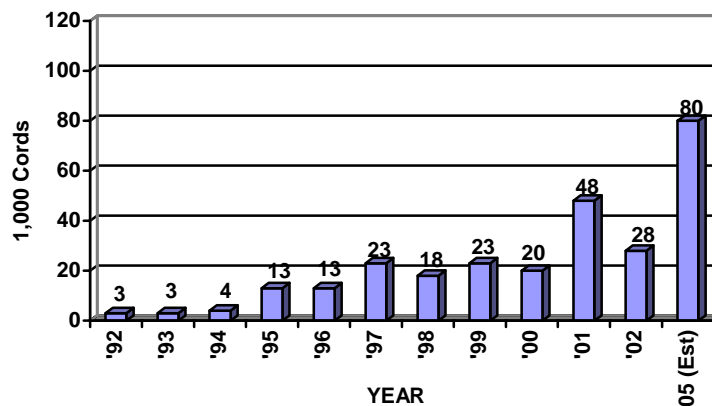
### **Some Management Issues or Concerns:**

Spruce budworm is a defoliator that has caused top kill and mortality on white spruce, (including plantations). This impact can be lessened by management activities such as thinning to maintain stand vigor and by discriminating against balsam fir in some mixed stands (balsam fir is the preferred host for spruce budworm).

There will be increased opportunities for thinning white spruce plantations over the next decade, as stands move into merchantable size classes. Thinning normally yields excellent quality pulp with little or no loss to rot or decay. It can be lower volume productivity work for loggers, however.

# Minnesota's Tamarack Resource

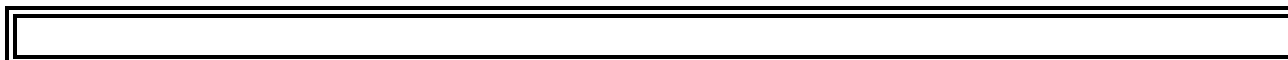
## TAMARACK HARVEST IN MINNESOTA: ACTUAL & PROJECTED (from Timberland)



**Source:** Harvest data compiled by NCFES & DNR

Estimated sustainable harvest for tamarack is 121,000 cords/year, based on DNR method, which consists of Area regulation with growth contribution of all live trees (based on MN 1990 FIA). Not adjusted for restrictions (Riparian & other). Estimated average net annual growth of tamarack growing stock: 210,300 cords, based on 2002 FIA database. Estimated average annual mortality of tamarack growing stock: 66,300 cords, based on 2002 FIA database.

## Current and Projected Demand for Tamarack from Minnesota Timberlands

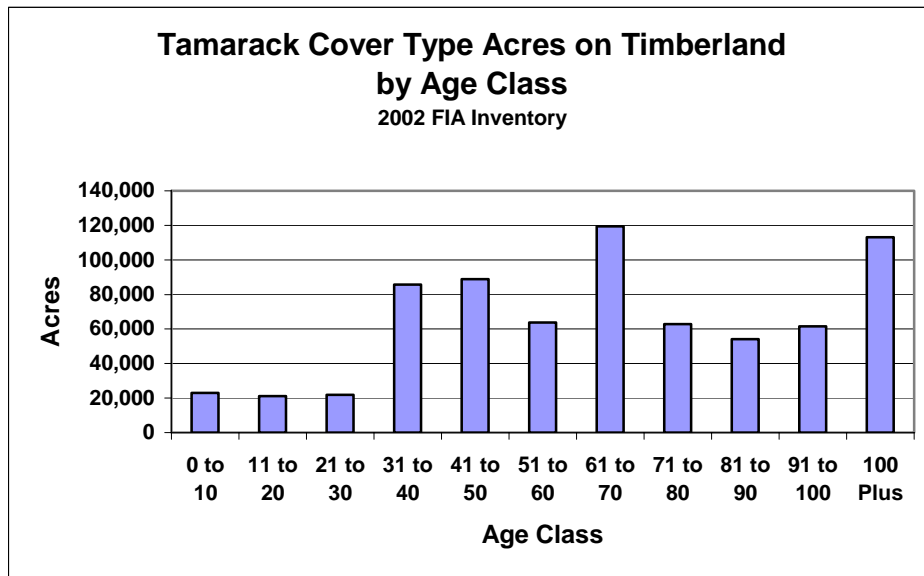


	<b>Cords</b>
2002 Harvest.....	<b>30,000</b>
• Minnesota Pulpwood Industries.....	14,600
• Pulpwood Export (2 Wisconsin pulp & paper mills).....	12,900
• Sawlogs & Other.....	1,800
• Fuelwood.....	700
2005 Projected Harvest.....	<b>80,000</b>
• Minnesota Pulpwood Industries.....	70,000
• Pulpwood Export.....	5,000
• Sawlogs & Other.....	4,000
• Fuelwood.....	1,000

**Concerns:**

- Forest stands with low volume/acre of tamarack.
- Forest health (insect) issues, especially in older stands.
- Winter access only.
- Some small, poor site stands.

**Source:** NCFES & DNR Surveys.     Projections based on DNR interviews/Industry Announcements



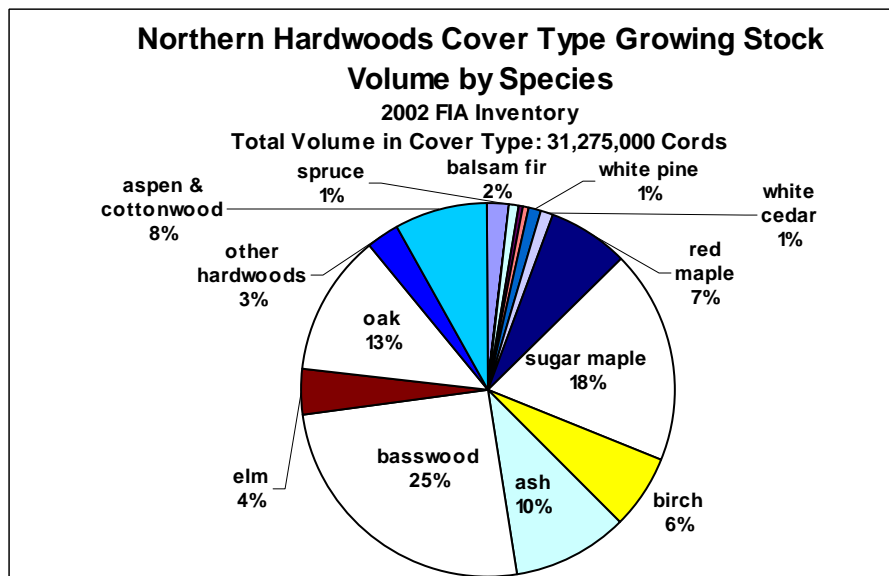
**Source:** 2002 FIA Database provided by USFS, North Central Research Station

Tamarack is dominated by “middle-aged” stands, but there is a fair amount of very old tamarack (average rotation age= 90). The state of Minnesota owns over 50% of the tamarack cover type.

Tamarack is now used in the manufacture of OSB, so markets for tamarack have improved greatly over the past 3 years, greatly enhancing the ability to manage this important resource.

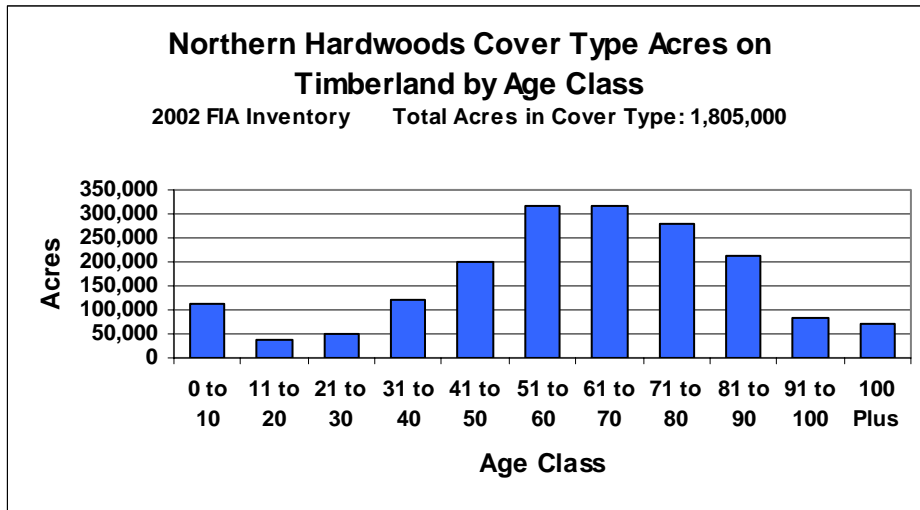


## Minnesota’s Northern Hardwood Resource



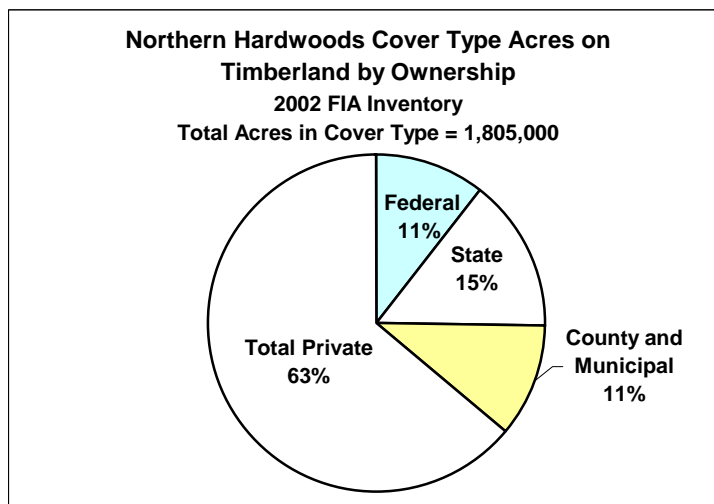
**Source:** 2002 FIA Database provided by USFS, North Central Research Station

The northern hardwoods cover type is a conglomeration of a wide group of species. The dominant species present are the shade tolerant sugar maple and basswood. There are also significant ash, oak, birch and aspen volumes present.



Source: 2002 FIA Database provided by USFS, North Central Research Station

The northern hardwood cover type is dominated by late “middle aged” stands (average rotation age = 80), many of which are in need of thinning in order to promote optimal growth and forest health.



Source: 2002 FIA Database provided by USFS, North Central Research Station

The northern hardwoods cover type is owned largely by private landowners. Continuing and improved availability and use of forest management technical assistance to private landowners is therefore a critical issue for this type.

Northern hardwoods are often managed through periodic “thinning” harvests, although clearcutting can be an appropriate tool in some situations.

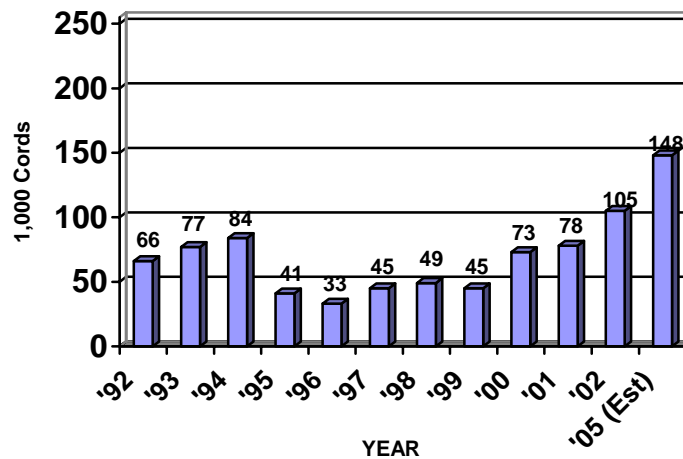
Our northern hardwoods cover type has been something of a “neglected” resource for many years. This has largely been due to a history of poor markets for many hardwood species and sizes in much of the state. The market situation for most hardwoods has changed drastically in recent years, however. Several Minnesota pulp and paper and OSB mills have expanded their raw material species mix to include maple and other hardwoods. Sawlog markets for most hardwood species are also very good throughout most of

the state. Better markets mean that greatly improved management of the northern hardwood resource is now possible. Since the majority of the resource is privately owned, availability and use of technical forest management assistance for private landowners will therefore be more critical than ever.

## Maple

### MAPLE HARVEST IN MINNESOTA: ACTUAL & PROJECTED

From MN Statewide Timberland, all Ownerships

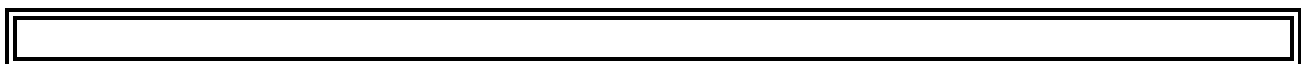


Source: NCFES Pulpwood Surveys, DNR Sawmill & Fuelwood Surveys.

Sustainable harvest for maple in Minnesota is 255,000 cords/year, based on DNR method, which consists of Area regulation with growth contribution of all live trees (based on MN 1990 FIA).

Estimated average annual net growth for maple growing stock in Minnesota is 609,100 cords, based on 2002 FIA database. Estimated average annual mortality of maple growing stock is 99,900 cords, based on 2002 FIA database.

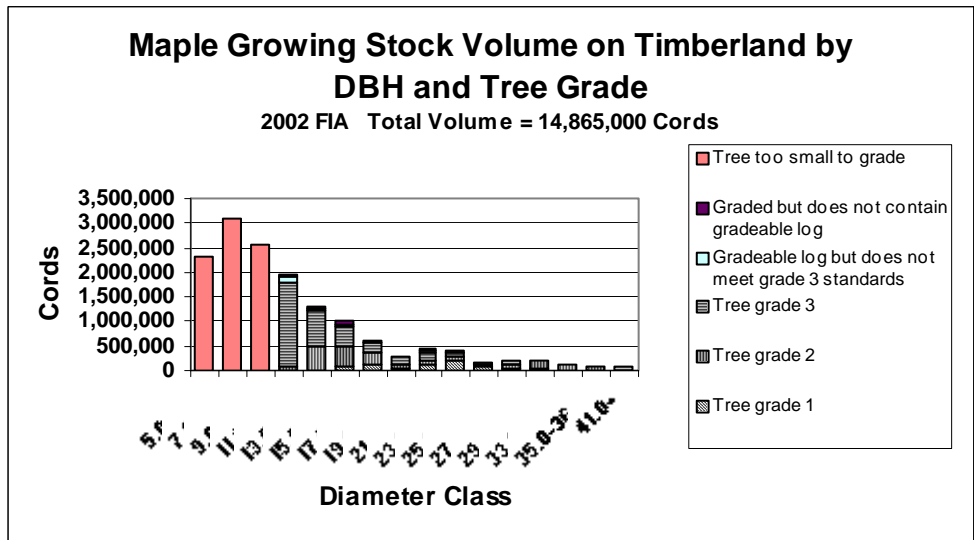
### Current and Projected Demand for Maple from Minnesota Timberlands



	Cords
2002 Harvest.....	<b>104,500</b>
• Minnesota Pulpwood Industries.....	68,100
• Pulpwood Export.....	4,200
• Sawlogs & Other.....	11,800
• Fuelwood.....	20,400
2005 Projected Harvest.....	<b>148,000</b>
• Minnesota Pulpwood Industries.....	111,000
• Pulpwood Export.....	5,000
• Sawlogs & Other.....	12,000
• Fuelwood.....	20,000

Concerns:

- Promoting good management on non-industrial private lands.
- Different logging equipment and intensity of management required in multiple-entry management.



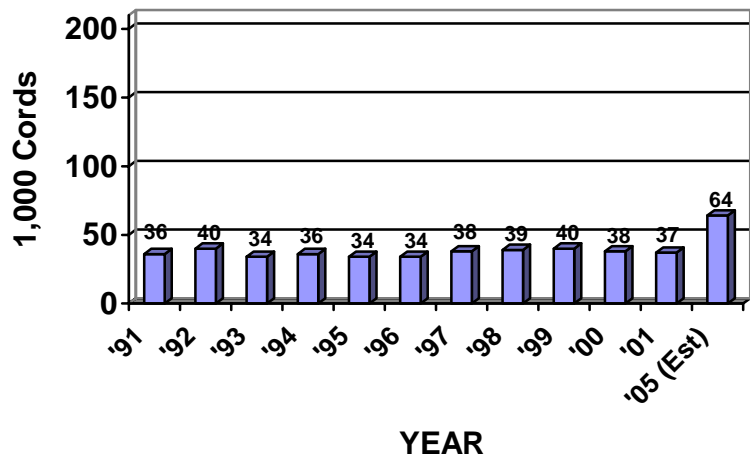
Source: 2002 FIA Database provided by USFS, North Central Research Station

Growing conditions for maple in most of Minnesota are marginal because we are on the western edge of its natural range. The result is that sugar maple in most of the state tends to be of lower sawlog quality than that grown in some regions of the country due to relatively small size and poor form (some higher quality sugar maple is grown in southeastern Minnesota).

## Basswood

### BASSWOOD HARVEST IN MINNESOTA: ACTUAL & PROJECTED

Minnesota statewide Timberland, all Ownerships



Source: NCFES Pulpwood Surveys, DNR Sawmill & Fuelwood Surveys.

**Sustainable harvest level for basswood in Minnesota is 213,000 cords/year**, based on DNR method, which consists of Area regulation with growth contribution of all live trees (based on MN 1990 FIA).

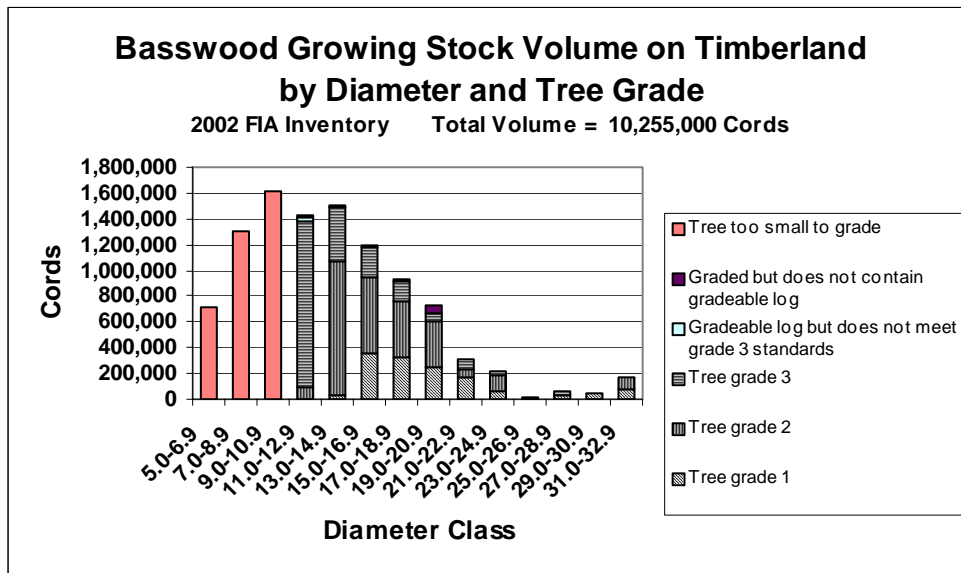
Estimated net annual basswood growth: 324,000 cords, based on 2002 FIA database. Estimated annual basswood mortality: 84,000 cords, based on 2002 FIA database.

# Current and Projected Demand for Basswood from Minnesota Timberlands

	Cords
2002 Harvest.....	<b>47,400</b>
• Minnesota Pulpwood Industries.....	21,500
• Pulpwood Export.....	100
• Sawlogs & Other.....	24,500
• Fuelwood.....	1,300
2005 Projected Harvest.....	<b>64,000</b>
• Minnesota Pulpwood Industries.....	37,000
• Pulpwood Export.....	1,000
• Sawlogs & Other.....	25,000
• Fuelwood.....	1,000

Concerns:

- Promoting good management on non-industrial private lands: with the recent development of a pulpwood market for basswood, it will become critical to prevent the harvest of potential high-quality sawlogs as pulp on productive sites.



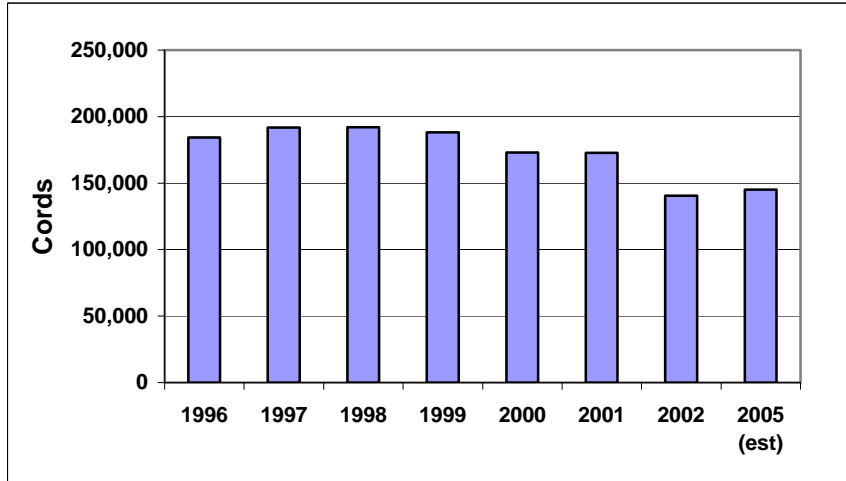
Source: 2002 FIA Database provided by USFS, North Central Research Station.

Basswood is capable of producing a large percentage of high-quality sawlog and veneer material on good sites in Minnesota.



# Minnesota's Oak Resource

## OAK HARVEST IN MINNESOTA: ACTUAL & PROJECTED Minnesota statewide Timberland, all Ownerships



**Source:** NCFES Pulpwood Surveys, DNR Sawmill & Fuelwood Surveys.

Sustainable harvest level for Oak in Minnesota is 460,000 cords/year, based on DNR method, which consists of Area regulation with growth contribution of all live trees (based on MN 1990 FIA).

Estimated net annual oak growth: 812,000 cords, based on 2002 FIA database. Estimated annual oak mortality: 103,000 cords, based on 2002 FIA database .

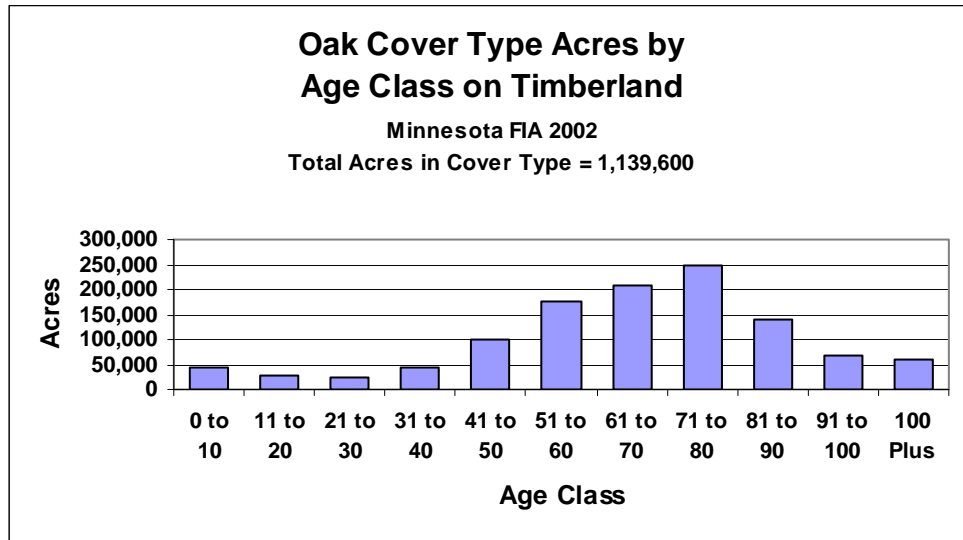
## Current and Projected Demand for Oak from Minnesota Timberlands

	Cords
2002 Harvest.....	<b>140,600</b>
• Minnesota Pulpwood Industries.....	0
• Pulpwood Export.....	300
• Sawlogs & Other.....	94,200
• Fuelwood.....	46,100
2005 Projected Harvest.....	<b>145,000</b>
• Minnesota Pulpwood Industries.....	4,000
• Pulpwood Export.....	1,000
• Sawlogs & Other.....	94,000
• Fuelwood.....	46,000

**Concerns:**

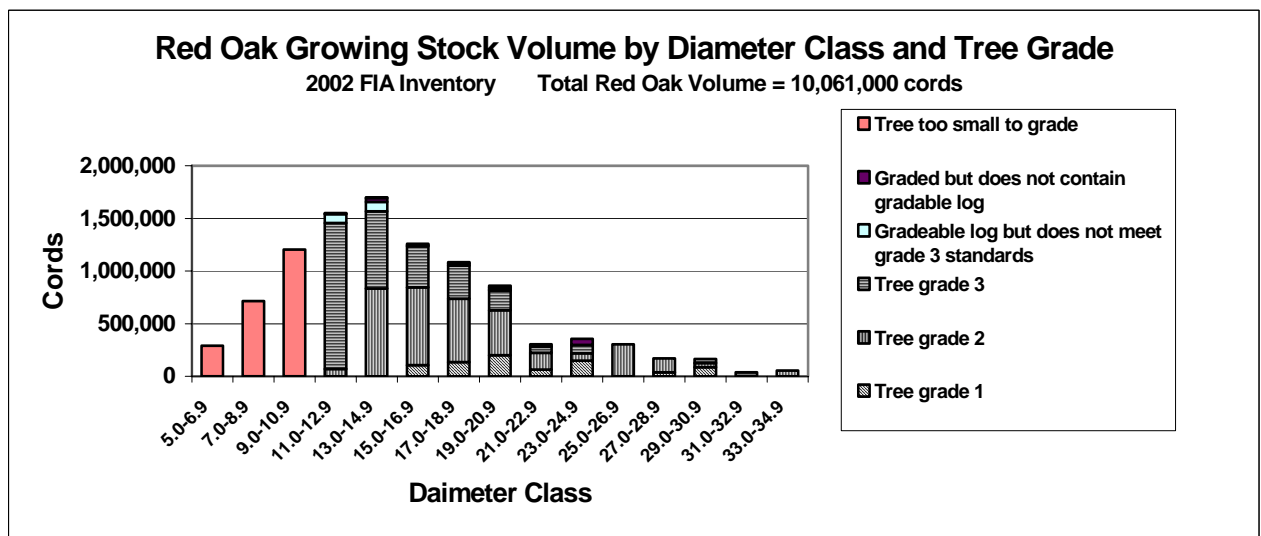
- High quality red oak sawlog resource continues to decline.
- Gypsy moth invasion likely to make it's way to MN by 2010 will have a negative impact on oak resource.

- There are opportunities to improve future oak volume and quality through investments in intermediate stand treatments on private and public lands.
- A small market has recently developed for pulpwood-size oak at the SAPPI paper mill.



Source: 2002 FIA Database provided by USFS, North Central Research Station

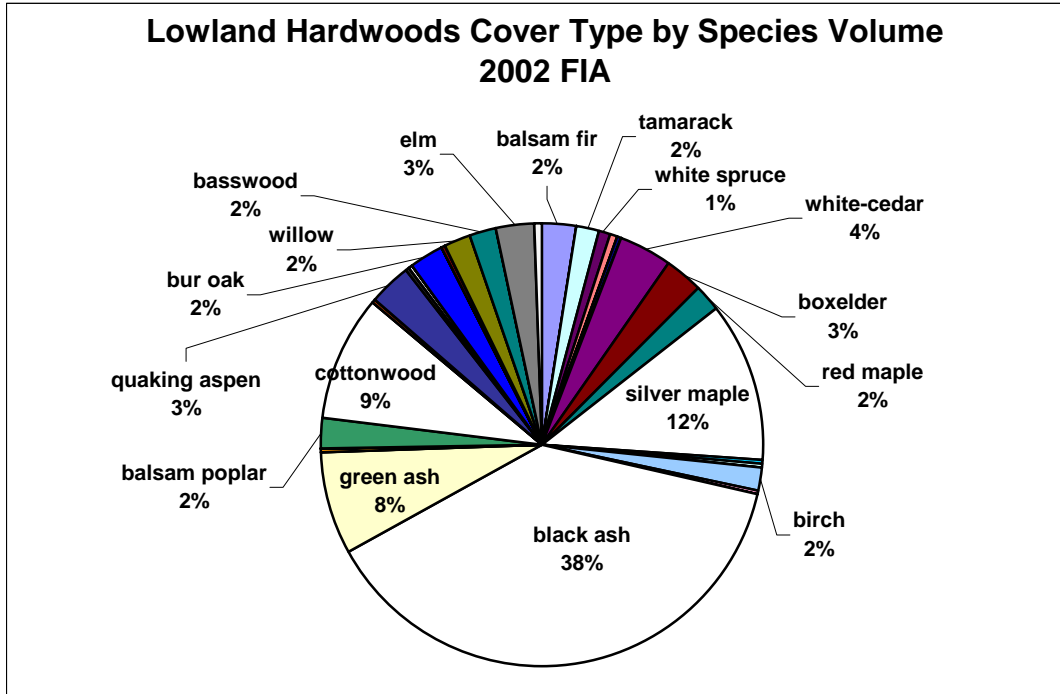
The oak cover type is dominated by late “middle aged” stands (average rotation age = 80 to 100).



Source: 2002 FIA Database provided by USFS, North Central Research Station

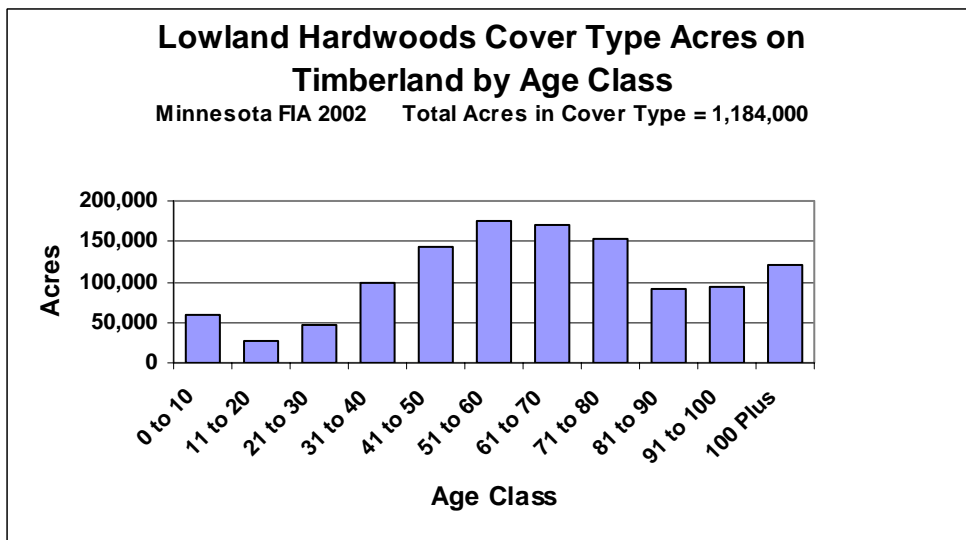
We grow some high sawlog and veneer quality red oak in Minnesota. It is the largest volume species sawed by many sawmills, especially those in the southern 2/3 of the state.

# Minnesota's Lowland Hardwoods Resource



Source: 2002 FIA Database provided by USFS, North Central Research Station

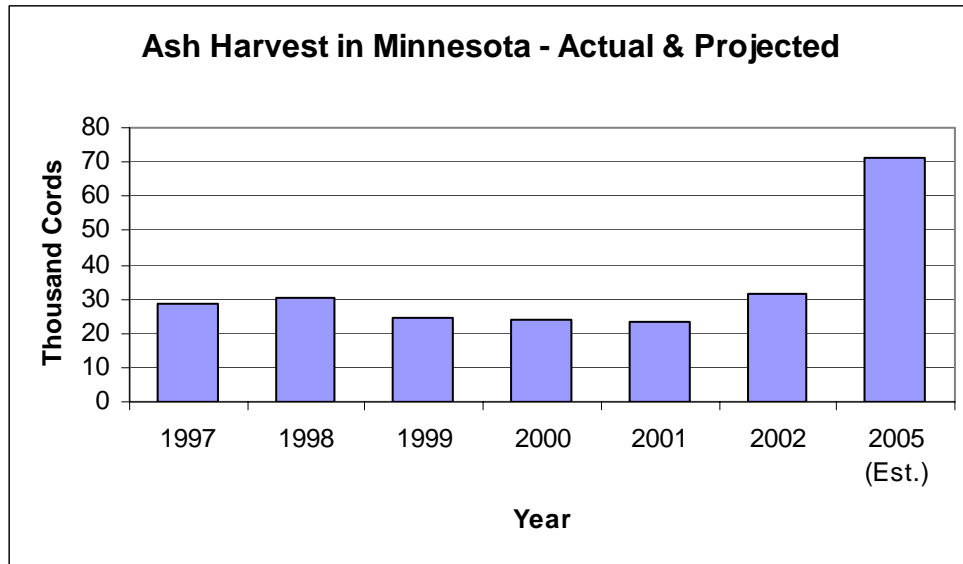
The lowland hardwoods cover type is made up of a variety of species. Most prevalent are black ash, silver maple, green ash and cottonwood.



Source: 2002 FIA Database provided by USFS, North Central Research Station

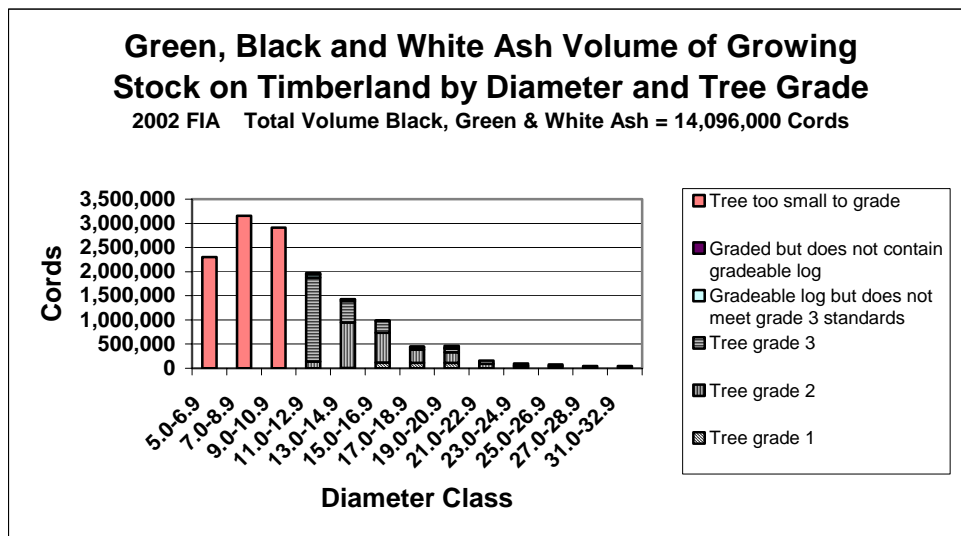
The lowland hardwood cover type is dominated by late “middle age” stands. A common rotation age for black ash is 90.

## Minnesota's Ash Resource



**Source:** Harvest data compiled by NCFES & DNR

Ash has not had a pulpwood market until recently, when several pulp & paper mills, and several OSB mills began using it.



**Source:** 2002 FIA Database provided by USFS, North Central Research Station

Minnesota's ash resource is dominated by smaller diameter material. This has an impact on processing opportunities: specifically, much of the ash resource is a good fit for pulpwood mills. We do grow a modest amount of high quality sawlog and veneer ash in Minnesota. It is important to get the high-quality material to these greater value-added markets.

Of the ash species found in Minnesota (black, green and white) black ash has by far the largest volume in Minnesota.

## Current and Projected Demand for Ash from Minnesota Timberlands



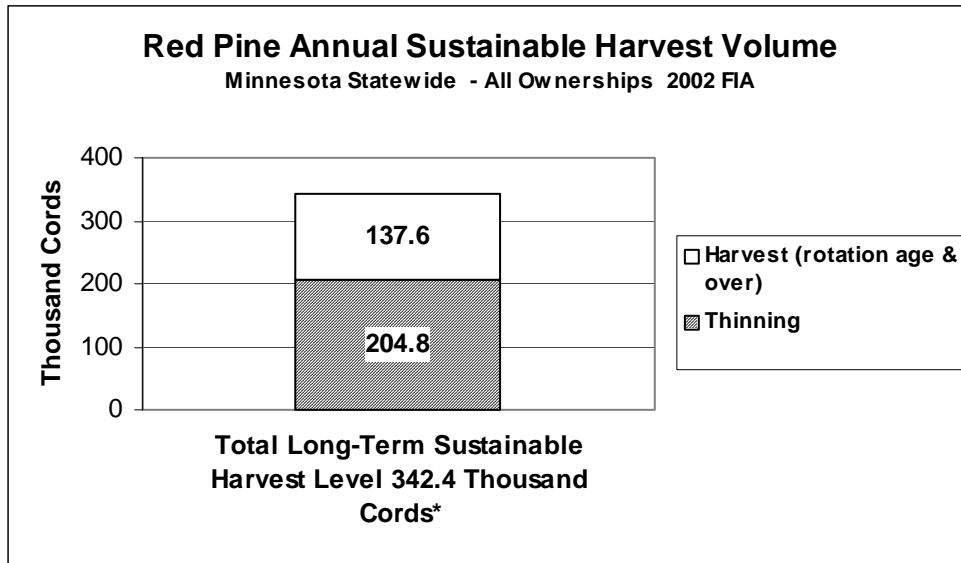
	<b>Cords</b>
2002 Harvest.....	<b>29,900</b>
• Minnesota Pulpwood Industries.....	3,700
• Pulpwood Export.....	0
• Sawlogs & Other.....	10,900
• Fuelwood.....	15,300
 2005 Projected Harvest.....	 <b>71,000</b>
• Minnesota Pulpwood Industries.....	44,000
• Pulpwood Export.....	1,000
• Sawlogs & Other.....	11,000
• Fuelwood.....	15,000

Concerns:

- Health concerns in black ash.
- Sorting high quality ash for highest value markets.

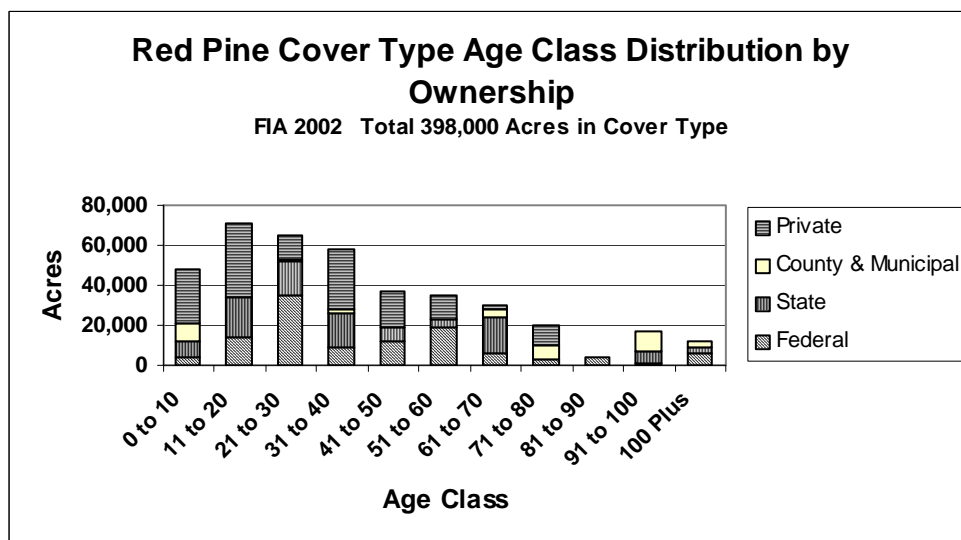
# Minnesota's Pine Resource

## Red Pine



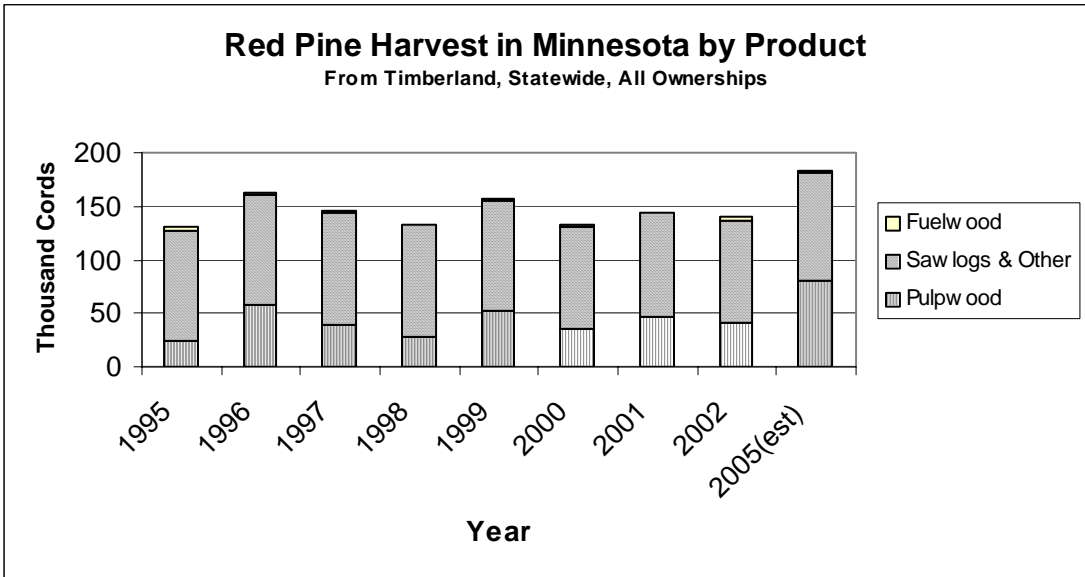
**Source:** MN DNR. Top segment of volume derived by DNR area regulation method. Bottom segment derived by DNR thinning model.

\*It is important to note that due to age-class structure of red pine (large acreages of young red pine) the short-term harvest level would be lower than the long-term sustainable figure. Short-term figure is approximately 270,000 cords, rising to 356,000 cords by 2012 and then continuing to rise for at least 50 years as the cover type ages and available volume for thinning increases.



**Source:** 2002 FIA Database provided by USFS, North Central Research Station

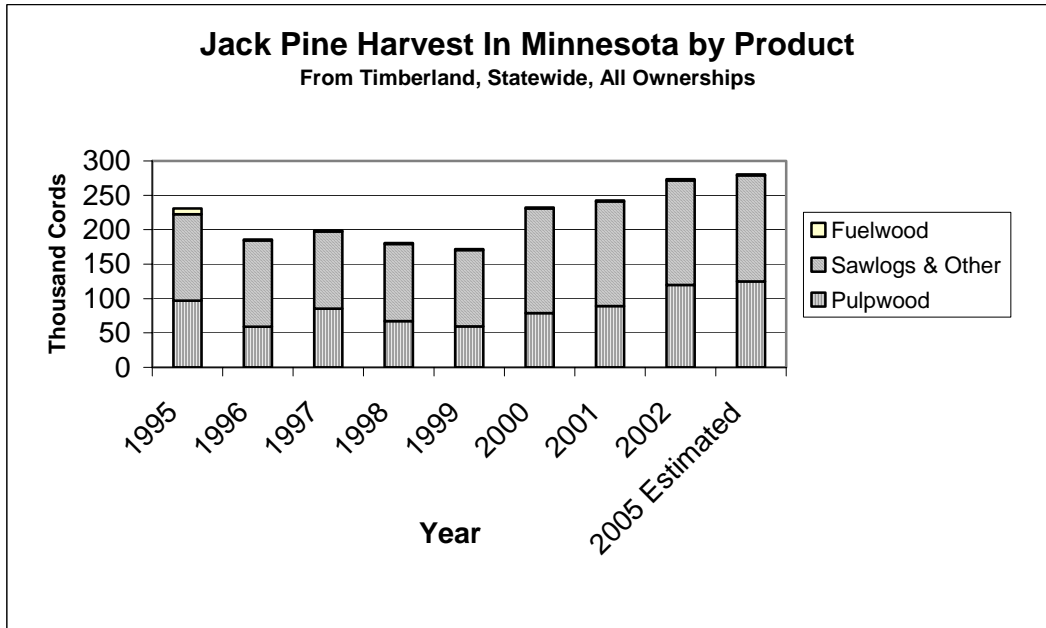
Red pine is a type dominated by young age classes, much of which is in the form of plantations in need of periodic thinning. Much of the resource is owned by the federal government and private landowners.



Source: Harvest data compiled by NCFES & DNR



## Jack Pine

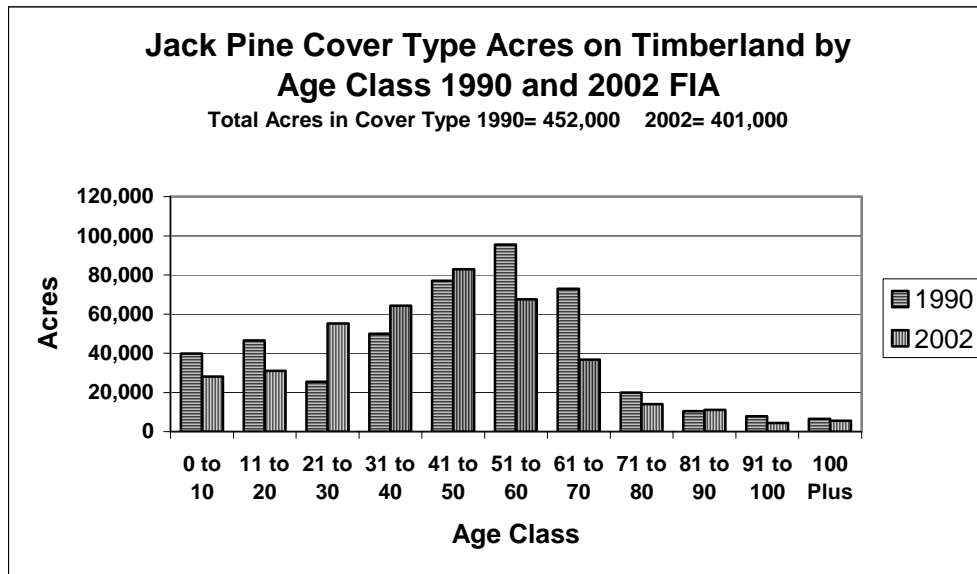


Source: Harvest data compiled by NCFES & DNR

Sustainable Harvest (DNR Method, not adjusted for restrictions): 219,000 cords, based on Minnesota 1990 FIA.

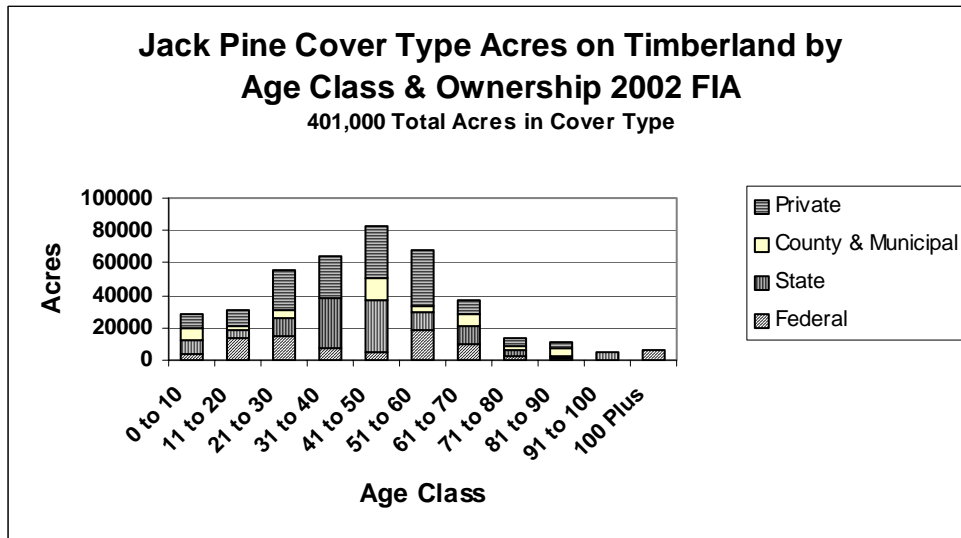
Average net annual growth of jack pine growing stock: 106,800 cords, based on 2002 USFS FIA database.

Average annual mortality of jack pine growing stock: 119,000 cords, based on 2002 USFS FIA database.



Source: 2002 FIA Database provided by USFS, North Central Research Station

Jack pine cover type acres have declined significantly since 1990.



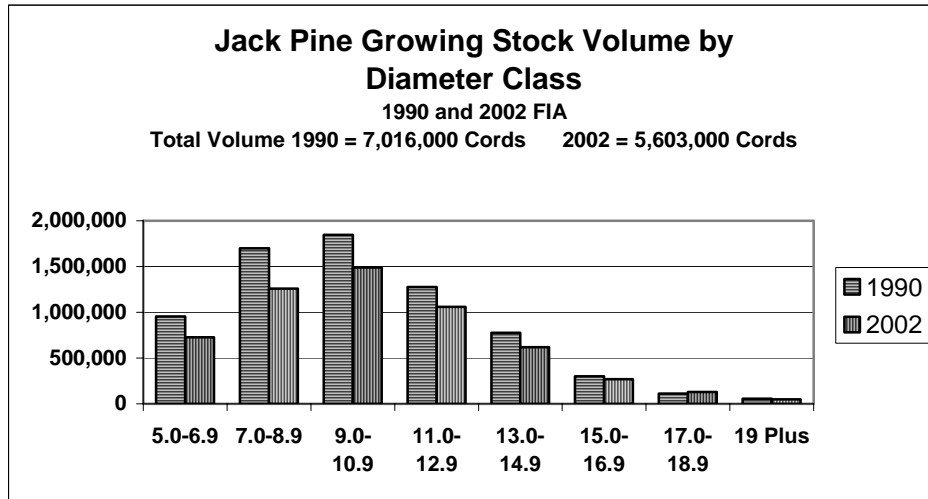
Source: 2002 FIA Database provided by USFS, North Central Research Station

The jack pine resource is very heavily weighted to the 41 to 60 year age classes. Many of these older stands are in need of management at the present time.

Much of the resource is owned by the state of Minnesota and by private landowners.

Because of the age class structure being heavily weighted toward older ages, jack pine harvest levels are likely to begin trending downward over the next five years. The volume “slack” caused by this will need to be made up with increased thinning of the young red pine resource.





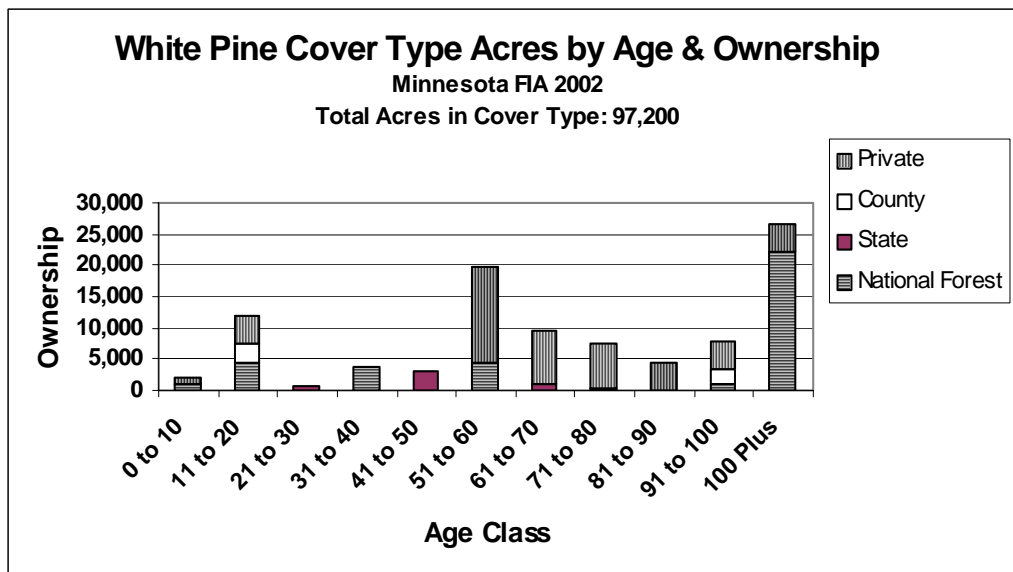
Source: 2002 FIA Database provided by USFS, North Central Research Station

Jack pine total volume has rapidly declined since 1990. Total volume of jack pine growing stock has gone from 7,016,000 cords in 1990 down to 5,603,000 cords in 2002 – a 20% decrease.

The vast majority of jack pine is under 15 inches in diameter.



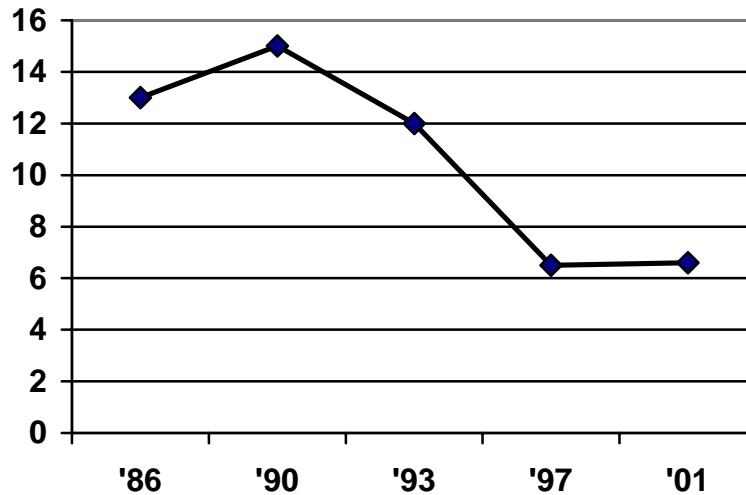
## White Pine



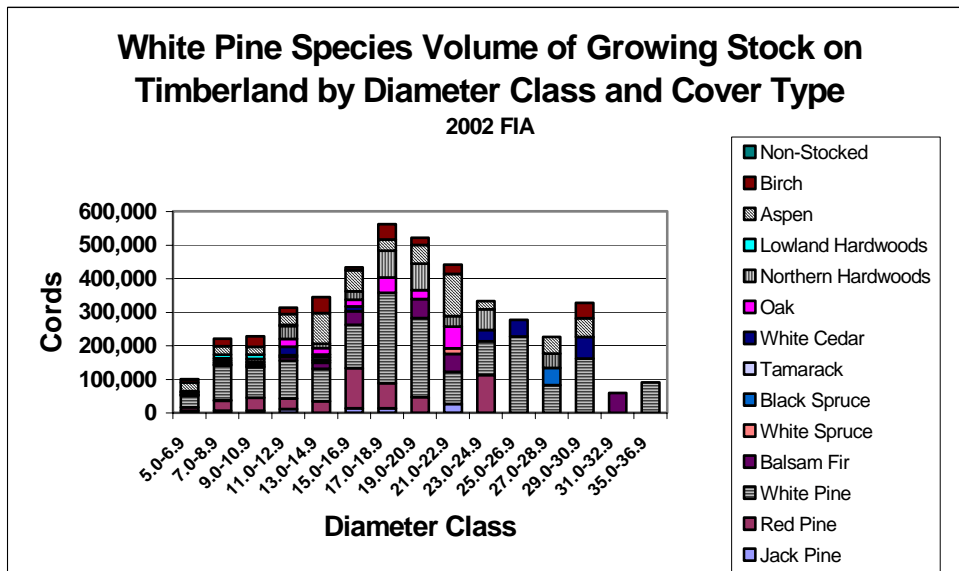
Source: 2002 FIA Database provided by USFS, North Central Research Station

National Forests and private landowners are by far the predominant ownership groups for the white pine cover type. The cover type is heavily weighted to age classes of 60 years plus.

## White Pine Sawtimber Harvest in Minnesota 1986 to 2001



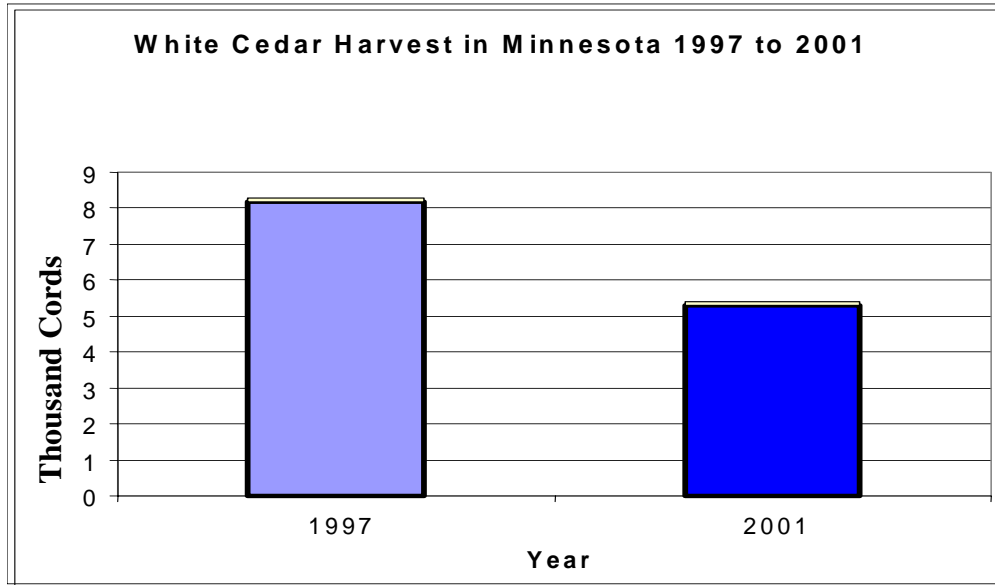
Source: DNR – Division of Forestry. Based on DNR Sawmill Surveys



Source: 2002 FIA Database provided by USFS, North Central Research Station

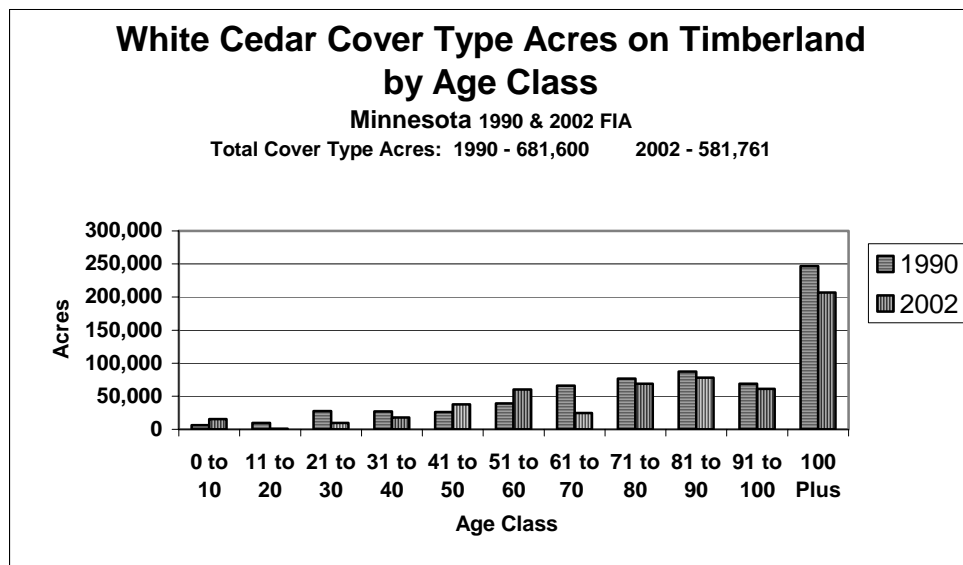
Most white pine volume occurs in the white pine, red pine, aspen and northern hardwoods cover types. The vast majority of white pine volume is in trees with diameters greater than 15 inches.

## Minnesota's White Cedar Resource



**Source:** North Central Forest Experiment Station Pulpwood Surveys, MN DNR Sawmill & Fuelwood Surveys.

Net annual growth for white cedar is 203,000 cords, according to the 2002 FIA inventory and harvest is less than 10,000 cords, so there is obviously a great deal of potential in the resource for more utilization and management, if the regeneration issue can be solved.



**Source:** 2002 FIA Database provided by USFS, North Central Research Station

**Issues:**

- White cedar has been somewhat of a “neglected” resource for many years. Probably the single biggest reason for this is an inability to consistently regenerate it on many sites. Cedar is in need of greater research efforts in regeneration techniques.
- There is no pulpwood market for cedar. The modest amount of utilization in Minnesota is entirely for sawtimber, specialty products and a small amount for fuelwood.
- Cedar has tremendous importance for wildlife habitat and ecological diversity.
- Cedar is very long-lived, but doesn’t often regenerate naturally



# Timber Price Information

\$\$\$\$

**Average Prices Received by product for Stumpage Sold by Public Land Agencies in  
Minnesota: 1995-2003**



## Average Prices Received for Stumpage Sold by Public Land Agencies in Minnesota: 1995-2003

### Pulpwood (\$'s per cord)

Species	1995	1996	1997	1998	1999	2000	2001	2002	2003
<b>Aspen</b>	18.69	16.09	19.20	20.54	23.40	25.28	28.76	27.36	28.95
<b>Balm</b>	16.48	13.24	13.76	16.95	14.13	25.27	32.06	27.53	25.12
<b>Birch</b>	3.52	7.52	7.88	7.53	7.66	7.69	8.31	8.16	9.04
<b>Ash</b>	4.46	5.00	4.46	5.51	2.28	4.09	3.91	5.86	3.62
<b>Oak</b>	4.51	4.37	5.64	8.98	10.76	9.27	7.74	5.77	4.35
<b>Basswood</b>	4.85	4.01	4.27	4.88	5.67	5.68	5.48	6.51	6.05
<b>Balsam Fir</b>	18.76	14.35	12.65	14.12	12.09	14.84	14.61	13.99	13.46
<b>W. Spruce</b>	26.18	19.06	12.8	19.18	26.62	32.63	29.90	30.51	21.87
<b>B. Spruce</b>	23.65	22.90	18.40	21.16	20.61	22.23	29.17	27.05	31.96
<b>Tamarack</b>	7.73	7.25	6.71	7.29	5.79	5.67	6.40	4.11	4.56
<b>W. Cedar</b>	10.48	10.55	11.27	7.31	6.83	8.46	6.74	7.06	4.68
<b>J. Pine</b>	32.08	23.48	23.59	24.72	24.32	21.94	21.63	22.18	21.37
<b>R &amp; W Pine</b>	17.49	21.18	23.35	15.63	17.02	18.61	20.79	20.99	19.55

Average prices based on those reported by Minnesota Counties, Chippewa and Superior National Forests, Bureau of Indian Affairs, and Minnesota DNR-Forestry.

Figures compiled by Doug Ford, Timber Sales Program Supervisor, DNR-Forestry

### Sold as Pulp & Bolts in Combination (\$'s per cord)

Species	1995	1996	1997	1998	1999	2000	2001	2002	2003
<b>Aspen</b>	20.59	19.05	22.85	25.39	26.35	28.66	34.33	30.80	34.52
<b>Balm</b>	16.96	15.48	16.01	19.51	18.04	25.41	32.57	28.35	28.21
<b>Birch</b>	5.48	9.51	9.03	9.40	8.97	9.45	10.40	10.18	12.61
<b>Ash</b>	28.76	28.65	26.70	18.45	7.09	10.01	11.52	10.01	9.84
<b>Oak</b>	32.82	35.48	30.71	24.58	34.00	25.35	24.33	32.32	34.50
<b>Basswood</b>	29.80	18.69	30.17	17.80	17.65	17.00	18.87	16.94	18.34
<b>Balsam Fir</b>	19.26	15.68	14.97	17.49	15.60	19.87	24.01	20.53	23.04
<b>W. Spruce</b>	29.57	26.51	27.78	26.56	29.83	34.25	33.84	34.88	35.86
<b>B. Spruce</b>	23.76	23.03	19.05	21.16	21.28	23.04	30.01	27.65	31.96
<b>Tamarack</b>	8.00	7.78	6.96	8.18	6.97	6.60	7.37	4.55	5.21
<b>White Cedar</b>	11.73	12.53	12.05	9.29	10.24	8.32	8.68	7.91	6.16
<b>J. Pine</b>	39.21	31.27	31.97	33.83	32.78	30.39	37.95	36.76	38.20
<b>R &amp; W Pine</b>	53.05	44.78	44.71	48.81	57.93	53.35	43.89	40.01	39.13

A *bolt* is defined as a short log, usually 100" length, with a specific minimum diameter and generally sawn for lumber

Average prices based on those reported by Minnesota Counties, Chippewa and Superior National Forests, Bureau of Indian Affairs, and Minnesota DNR-Forestry.

Figures compiled by Doug Ford, Timber Sales Program Supervisor, DNR-Forestry

Species	Sawtimber (\$ per Thousand Board Feet)								
	1995	1996	1997	1998	1999	2000	2001	2002	2003
<b>Aspen</b>	68.93	71.22	93.83	100.54	85.09	102.28	114.11	103.19	109.91
<b>Birch</b>	50.67	52.31	36.60	39.78	36.12	43.17	50.48	55.87	72.34
<b>Ash**</b>	151.28	147.18	108.93	97.09	48.70	71.39	81.97	66.85	76.60
<b>Elm</b>	47.02	60.08	107.20	53.31	56.50	---	44.10	69.00	62.08
<b>Oak*</b>	156.88	177.30	155.97	140.20	146.00	109.53	118.72	151.77	150.04
<b>Basswood</b>	120.91	105.37	107.07	81.15	74.77	70.25	81.24	80.43	94.47
<b>Balsam Fir</b>	55.10	61.49	71.61	88.30	80.82	120.65	144.20	136.32	145.47
<b>W. Spruce</b>	77.79	73.47	83.23	78.34	81.91	90.00	91.27	94.95	101.81
<b>W. Cedar</b>	38.55	42.58	37.00	38.64	39.13	19.96	30.46	29.43	24.73
<b>J. Pine</b>	136.55	108.37	115.46	121.84	124.00	114.86	154.35	155.76	135.43
<b>R &amp; W Pine</b>	171.55	163.64	174.34	161.01	198.99	176.01	170.13	153.78	153.10

\*Oak sawtimber prices mainly from public lands in northern Minnesota

\*\*Black ash includes veneer

Salvage from July 1999 windstorm included in price for stumpage in 1999 and 2000.

Average prices based on those reported by Minnesota Counties, Chippewa and Superior National Forests, Bureau of Indian Affairs, and Minnesota DNR-Forestry.

Figures compiled by Doug Ford, Timber Sales Program Supervisor, DNR-Forestry



# Forest Certification



**Brief overview of the status of forest certification in Minnesota**



# Forest Certification

Forest certification is becoming an increasingly important factor influencing forest management. Certification is a means of affirming that responsible forestry practices that enhance and protect environmental values of forests are being practiced. Forest certification provides an independent, third-party assurance that a forestry operation meets standards set by a certification program. Companies and landowners apply voluntarily. The market demand for certified wood products is currently quite modest, but is increasing.

Forest certification is intended to influence wood purchasing decisions by assuring consumers that certified products are sourced from sustainably managed forests. Some large buyers of wood products such as Home Depot and Time-Warner have announced policies to give preference to certified wood.

The certification process is reliant on forest owners and managers submitting their timberlands and management plans to a third-party audit process. It is likely to become an increasing market share advantage to industry to operate from states or countries with high proportions of certified land base.

## **Current Status of Certification in Minnesota**

Minnesota forestlands that are certified use one or more of the available certification systems, including the Forest Stewardship Council (FSC), Sustainable Forestry Initiative® Program (SFI®), International Standards Organization (ISO 14001) and Tree Farm systems. Minnesota currently has approximately 840,000 acres of publicly and privately owned forests third party certified under FSC, and 520,000 acres third party certified under SFI. Some of these lands are certified under both FSC and SFI. SFI licensees (self-audited) account for approximately 1.3 million acres.

FSC certified lands in Minnesota: State lands in Aitkin County, county lands in Aitkin and Cass Counties, The Audubon Center of the North Woods, and the forests of St. John's Abbey. There are also 3,000 to 4,000 acres of private forest lands certified under FSC.

Sustainable Forestry Initiative® Program Participants in Minnesota: St. Louis, Carlton, Beltrami, Koochiching and Lake Counties, the State of Minnesota, Industry lands of Potlatch, Boise Cascade and UPM-Blandin. The U of M Cloquet Forestry Center is also a SFI® participant.

Tree Farm certified lands in Minnesota: There are many thousands of acres of private lands certified under the Tree Farm system, which is mutually recognized by SFI.

ISO-14001 certified lands in Minnesota: UPM-Blandin and Potlatch lands have been dual certified through SFI and ISO-14001

***To help meet anticipated demand for certified wood, the state of Minnesota has begun the process of third party certification for all state-owned timberlands. The DNR Commissioner has committed to DNR-administered timberlands becoming dually 3<sup>rd</sup> party certified under the SFI® and FSC programs by the end of 2005.***



# **Glossary and Conversion Factors**



# Glossary

**BIA** – Bureau of Indian Affairs

**Cover Type** - A classification of forest land based on the species forming a plurality of live tree stocking.

**CSA** – Cooperative Stand Assessment. This is the inventory system used on state-owned land. Different vegetative stands are mapped using aerial photography and ground checks. Variable radius sample plots are distributed throughout each cover type and measured on the ground. A variety of information on stand condition is collected. Things like timber volumes, species mixes and insect and disease damage for the state forest and wildlife management areas can be determined using CSA data

**Cull** – Portions of a tree that are unusable for industrial wood products because of rot, form, missing or dead material, or other defect.

**FIA** – Forest Inventory & Analysis. In this inventory, permanent plots are remeasured periodically. Field remeasurements were last completed in 1977 and 1990. A recent change is that after completion in 2004, the inventory will be updated continually, with approximately 20% of the plots revisited each year. Minnesota has recently completed year three of a five-year effort to update its FIA, which is a cooperative effort between the USDA Forest Service and Minnesota DNR. The inventory will be complete in early 2004.

FIA provides extremely important information on the condition of the forest resource. Things like timber volumes, species mixes, and changes to the forest resource over time can all be determined using FIA data. It is the only way to track condition and changes over time for non-industrial private woodlands and is the only way to get comprehensive data across all ownerships.

**Growing Stock Trees**- Live trees of commercial species excluding cull trees.

**MAI** – Mean Annual Increment. the average annual increase in volume of a stand at a specified point in time. MAI changes with different growth phases in a tree's life, generally being highest in the middle ages & decreasing with age. The point at which MAI peaks is sometimes used as a guide to identify biological maturity and a stand's readiness for harvesting.

**NCFES** – North Central Forest Experiment Station. This is where the FIA unit of the USFS is located. These are the folks that, in cooperation with state DNR, accomplish the FIA inventory and Timber Product Output surveys. Without them, very little of the information in this book would be available.

**NIPF** – Non-Industrial Private Forest Land. Forest land owned privately by people or groups not involved in forest industry.

**Pulpwood** – Wood that is harvested and used by primary mills that make products from reconstituted wood fiber. In addition to wood pulp, this includes particleboard and engineered lumber products made from chips, shavings, wafers, flakes, strands and sawdust.

**Rotation Age** - Age at which a stand is generally considered mature and ready for harvest.

**Sawtimber** - For our purposes, this is wood that is harvested and used by sawmills.

## Glossary (continued)

**Sustainable Harvest Levels (DNR)** - DNR sustainable harvest levels are an indication of *potential* wood available on an annual sustainable basis. They are calculated based on available “timberlands” only, but they are still not the same as “*available*” harvest levels. Lands where harvesting is restricted by policy or low site productivity are excluded from the calculation, but the figures are not further adjusted downward for potential timber supply restrictions that can apply to timberlands (such as riparian, access, operability, extended rotation & other). Therefore actual *available* timber is likely to be somewhat lower than indicated by the long-term DNR *sustainable* figures.

Sustainable harvest levels are annual figures averaged over an entire rotation. Generally therefore, for cover types with old age-class imbalances, current timber availability is likely to be *above* long-term sustainable levels. This is due to a need to manage many old stands on timberlands before their health and available timber volume deteriorates. For cover types with young age-class imbalances, current timber availability is likely to be *below* long-term sustainable figures.

**Timberland** – Forest land that is producing, or is capable of producing, more than 20 cubic feet per acre per year of industrial wood crops, that is not withdrawn from timber utilization by policy.

**USDA** – United States Department of Agriculture.

**USFS** – United States Forest Service.

# Conversion Factors

**Conversion factors used in the preparation of this publication:**

**1 cord = 500 board feet**

**1 cord = 79 cubic feet**





