MINNESOTA'S FOREST RESOURCES

Department of Natural Resources
Division of Forestry
December 2000

500 Lafayette Road
St. Paul, Minnesota 55155

Minnesota Wood Industry - 2001

Annual Economic Impact*

- Value of Forest Products Manufactured = 7.7 Billion (estimated)
- 3rd Largest Manufacturing Industry in Minnesota Based on Employment
  - #1 = Machinery and Computer Equipment
  - #2 = Electronic Equipment and Instruments
- Generates 14% of Dollars of all Manufacturing
- Value Added = $3.71 Billion that stays in Minnesota

Employment

- 61,000 Employees
  - Primary Processing = 28,100
  - Secondary Manufacturing = 32,900
- $2.0 Billion in Wages Paid (15% of all Manufacturing in Minnesota)

Industry

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

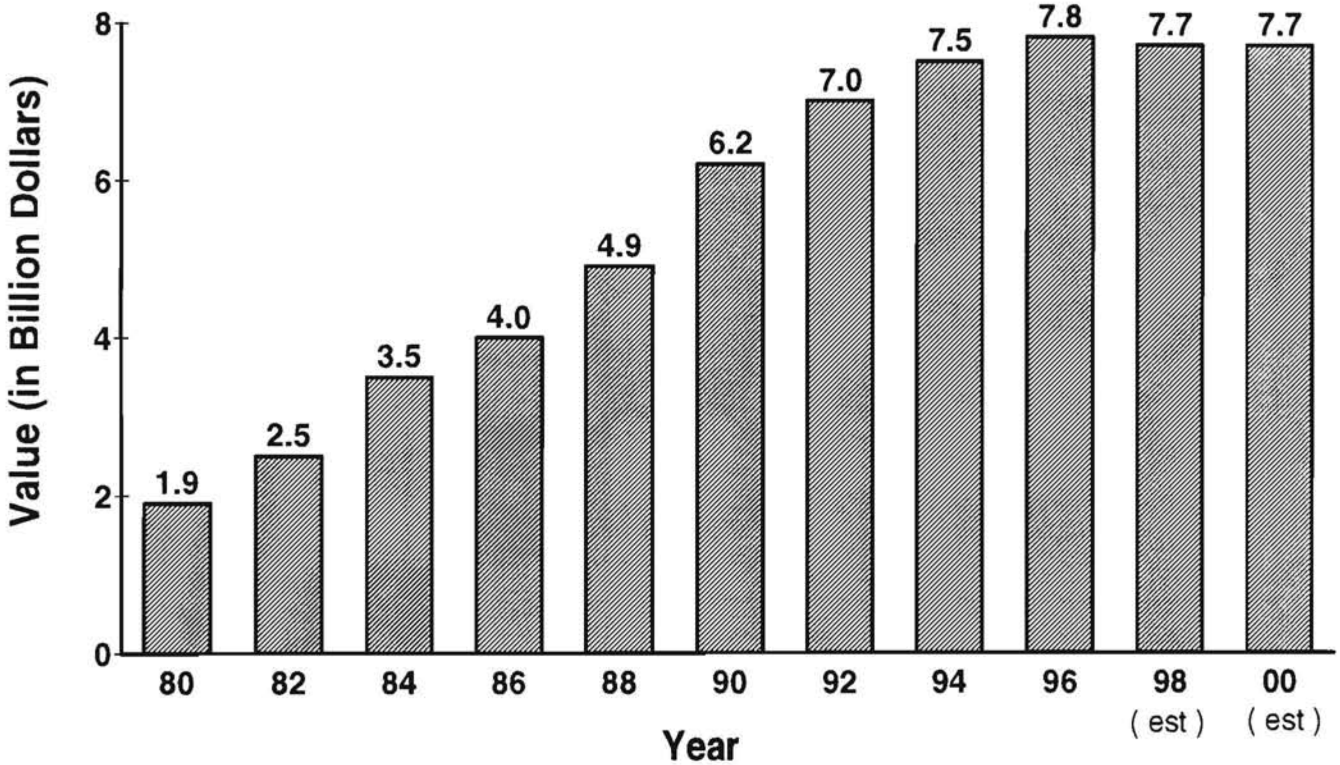
Annual Volume of Timber Harvested**

Pulpwood	=	2,987,000 Cords
Saw Logs	=	270 Million Board Feet
Fuelwood	=	752,000 Cords (202,000 from Timberland)
Veneer	=	8.0 Million Board Feet (Domestic)
	=	.5 Million Board Feed (Exported)
Chips	=	9,000 Cords (Fuel and Mulch)
Shavings	=	14,000 Cords (Animal Bedding)
Posts and Poles	=	9,100 Cords

*Source: Minnesota Employment Review and Survey of Current Businesses

**Source: NCFES and DNR Surveys

Value of Forest Products Manufactured in Minnesota

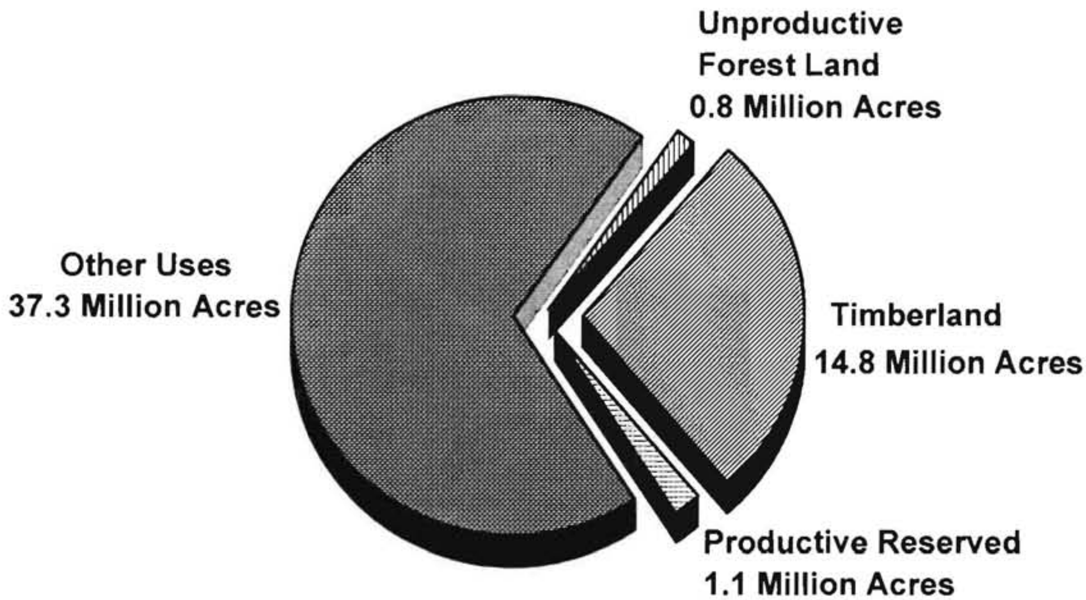


Source : MFI and Estimate from US Dept of Commerce, Bureau of Economic Analysis

DNR-Forestry 11/00

MINNESOTA LAND USE

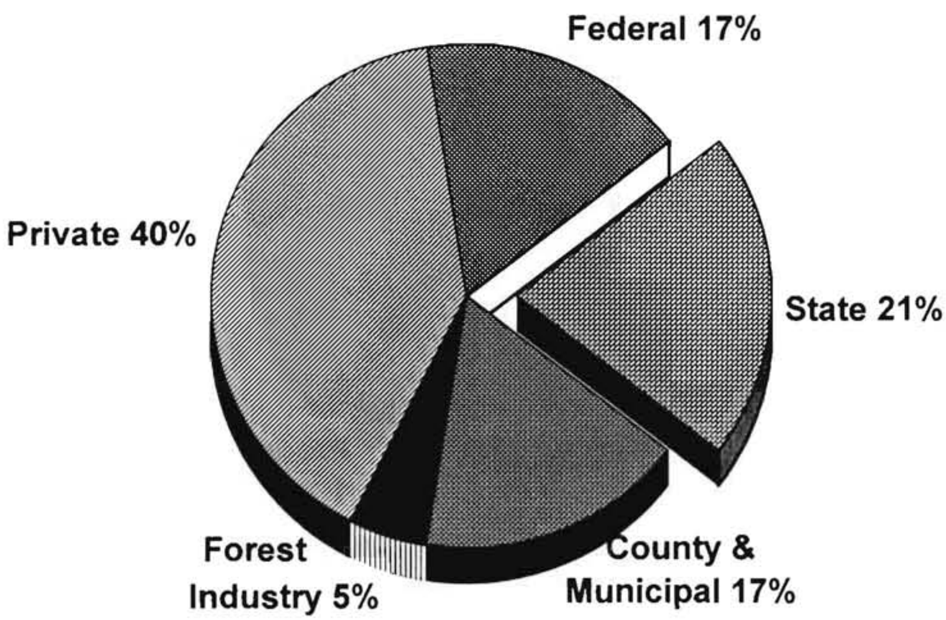
- Total of 54 Million Acres -



Source : Minnesota FIA 1990 Eastwide database provided by USFS N. Central F. Exp. Station

MINNESOTA TIMBERLAND by OWNERSHIP

- 14.8 Million Acres -



Source : Minnesota Forest Statistics, 1990 - USFS, Resource Bull. NC-141 (Table 2)

Area of Timberland in Minnesota by Forest Type

—1990—

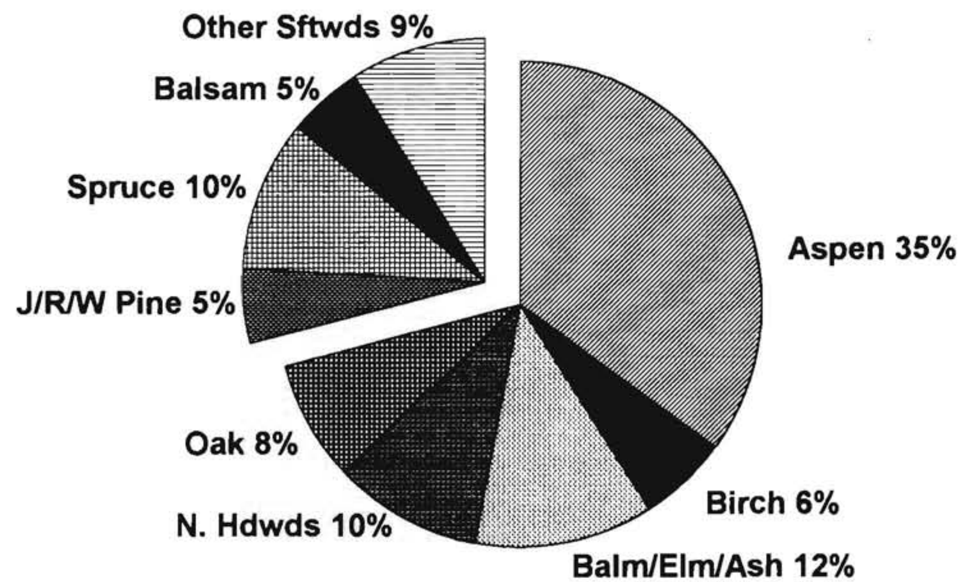
Forest Type	Acres (000's)
Jack Pine	447.5
Red Pine	301.6
White Pine	63.2
Balsam Fir	734.3
White Spruce	93.8
Black Spruce	1,322.1
Cedar	680.5
Tamarack	705.1
Oak	1,184.3
Elm - Ash	1,291.5
Maple - Basswood	1,402.9
Aspen	5,114.2
Birch	835.8
Balm of Gilead	427.7
Non-Forest	168.9
Total All Types	14,773.4

Source: Based on MN Forest Statistics, 1990, USDA Forest Service Resource Bulletin NC-141.

MINNESOTA TIMBERLAND by COVER TYPE

- State of Minnesota -

14.8 Million Acres



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

Minnesota Forest Statistics, Resource Bulletin NC-141, 1990.

DNR 11/94

Source: USDA Forest Service cordwood mill survey & MN DNR Sawmill & Residential Fuelwood survey

Total Wood Harvest in Minnesota by Species - Timberland

(Pulpwood: 1999; Sawtimber: Updated to 1999; Fuelwood: 1995-96)
(in thousand cords)

			Fuel		
Species	**Pulpwood***	**Sawlogs & Others**	**Residential****	**Commercial**	**Total**
Aspen	2,241.2	142.2	29.0	.6	2,413.0
Birch	144.4	40.1	40.3	6.3	231.1
Balm of Gilead	104.1	1.9	---	.1	106.1
Ash	1.1	12.0	11.5	.2	24.8
Oak	.6	109.0	77.6	1.0	188.2
Basswood	6.2	30.4	3.2	---	39.8
Maple	15.7	13.0	11.4	4.7	44.8
Cottonwood	---	9.7	---	---	9.7
Other Hardwood	.1	13.8	13.1	---	27.0
Sub-Total Hardwood	2,513.4	372.1	186.1	12.9	3,084.5
Pine					
Red Pine	52.7	103.2	1.0	---	156.9
White Pine	1.5	12.8	.2	---	14.5
Jack Pine	59.5	110.8	1.3	---	171.6
Spruce	155.3	10.5	.1	---	165.9
Balsam	188.2	9.1	.1	---	197.4
Tamarack	16.4	.1	.6	---	17.1
Cedar	---	8.2	.1	---	8.3
Sub-Total Softwood	457.2	254.7	3.4	---	731.7
Total	2,987.0	626.80	189.5	12.9	3,816.2

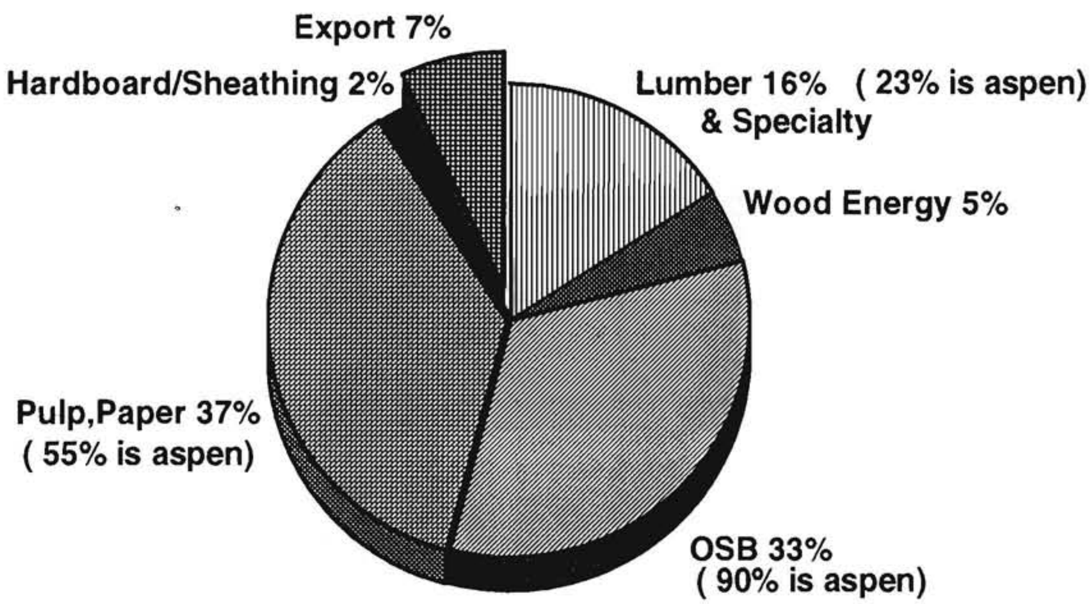
* Figures include pulpwood exported to Wisconsin: Spruce: 39,200 cds.; Balsam: 5,200 cds.; Aspen: 92,600 cds.; Jack Pine: 29,000 cds.; Red Pine: 18,100.; Tamarack:13,800 cds.; Birch: 30,600 cds.; and Maple: 800 cds.

**This is fuelwood removed from growing stock 1995-96.

"MN Forest Resources"

December 2000

WOOD USE by PRODUCT from TIMBER HARVEST in MINNESOTA
- 1999 -
Total 3.81 Million Cords (Includes All Species)



Source : Harvest data compiled by NCFES & DNR
Special products include veneer, posts & poles, shavings wood, & landscape chips.
Export is primarily pulpwood shipped to Wisconsin mills.

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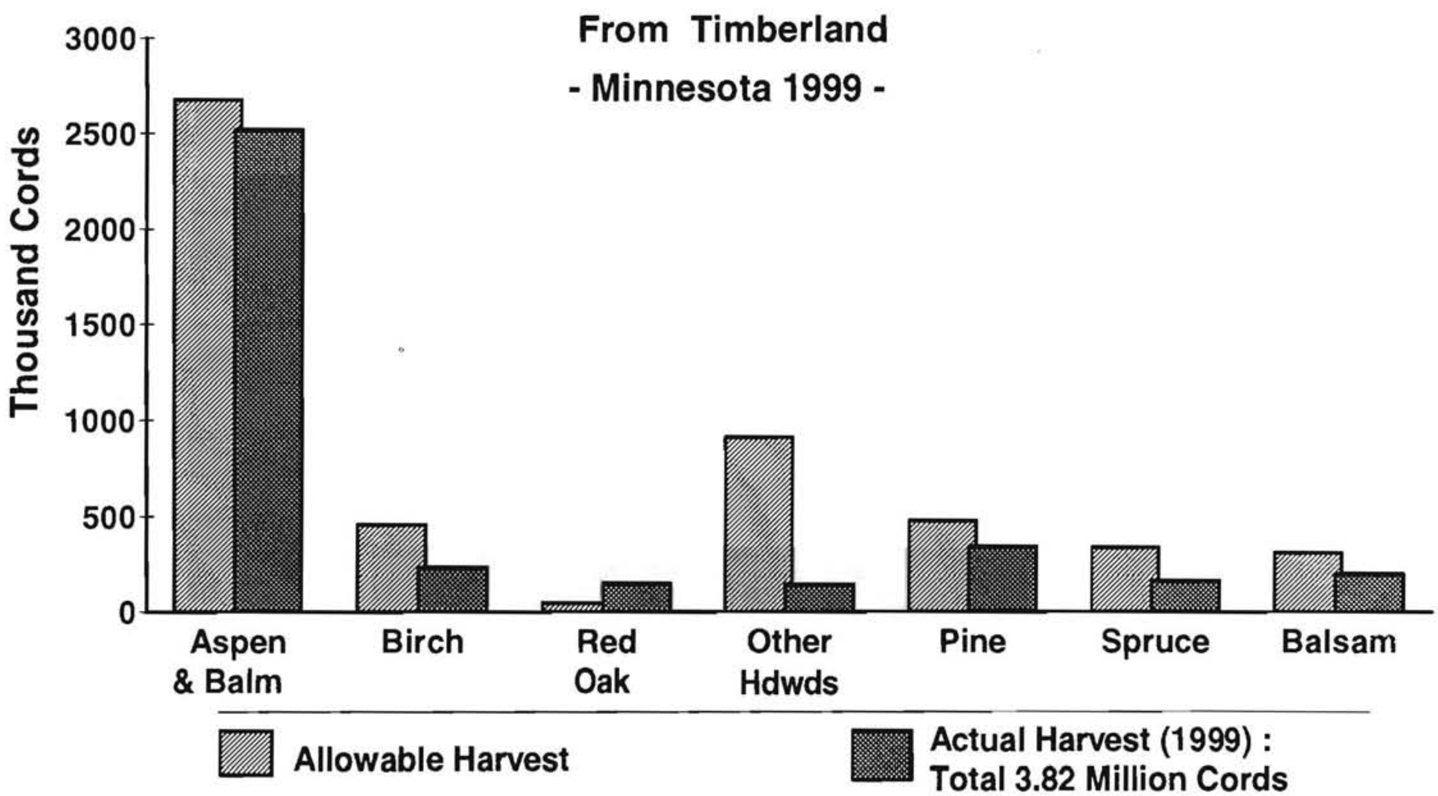
ESTIMATED ALLOWABLE HARVEST & ACTUAL HARVEST



Aspen/Balm based on GEIS (Table 6.25, medium level, Dec. 92)
Birch, pine, spruce & balsam volume based on DNR sustainable harvest model (not adjusted for restrictions : riparian and other).
Harvest data compiled by NCFES & DNR.

DNR 11/00

Minnesota Pulp and Paper
— 2001 —

Firm	Wood Used	Product
Blandin Paper Company Grand Rapids	Aspen, Balsam & Spruce	Magazines, Catalogs
Boise Cascade International Falls	Aspen, Pine, Spruce, Balsam, & Tamarack	Business, Xerox, Envelope, Computer
International Paper Sartell	Aspen & Balsam	Magazines, Catalogs
Duluth Mills Duluth	Balsam & Spruce	Advertising Supplements
Potlatch Corporation (2) Brainerd & Cloquet	Aspen, Balm, Maple, Birch, & Pine	Business & Printing
Rock-Tenn Company St. Paul	Recycled Paper & Corrugated	Cardboard & Corrugated Boxes
Duluth Mills Recycled Fiber 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 (OSB)
— 2001 —

Firm	Wood Used	Product
Potlatch Grand Rapids	Aspen, Balm, Birch, Pine, & Maple	OSB—"Potlatch Select"
Louisiana-Pacific Two Harbors	Aspen & Balm	OSB—Siding "Inner Seal"
Northwood Panelboard Solway	Aspen & Balm	OSB—"Norbord"
Potlatch Bemidji	Aspen, Balm, Birch, Pine & Maple	OSB—"Oxboard"
Potlatch Cook	Aspen, Balm, Birch, Maple, & Pine	OSB—"Oxboard"
Trus Joist Weyerhaeuser Deerwood	Aspen	Laminated Structural Lumber "TimberStrand"

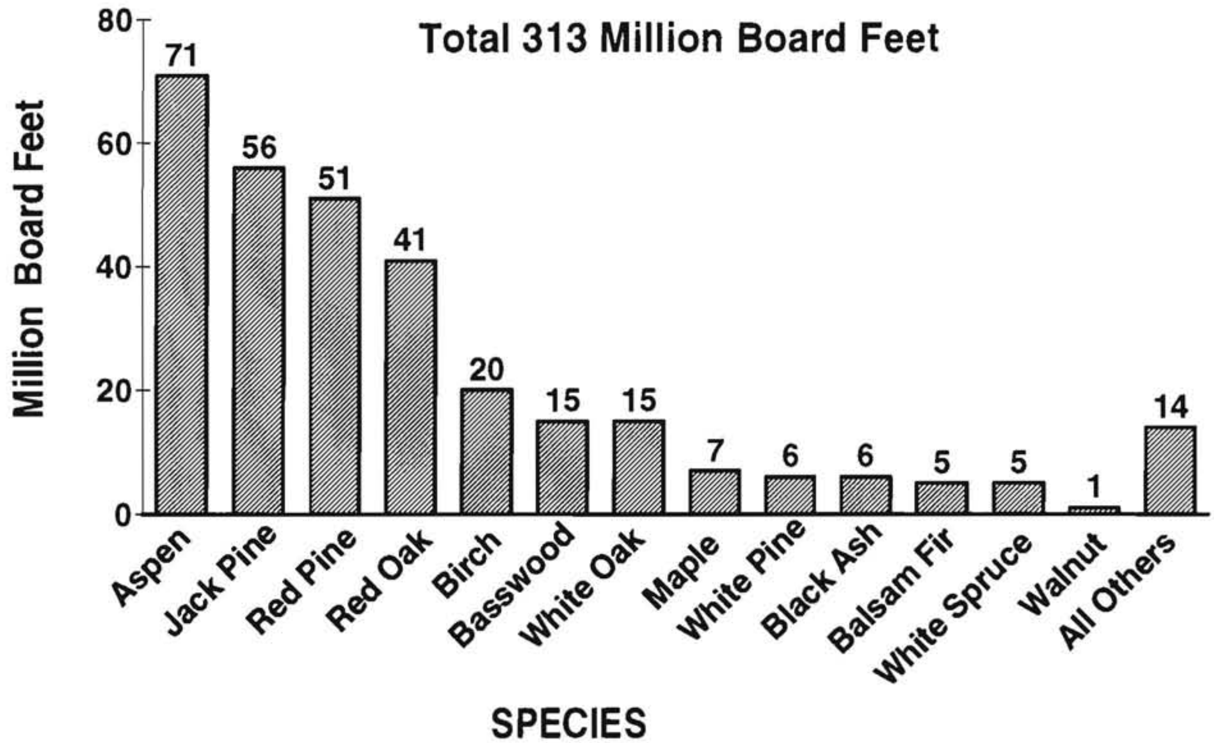
Minnesota Hardboard and Specialty
— 2001 —

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

MINNESOTA TIMBER PRODUCED by SPECIES

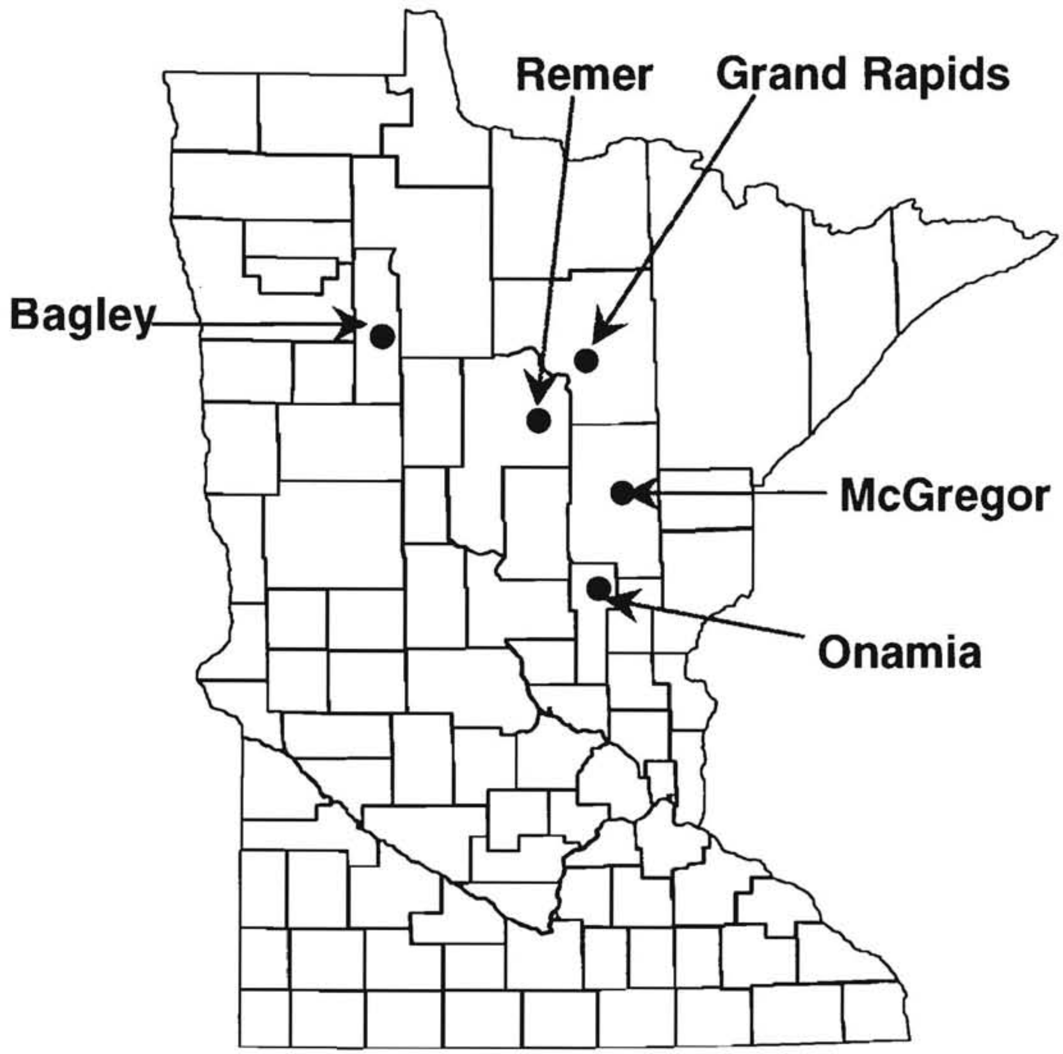
(Lumber , Posts/Poles , Shavings , Veneer , Energy & Landscape Chips)

- 1999 adjusted -



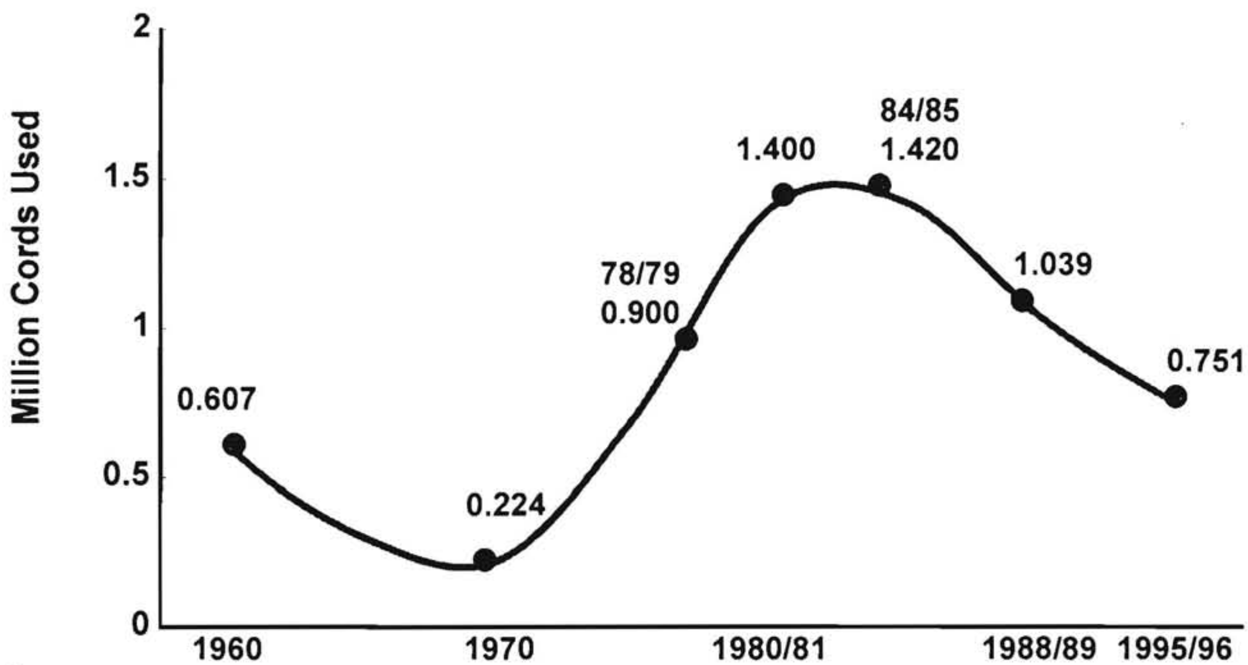
Source : DNR sawmill survey. DNR 11/00

MINNESOTA MILLS UTILIZING SMALL HARDWOODS
2001



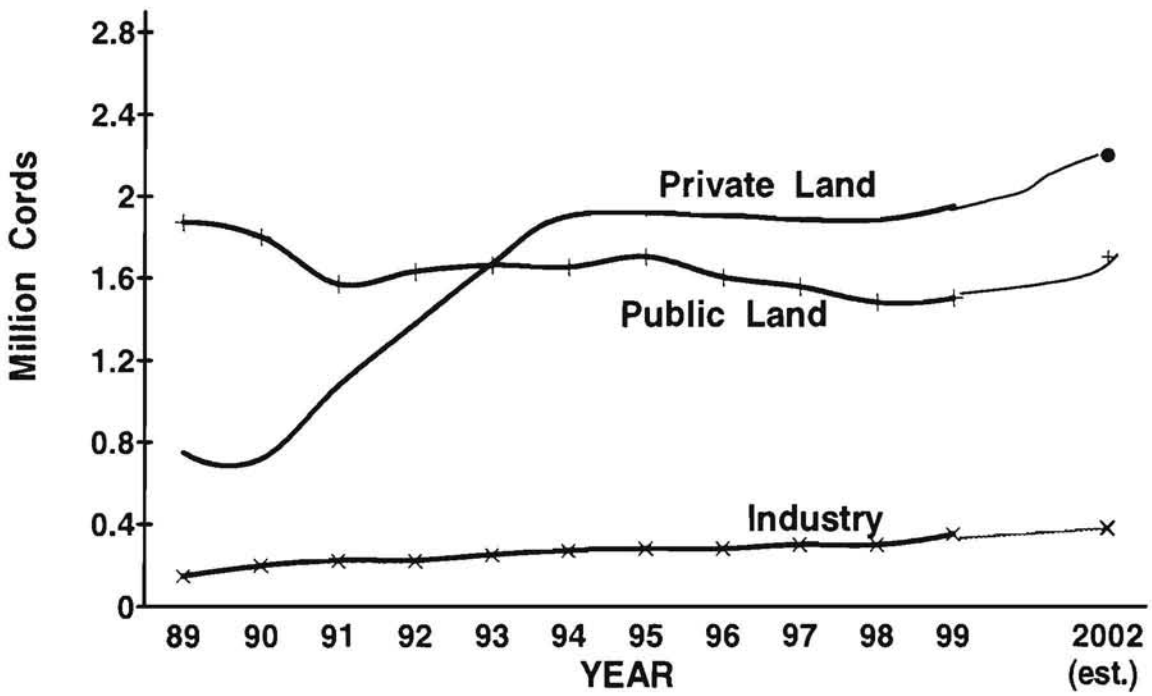
FUELWOOD DEMAND in MINNESOTA

1960 - 1995/96



Source : DNR Fuelwood Use Surveys

VOLUME of TIMBER SOLD by OWNERSHIP - MINNESOTA



Public Land : State, Chippewa & Superior Nat'l Forest, BIA, and 15 Counties.
Source : Volume of timber sold by public land agencies, DNR survey,
NCFES pulpwood use survey, MFI industry survey.
Estimated 2002 based on announced industry expansions.

DNR 10/00

Total Timber Sold by Landowner
Minnesota 1999

1999 Harvest	3,816,200 Cords (Excludes Fuelwood)
Private Landowner	54.1%
State	13.4%
Counties	15.9%
Chippewa & Superior National Forest	4.4%
BIA	2.1%
Industry	10.1%

Timber Sold by Public Agencies
Minnesota 1999

All Agencies	Sawtimber 122.0 MMBF (243,800 cds.)	Pulpwood --- 1,121,600 cds.	Total --- 1,365,400 cds.
State	30.7 MMBF (61,400 cds.)	450,700 cds.	512,100 cds.
Counties	81.1 MMBF (162,100 cds.)	445,100 cds.	607,200 cds.
Chippewa & Superior National Forest	9.07 MMBF (18,100 cds.)	149,500 cds.	167,600 cds.
BIA	1.08 MMBF (2,200 cds.)	76,300 cds.	78,500 cds.

Source: Volume of timber sold by public land agencies, DNR Survey, NCFES Pulpwood Use Survey, and DNR Sawtimber Survey.

Minnesota--New and Expanding Large Wood Industries

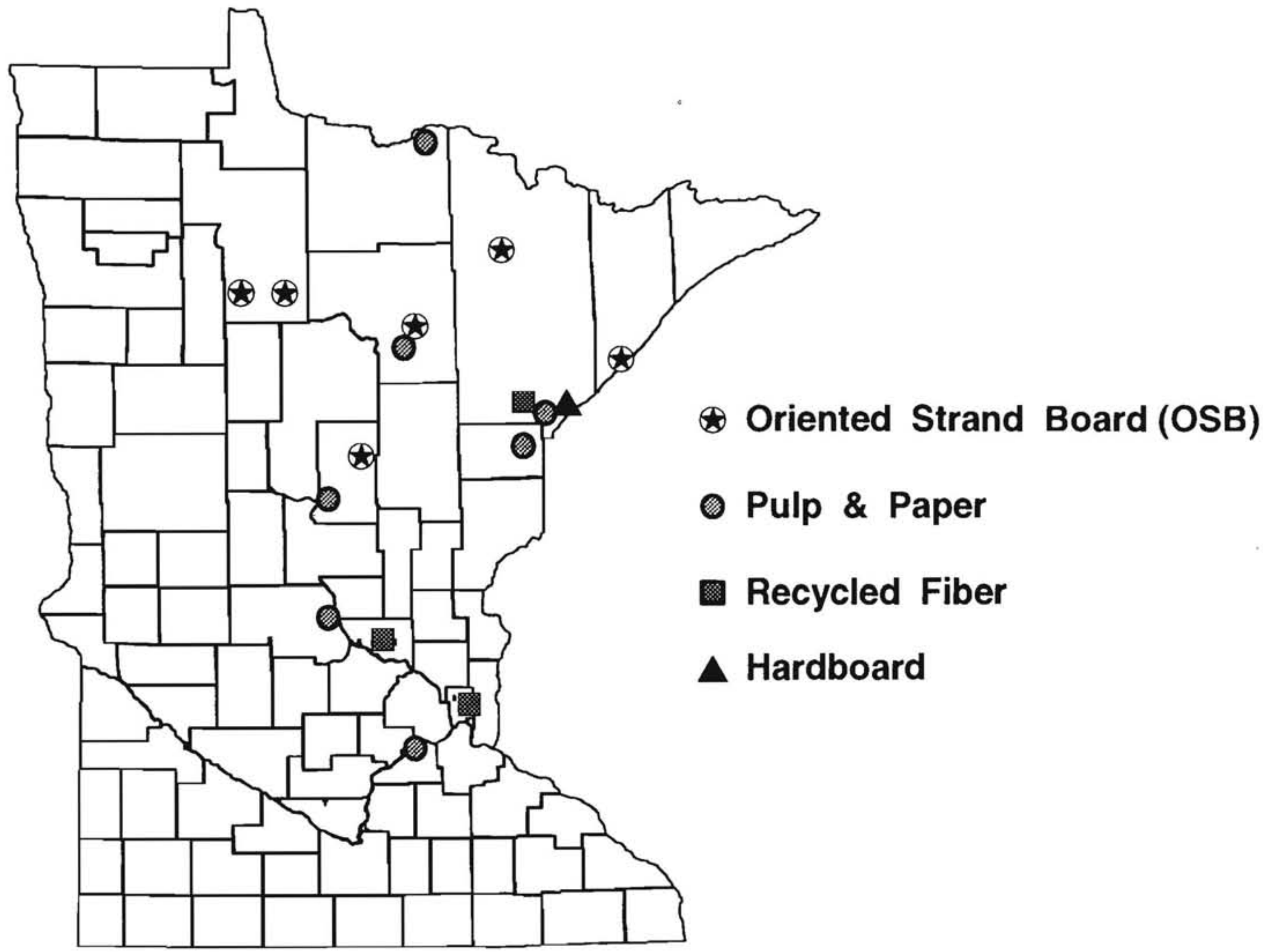
		Add'l Wood Use (cords)	Capital Investment ($Millions)
1975-1985			
Potlatch	Paper	30,000	$100
Potlatch	OSB	170,000	40
Potlatch	OSB	170,000	40
Northwood Panelboard	OSB	220,000	45
International Paper (f/k/a Champion International)	Paper	60,000	250
Blandin (now Potlatch)	OSB	220,000	50
Louisiana Pacific	OSB	90,000	30
Total		960,000	$555
1986-1989			
Blandin	Paper	138,000	$350
Potlatch	Paper	None	100
Duluth Mills (f/k/a LSPI)	Paper	130,000	404
International Biltrite	Sheathing	25,000	12
Total		293,000	$866
1990-1992			
Boise Cascade	Paper	340,000	$535
Trus Joist Weyerhaeuser (f/k/a TJ MacMillan)	*PSL	135,000	70
Potlatch	OSB	160,000	35
Potlatch	Lumber	120,000	22
Total		755,000	$662
1998-2001			
Potlatch	Pulp Mill	420,000	525
Potlatch	OSB	80,000	60
Total		500,000	$585

*Parallel Strand Lumber

Source: MN DNR-Forestery

OSB, PULP & PAPER, HARDBOARD & RECYCLING MILLS

Minnesota 2001



Current and Projected Wood Harvest from Timberland

-Minnesota Statewide-

	(In Thousand Cords)	
Species	**1999**	**Projected 2002***
Aspen/Balm-of-Gilead	2,519.1	2,535
Birch	231.1	377
Ash	24.8	30
Oak	188.2	190
Basswood	39.8	103
Maple	44.8	113
Cottonwood	9.7	10
Other Hardwoods	27.0	25
Pine	343.0	432
Spruce	165.9	201
Balsam	197.4	244
Tamarack	17.1	20
Cedar	8.3	6
Total	**3,816.2**	**4,286**

Source: 1999 Harvest Data compiled by NCFES and DNR.
Projected 2002 based on announced expansions and industry interviews.

*Adjustments due to:
- Potlatch expansion of pulpmill at Cloquet
- Potlatch rebuild of OSB mill at Cook
- Blandin's switch to more spruce/balm
- Potlatch additions to lumbermill
- Closing of aspen sawmill and reductions at other mills
- A portion of Boise Cascade proposed increase

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ESTIMATE OF INCREASES/DECREASES BY 2002: MINNESOTA HARVEST

	ASPEN/BALM	PINE	SPRUCE	BALSAM	BIRCH	MAPLE	BASSWOOD
POTLATCH MILLS (Bemidji, Cook, Cloquet, & Grand Rapids)	138,000	60,000*			135,000	64,000	60,000
POTLATCH LUMBERMILL**		37,500	10,000	17,500			
BOISE CASCADE***	10,000		1,000	2,000	6,000		
BLANDIN	(-)50,000		25,000	25,000			
SAWMILLS	(-)35,000	5,000	5,000		10,000		5,000

* This roundwood may be reduced approximately 30,000 cd. equivalents when expansion of lumbermill is finalized.
** Assumes all wood being harvested in Minnesota.
*** 20% of projected increase over next 10 years.

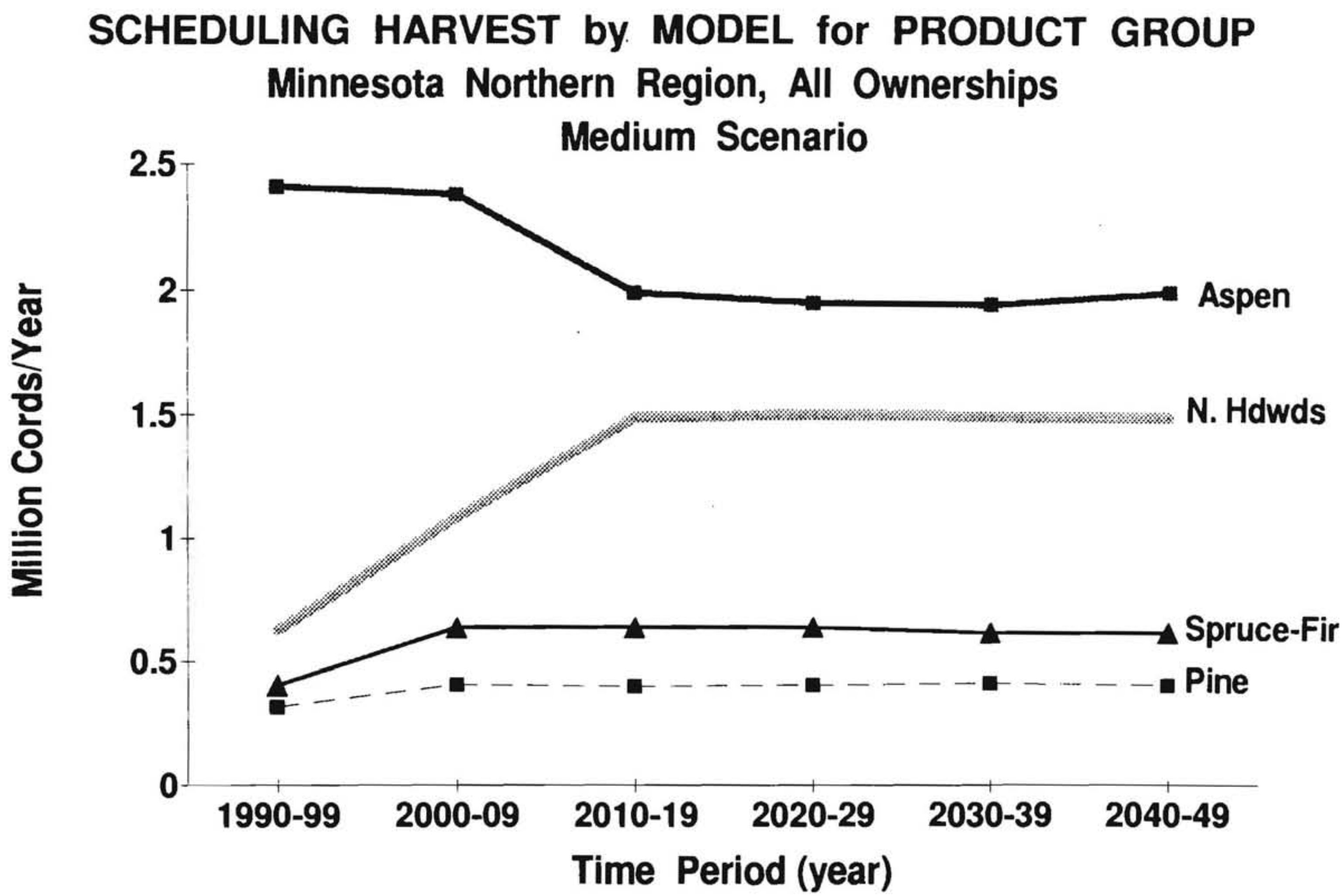
NOTES

1) The 1999 harvest figures are used as a basis for determining estimated harvest in 2002.
2) The 1999 roundwood harvest increased 155,000 cords compared to 1998. Mill inventories at the end of 2000 are at their lowest point in years. Year 2001 may reflect additional harvest to build inventory even though mill capacity will remain fairly constant.
3) Pulpwood exports to Wisconsin will continue to decrease as the demand and stumpage prices in Minnesota continues to increase.
4) There has been an overall reduction in saw timber production since mill surveys were taken in 1997. The figures in 2002 reflect this reduction except for one sawmill as indicated above. There was a reduction of 30,000 cords in sawmill production in 1999.
5) The Ontario Ministry of Natural Resources has stated that they are offering permits to export surplus aspen and white birch pulpwood from government lands over the next 3 years. This is a major policy change and may impact additional pulpwood resources available to Minnesota industry.

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. Normally, transitions from the present 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 markets and other conditions dictate.

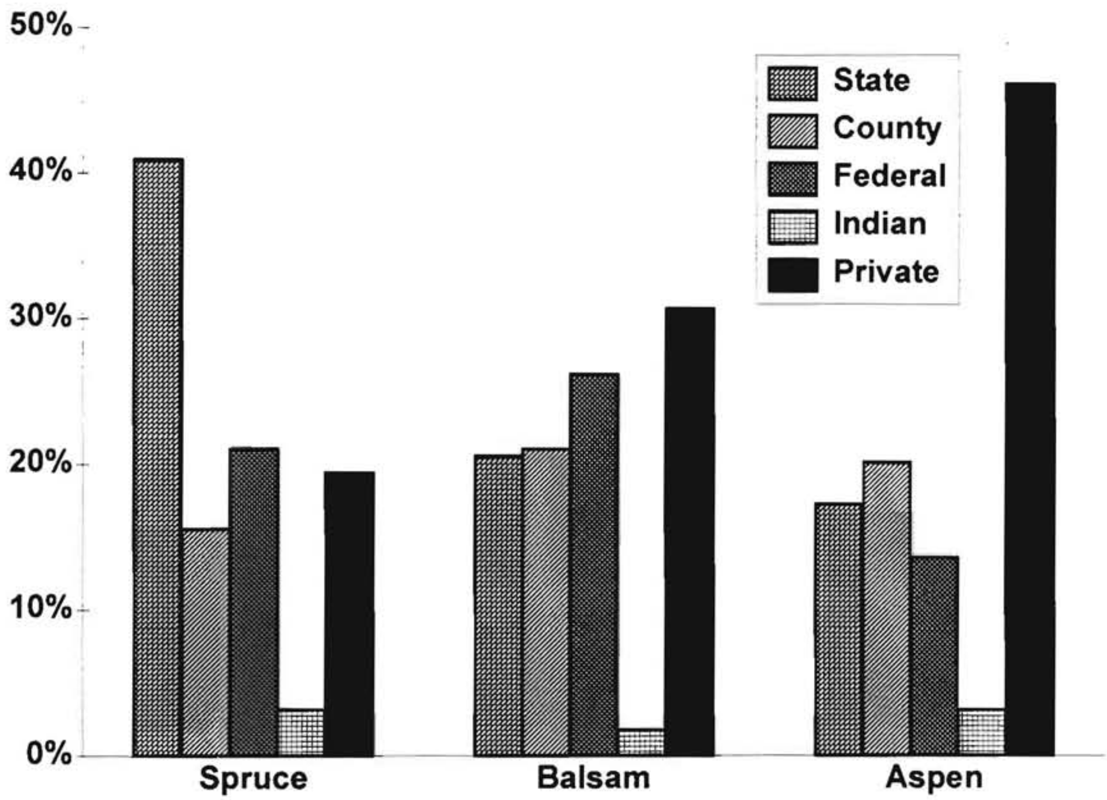
There is no one best way or time period to reach a target age class structure. Transition harvests may at some time be either higher or lower than the long-term sustained yield.



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.)

Objective : To harvest every stand at least once during a rotation with the goal to achieve a sustainable harvest level from a regulated forest at some point.

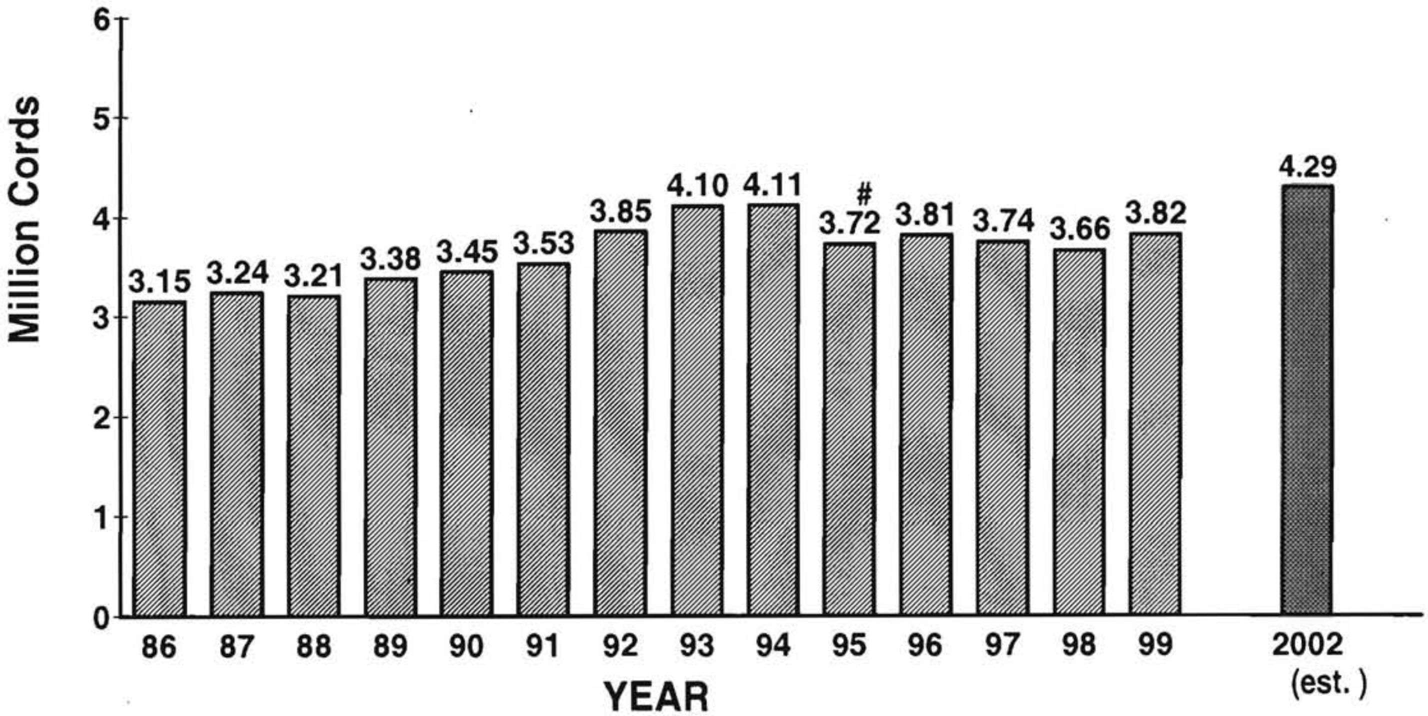
OWNERSHIP of SPRUCE, BALSAM & ASPEN TYPES in MINNESOTA



Total (in 1,000 acres) : 1,415.9 734.3 5,114.2

Source : Minnesota Forest Statistics, 1990 - USFS, Resource Bull. NC-141 (Table 8)

ACTUAL & PROJECTED TIMBER HARVEST in MINNESOTA
- from MN Timberland , all Ownerships, all Species -



Source : # 1995 adjustment due to decrease in fuelwood use since 1989/90
Harvest Data Compiled by NCFES and DNR.

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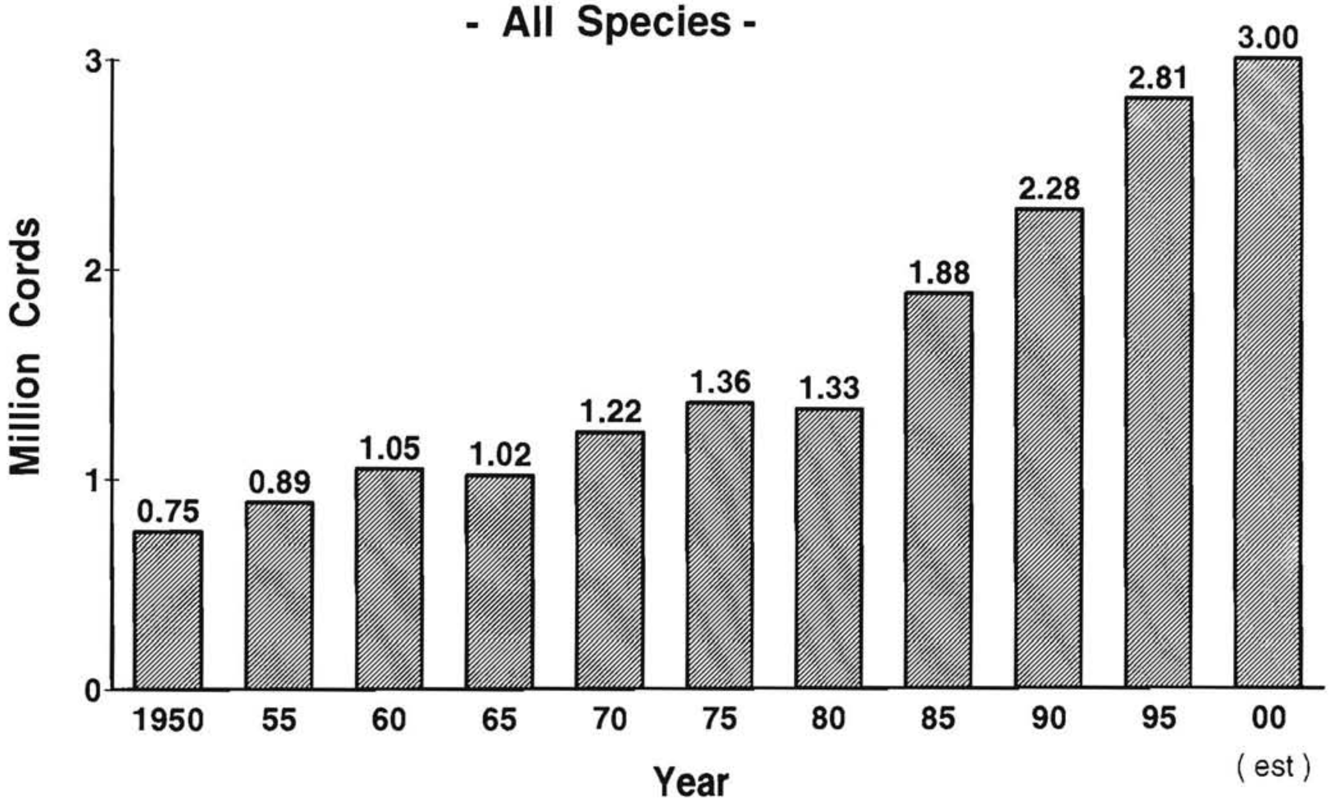
PULPWOOD PRODUCTION in MINNESOTA
1950 - 2000
- All Species -



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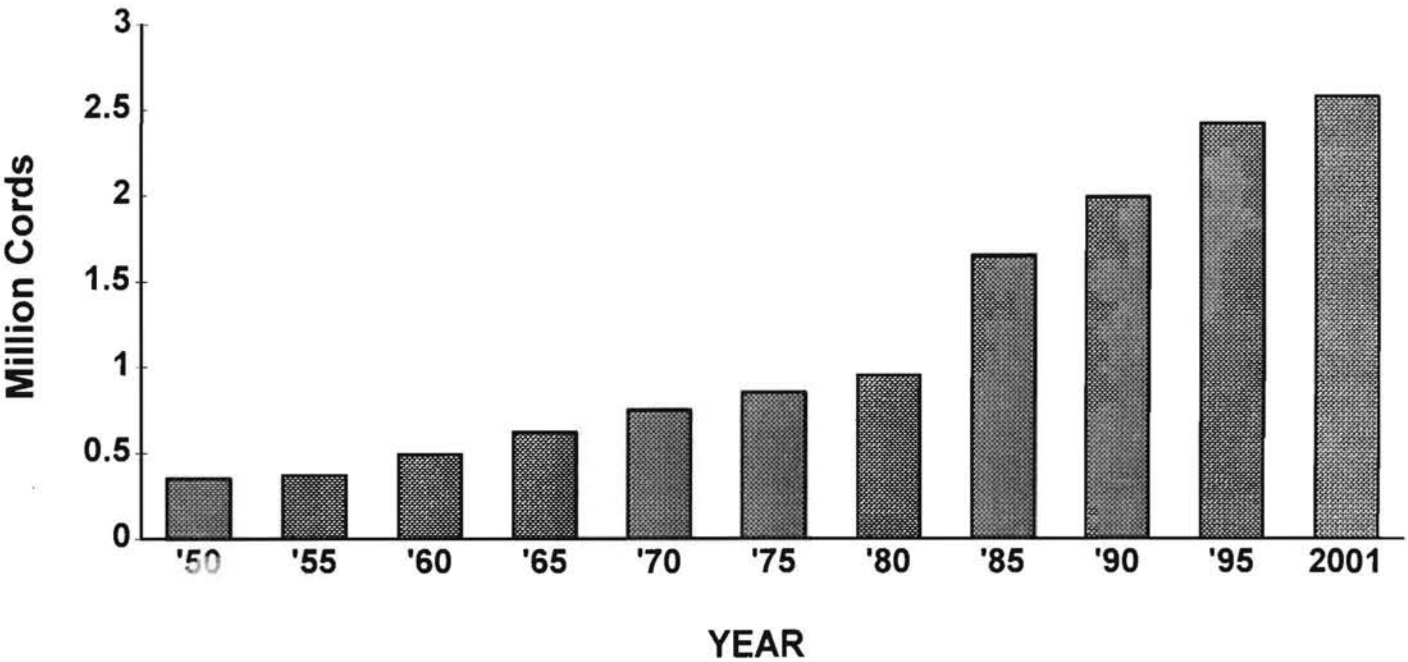
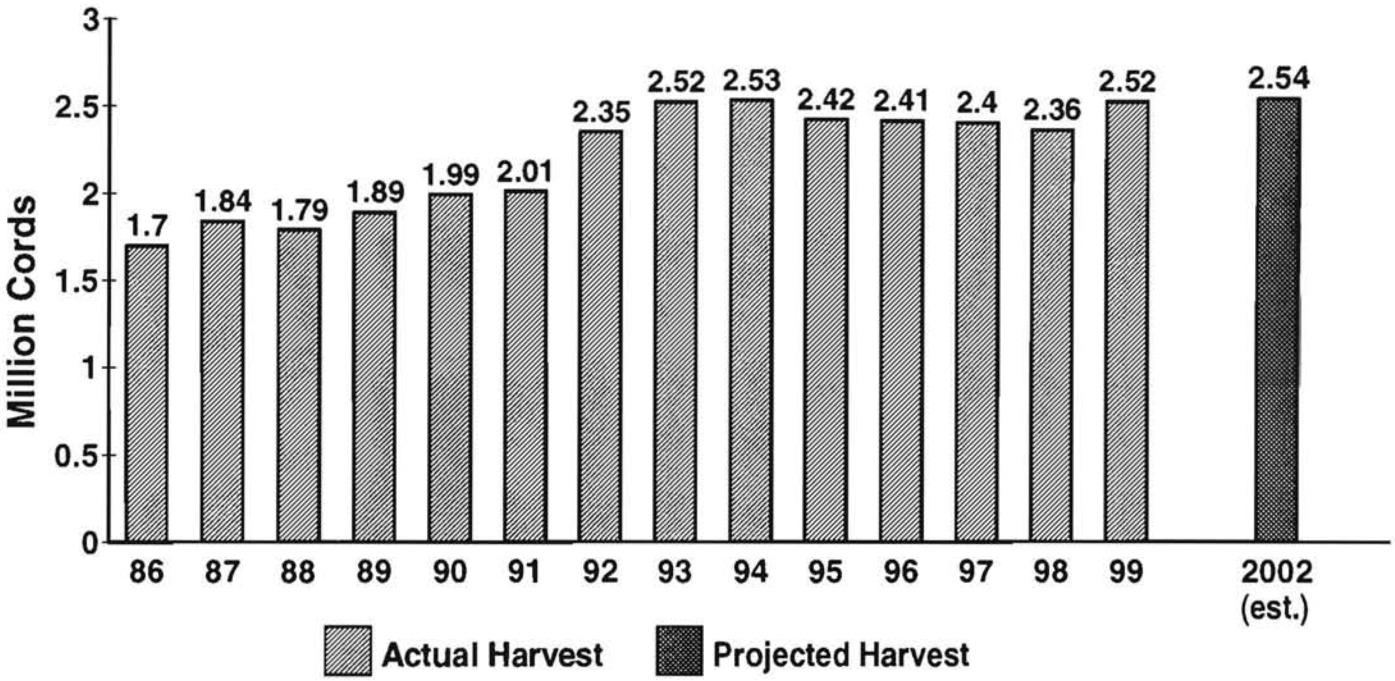
ASPEN & BALM HARVEST in MINNESOTA



Source : NCFES & DNR Surveys

DNR 1/99

ASPEN & BALM HARVEST in MINNESOTA: ACTUAL & PROJECTED
(includes pulpwood, sawtimber, wood for energy & specialty products)



1) Annual sustainable yield=2.68 million cords based on Table 6.25, GEIS, medium level, Dec, 92
2) Harvest data compiled by NCFES & DNR

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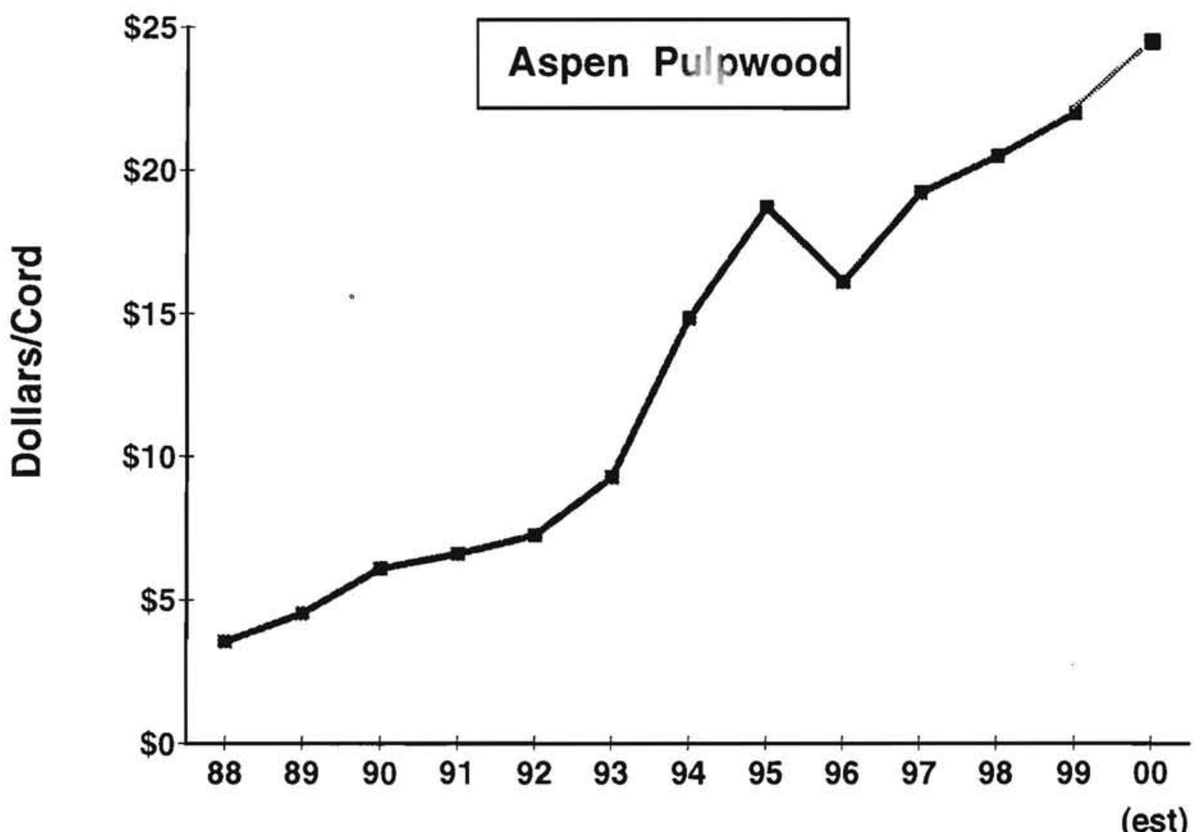
AVERAGE PRICES RECEIVED for STUMPAGE SOLD by PUBLIC LAND AGENCIES in MINNESOTA : 1988 - 2000



* Not adjusted for inflation

Source : Volume of timber sold by public land agencies, a DNR survey .

Aspen/Balm-of-Gillead

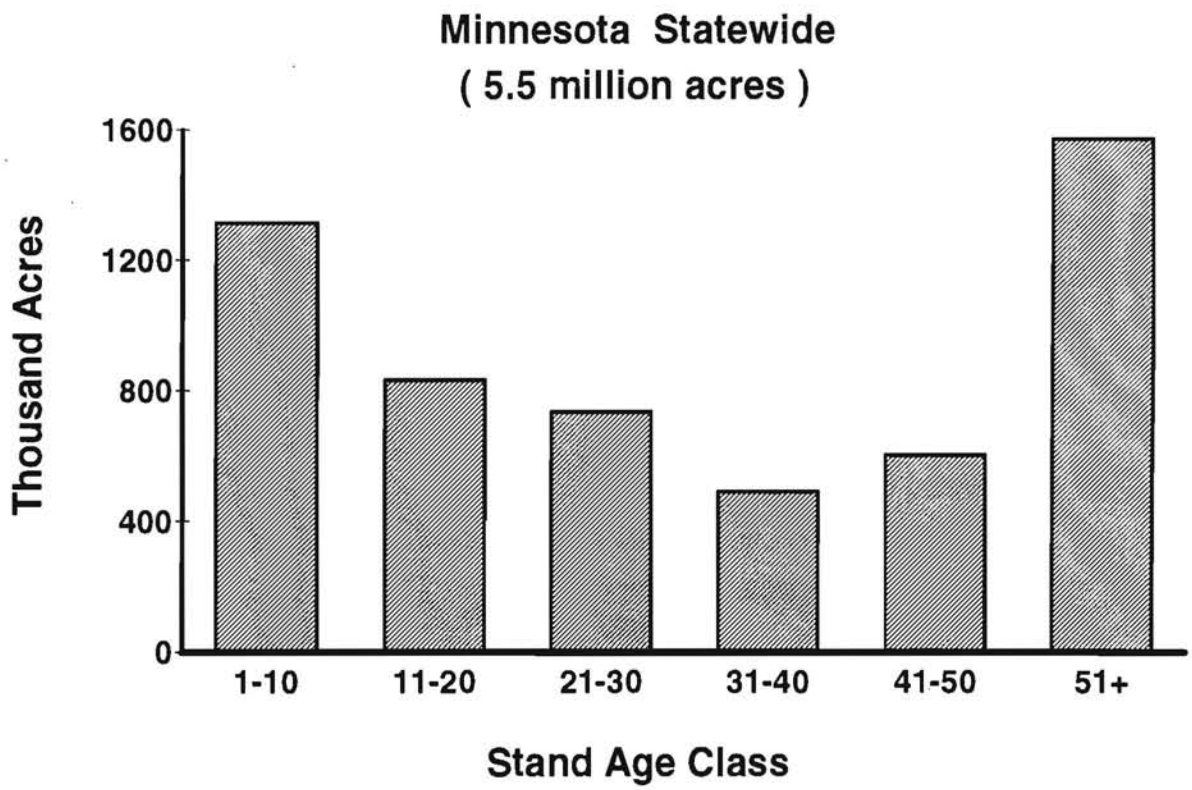
Present and Projected Demand

	cords
1999 Harvest	**2,519,100**
• Minnesota Pulpwood Industries:	
◦ Pulp & Paper, Hardboard, Sheathing, Shingles	1,004,600
◦ OSB	1,250,000
• Pulpwood Export	92,600
• Sawlogs & Other	142,200
• Fuelwood (from growing stock)	29,700
2002 Projected Harvest	**2,535,000**
• Minnesota Pulpwood Industries:	
◦ Pulp & Paper, Hardboard, Sheathing, Shingles	932,000
◦ OSB	1,356,000
• Pulpwood Export	70,000
• Sawlogs & Other	160,000
• Fuelwood (from growing stock)	30,000

Figures include a projected OSB and pulp mill increases and a shift to the use of alternative species by present OSB industries.

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

ASPEN & BALM TYPE AGE DISTRIBUTION - YEAR 2000



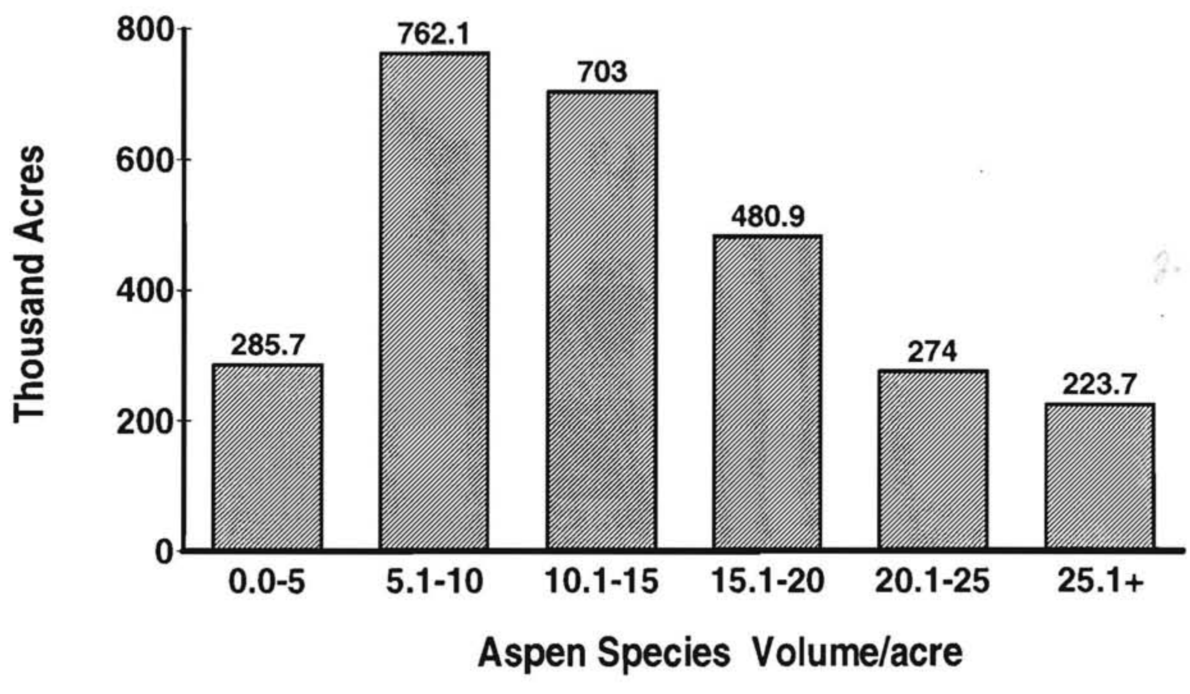
Source : Estimated by a DNR demand & supply model based on MN FIA 1990 Eastwide database.

1/31/00 rev.

Aspen Species in Aspen Type : Total Acreage by Species Volume Class

Minnesota FIA 90, Statewide, All Ownerships

For Stand Age 40 & over at the Time of Survey



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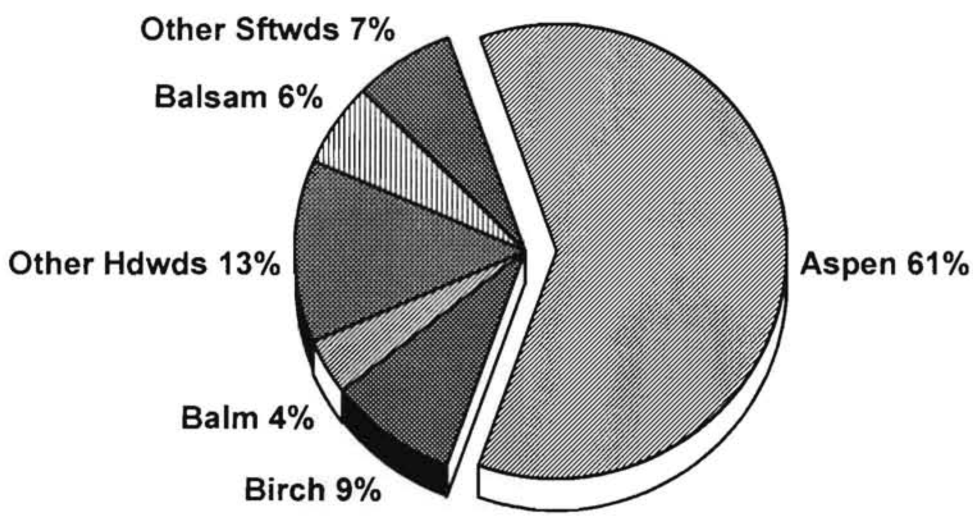
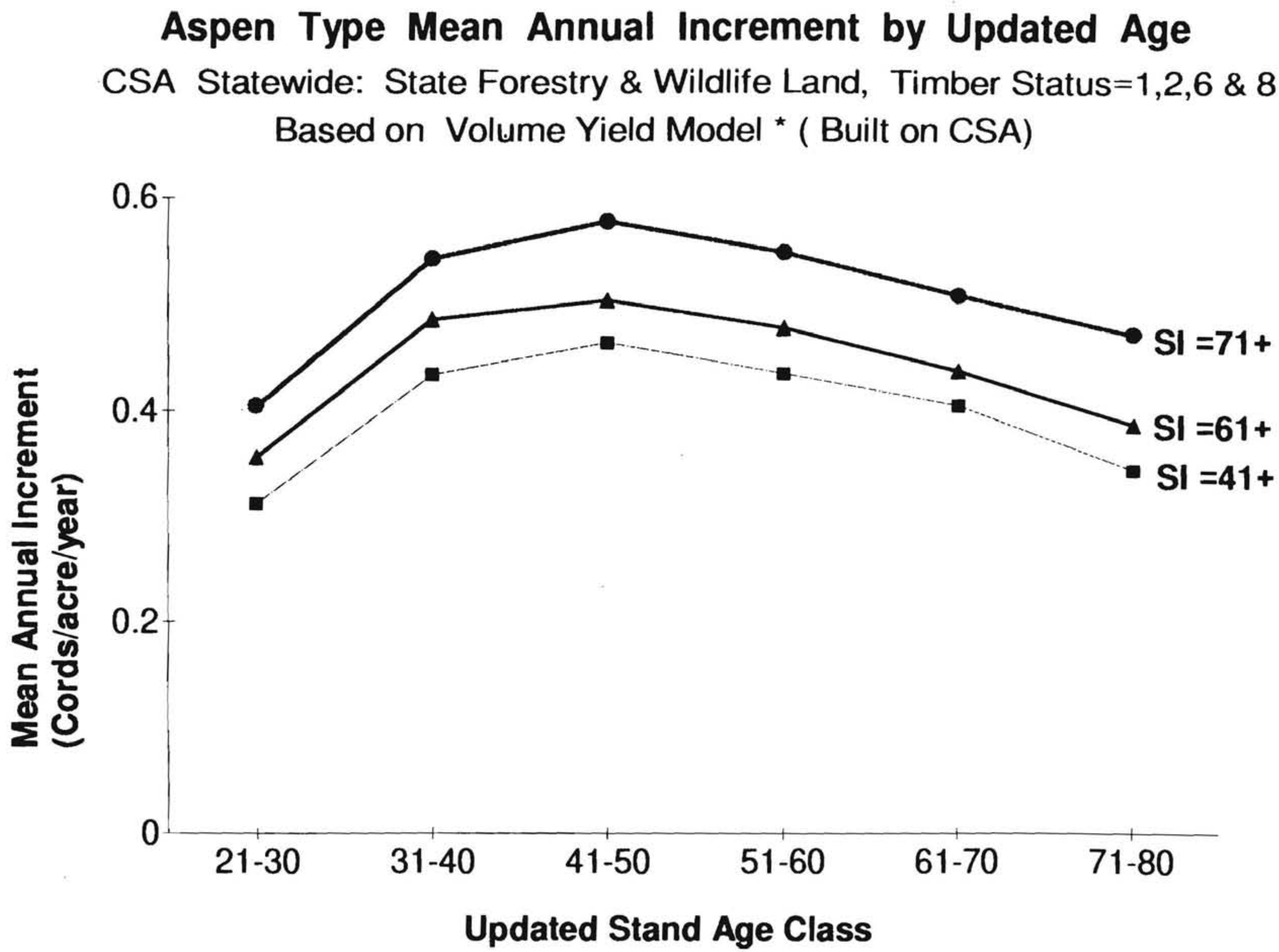
MINNESOTA : ASPEN TYPE by SPECIES COMPOSITION

(5.1 Million Acres Aspen Type)

- 1990 Forest Survey -



Source : Minnesota Forest Statistics , 1990 - USFS, Reource Bull. NC-141 (Table 47)

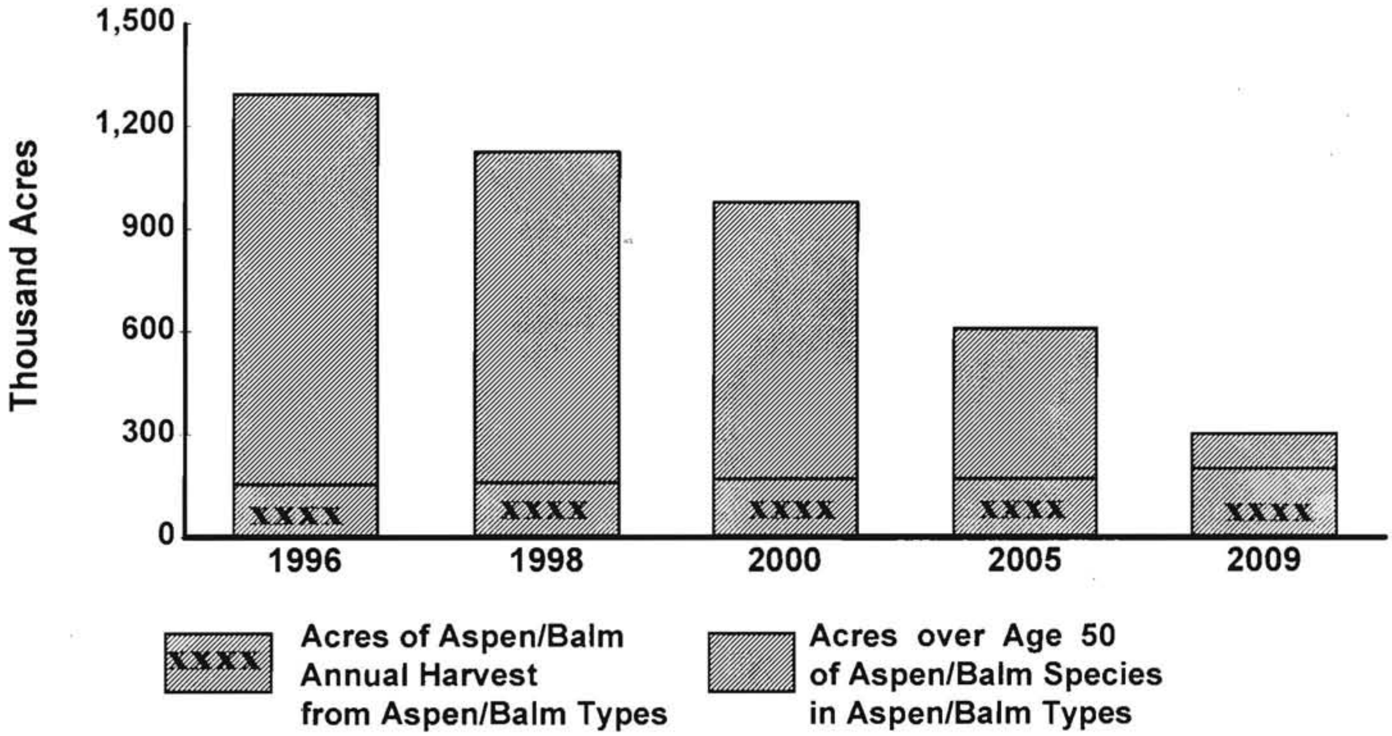


* The biological yield model based on CSA at the time of survey age.

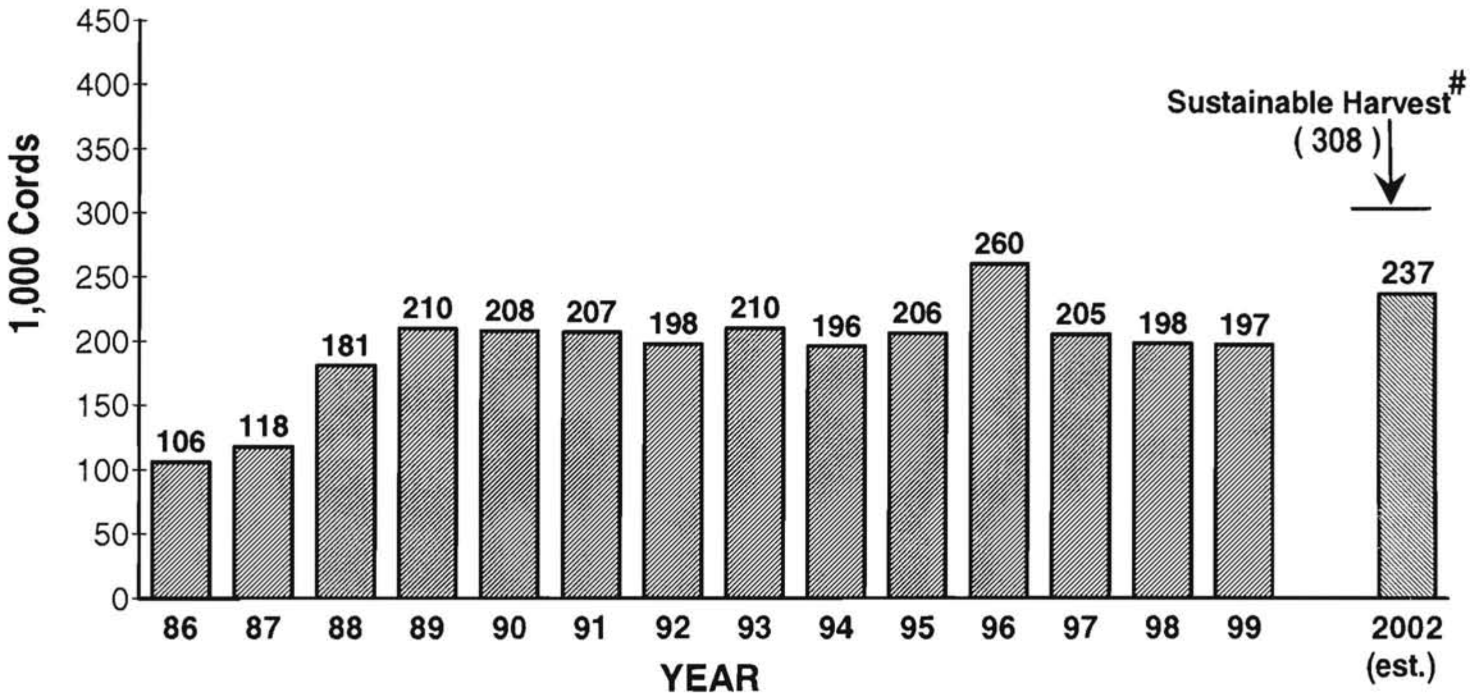
DNR-Forestry 11/30/95

ASPEN & BALM TYPES : ANNUAL HARVEST VS ACRES over AGE 50
Minnesota Statewide

(includes aspen & Balm species in the aspen & Balm types only)



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



Sustainable harvest declined due to mortality from spruce budworm by 28% estimated by MN state CSA data 1989 vs. 1999.
The sustainable harvest not adjusted for restrictions (riparian and other)
Harvest data compiled by NCFES & DNR. 10/00

Balsam Fir

Present and Projected Demand from Minnesota

	cords
1999 Harvest	**197,400**
• Minnesota Pulpwood Industries	183,000
• Pulpwood Export	5,200
• Sawlogs & Other	9,100
• Fuelwood	100
2002 Projected Harvest	**237,000**
• Minnesota Pulpwood Industries	205,400
• Pulpwood Export	5,000
• Sawlogs & Other	26,600

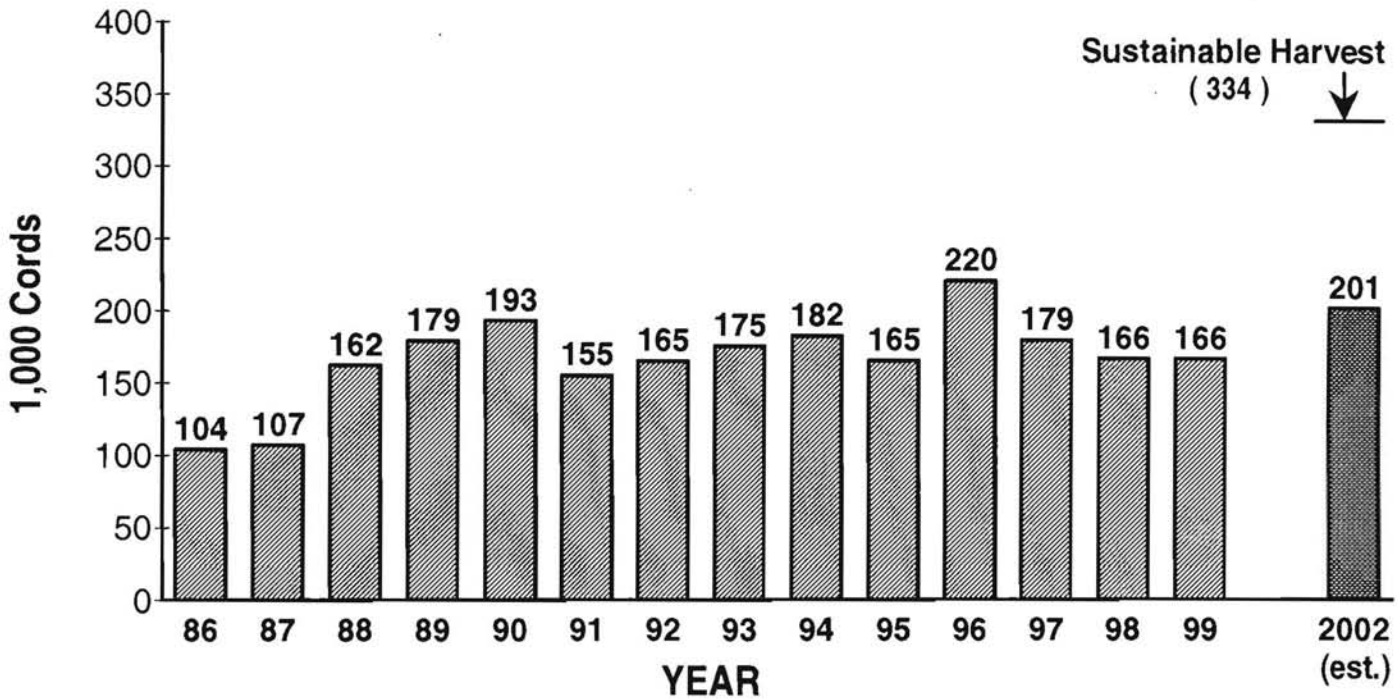
Concerns:

- Balsam availability dependent upon harvest of aspen (45% of balsam in aspen type).
- Volume tied up in types not currently harvestable.
- Summer access wood: 30 to 50% maximum.
- Spruce budworm impact in NE Minnesota.

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

SPRUCE HARVEST in MINNESOTA : ACTUAL & PROJECTED

(includes pulpwood and sawtimber)



1) Harvest data compiled by NCFES & DNR

2) Based on DNR's method sustainable harvest = 334,000 cords/year.
(Black Spruce 202,600 cords. White Spruce 131,700 cords/year).

3) The sustainable harvest not adusted for restrictions (riparian and other)

10/00

Spruce

Present and Projected Demand from Minnesota

	cords
1999 Harvest	**165,900**
• Minnesota Pulpwood Industries	116,100
• Pulpwood Export	39,200
• Sawlogs & Other	10,500
• Fuelwood	100
2002 Projected Harvest	**201,200**
• Minnesota Pulpwood Industries	140,700
• Pulpwood Export	35,000
• Sawlogs & Other	25,500

- Utilization to 3" top increases availability by at least 10%
- Thinning white spruce plantations could increase availability by 5%

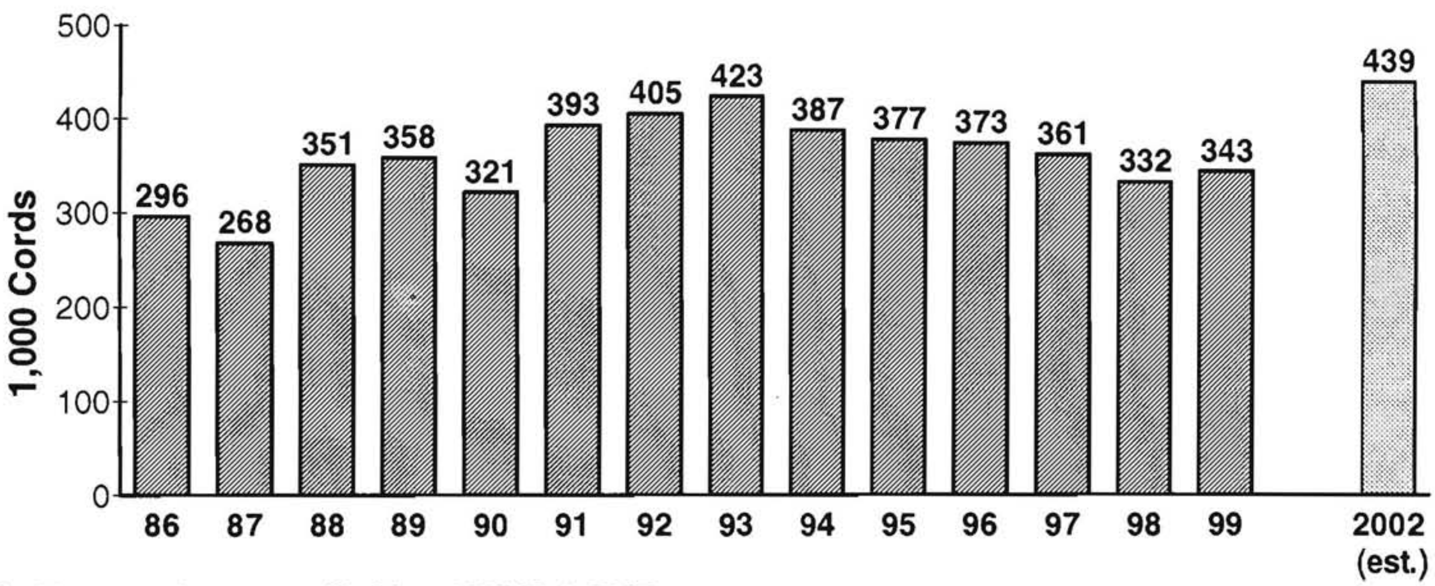
Concerns:

- Volume tied up in types not currently harvestable.
- Forest types with low volume/acre of spruce.
- Increasing competition for sawbolts.
- Summer access.

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

PINE HARVEST in MINNESOTA : ACTUAL & PROJECTED

(includes pulpwood, sawtimber, wood for energy & specialty products)



1) Harvest data compiled by NCFES & DNR

2) Based on DNR's method, sustainable harvest = 473,700 cords / year :

1. Assumes 20% of the red/white pine in the non-pine cover types would be harvested at the rotation specified for the non-pine cover type.
2. Includes thinnings from red pine plantations & natural stands.
3. Selective harvests only in the white pine type
4. The sustainable harvest not adjusted for restrictions (riparian and other).

10/00

Pine

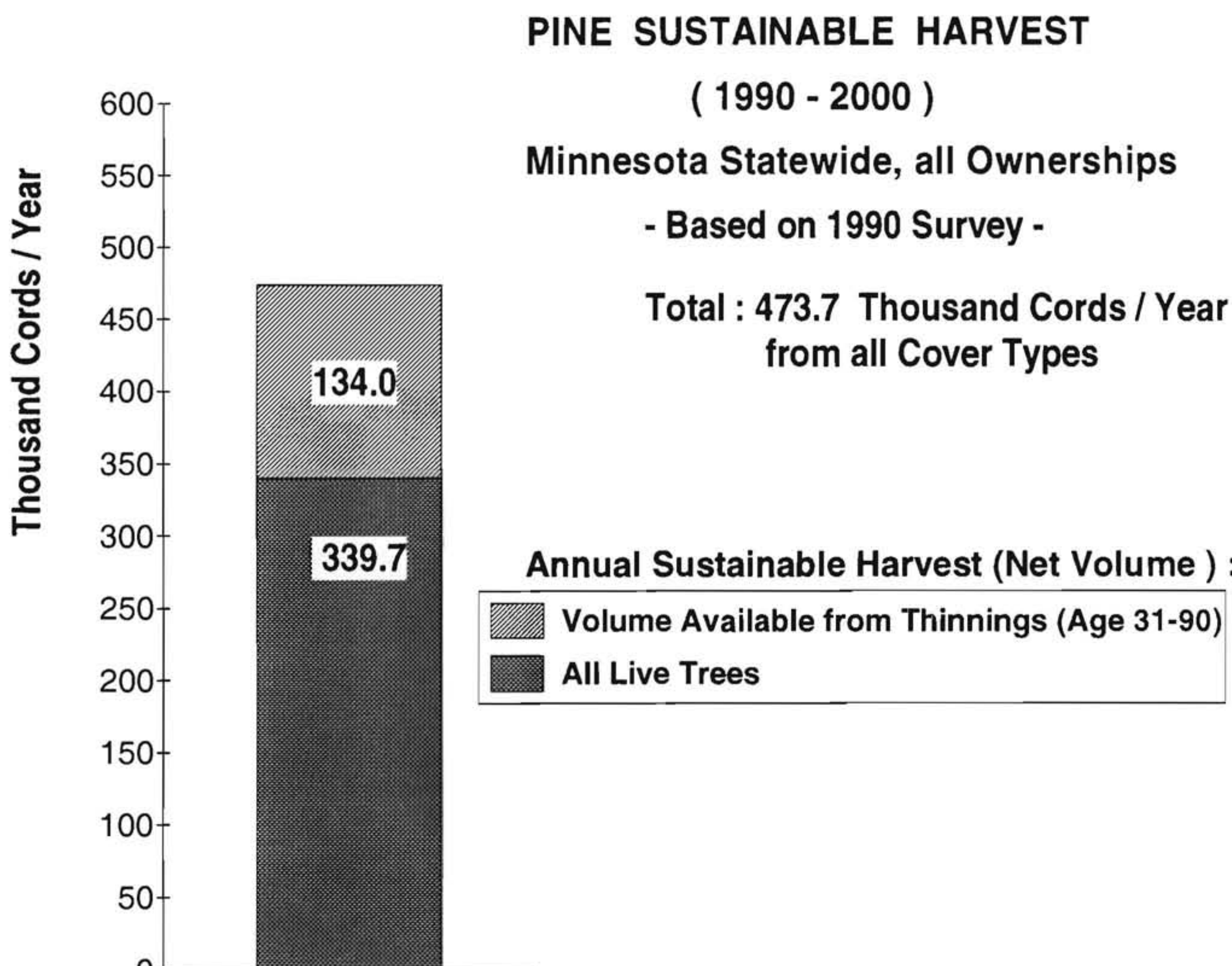
Present and Projected Demand

	cords
1999 Harvest	**343,000**
• Minnesota Pulpwood Industries	66,600
• Pulpwood Export	47,100
• Sawlogs & Other	226,800
• Fuelwood	2,500
2002 Projected Harvest	**439,000**
• Minnesota Pulpwood Industries:	
◦ Pulp & Paper	92,000
◦ OSB	28,000
• Pulpwood Export	50,000
• Sawlogs & Other	269,000

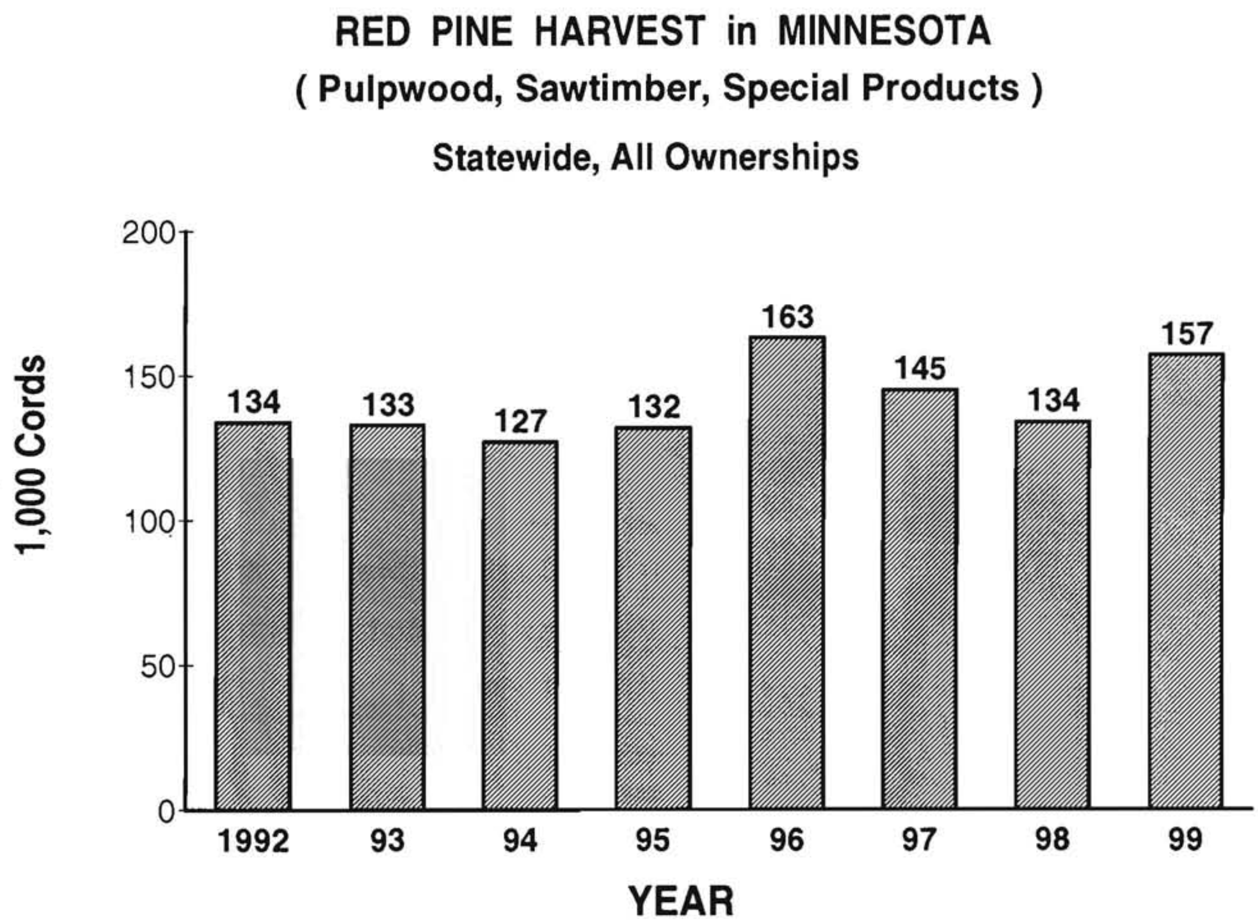
Anticipate 20% to 25% volume from red and white pine plantation thinnings.

Source: NCFES & DNR Surveys

Projections based on DNR/Industry Announcements


PINE SUSTAINABLE HARVEST
(1990 - 2000)
Minnesota Statewide, all Ownerships
- Based on 1990 Survey -
Total : 473.7 Thousand Cords / Year
from all Cover Types
Annual Sustainable Harvest (Net Volume) :
Volume Available from Thinnings (Age 31-90)
All Live Trees
Thousand Cords / Year
600
550
500
450
400
350
300
250
200
150
100
50
0
134.0
339.7

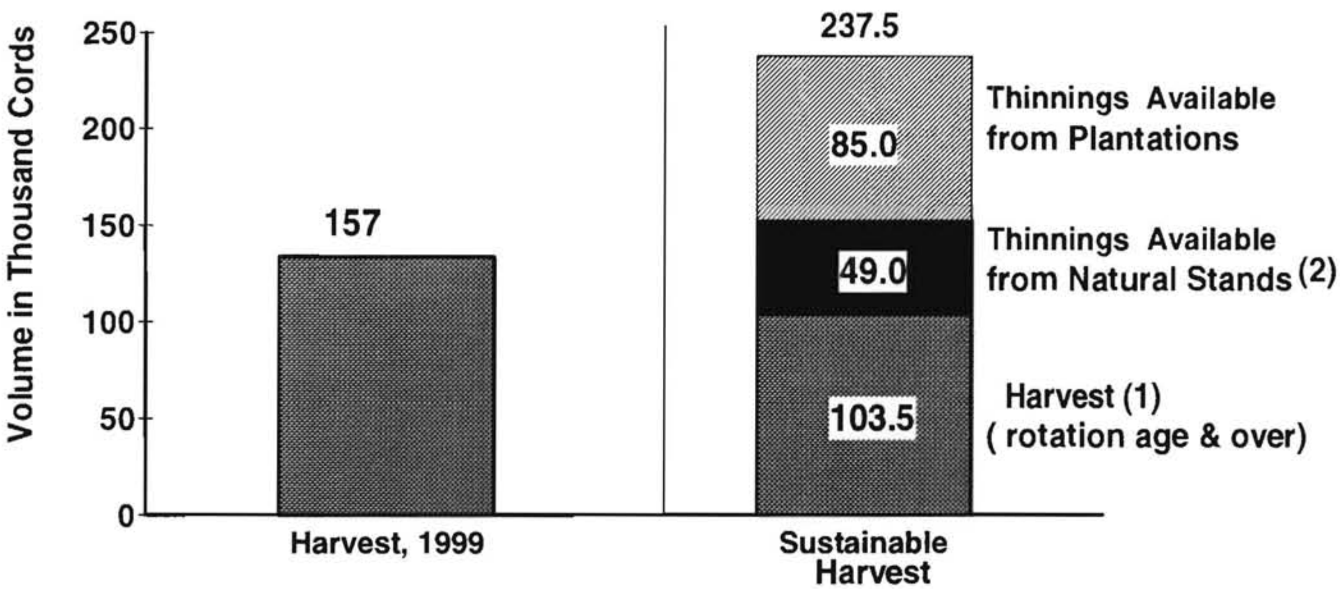
3/00


RED PINE HARVEST in MINNESOTA
(Pulpwood, Sawtimber, Special Products)
Statewide, All Ownerships
1,000 Cords
200
150
100
50
0
134
133
127
132
163
145
134
157
1992
93
94
95
96
97
98
99
YEAR

11/00

Red Pine : Annual Volume Available for Sustainable Harvest

Minnesota Statewide, All Ownerships, FIA 90 Updated to Year 2000 by Model



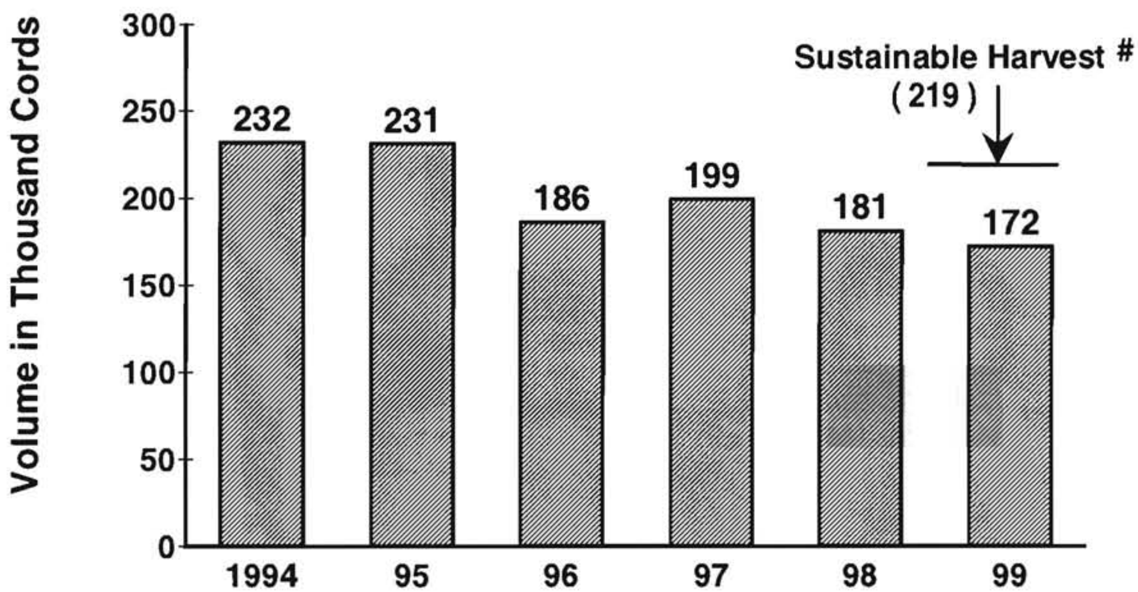
(1) The sustainable harvest (red pine from all types) not adjusted for restrictions (riparian and other) Assumes 20% of the red pine in the non-pine cover types would be harvested at the rotation specified for the non-pine cover type.

(2) The annual thinnings from the natural red pine stands= (751,000 cords/10 years) x 65.3% red pine .

(3) The annual volume available from thinings : thin to 90 sq.ft/acre from age 31-90.

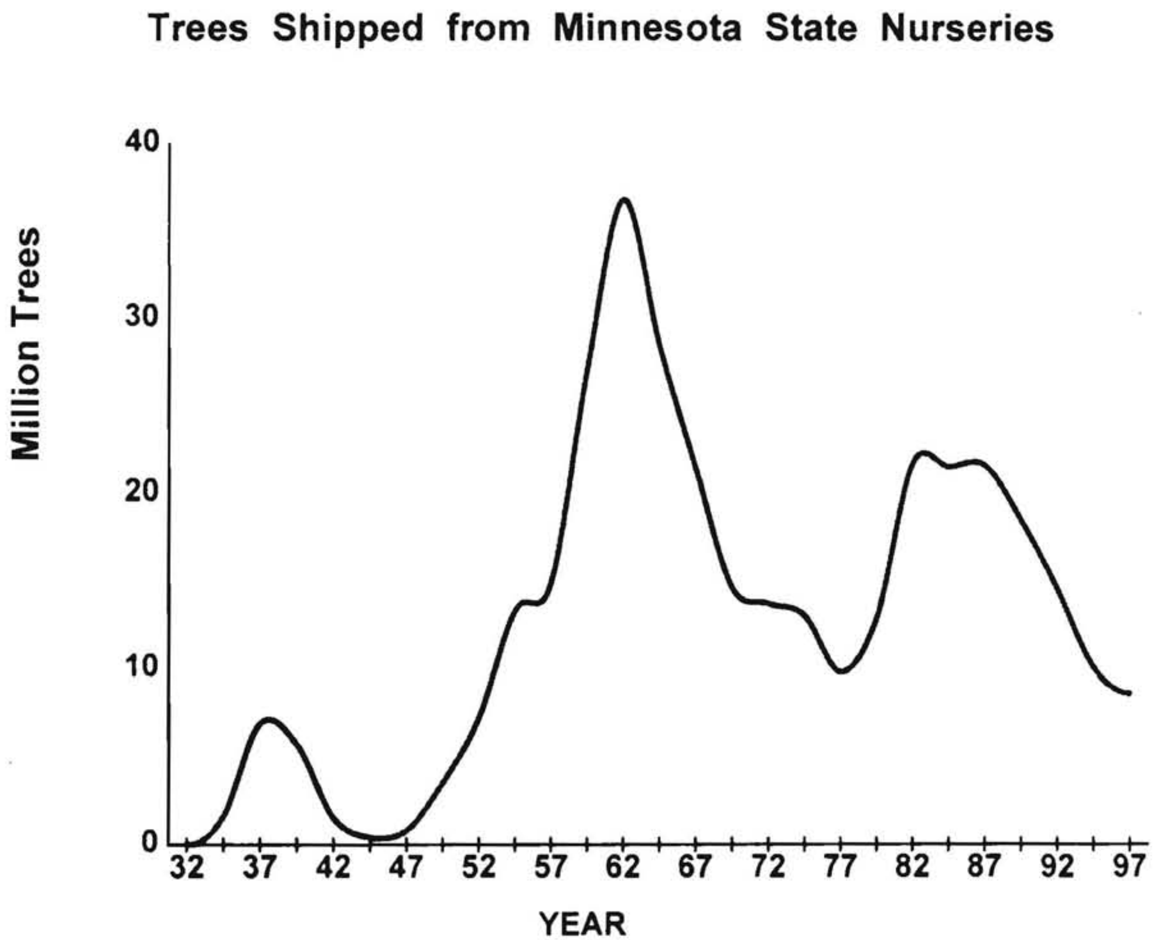
11 / 00

Jack Pine Harvest Compared to Sustainable Harvest
Minnesota Statewide, All Ownerships



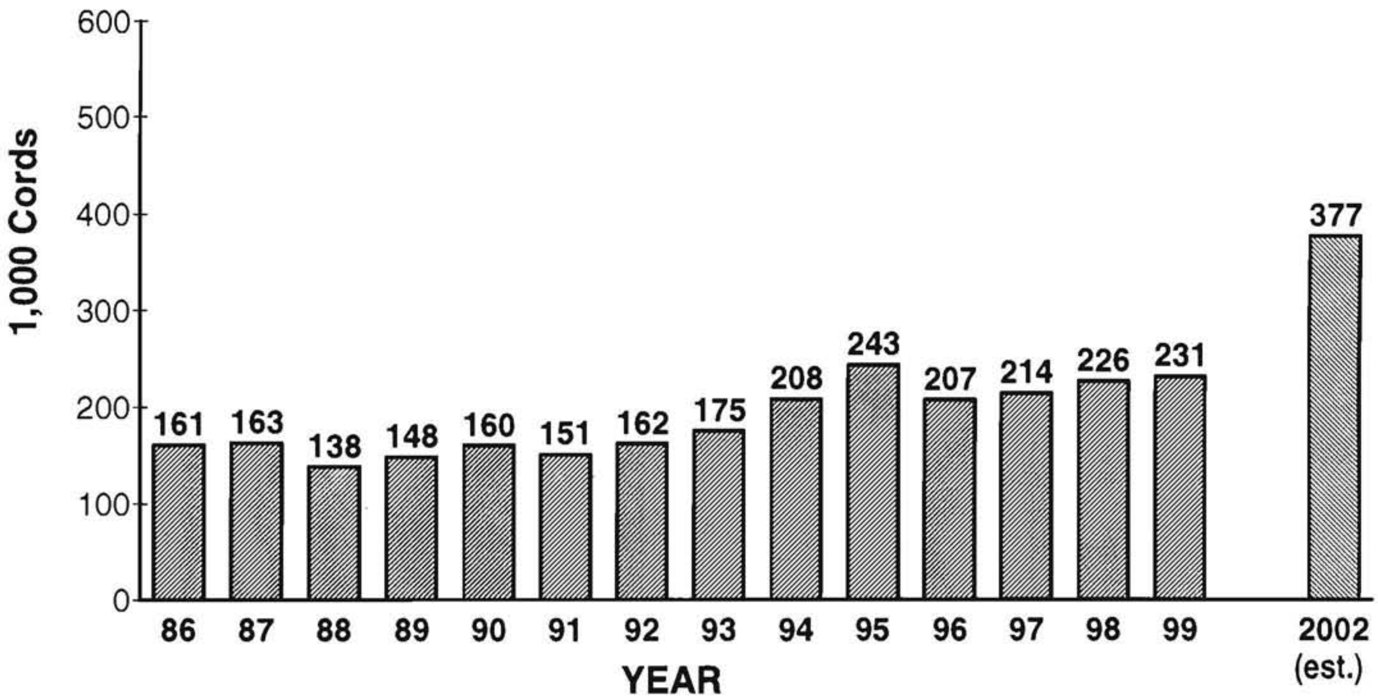
The sustainable harvest not adjusted for restrictions (riparian and other)
The sustainable harvest based on Minnesota FIA 1990

11/00



Source : DNR nursery records

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



1). Sustainable harvest 457,000 cds/yr. DNR method adjusted 30% due to mortality.

2). Harvest data compiled by NCFES & DNR

3). The sustainable harvest not adjusted for restrictions (riparian and other).

10/00

Birch

Present and Projected Demand

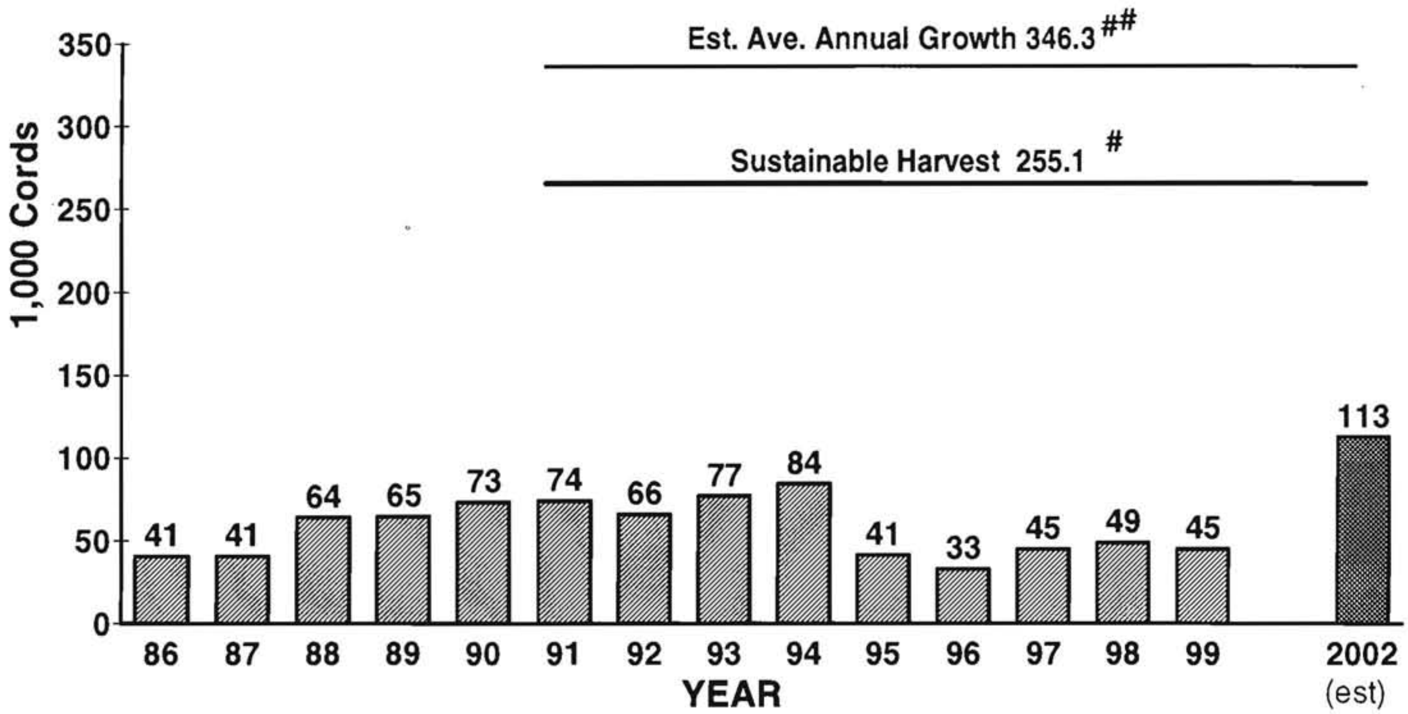
	cords
1999 Harvest	**231,100**
• Minnesota Pulpwood Industries	113,400
• Pulpwood Export	30,600
• Sawlogs & Other	40,100
• Fuelwood (from growing stock)	47,000
2002 Projected Harvest	**377,000**
• Minnesota Pulpwood Industries:	
○ Pulp & Paper	106,000
○ OSB & Hardboard	120,000
• Pulpwood Export	40,000
• Sawlogs & Other	54,000
• Fuelwood (from growing stock)	57,000

Figures include a pulp and paper mill expansion and a increases in OSB use by present companies.

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

MAPLE HARVEST in MINNESOTA : ACTUAL & PROJECTED COMPARED to SUSTAINABLE HARVEST & AVE. GROWTH

- from MN Statewide Timberland, all Ownerships -



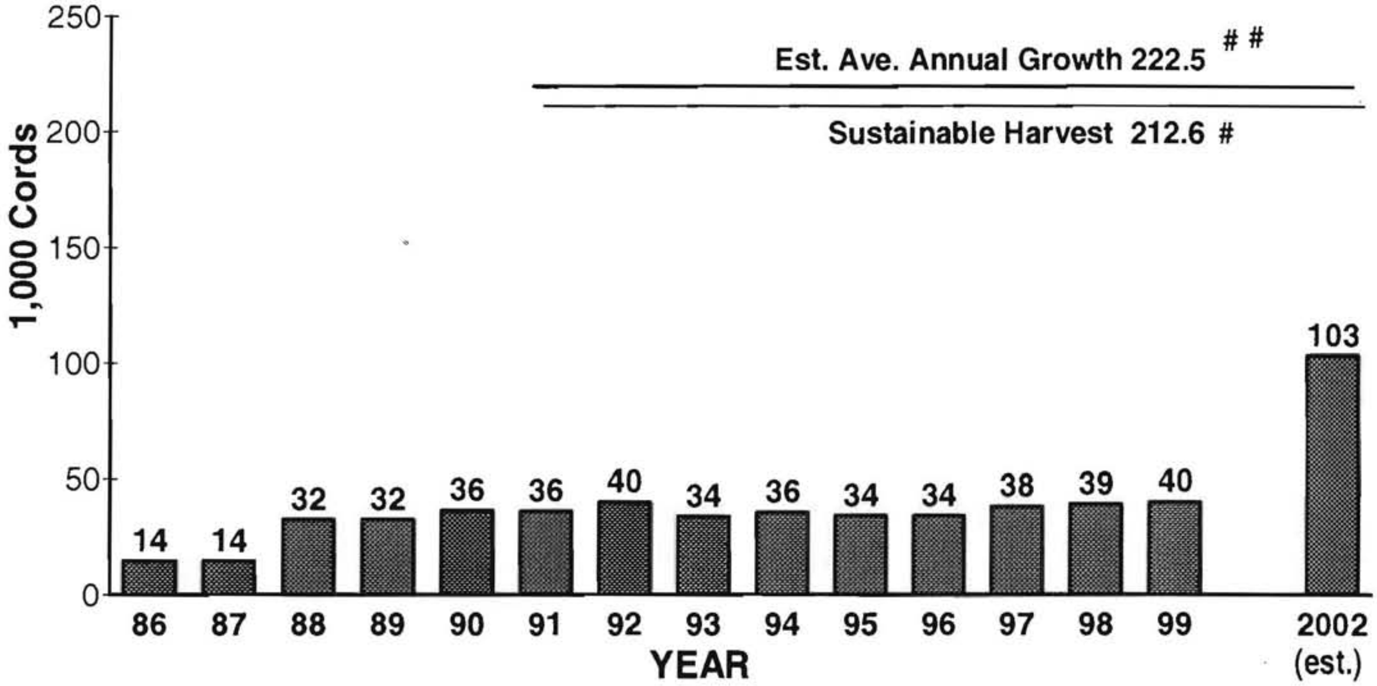
DNR's method : Area regulations with growth contribution of all live trees (based on MN FIA 90)

Based on MN Forest Statistics, 1990 (USDA FS Reso.Bull. NC-141, table #21)

10/00

BASSWOOD HARVEST in MINNESOTA : ACTUAL & PROJECTED COMPARED to SUSTAINABLE HARVEST & AVE. GROWTH

- from MN Statewide Timberland, all Ownerships -



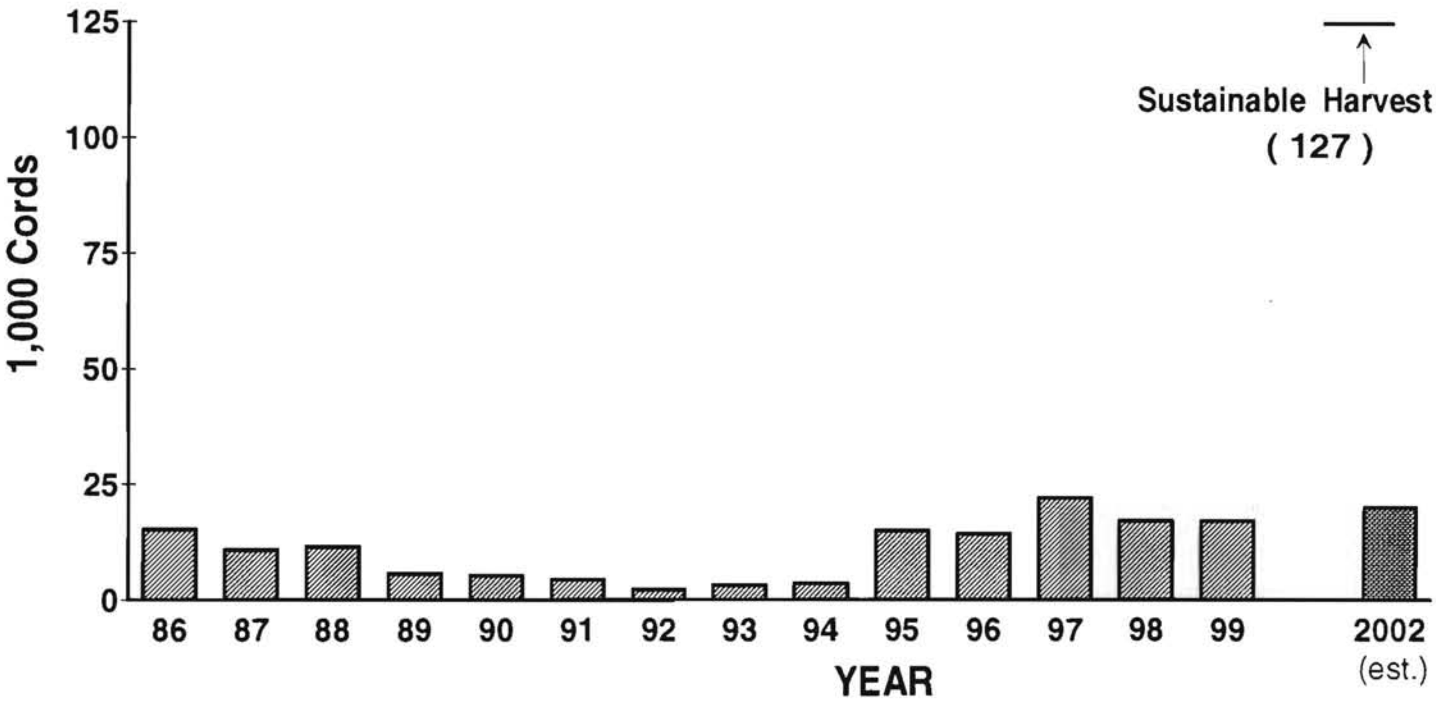
DNR's method : Area regulations with growth of all live trees (based on MN FIA 90)
(The sustainable harvest not adjusted for restrictions : riparian and other)

Based on MN Forest Statistics, 1990 (USDA FS Reso.Bull. NC-141, table #21)

10/00

TAMARACK HARVEST in MINNESOTA : ACTUAL & PROJECTED COMPARED to ESTIMATED ALLOWABLE HARVEST

- from Timberland -



Estimated sustainable harvest based on DNR method.

The sustainable harvest not adjusted for restrictions (riparian and other) **10/00**

Tamarack

Present and Projected Demand from Minnesota

	cords
1999 Harvest	**17,100**
• Minnesota Pulpwood Industries	3,200
• Pulpwood Export	13,800
• Sawbolts & Other	100
2002 Projected Harvest	**20,000**
• Minnesota Pulpwood Industries	3,300
• Pulpwood Export	16,000
• Sawbolts & Other	700

Concerns:

- Volume tied up in types not harvestable
- Forest types with low volume/acre of tamarack
- Some small, poor site stands
- Winter access only

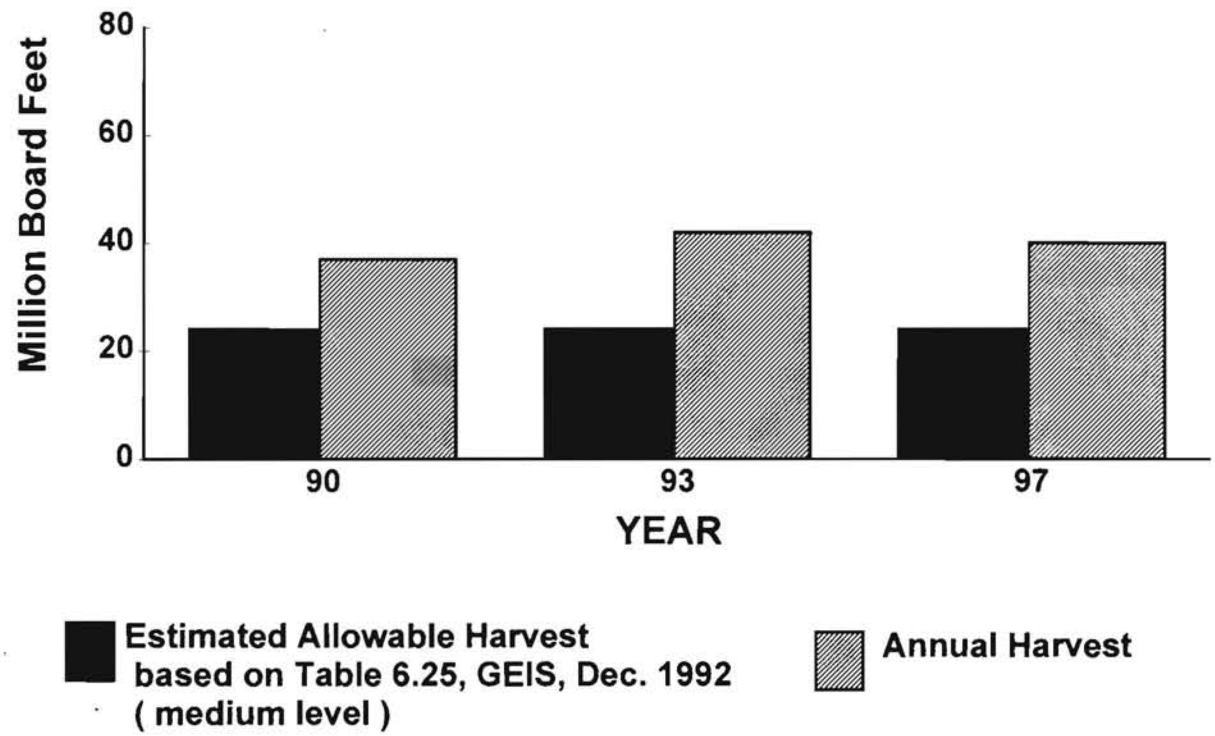
Available Annual Surplus:

- 2000 .... 50,000 to 60,000

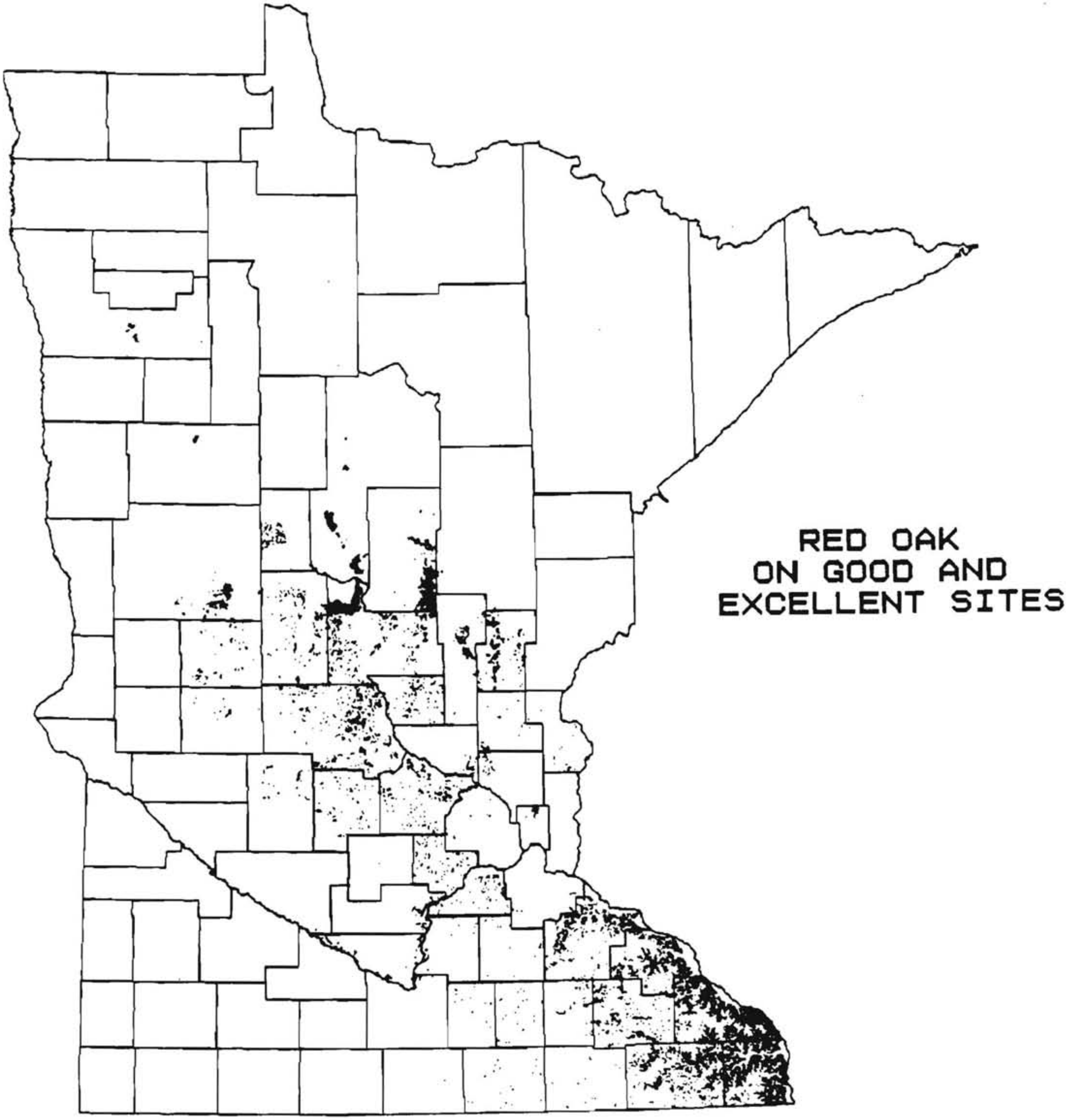
Source: NCFES & DNR Surveys
Projections based on DNR/Industry Announcements

RED OAK SAWTIMBER ESTIMATED & ACTUAL HARVEST

- Minnesota Statewide -



DNR 2/99


RED OAK
ON GOOD AND
EXCELLENT SITES

Average Prices Received for Stumpage Sold by Public Land Agencies in Minnesota: 1990–1999

(Compiled by Doug Ford, Timber Sales Supervisor , DNR-Forestry)

Pulpwood ($s per cord)

Species	1991	1992	1993	1994	1995	1996	1997	1998	1999
Aspen	$6.61	$7.25	$9.28	$14.82	$18.69	$16.09	$19.20	$20.54	$23.40
Balm	3.58	4.51	6.43	12.73	16.48	13.24	13.76	16.95	14.13
Birch	2.95	4.19	3.23	5.45	3.52	7.52	7.88	7.53	7.66
Ash	4.19	3.96	3.60	3.42	4.46	5.00	4.46	5.51	2.28
Oak	3.79	3.57	5.24	5.27	4.51	4.37	5.64	8.98	10.76
Basswood	—	—	—	—	4.85	4.01	4.27	4.88	5.67
Balsam	6.69	8.09	10.36	15.15	18.76	14.35	12.65	14.12	12.09
W. Spruce	13.27	16.46	12.16	15.66	26.18	19.06	12.80	19.18	26.62
B. Spruce	12.32	12.78	11.96	20.54	23.65	22.90	18.40	21.16	20.61
Tamarack	4.13	4.29	4.38	4.90	7.73	7.25	6.71	7.29	5.79
Cedar	9.39	9.98	8.37	9.92	10.48	10.55	11.27	7.31	6.83
J. Pine	12.79	14.65	15.99	24.81	32.08	23.48	23.59	24.72	24.32
R. & W. Pine	14.06	8.14	10.39	24.57	17.49	21.18	23.35	15.63	17.02

Sawtimber ($s per MBF)

Species	1991	1992	1993	1994	1995	1996	1997	1998	1999
Aspen	$23.66	$28.53	$37.20	$64.67	$68.93	$71.22	$93.83	$100.54	$85.09
Birch	24.24	26.38	26.34	43.12	50.67	52.31	36.60	39.78	36.12
Ash[b]	63.37	90.63	106.62	132.52	151.28	147.18	108.93	97.09	48.70
Elm	36.26	36.93	48.90	50.68	47.02	60.08	107.20	53.31	56.50
Oak[a]	64.45	73.99	91.69	110.67	156.88	177.30	155.97	140.20	146.00
Basswood	NA	NA	66.80	90.60	120.91	105.37	107.07	81.15	74.77
Balsam	23.29	25.39	34.30	52.95	55.10	61.49	71.61	88.30	80.82
W. Spruce	42.58	45.48	48.04	72.45	77.79	73.47	83.23	78.34	81.91
Cedar	33.19	29.69	33.88	37.59	38.55	42.58	37.00	38.64	39.13
J. Pine	62.72	72.96	83.59	120.51	136.55	108.37	115.46	121.84	124.00
R. & W. Pine	101.13	108.84	132.83	183.95	171.55	163.64	174.34	161.01	198.99

Pulpwood prices for 1999 based on 1.12 million cords sold; sawtimber based on 122 MMBF.
[a] Oak sawtimber prices mainly from public lands in northern Minnesota.
[b] Black ash: includes veneer.

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

Average Prices Received for Stumpage Sold by Public Land Agencies in Minnesota: 1994–1999

(Compiled by Doug Ford, Timber Sales Supervisor, DNR-Forestry)

Sold As Pulp & Bolts in Combination
($s per cord)

Species	1994	1995	1996	1997	1998	1999*
Aspen	$17.16	$20.59	$19.05	$22.85	$25.39	$26.35
Balm of Gilead	13.23	16.96	15.48	16.01	19.51	18.04
Birch	7.51	5.48	9.51	9.03	9.40	8.97
Ash	23.95	28.76	28.65	26.70	18.45	7.09
Oak	20.34	32.82	35.48	30.71	24.58	34.00
Basswood	21.70	29.80	18.69	30.17	17.80	17.65
Balsam Fir	16.03	19.26	15.68	14.97	17.49	15.60
White Spruce	17.04	29.57	26.51	27.78	26.56	29.83
Black Spruce	22.45	23.76	23.03	19.05	21.16	21.28
Tamarack	5.36	8.00	7.78	6.96	8.18	6.97
White Cedar	12.28	11.73	12.53	12.05	9.29	10.24
Jack Pine	34.26	39.21	31.27	31.97	33.83	32.78
Red/White pine	50.60	53.05	44.78	44.71	48.81	57.93

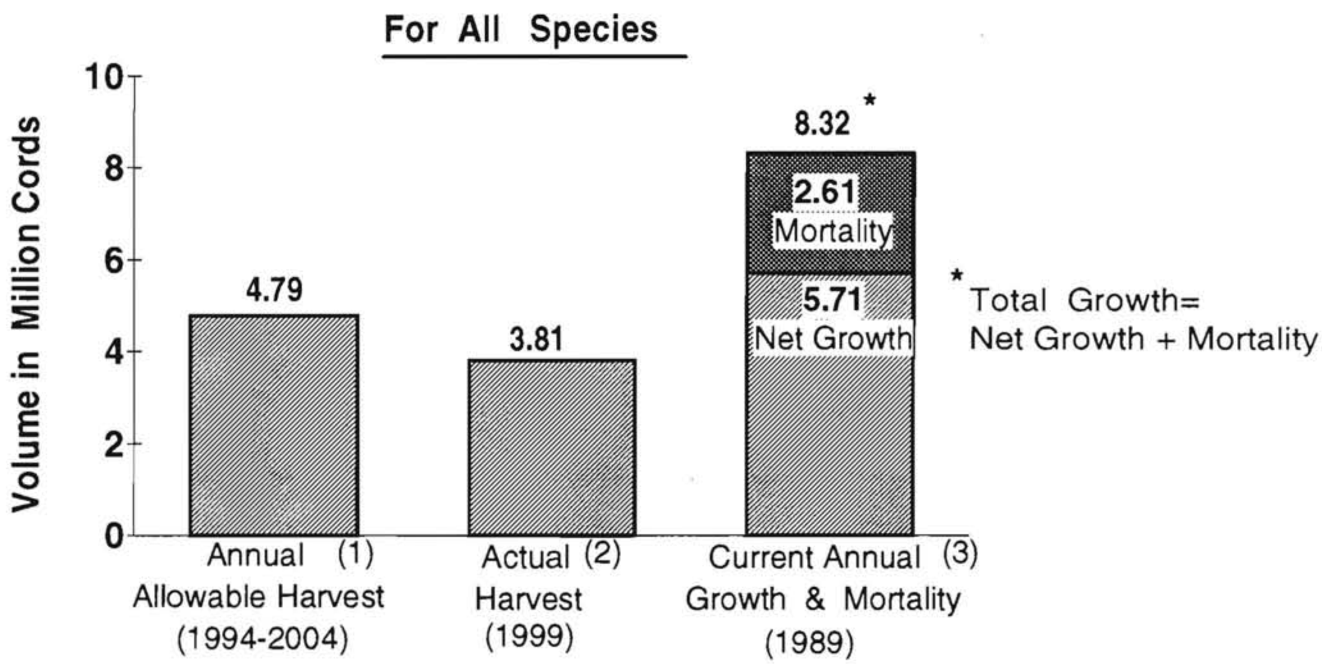
*Pulp & Bolts price for 1999 based on 1.39 million cords sold.

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

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

COMPARISON of AN ESTIMATED ALLOWABLE HARVEST LEVEL, ACTUAL HARVEST, CURRENT ANNUAL GROWTH & MORTALITY

- Minnesota Statewide Timberland, all Ownerships -



Source :

1). Table 6.25, GEIS, Medium Level : Maintaining Productivity & Forest Resource Base Tech. Pap., Dec 92 ;

2). NCFES 96 Pulpwood Harvest, 92-93 DNR Sawtimber Survey, 95-96 Statewide Fuelwood Use Survey.

3). Table #63 of NCFES Resource Bulletin, NC-141, Aug. 92.

DNR 11/00