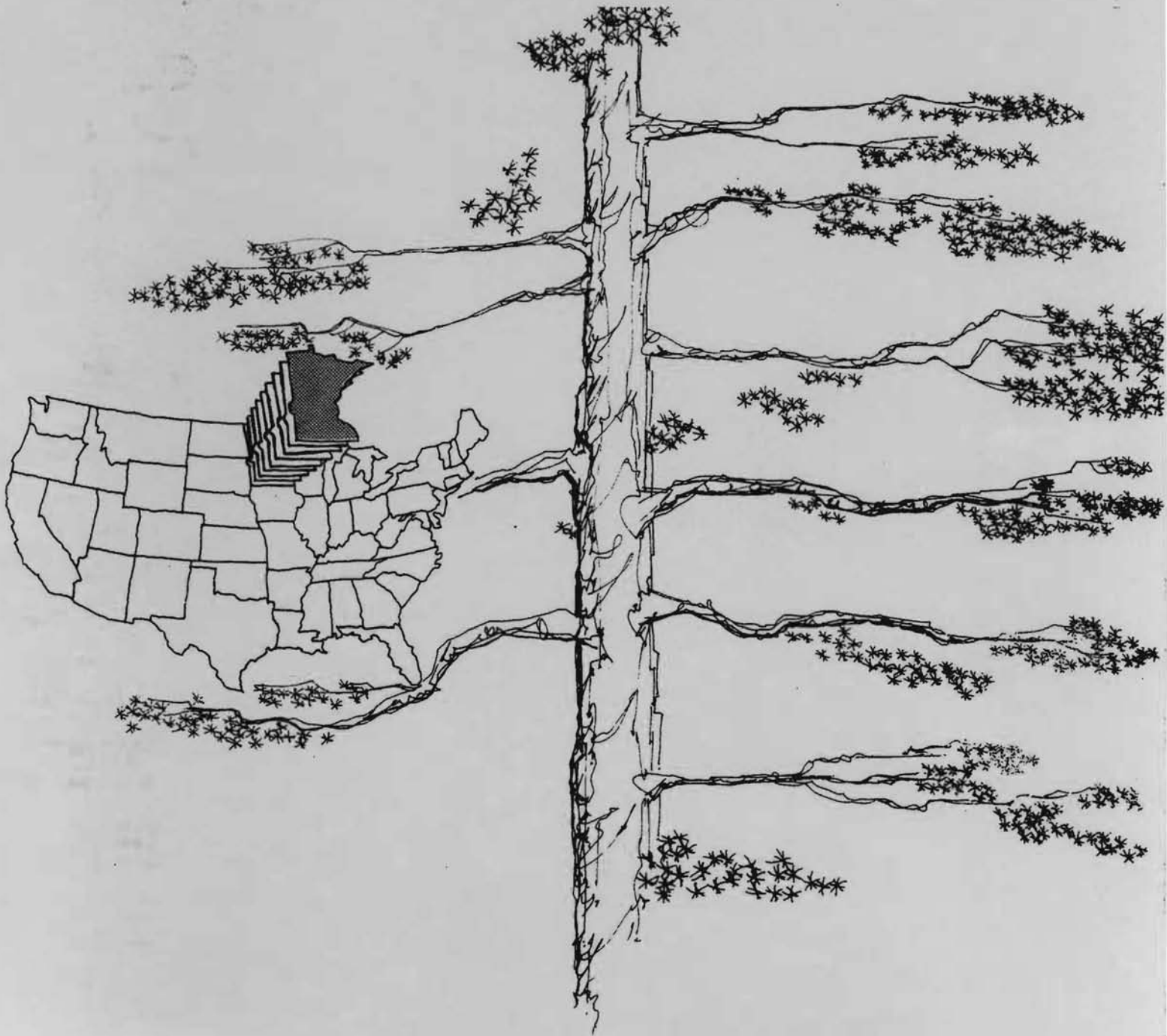


MINNESOTA'S FOREST RESOURCES



Department of Natural Resources
Division of Forestry
April 1999

500 Lafayette Road
St. Paul, Minnesota 55155

Minnesota Wood Industry - 1998

Annual Economic Impact*

- ✳ Value of Forest Products Manufactured = \$8.0 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**

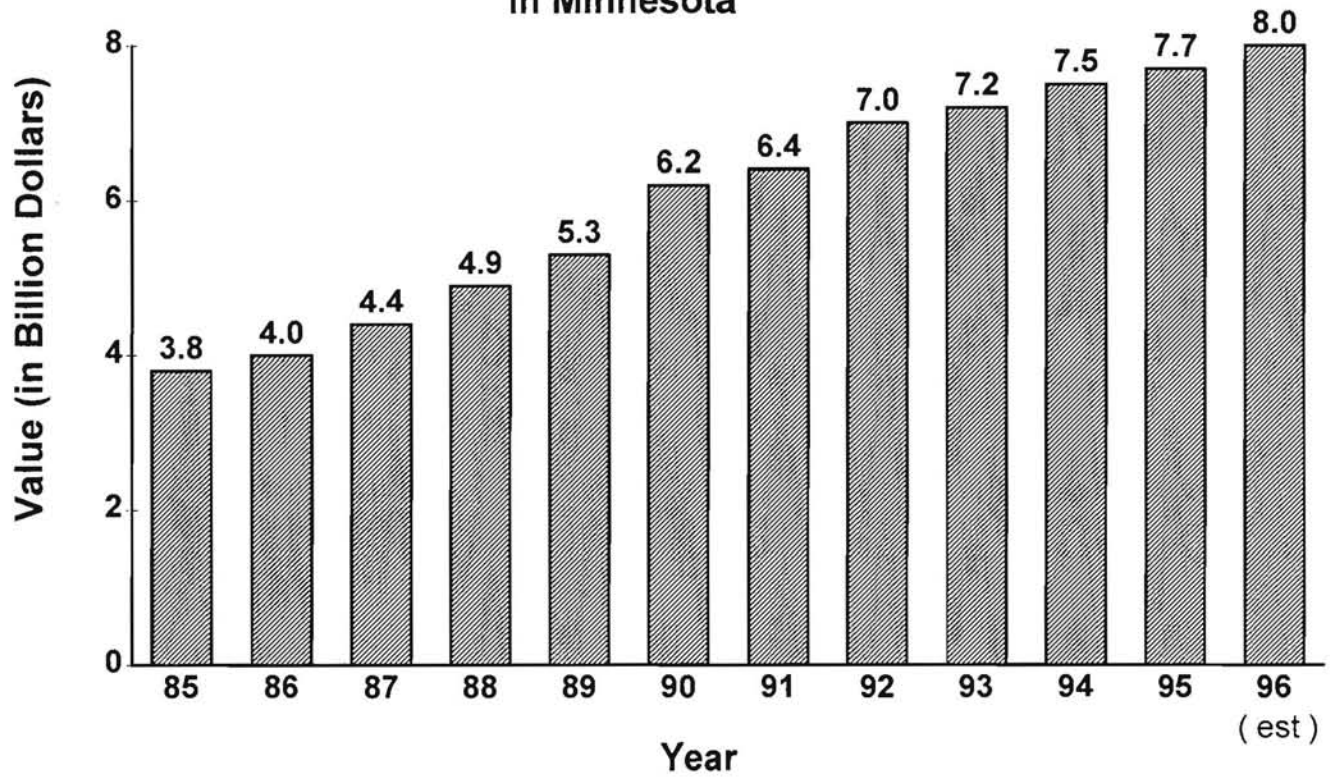
- ✳ Pulpwood = 2,900,000 Cords
- ✳ Saw Logs = 285 Million Board Feet
- ✳ Fuelwood = 752,000 Cords
(202,000 from Timberland)
- ✳ Veneer = 12.5 Million Board Feet
(Domestic)
= 3.0 Million Board Feet
(Exported)
- ✳ Chips = 9,000 Cords (Fuel and Mulch)
- ✳ Shavings = 14,000 Cords (Animal Bedding)
- ✳ Posts and Poles = 9,100 Cords

*Source: *Minnesota Employment Review*, August 1997, and *Survey of Current Businesses*, November 1997

**Source: NCFES and DNR Surveys

Value of Forest Products Manufactured

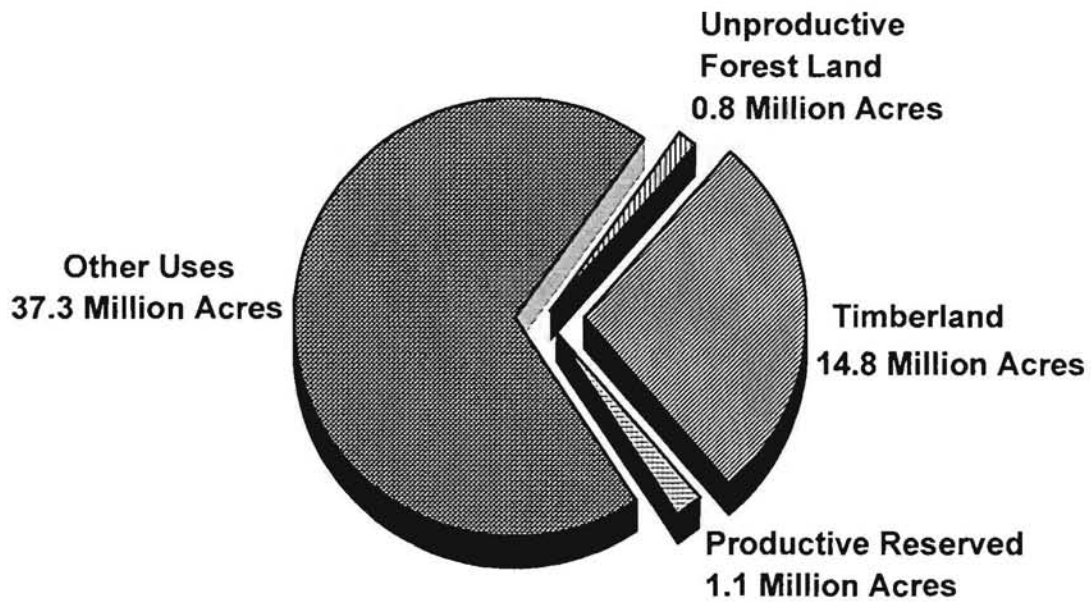
in Minnesota



Source : MFI/TPA. Estimate from US Dept of Commerce, Bureau of Economic Analysis

MINNESOTA LAND USE

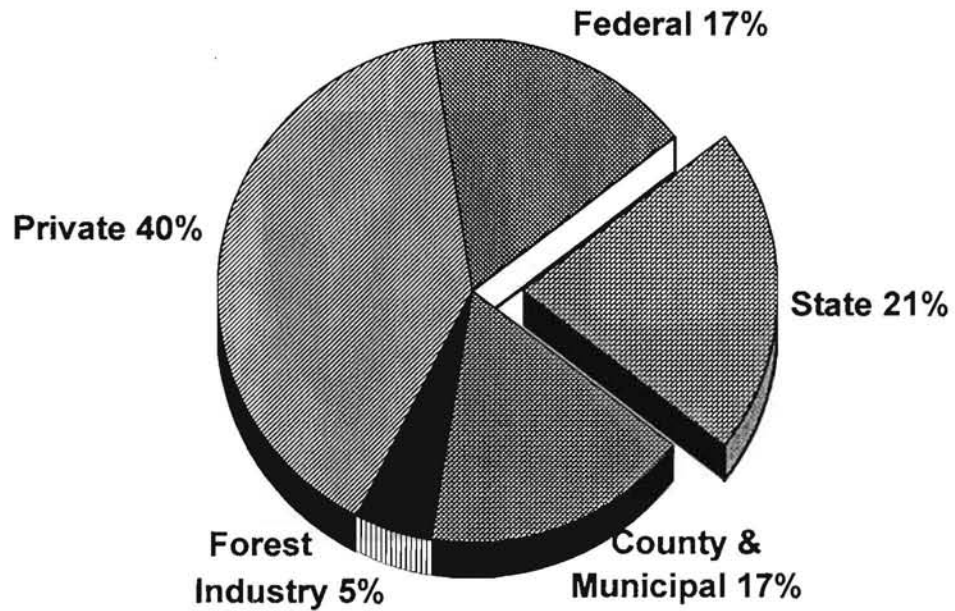
- Total of 54 Million Acres -



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—**

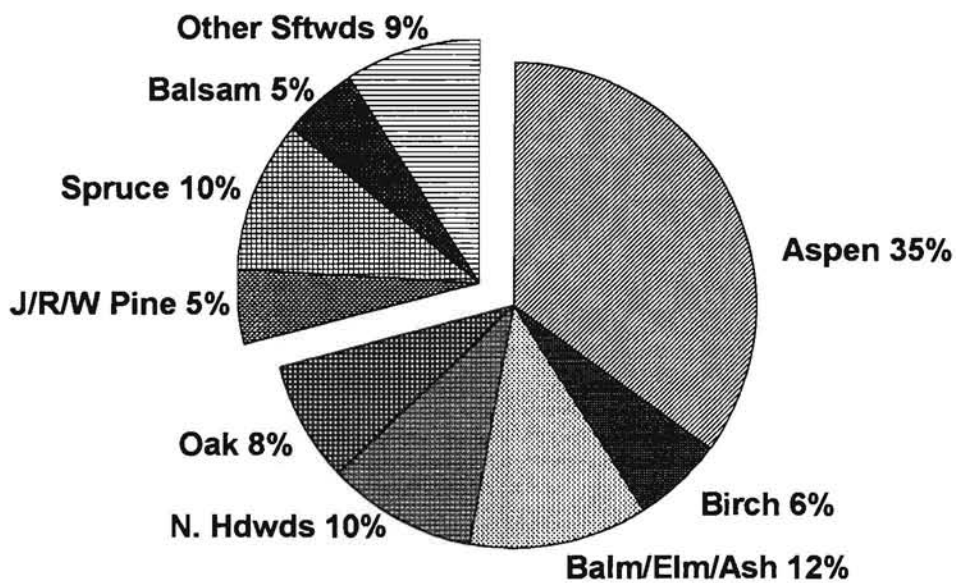
Forest Type	Acres (000's)
Jack Pine	447.5
Red Pine	301.6
White Pine	63.2
Balsam Fir	734.3
White Spruce	93.8
Black Spruce	1,322.1
Cedar	680.5
Tamarack	705.1
Oak	1,184.3
Elm - Ash	1,291.5
Maple - Basswood	1,402.9
Aspen	5,114.2
Birch	835.8
Balm of Gilead	427.7
Non-Forest	168.9
Total All Types	14,773.4

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

Total Wood Harvest in Minnesota by Species - Timberland
(Pulpwood: 1997; Sawtimber: 1997; Fuelwood: 1995–96)
(in thousand cords)

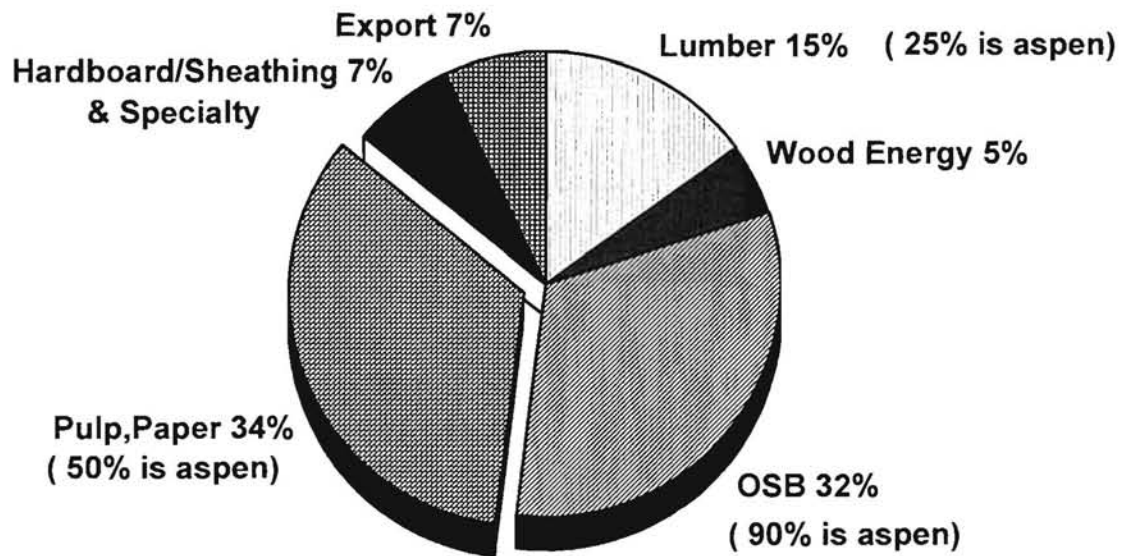
Species	Pulpwood*	Sawlogs & Other	Fuel		Total
			Residential **	Commercial	
Aspen	2,108.2	150.4	29.0	.6	2,288.2
Birch	122.7	44.3	40.3	6.3	213.6
Balm of Gilead	112.1	1.9	—	.1	114.1
Ash	3.4	13.6	11.5	.2	28.7
Oak	.9	112.2	77.6	1.0	191.7
Elm	—	1.6	8.4	—	10.0
Basswood	2.4	32.0	3.2	—	37.6
Maple	14.8	13.6	11.4	4.7	44.5
Cottonwood	—	11.7	—	—	11.7
Other Hardwoods	.2	14.8	4.7	—	19.7
Sub-Total Hardwood	2,364.7	396.1	186.1	12.9	2,959.8
Pine	(126.2)				
Red Pine	39.1	105.0	1.0	—	145.1
White Pine	1.5	15.6	.2	—	17.3
Jack Pine	85.6	111.8	1.3	—	198.7
Spruce	168.5	10.5	.1	—	179.1
Balsam	194.8	10.1	.1	—	205.0
Tamarack	21.2	.1	.6	—	21.9
Cedar	—	8.2	.1	—	8.3
Sub-Total Softwood	510.7	261.3	3.4	—	775.4
Total	2,875.4	657.4	189.5	12.9	3,735.2

* Figures include pulpwood exported to Wisconsin: Spruce: 57,000 cds.; Balsam: 5,000 cds.; Aspen: 88,000 cds.; Jack Pine: 41,000 cds.; Red Pine: 11,000 cds.; Tamarack: 19,000 cds.; Birch: 43,000 cds.; and Maple: 7,000 cds.

** This is fuelwood removed from growing stock, winter 1995–96.

**WOOD USE by PRODUCT from TIMBER HARVEST in MINNESOTA
- 1998 -**

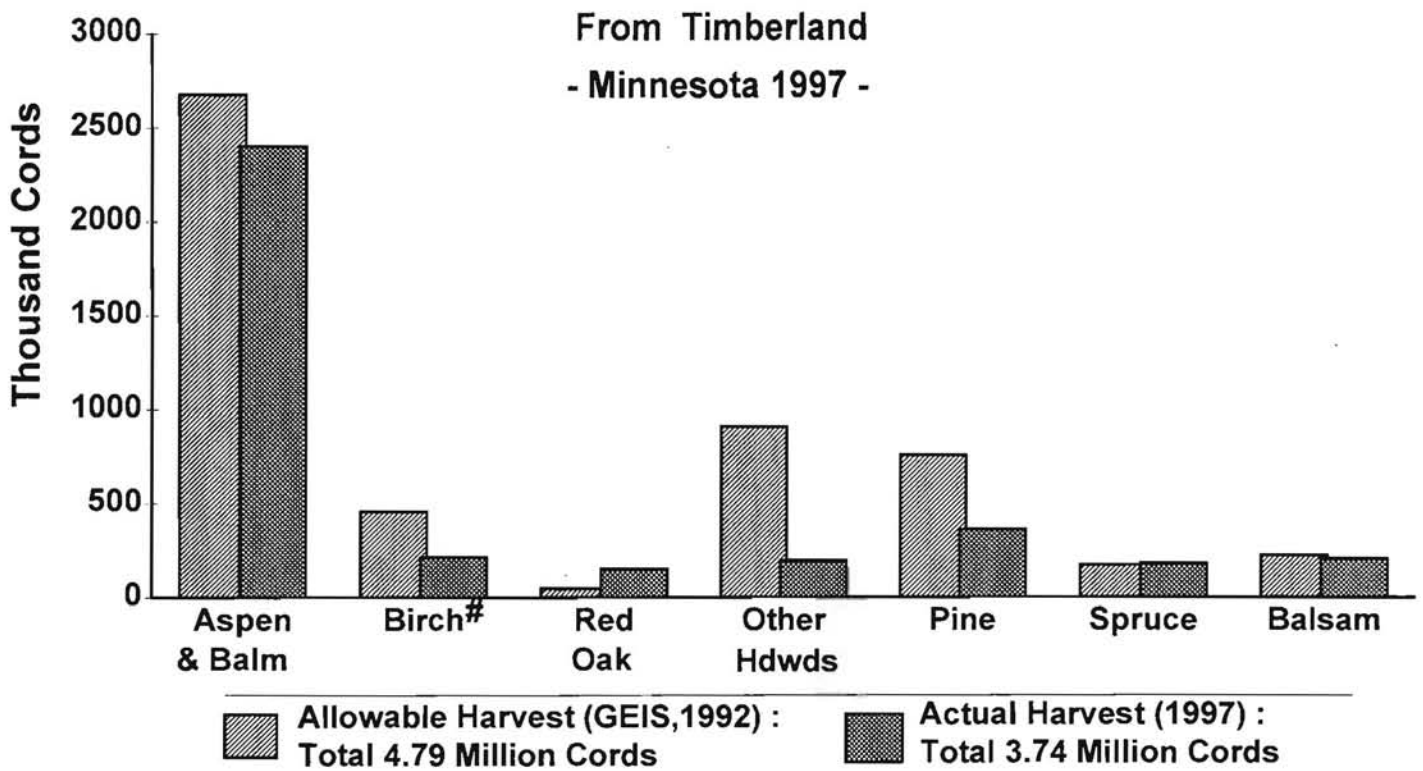
Total 3.74 Million Cords (Includes All Species)



Source : Harvest data compiled by NCFES & DNR

Special products include veneer, posts & poles, shavings wood, & landscape chips.

ESTIMATED ALLOWABLE HARVEST & ACTUAL HARVEST



Source: Table 6.25, GEIS, medium level, Dec. 92.

Birch volume based on DNR sustainable harvest model .

Harvest data compiled by NCFES & DNR.

Minnesota Pulp and Paper —1999—

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
Champion International Sartell	Aspen & Balsam	Magazines, Catalogs
Lake Superior Paper Duluth	Balsam & Spruce	Advertising Supplements
Potlatch Corporation (2) Brainerd & Cloquet	Aspen, Balm, Maple, & Pine	Business & Printing
Rock-Tenn Company St. Paul	Recycled Paper & Corrugated	Cardboard & Corrugated Boxes
Superior 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) —1999—

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 Solway	Aspen & Balm	OSB—"Norbord"
Potlatch Bemidji	Aspen, Balm, Birch, Pine, & Maple	OSB—"Oxboard"
Potlatch Cook	Aspen, Balm, Birch, & Maple	OSB—"Oxboard"
Trus Joist MacMillan Deerwood	Aspen	Laminated Structural Lumber "TimberStrand"

Minnesota Hardboard and Specialty —1999—

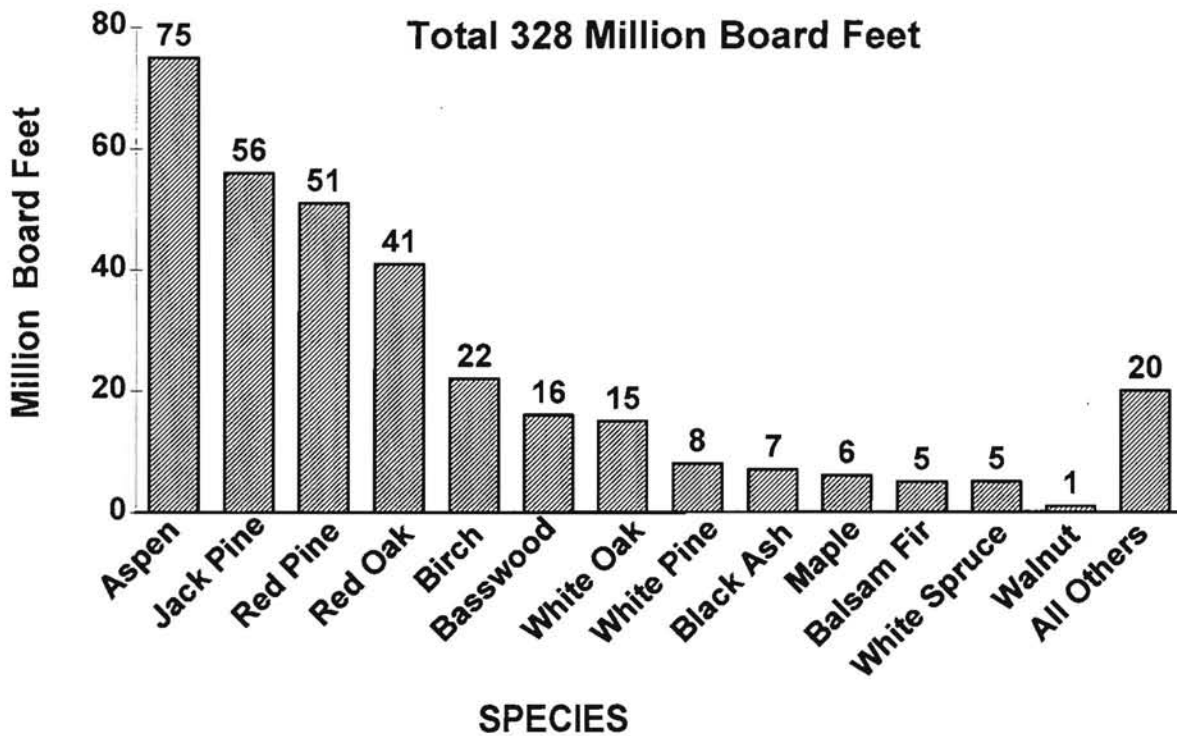
Firm	Wood Used	Product
Certainteed Corporation Shakopee	Aspen & Recycled Paper	Roofing Felt
International Biltrite International Falls	Aspen, Balm, & Recycled Paper	Sheathing
Georgia-Pacific Corporation, Superwood Division, Duluth	Aspen, Pine, & Mixed Hardwoods	Industrial Hardboard

Source: Minnesota DNR Forestry

MINNESOTA TIMBER PRODUCED by SPECIES

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

- 1997 -



Source : DNR sawmill survey.

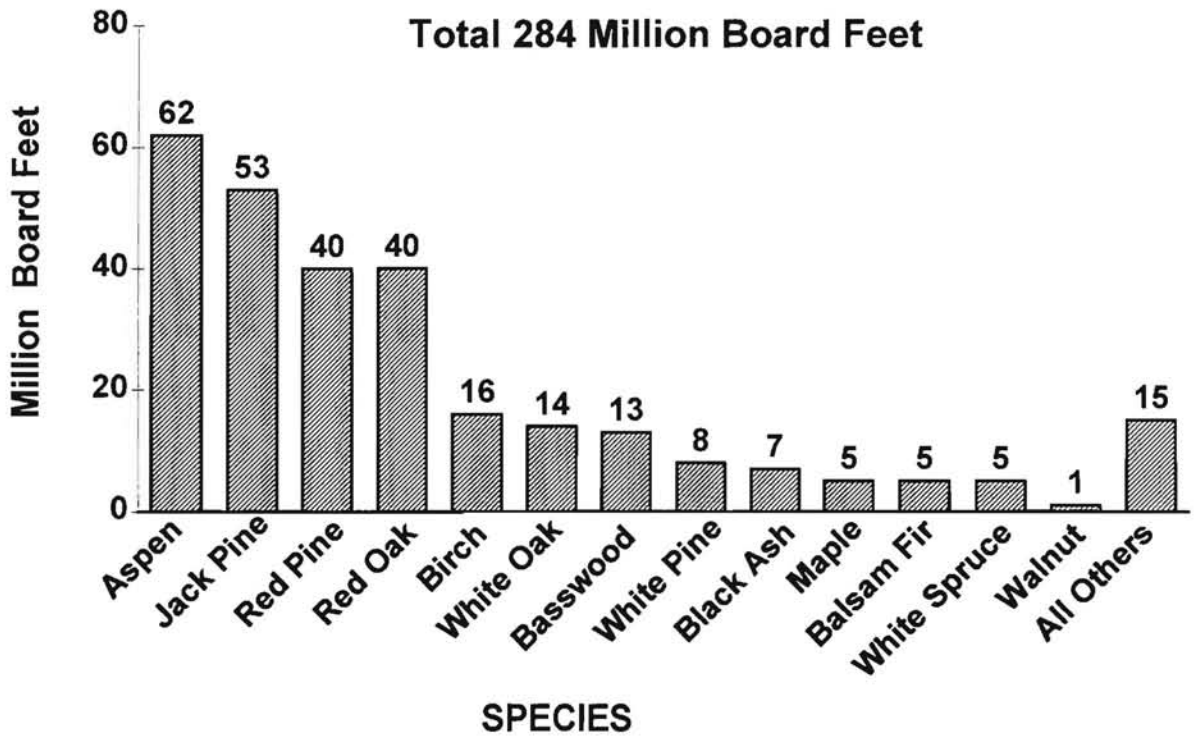
DNR 12/98

*44 MMBF or 80,000 cfs
for species*

MINNESOTA SAWMILL PRODUCTION by SPECIES

(includes lumber only)

- 1997 -



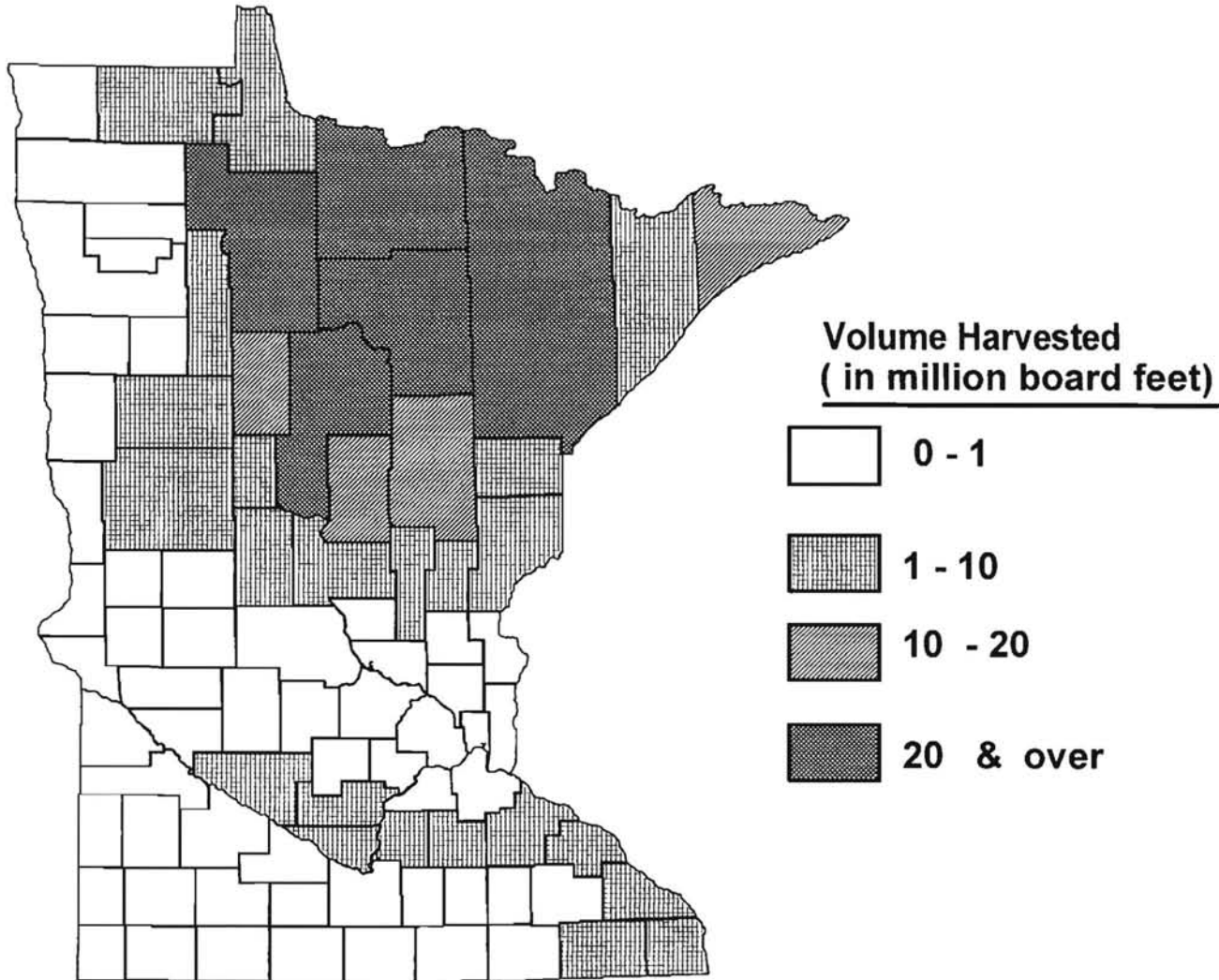
Source : DNR sawmill survey.

DNR 12/98

TIMBER VOLUME by HARVESTED COUNTY

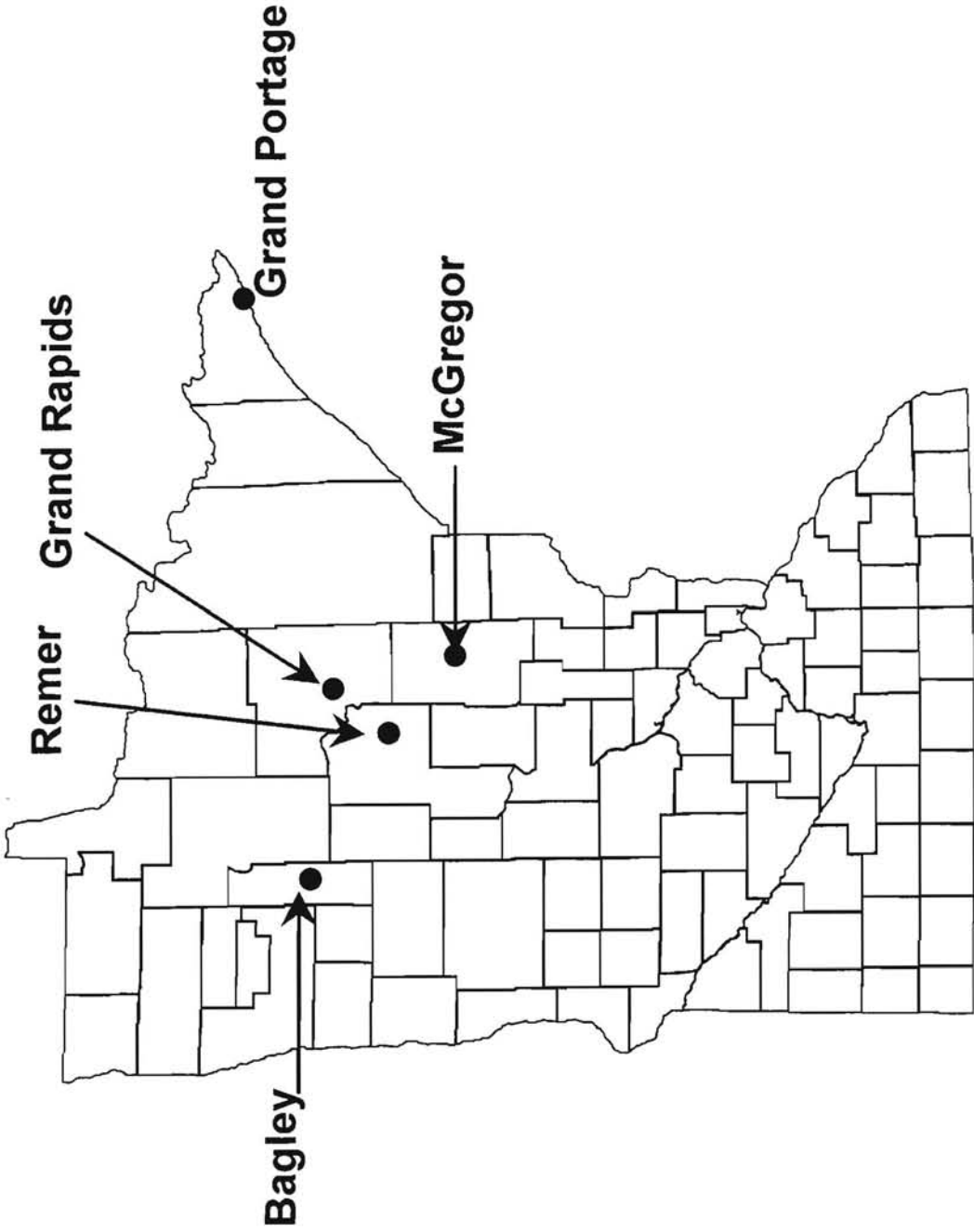
1997 Minnesota Sawmill Survey

Total 308 million board Feet



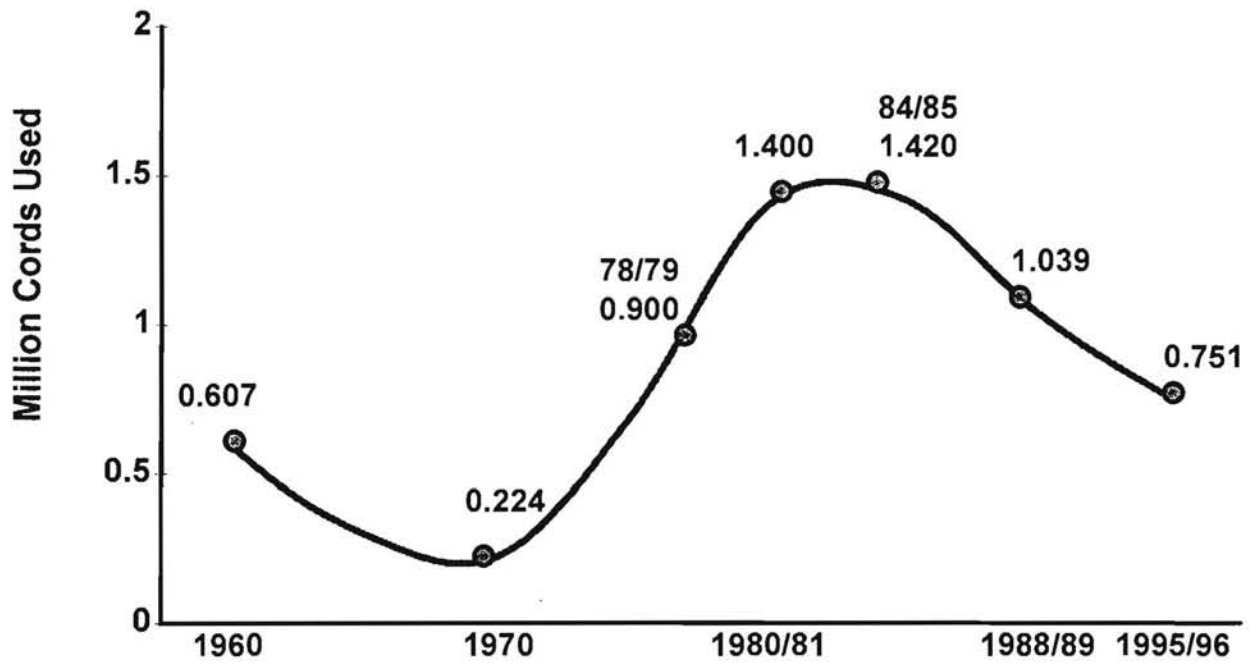
MINNESOTA MILLS UTILIZING SMALL HARDWOODS

1998



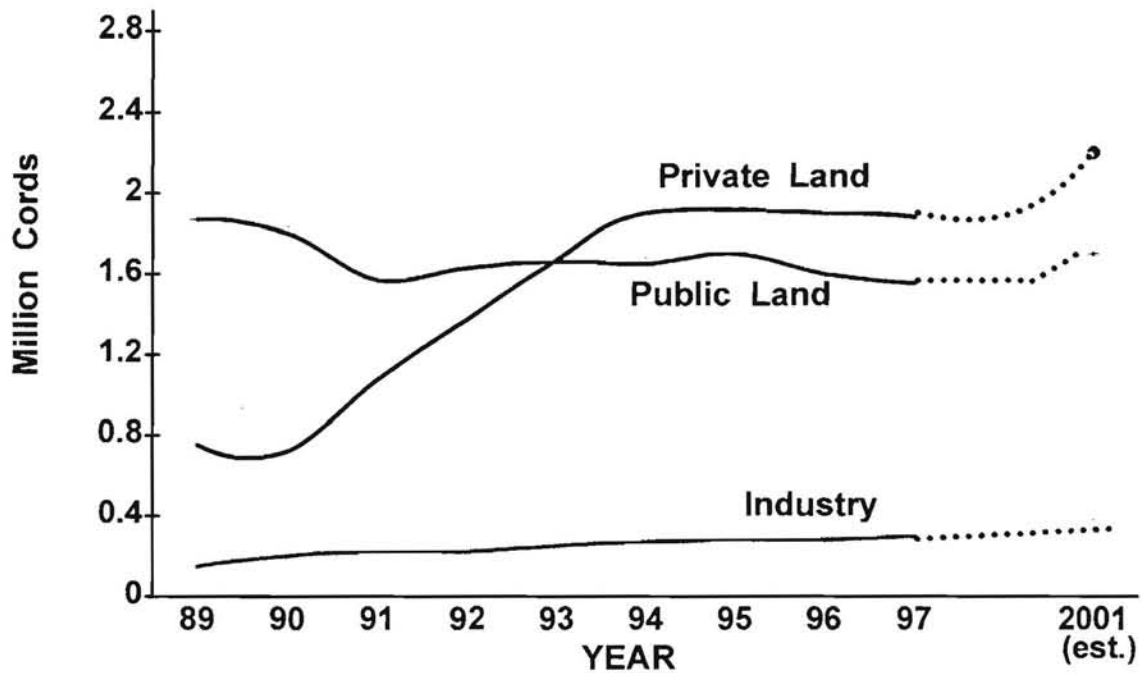
FUELWOOD DEMAND in MINNESOTA

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 2001 based on announced industry expansions.

Harvest 1997: 3,735,000 cords.

Private: 49.6%, State : 15.5%, Counties 15.3%, Nat'l Forests: 7.4%
BIA 2.1% and Industry 10.1%.

DNR 12/98

Total Timber Sold by Landowner - Minnesota 1997 -

1997 Harvest	3,733,200 cds. (Excludes Fuelwood)
Private Landowner	49.6%
State	15.5%
Counties	15.3%
Chippewa & Superior National Forests	7.4%
BIA	2.1%
Industry	10.1%

Timber Sold by Public Agencies

All Agencies	Sawtimber — 114.5 MMBF (229,000 cds.)	Pulpwood — 1,275,700 cds.	Total — 1,504,700 cds.
State (38.5%)	29.6 MMBF (59,200 cds.)	519,900 cds.	579,100 cds.
Counties (38%)	74.0 MMBF (148,030 cds.)	421,570 cds.	569,600 cds.
Chippewa & Superior National Forests (18.5%)	9.91 MMBF (19,800 cds.)	259,000 cds.	276,800 cds.
BIA (5%)	.95 MMBF (1,900 cds.)	77,320 cds.	79,200 cds.

Source: Volume of timber sold by public land agencies, DNR survey, NCFES pulpwood use survey, DNR Sawtimber Survey.

Minnesota—New and Expanding Large Wood Industries

<u>1975–1985</u>		<u>Add'l. Wood Use</u>	<u>Capital Investment (millions \$)</u>
Potlatch	Paper	30,000 cords	100
Potlatch	OSB	170,000 cords	40
Potlatch	OSB	170,000 cords	40
Northwood Panelboard	OSB	220,000 cords	45
Champion International	Paper	60,000 cords	250
Blandin (now Potlatch)	OSB	220,000 cords	50
Louisiana Pacific	OSB	90,000 cords	30
		960,000 cords	\$555 million
 <u>1986–1989</u>			
Blandin	Paper	138,000 cords	350
Potlatch	Paper	None	100
Lake Superior Paper Ind.	Paper	130,000 cords	404
International Biltrite	Sheathing	25,000 cords	12
		293,000 cords	\$866 million
 <u>1990–1992</u>			
Boise Cascade	Paper	340,000 cords	535
Trus Joist MacMillan	**PSL	135,000 cords	70
Potlatch	OSB	160,000 cords	35
Potlatch	Lumber	120,000 cords	22
		755,000 cords	\$662 million
 <u>1998–2001</u>			
*Potlatch	Pulp Mill	420,000 cords	500
*Potlatch	OSB	100,000 cords	60
		520,000 cords	\$560 million

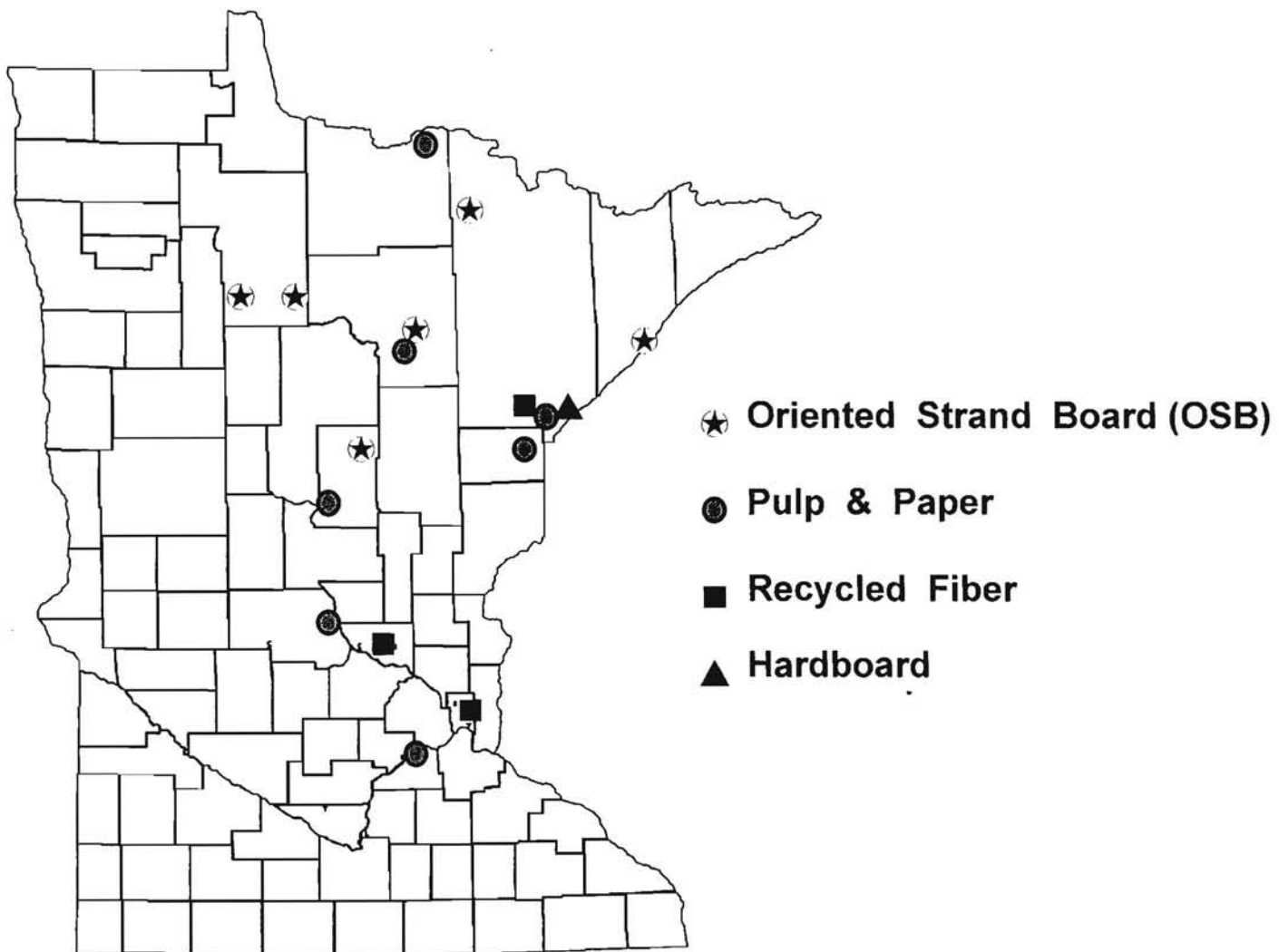
* Under construction; start-up 2000.

** Parallel Strand Lumber.

Source: MN DNR-Forestry

OSB, PULP & PAPER, HARDBOARD & RECYCLING MILLS

Minnesota 1999



USDA Forest Service commercial mill survey,
DNR Sawmill & Residential Fuelwood survey

Current and Projected Wood Harvest from Timberland

—Minnesota Statewide—

Species	(In Thousand Cords)	
	1997	Projected 2001
Aspen/Balm-of-Gilead	2,402.3	2,580
Birch	213.6	365*
Ash	28.7	30
Oak	191.7	190
Elm	10.0	15
Basswood	37.6	60*
Maple	44.5	135*
Cottonwood	11.7	10
Other Hardwoods	19.7	10
Pine	361.1	490*
Spruce	179.1	192*
Balsam	205.0	237*
Tamarack	21.9	20
Cedar	8.3	6
Total	3,735.2	4,340

USDA Forest Service
Source: 1996 Harvest Data compiled by NCFES and DNR.
 Projected 2001 based on announced expansions and industry interviews.

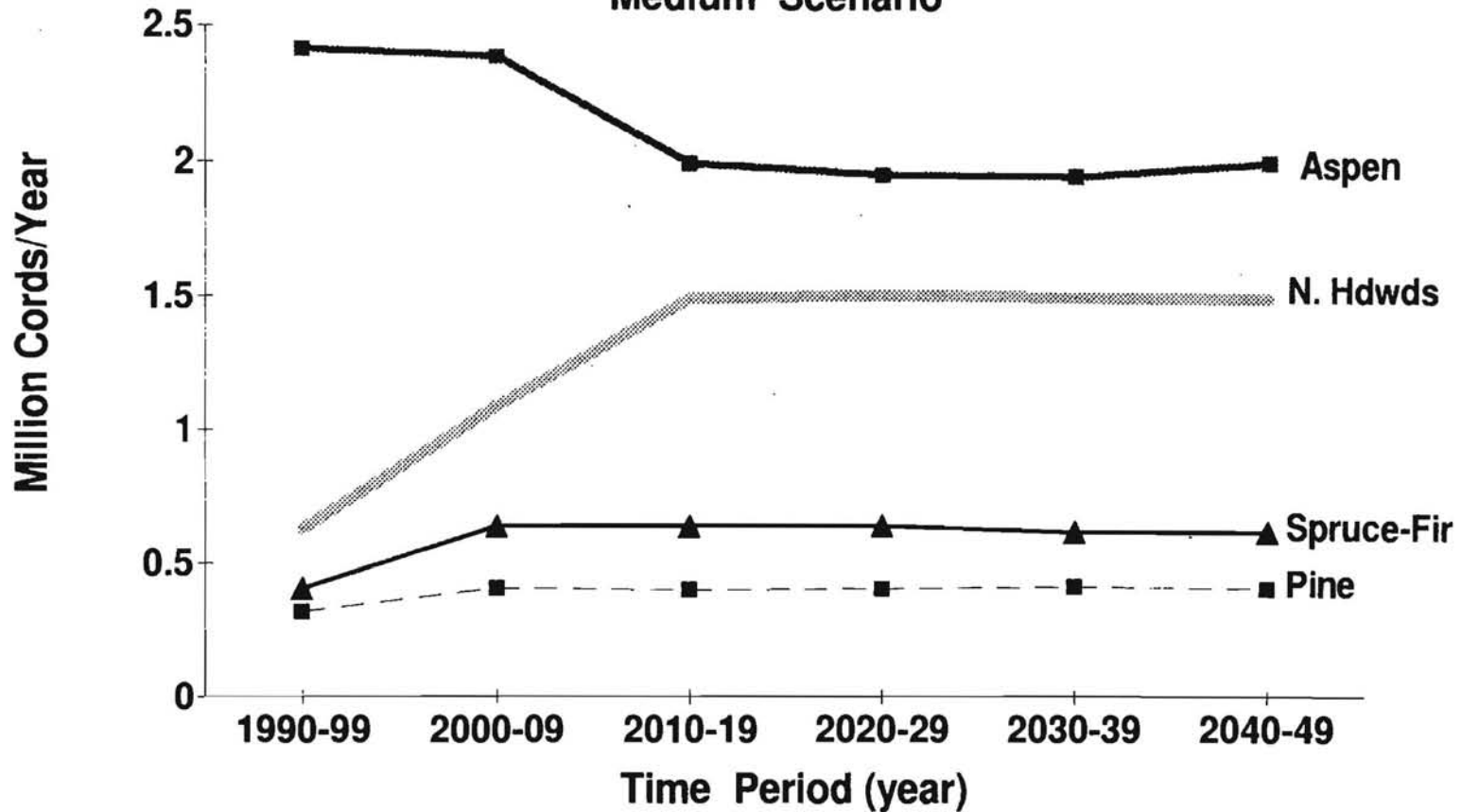
- * Increases due to:
- Potlatch expansion of pulpmill at Cloquet,
 - Potlatch rebuild of OSB mill at Cook, and
 - Blandin's switch to more spruce/balsam.

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.

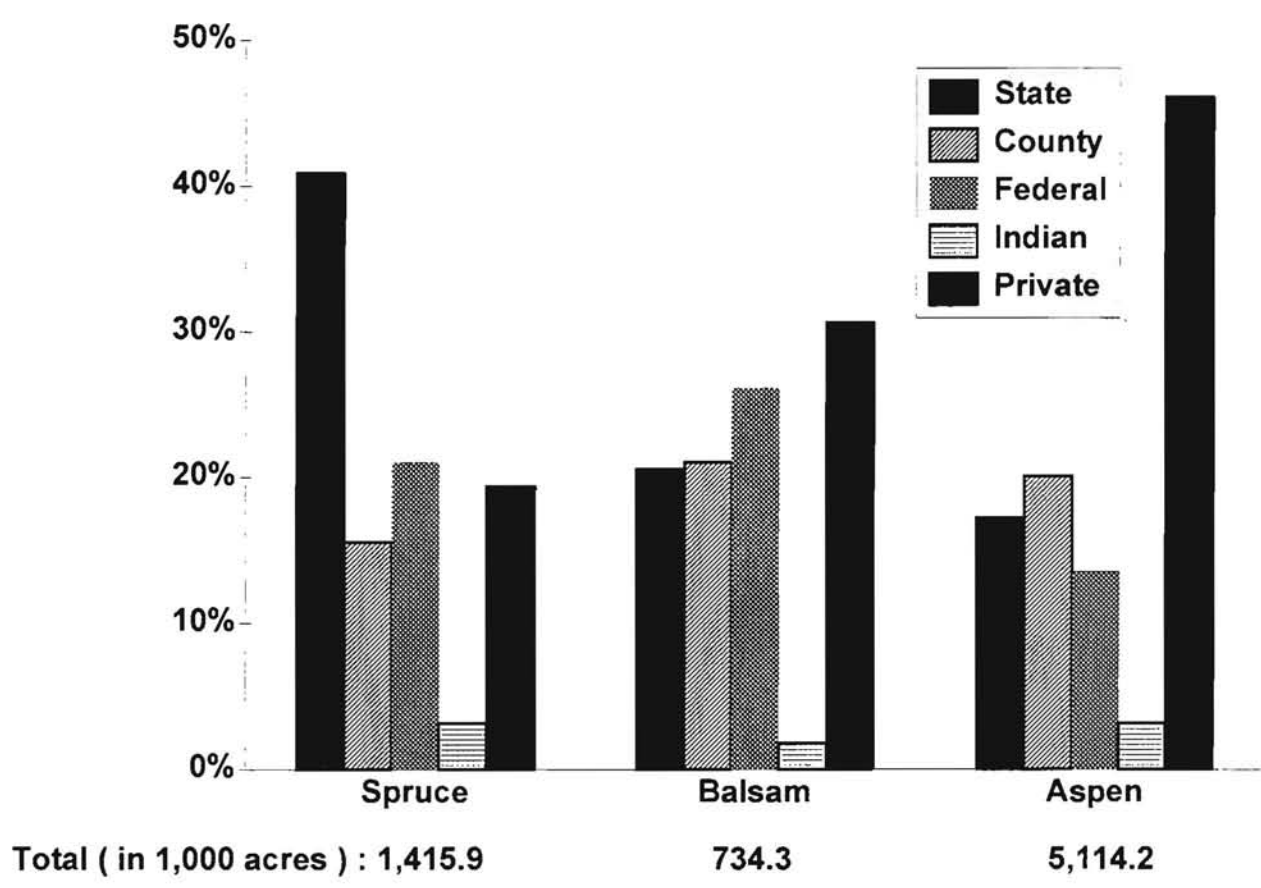
SCHEDULING HARVEST by MODEL for PRODUCT GROUP
Minnesota Northern Region, All Ownerships
Medium Scenario



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.)

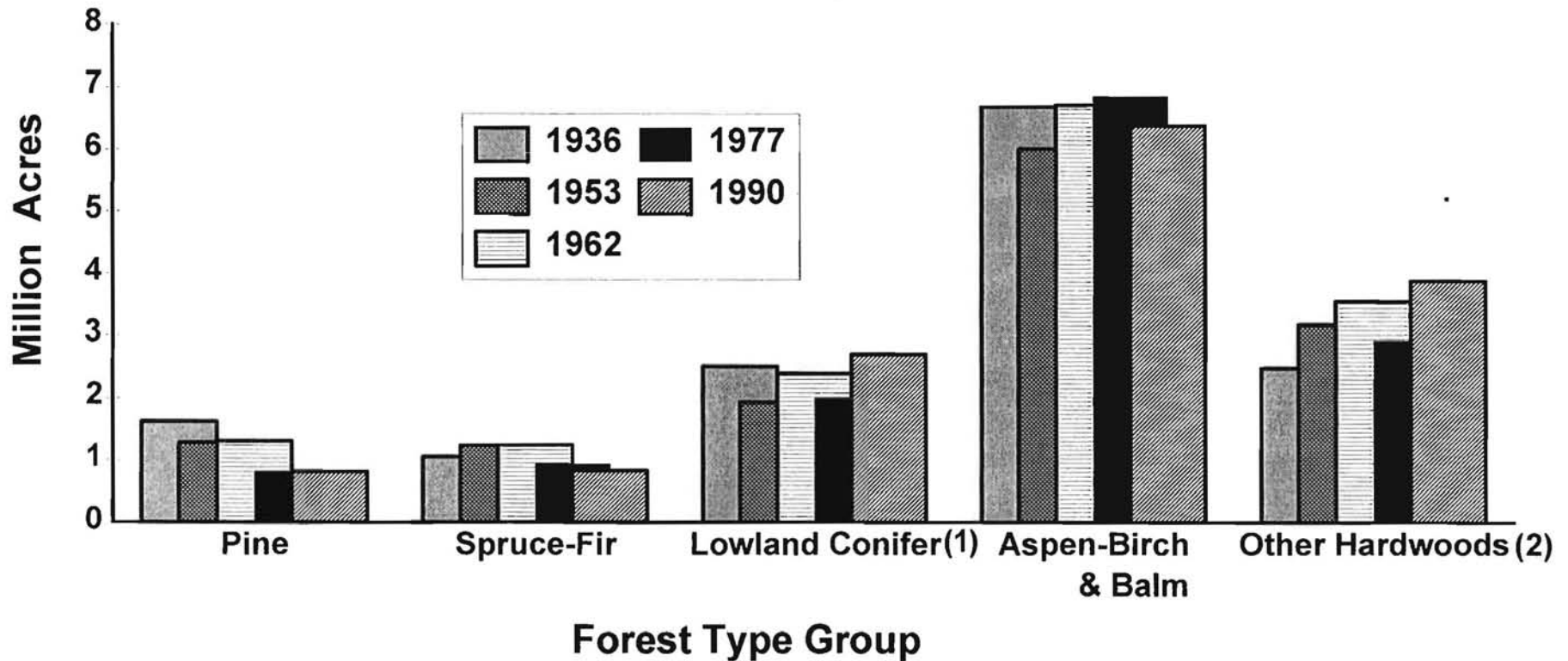
Objective : To harvest every stand at least once during a rotation with the goal to achieve a sustainable harvest level from a regulated forest at some point.

OWNERSHIP of SPRUCE, BALSAM & ASPEN TYPES in MINNESOTA



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

Timberland Acreage Distribution by Forest Type by Year Minnesota Statewide, All Ownerships

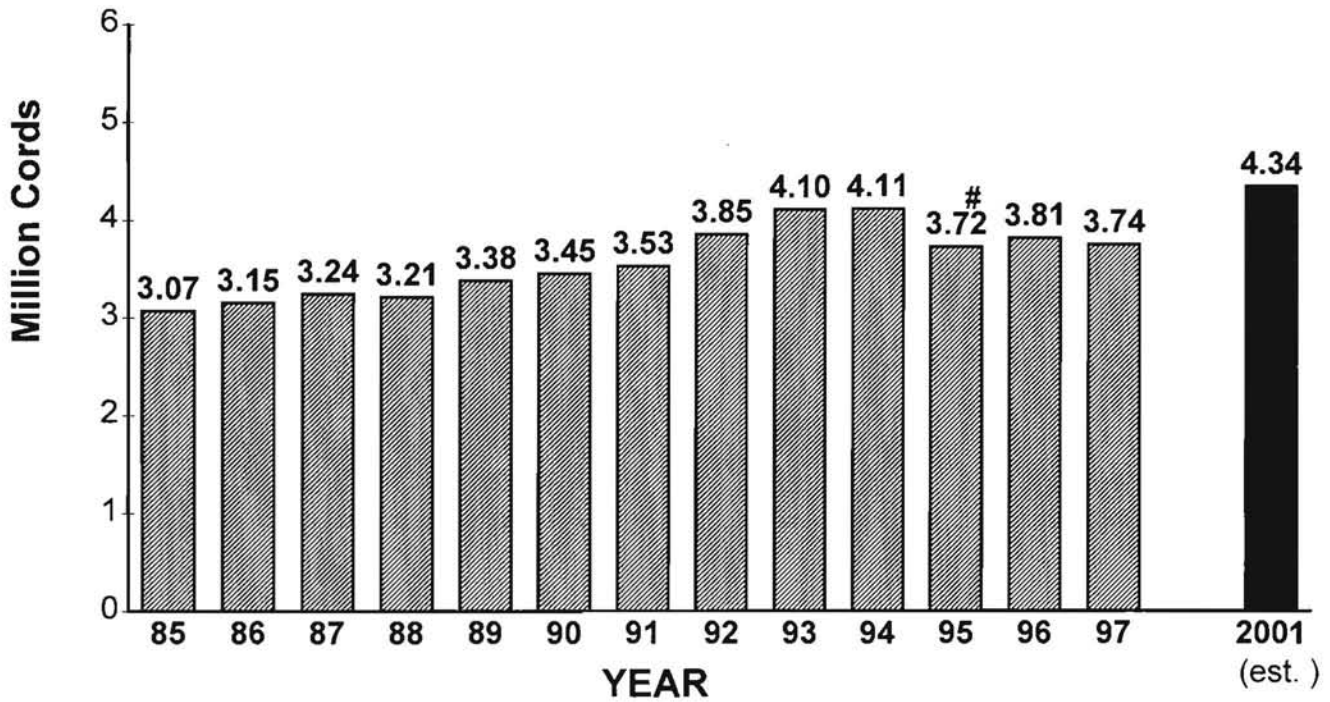


Notes: (1) Lowland conifer includes black spruce, tamarack & cedar.

(2) Other hardwoods includes oak, northern hardwoods & lowland hardwoods.

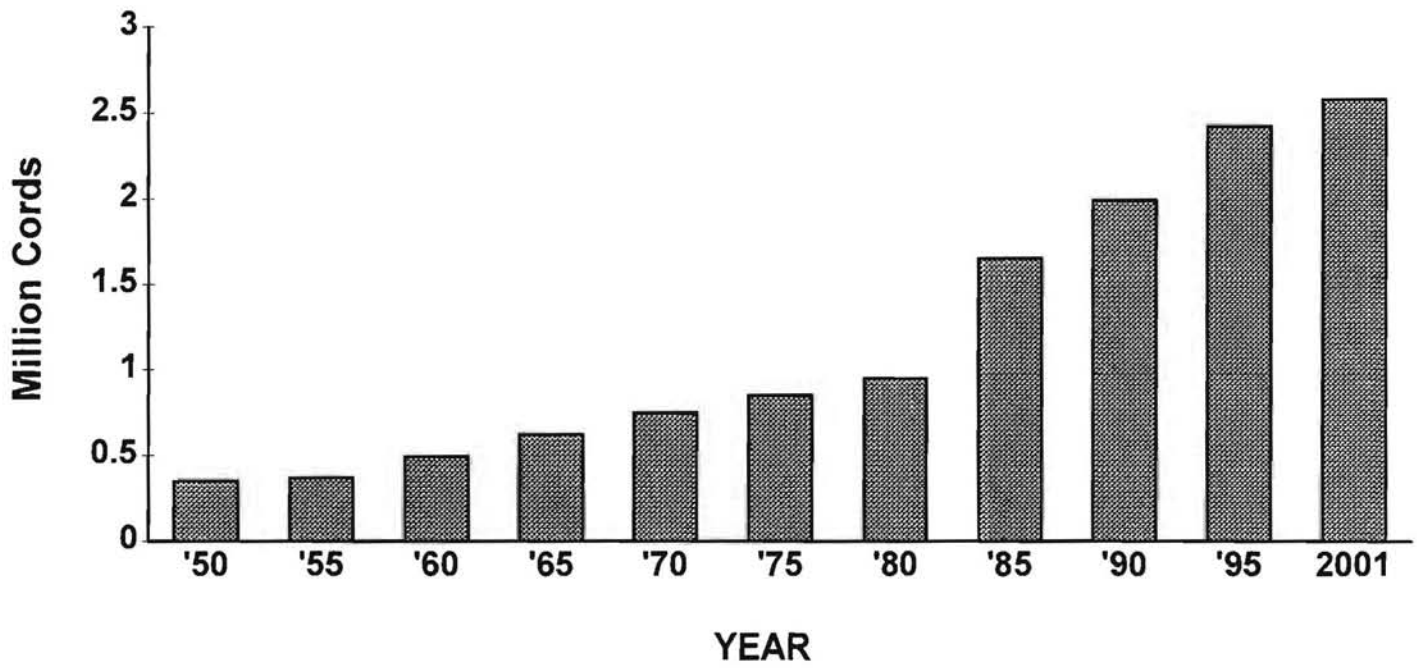
(3) Timberlands in 1977 & 1990 do not include BWCA.

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



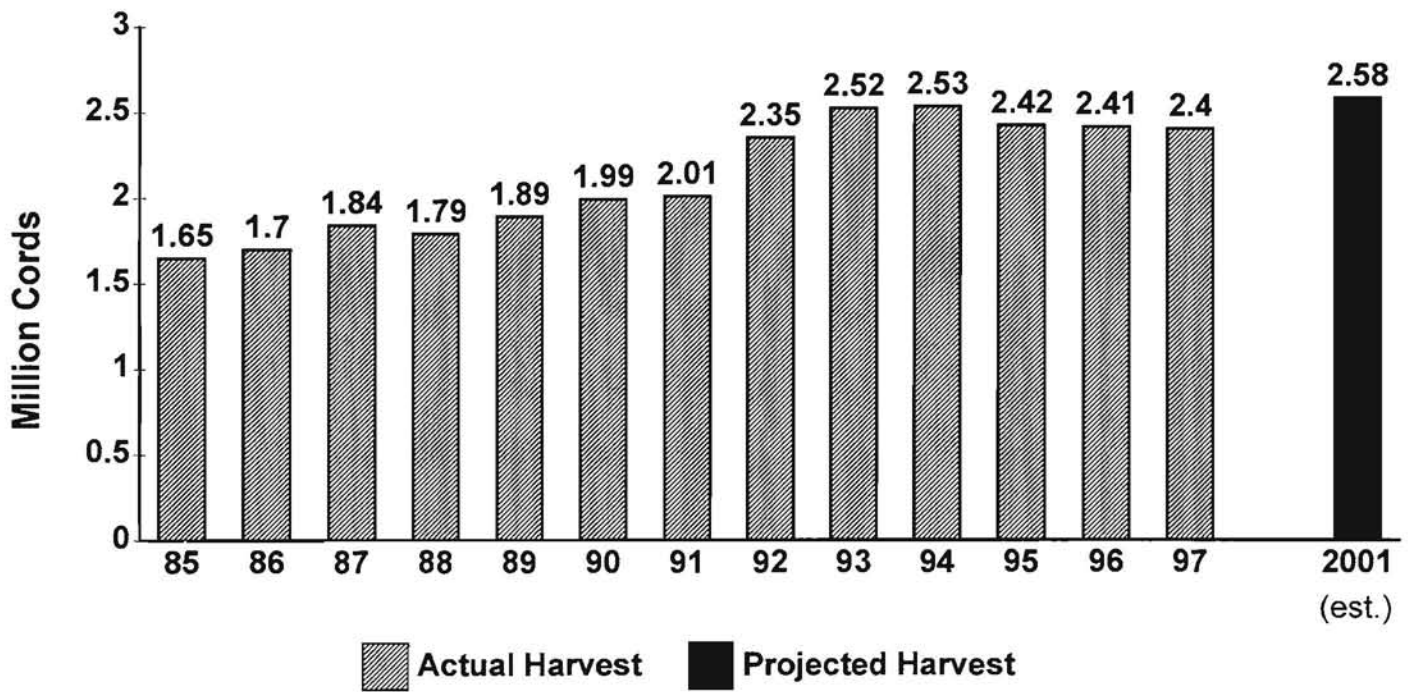
Source : # 1995 adjustment due to decrease in fuelwood use since 1989/90
 ## Harvest Data Compiled by NCFES and DNR.
 1996 figures include a one time increase in pulpwood exported to Wisconsin.

ASPEN & BALM HARVEST in MINNESOTA



Source : NCFES & DNR Surveys

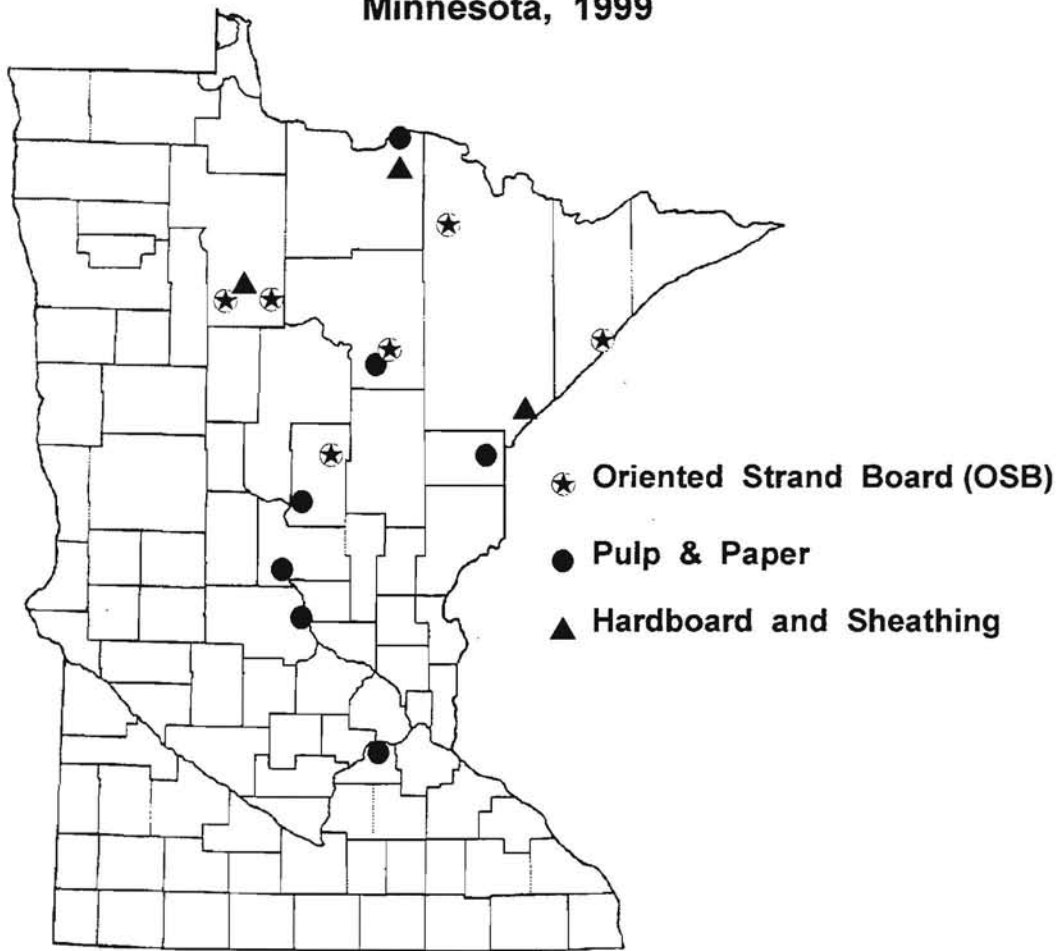
ASPEN & BALM HARVEST in MINNESOTA : ACTUAL & PROJECTED
 (includes pulpwood, sawtimber, wood for energy & specialty products)



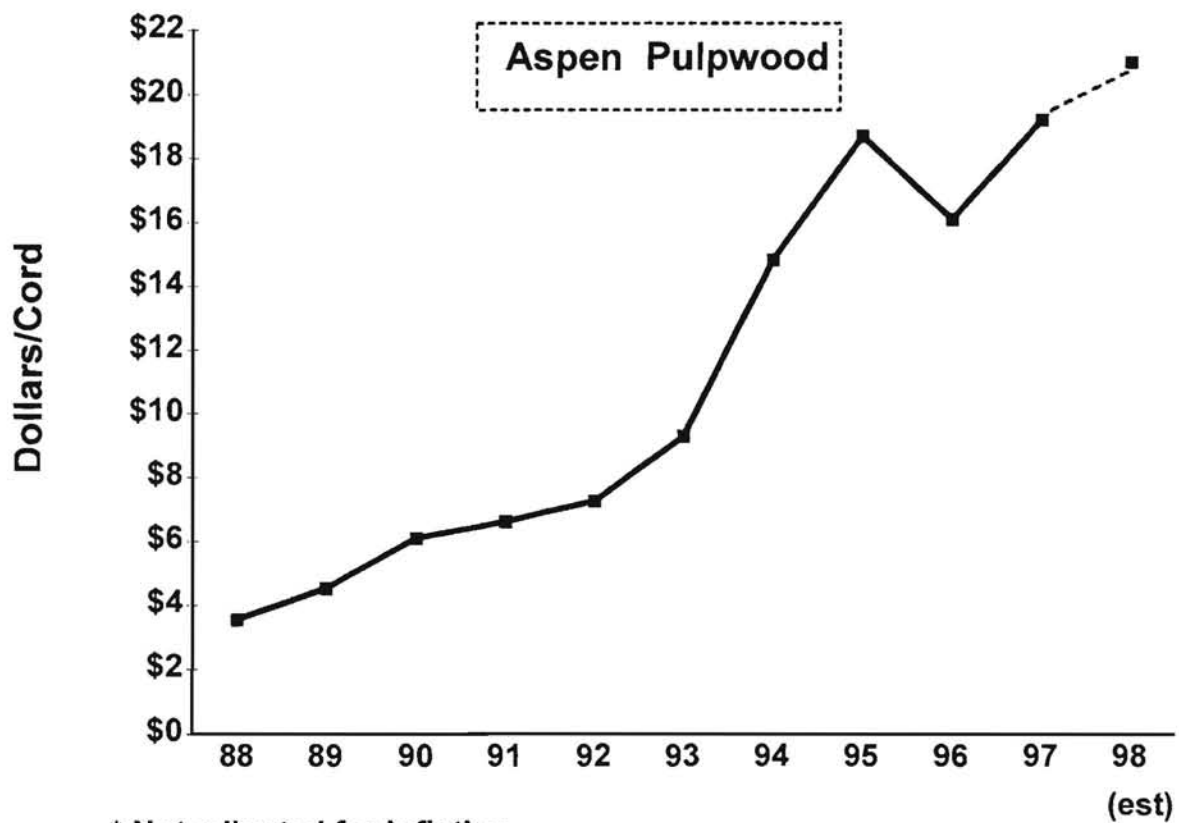
- 1) Annual sustainable yield=2.68 million cords based on Table 6.25, GEIS, medium level, Dec, 92
- 2) Harvest data compiled by NCFES & DNR

OSB, PULP & PAPER and HARDBOARD MILLS USING ASPEN

Minnesota, 1999



**AVERAGE PRICES RECEIVED for STUMPAGE SOLD by
PUBLIC LAND AGENCIES in MINNESOTA : 1988 - 1997**



* Not adjusted for inflation

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

Aspen/Balm-of-Gilead

Present and Projected Demand

1997 Harvest 2,402,300 cds.

- Minnesota Pulpwood Industries:
 - Pulp & Paper 852,000 cds.
 - OSB, Hardboard, Sheathing 1,278,800 cds.
- Pulpwood Export 89,500 cds.
- Sawlogs & Other. 152,300 cds.
- Fuelwood (from growing stock) 29,700 cds.

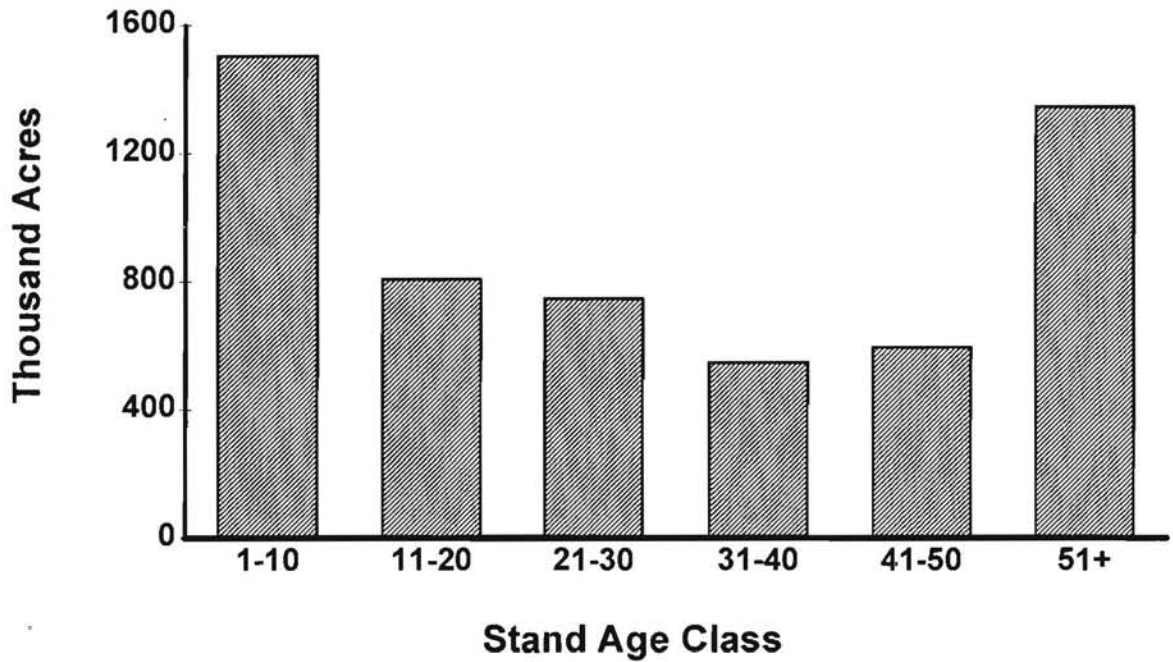
2001 Projected Harvest . . . 2,580,000 cds.

- Minnesota Pulpwood Industries:
 - Pulp & Paper 900,000 cds.
 - OSB, Hardboard, Sheathing 1,396,000 cds.
- Pulpwood Export 60,000 cds.
- Sawlogs & Other. 194,000 cds.
- Fuelwood (from growing stock) 30,000 cds.

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

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

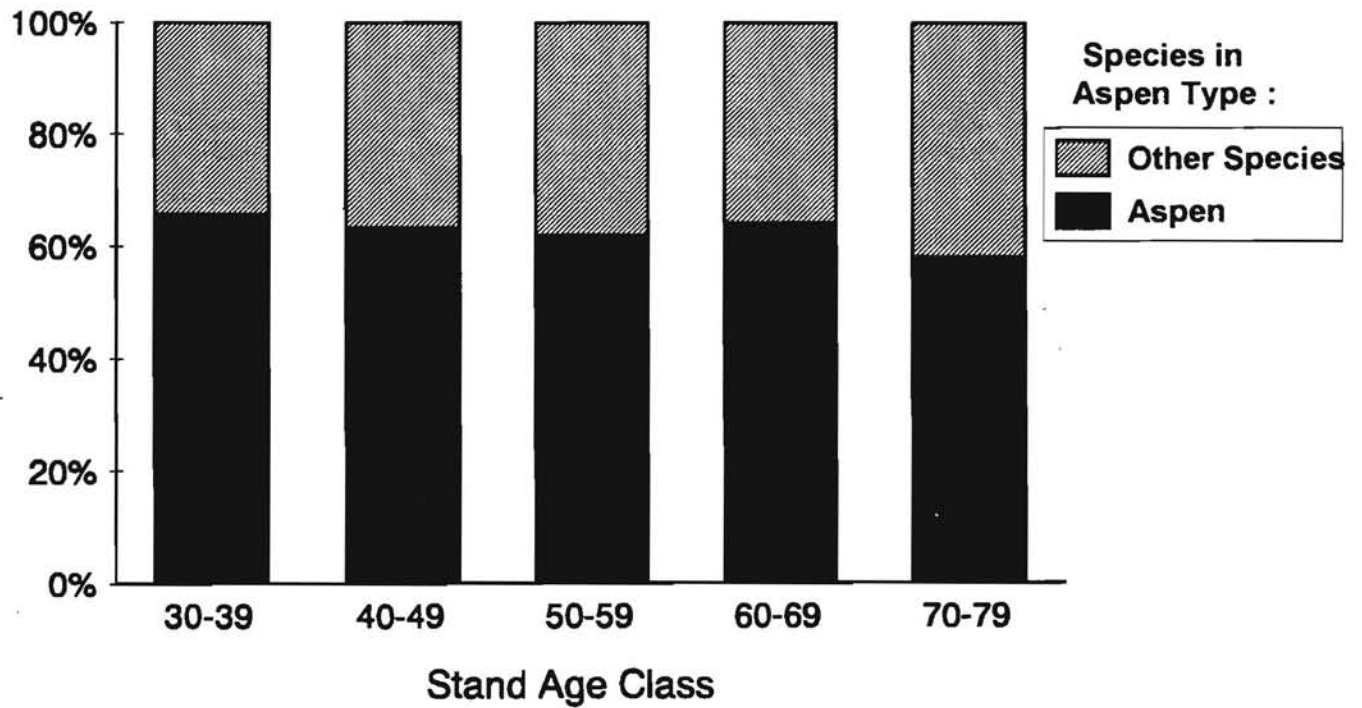
ASPEN & BALM TYPE AGE DISTRIBUTION - YEAR 2000
Minnesota Statewide



Source : Estimated by a DNR simulation model based on MN FIA 90 Eastwide database.

% of SPECIES VOLUME in ASPEN TYPE

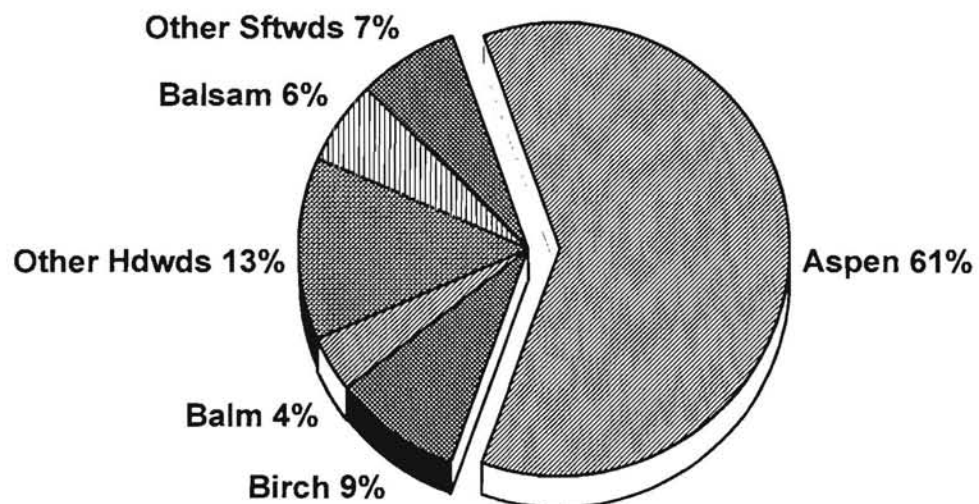
Minnesota Timberland, All Ownerships



Source : 1990 FIA (USFS, N.C. Eastwide Database, 2/94)

DNR 11/94

MINNESOTA : ASPEN TYPE by SPECIES COMPOSITION
(5.1 Million Acres Aspen Type)
- 1990 Forest Survey -

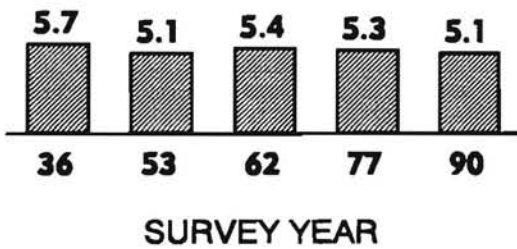


Source : Minnesota Forest Statistics , 1990 - USFS, Resource Bull. NC-141 (Table 47)

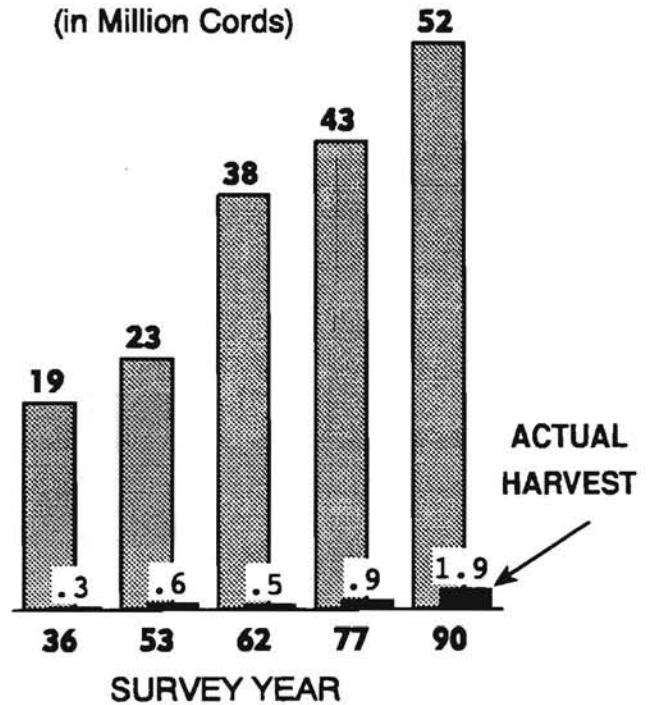
ASPEN TYPE ACREAGE & ASPEN SPECIES VOLUME & HARVEST

Minnesota Statewide

Aspen Type Acreage
(in Million Acres)



Aspen Species from all Cover Types
Growing Stock Volume
(in Million Cords)

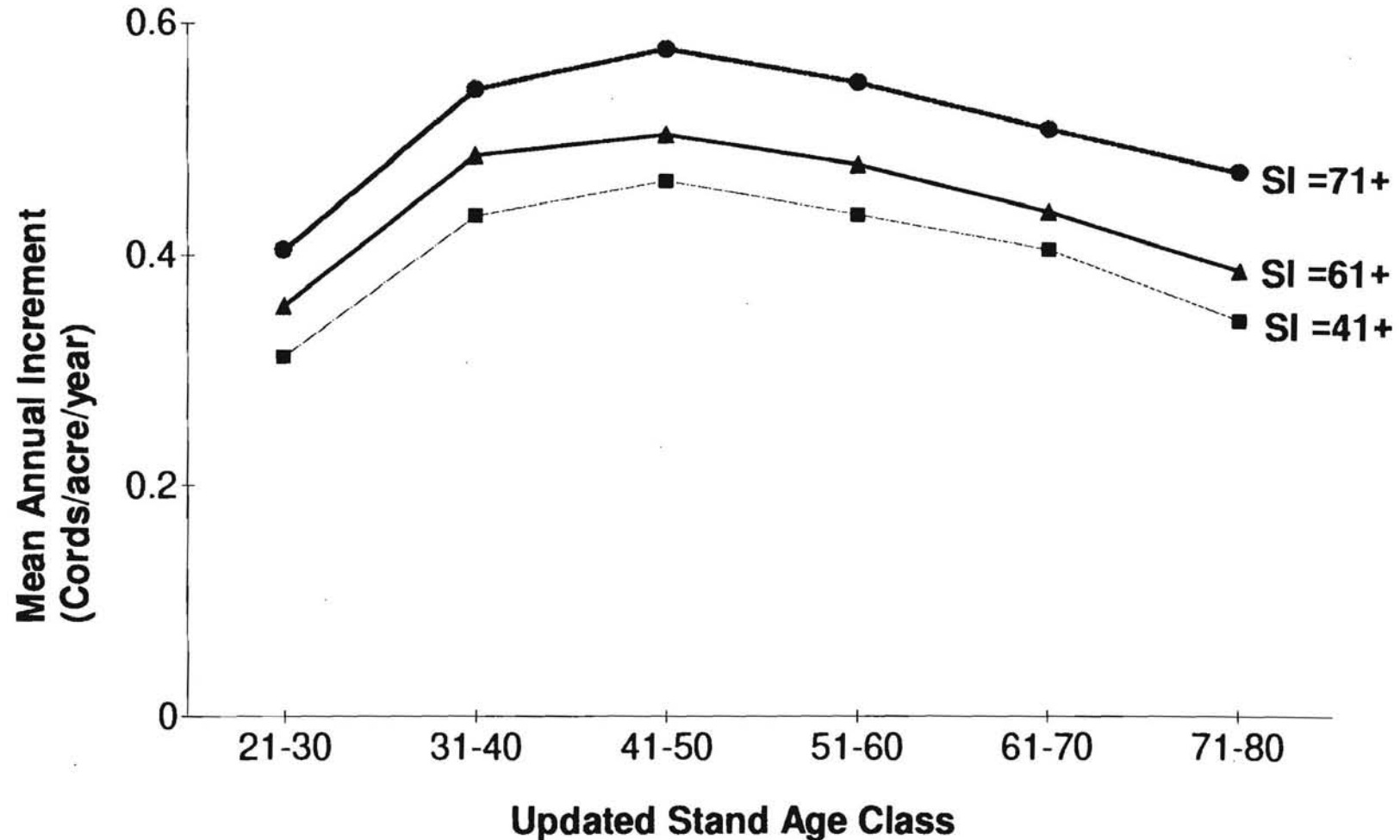


Cover Type : A classification of Forest land based on the species forming a plurality of live tree stocking.

Source : NCFES survey.

Aspen Type Mean Annual Increment by Updated Age

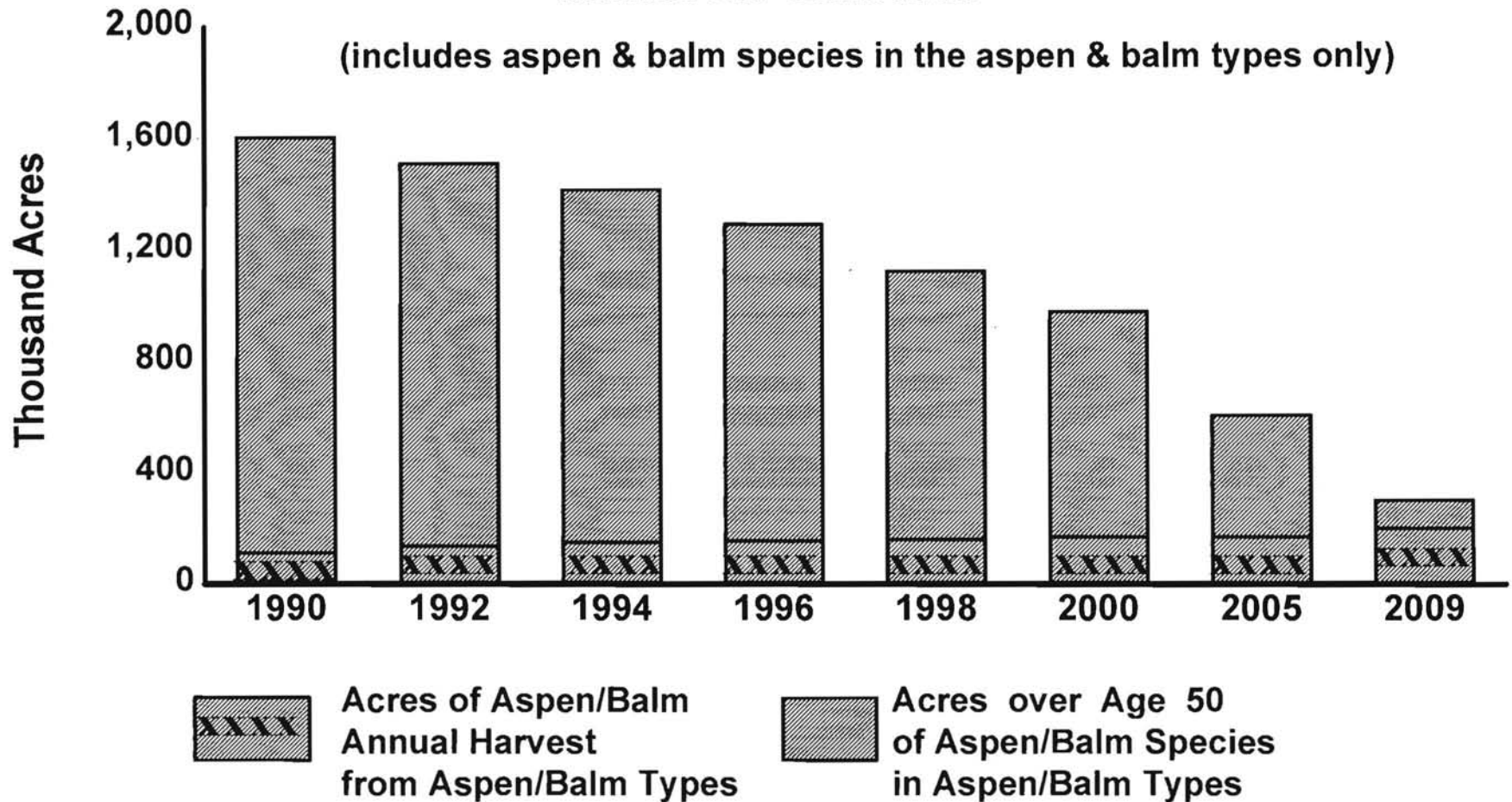
CSA Statewide: State Forestry & Wildlife Land, Timber Status=1,2,6 & 8
Based on Volume Yield Model * (Built on CSA)



* 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



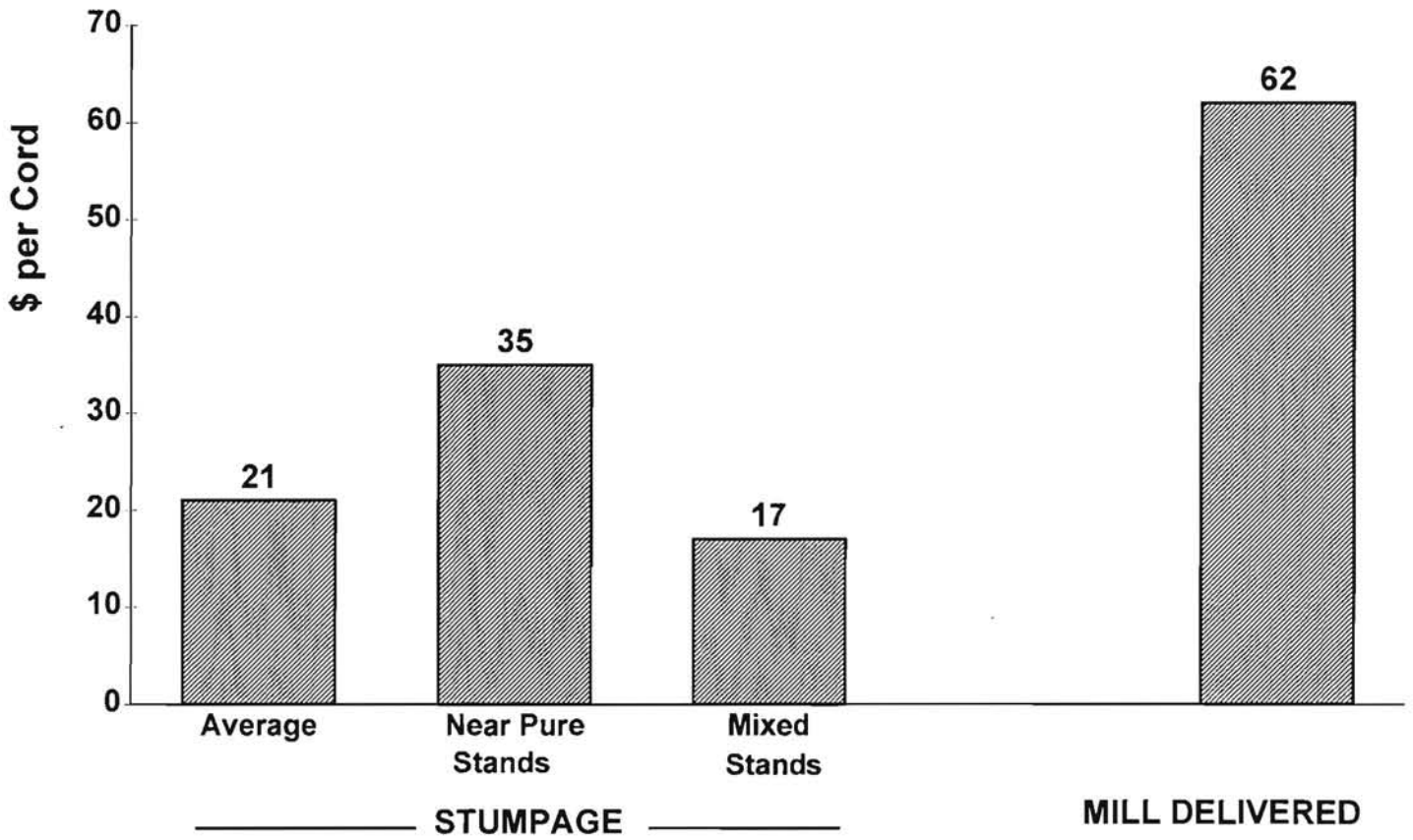
- Assumptions :
1. Harvest 23 cords/acre from the aspen/balm types
 2. Aspen/balm in aspen/balm types : 70% in 1990 and declines to 51% in 2009
 3. 90% of aspen/balm harvest from aspen/balm types

Source : Estimated by a DNR simulation model based on MN FIA 90 Eastwide database.

6/5/97

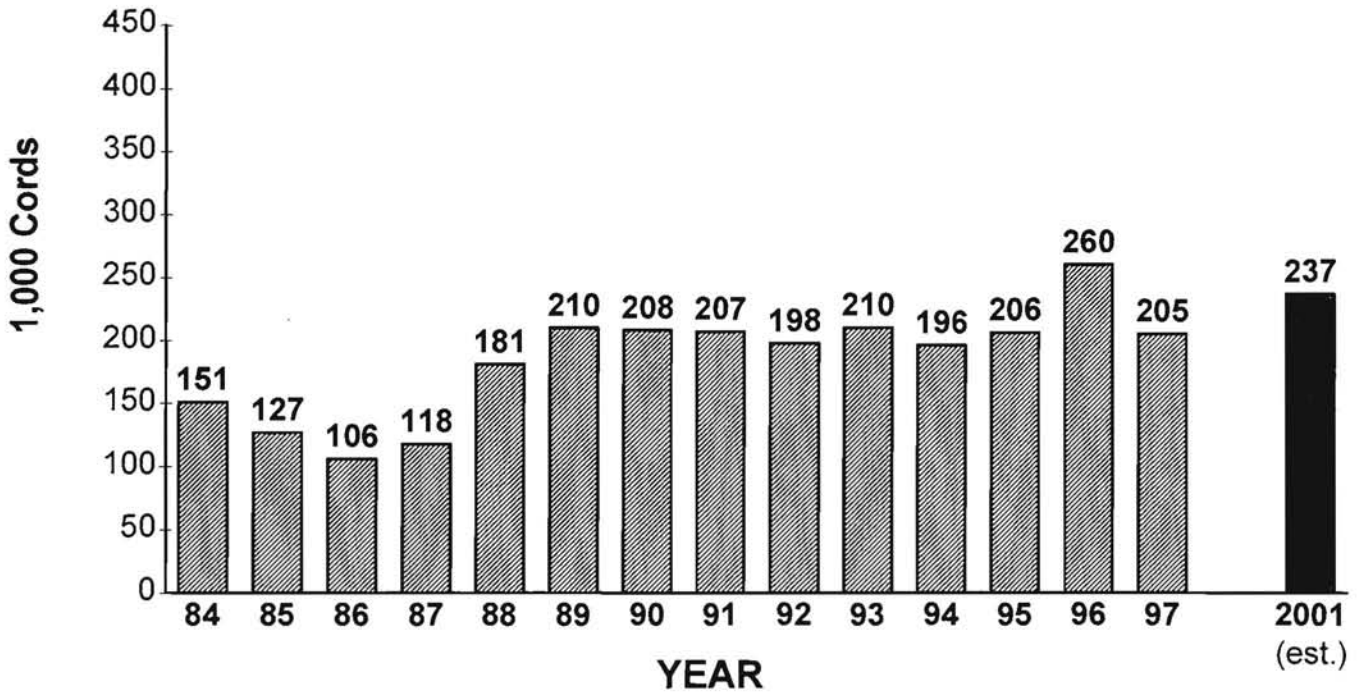
PRICES for ASPEN / BALM PULPWOOD

- 1998 -



Source : Analysis of DNR timber sales & DNR/Industry survey

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



- 1) Based on DNR's method sustainable harvest = 433,000 cords/year *without restraints.*
- 2) Harvest data compiled by NCFES & DNR
- 3) 1996 harvest includes a one time increase in pulpwood exported to Wisconsin.

Balsam Fir

Present and Projected Demand From Minnesota

1997 Harvest 205,000 cds.

- Minnesota Pulpwood Industries . . . 190,000 cds.
- Pulpwood Export 4,800 cds.
- Sawlogs & Other 10,100 cds.
- Fuelwood 100 cds.

2001 Projected Harvest 237,000 cds.

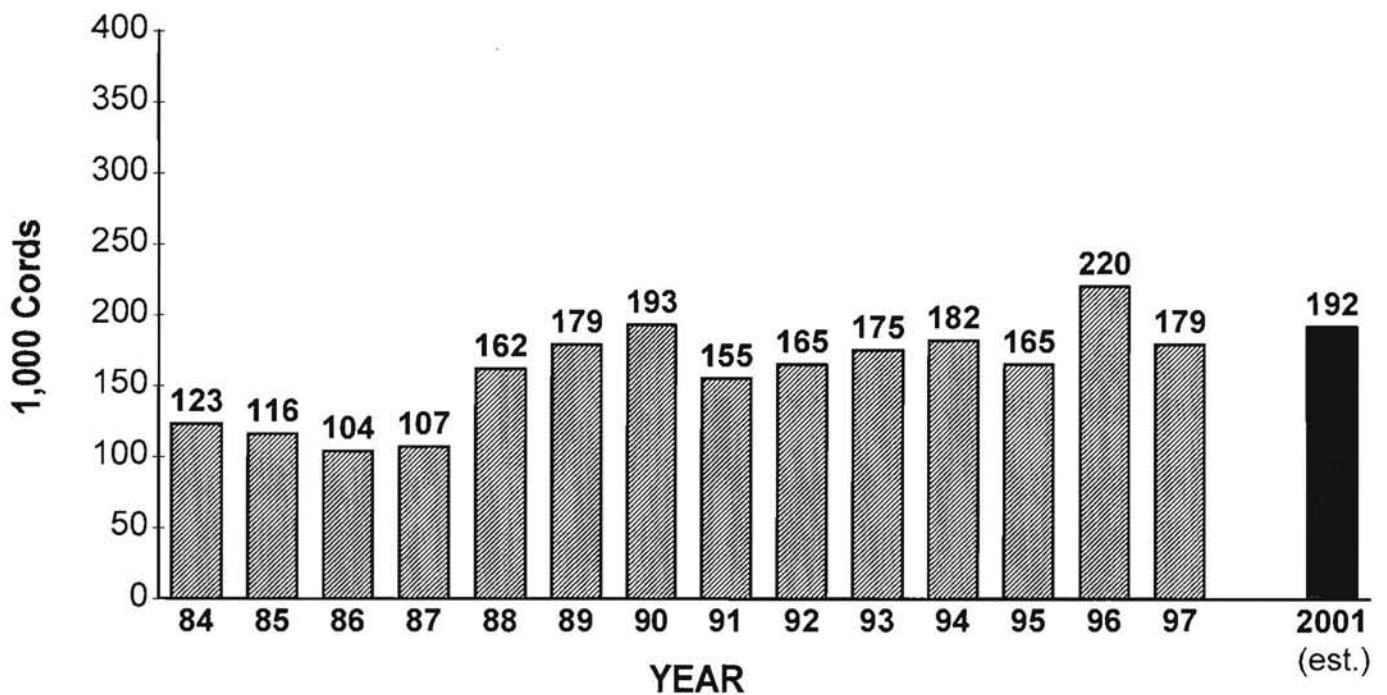
- Minnesota Pulpwood Industries . . . 192,000 cds.
- Pulpwood Export 30,000 cds.
- Sawlogs & Other 15,000 cds.

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.

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

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



1) Based on DNR's method sustainable harvest = 334,000 cords/yr.

(black spruce 202,600 cords. white spruce 131,700 cords)

2) Harvest data compiled by NCFES & DNR

3) 1996 harvest includes a one time increase in pulpwood exported to Wisconsin.

Spruce

Present and Projected Demand From Minnesota

1997 Harvest 179,100 cds.

- Minnesota Pulpwood Industries . . 111,700 cds.
- Pulpwood Export 56,800 cds.
- Sawlogs & Other 10,500 cds.
- Fuelwood 100 cds.

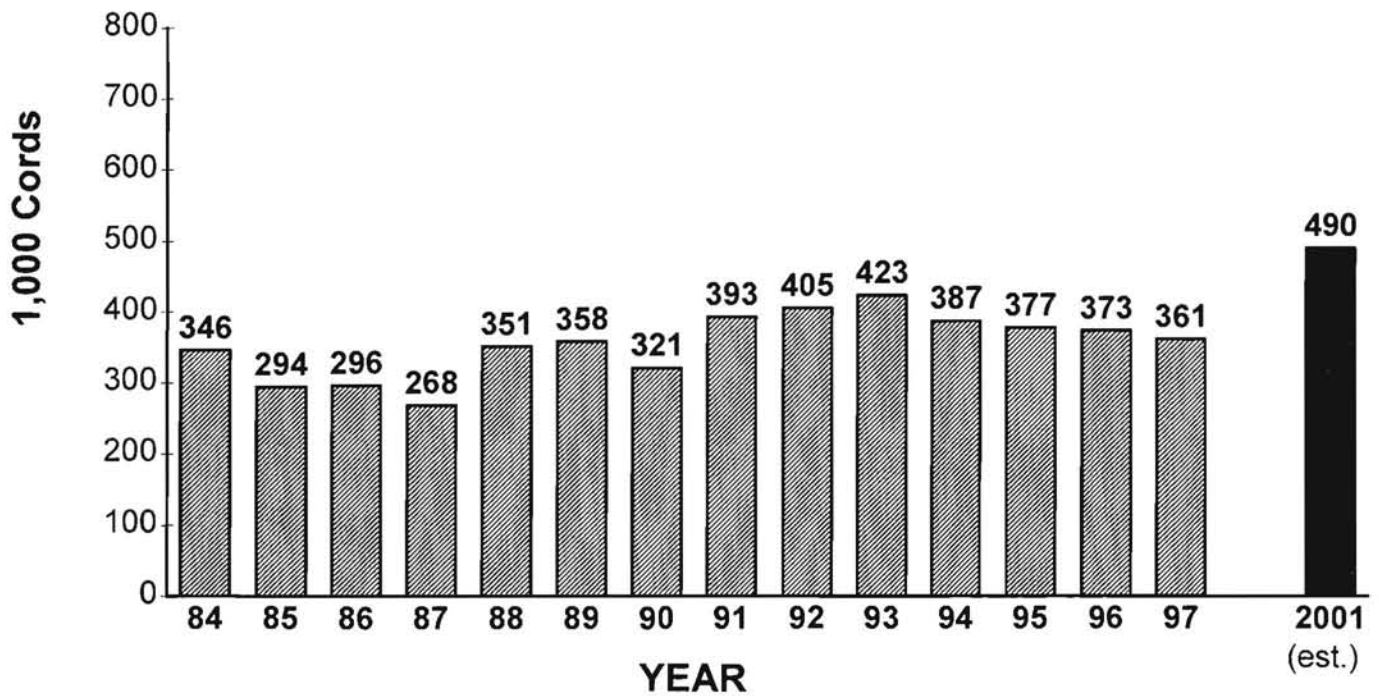
2001 Projected Harvest 192,000 cds.

- Minnesota Pulpwood Industries . . 110,000 cds.
- Pulpwood Export 57,000 cds.
- Sawlogs & Other 25,000 cds.
- 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.

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



1) Based on DNR's Method, Sustainable Harvest = 590,000 cords/yr .

2) Harvest Data Compiled by NCFES & DNR

Pine

Present and Projected Demand

1997 Harvest 361,100 cds.

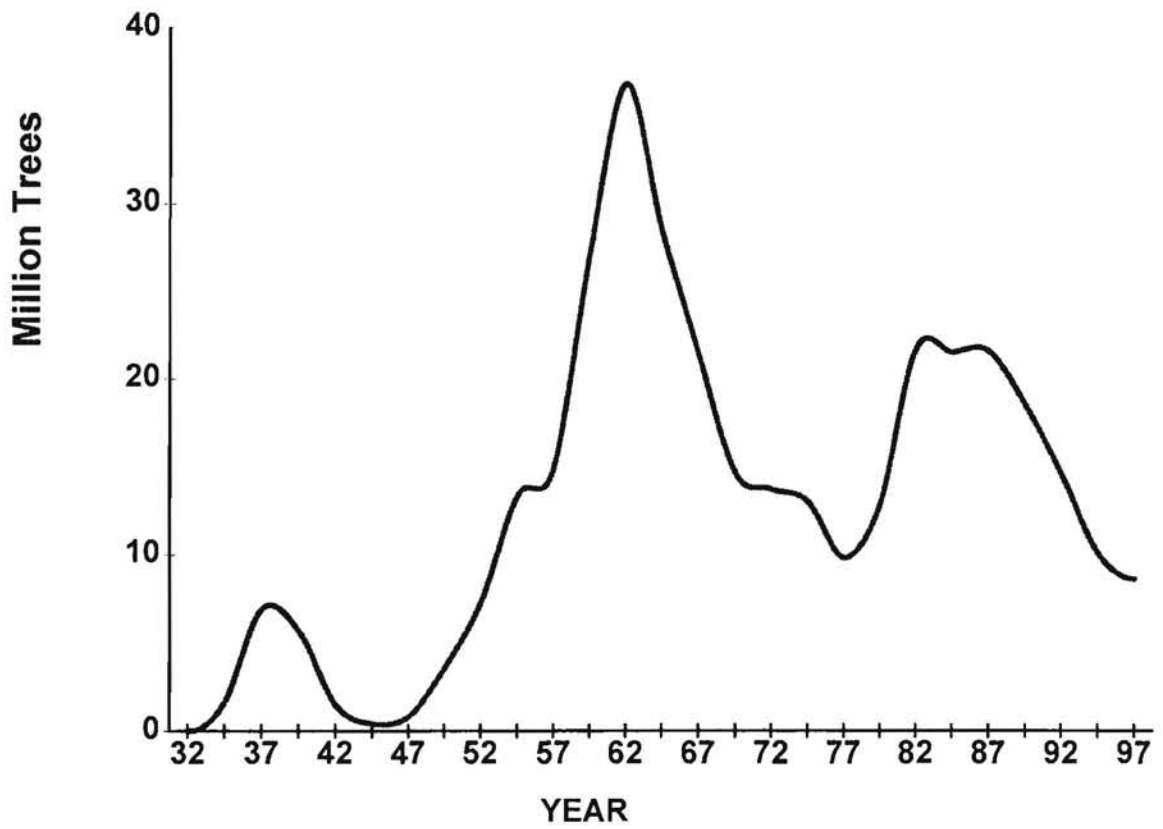
- Minnesota Pulpwood Industries. . . 73,900 cds.
- Pulpwood Export 52,300 cds.
- Sawlogs & Other. 232,400 cds.
- Fuelwood. 2,500 cds.

2001 Projected Harvest 490,000 cds.

- Minnesota Pulpwood Industries:
 - Pulp & Paper 176,000 cds.
 - OSB 35,000 cds.
- Pulpwood Export 12,000 cds.
- Sawlogs & Other. 267,000 cds.

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

Trees Shipped from Minnesota State Nurseries



Source : DNR nursery records

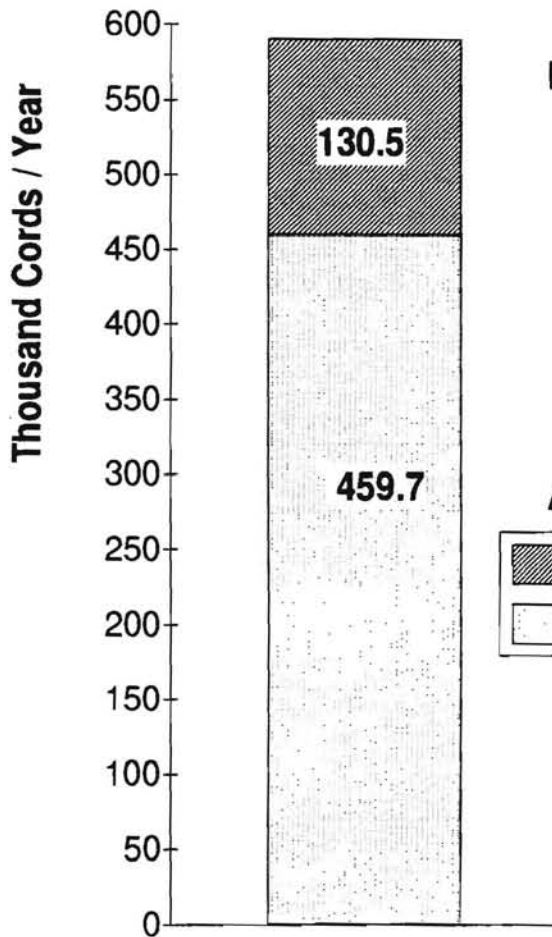
PINE SUSTAINABLE HARVEST

(1990 - 2000)

Minnesota Statewide, all Ownerships

- Based on 1990 Survey -

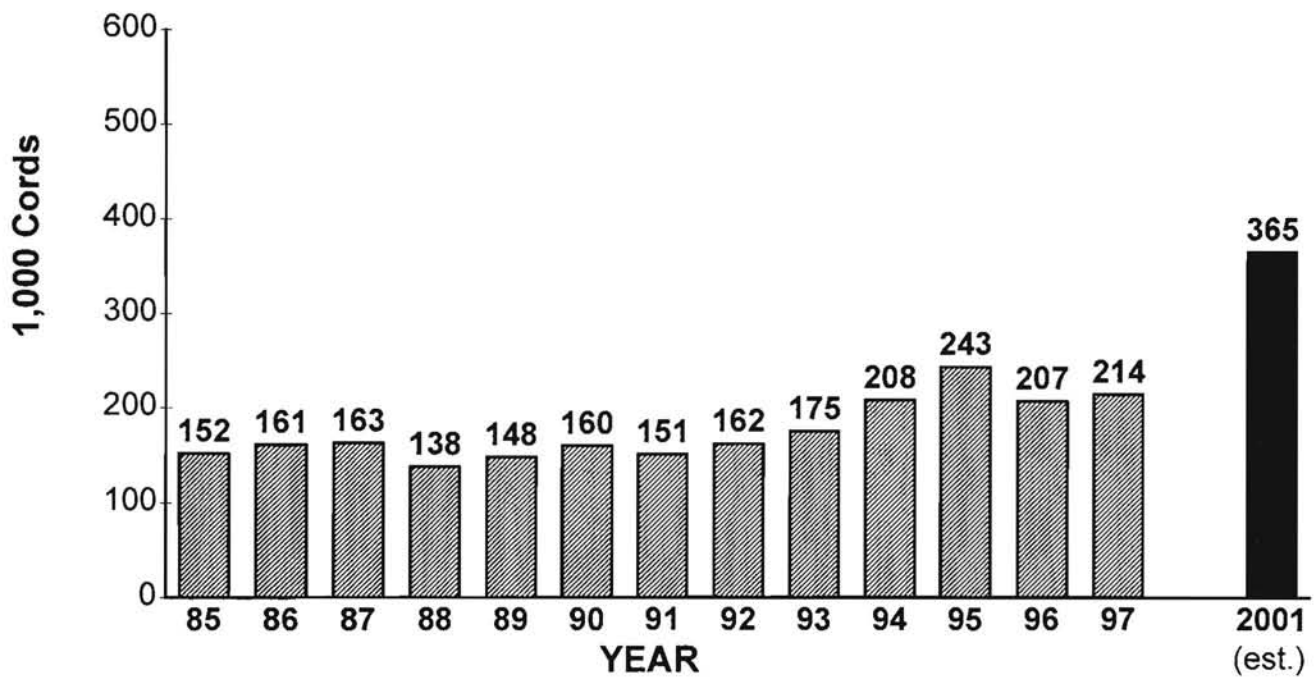
Total : 590.2 Thousand Cords / Year
from all Cover Types



Annual Sustainable Harvest (Net Volume) :

-  Volume Available from Thinnings (Age 31-100)
-  All Live Trees

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

Birch

Present and Projected Demand

1997 Harvest 213,600 cds.

- Minnesota Pulpwood Industries:
 - OSB & Hardboard 79,300 cds.
- Pulpwood Export 43,000 cds.
- Sawlogs & Other 44,300 cds.
- Fuelwood (from growing stock) . . . 47,000 cds.

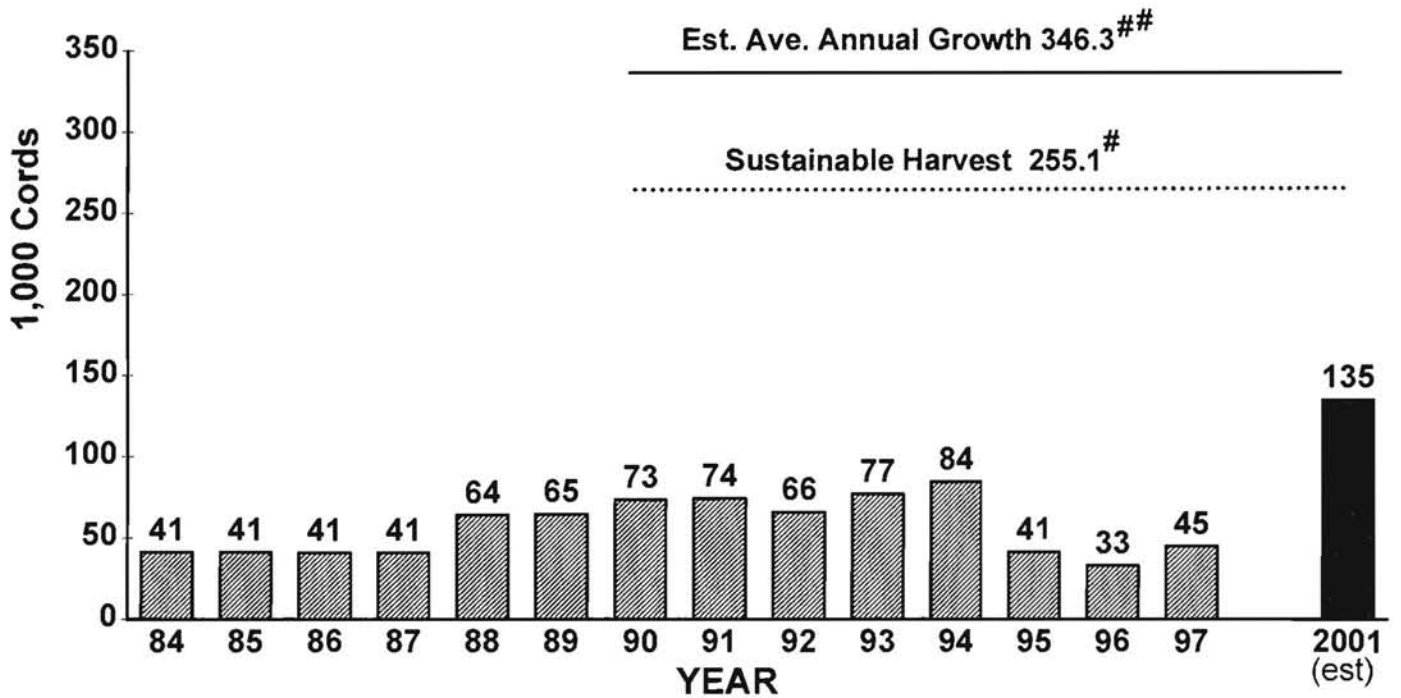
2001 Projected Harvest 365,000 cds.

- Minnesota Pulpwood Industries:
 - Pulp & Paper 120,000 cds.
 - OSB & Hardboard 70,000 cds.
- Pulpwood Export 52,000 cds.
- Sawlogs & Other 66,000 cds.
- Fuelwood (from growing stock) . . . 57,000 cds.

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

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

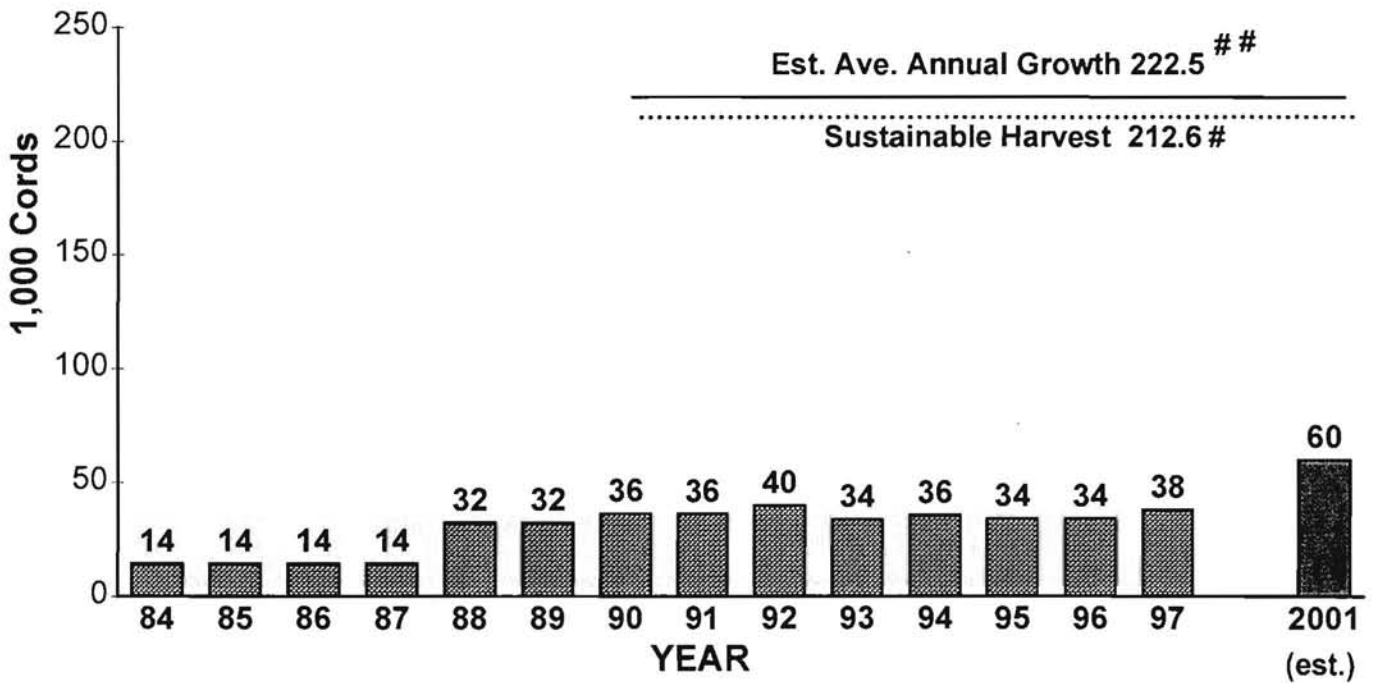
- from MN Statewide Timberland, all Ownerships -



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

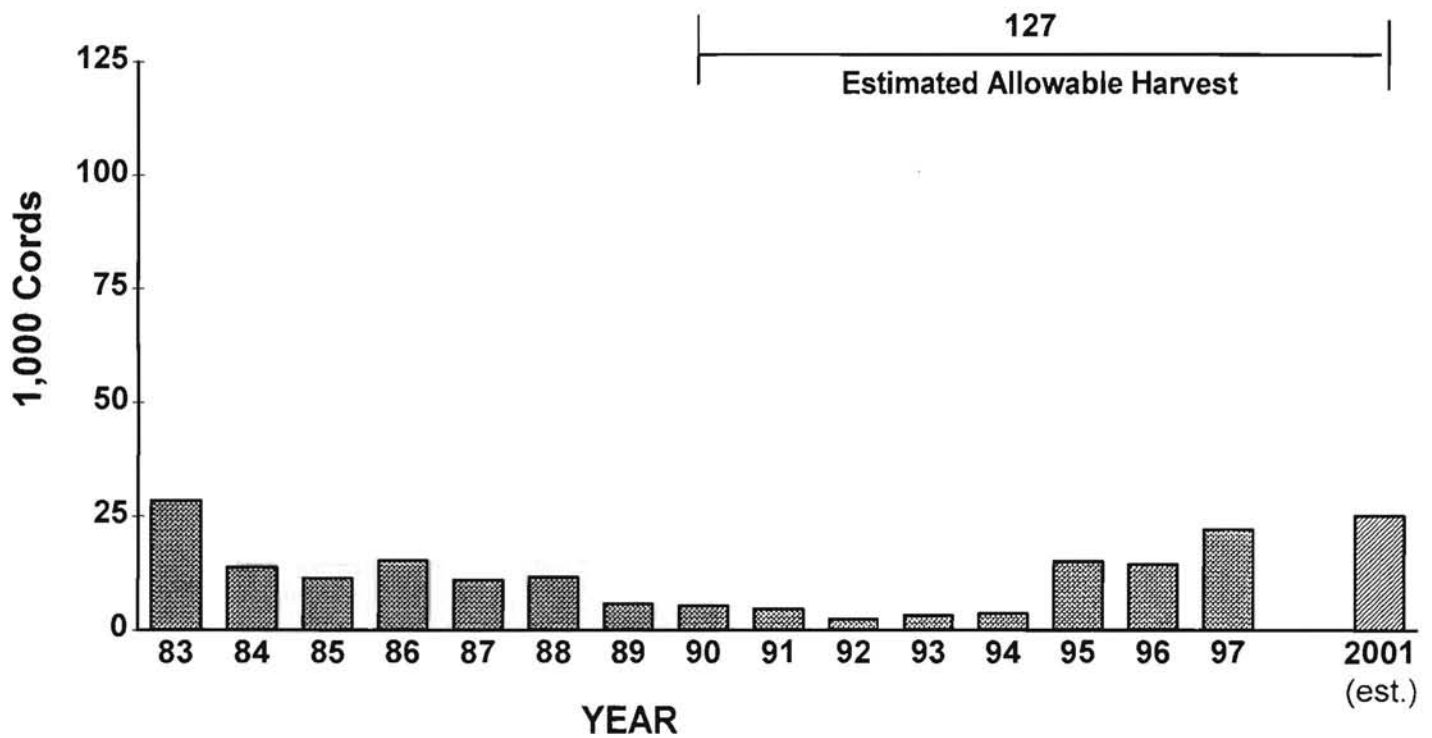
Based on MN Forest Statistics, 1990 (USDA FS Reso.Bull. NC-141, table #21)

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

**TAMARACK HARVEST in MINNESOTA : ACTUAL & PROJECTED
 COMPARED to ESTIMATED ALLOWABLE HARVEST
 - from Timberland -**



Estimated allowable harvest based on DNR method.

Tamarack

Present and Projected Demand From Minnesota

1997 Harvest 21,200 cds.

- Minnesota Pulpwood Industries . . . 1,800 cds.
- Pulpwood Export 19,300 cds.
- Sawbolts & Other. 100 cds.

2001 Projected Harvest 20,000 cds.

- Minnesota Pulpwood Industries . . . 9,300 cds.
- Pulpwood Export 10,000 cds.
- Sawbolts & Other. 700 cds.

Concerns:

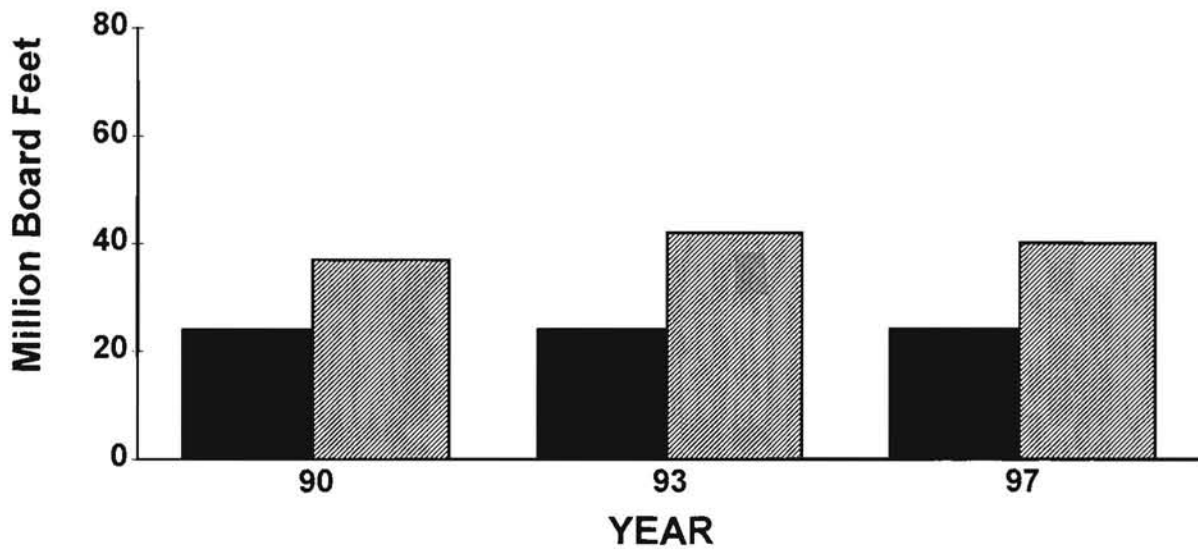
- Volume tied up in types not harvestable
- Forest types with low volume/acre of tamarack
- Some small, poor site stands
- Winter access only

Available Annual Surplus:

- 2000 50,000 to 60,000 cds.

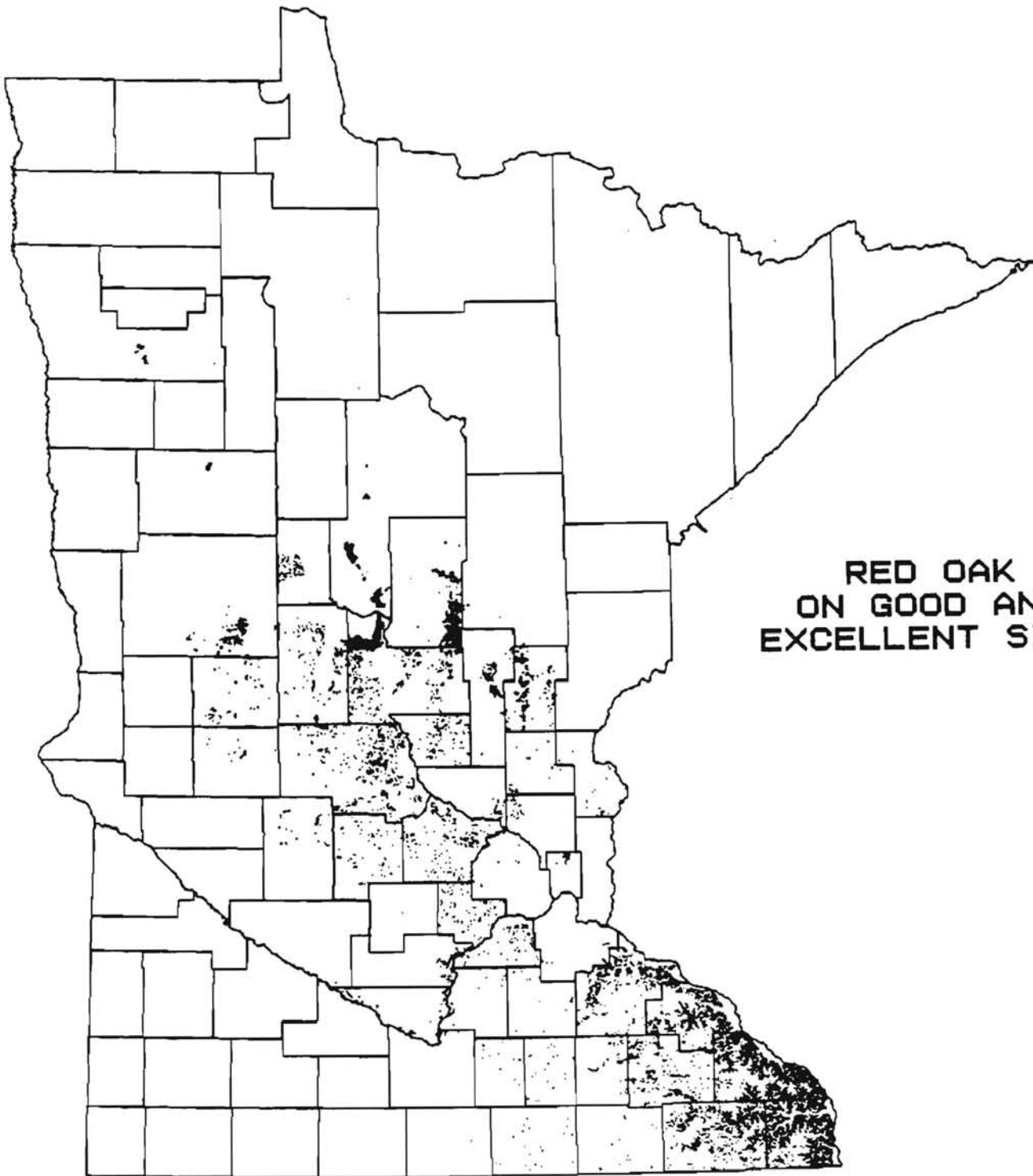
Source: NCFES & DNR Surveys
Projections based on DNR/Industry Announcements

RED OAK SAWTIMBER ESTIMATED & ACTUAL HARVEST
- Minnesota Statewide -



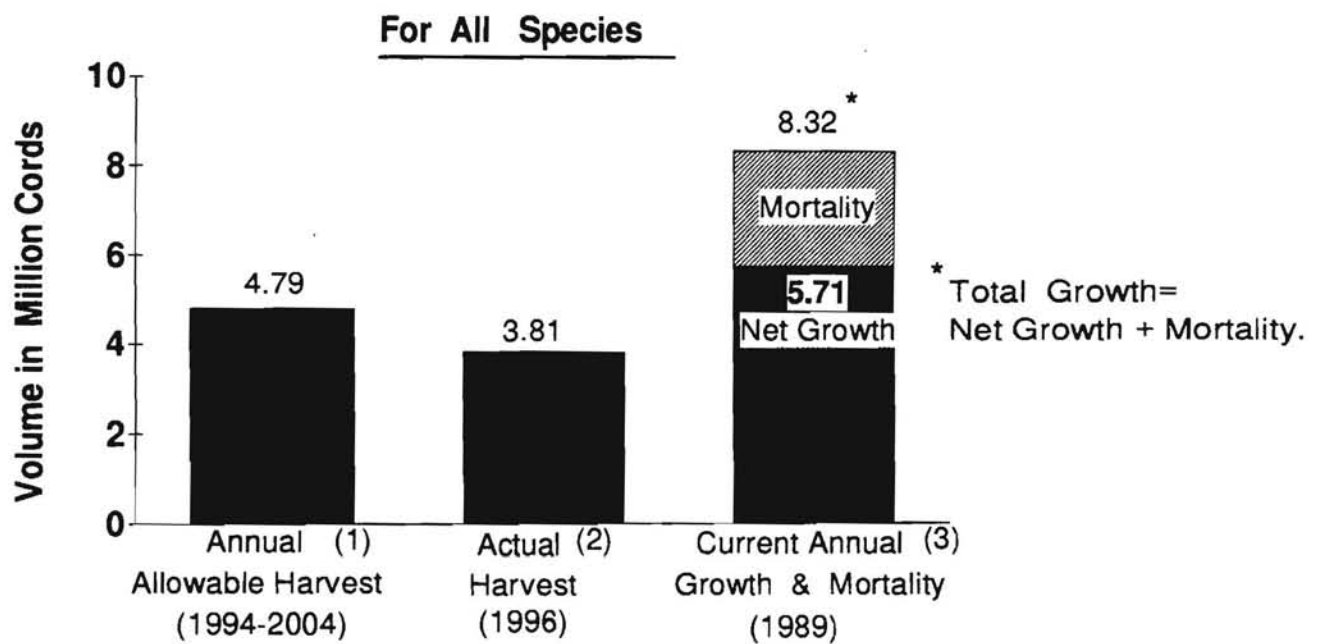
Estimated Allowable Harvest
based on Table 6.25, GEIS, Dec. 1992
(medium level)

Annual Harvest



**RED OAK
ON GOOD AND
EXCELLENT SITES**

**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.

Average Prices Received for Stumpage Sold by Public Land Agencies in Minnesota: 1989–1997

(Compiled by Doug Ford, Forest Economist, DNR-Forestry)

Pulpwood (\$s per cord)

Species	1989	1990	1991	1992	1993	1994	1995	1996	1997
Aspen	\$4.53	\$6.09	\$6.61	\$7.25	\$9.28	\$14.82	\$18.69	\$16.09	\$19.20
Balm	2.88	3.35	3.58	4.51	6.43	12.73	16.48	13.24	13.76
Birch	2.64	3.69	2.95	4.19	3.23	5.45	3.52	7.52	7.88
Ash	3.76	3.82	4.19	3.96	3.60	3.42	4.46	5.00	4.46
Oak	4.66	4.89	3.79	3.57	5.24	5.27	4.51	4.37	5.64
Mixed Hardwoods	2.77	5.58	3.34	4.32	6.35	10.96	10.07	5.67	6.14
Balsam	4.15	6.49	6.69	8.09	10.36	15.15	18.76	14.35	12.65
W. Spruce	10.61	12.42	13.27	16.46	12.16	15.66	26.18	19.06	12.80
B. Spruce	9.72	11.88	12.32	12.78	11.96	20.54	23.65	22.90	18.40
Tamarack	4.50	4.61	4.13	4.29	4.38	4.90	7.73	7.25	6.71
Cedar	7.76	9.76	9.39	9.98	8.37	9.92	10.48	10.55	11.27
J. Pine	9.75	11.34	12.79	14.65	15.99	24.81	32.08	23.48	23.59
R. & W. Pine	14.79	13.04	14.06	8.14	10.39	24.57	17.49	21.18	23.35

Sawtimber (\$s per MBF)

Species	1989	1990	1991	1992	1993	1994	1995	1996	1997
Aspen	\$17.83	\$23.34	\$23.66	\$28.53	\$37.20	\$64.67	\$68.93	\$71.22	\$93.83
Birch	18.87	20.87	24.24	26.38	26.34	43.12	50.67	52.31	36.60
Ash ^b	36.52	49.44	63.37	90.63	106.62	132.52	151.28	147.18	108.93
Elm	35.12	38.77	36.26	36.93	48.90	50.68	47.02	60.08	107.20
Oak ^a	74.11	73.40	64.45	73.99	91.69	110.67	156.88	177.30	155.97
Basswood	NA	NA	NA	NA	66.80	90.60	120.91	105.37	107.07
Balsam	16.97	20.54	23.29	25.39	34.30	52.95	55.10	61.49	71.61
W. Spruce	38.94	54.34	42.58	45.48	48.04	72.45	77.79	73.47	83.23
Cedar	25.32	29.63	33.19	29.69	33.88	37.59	38.55	42.58	37.00
J. Pine	53.43	62.83	62.72	72.96	83.59	120.51	136.55	108.37	115.46
R. & W. Pine	88.90	93.55	101.13	108.84	132.83	183.95	171.55	163.64	174.34

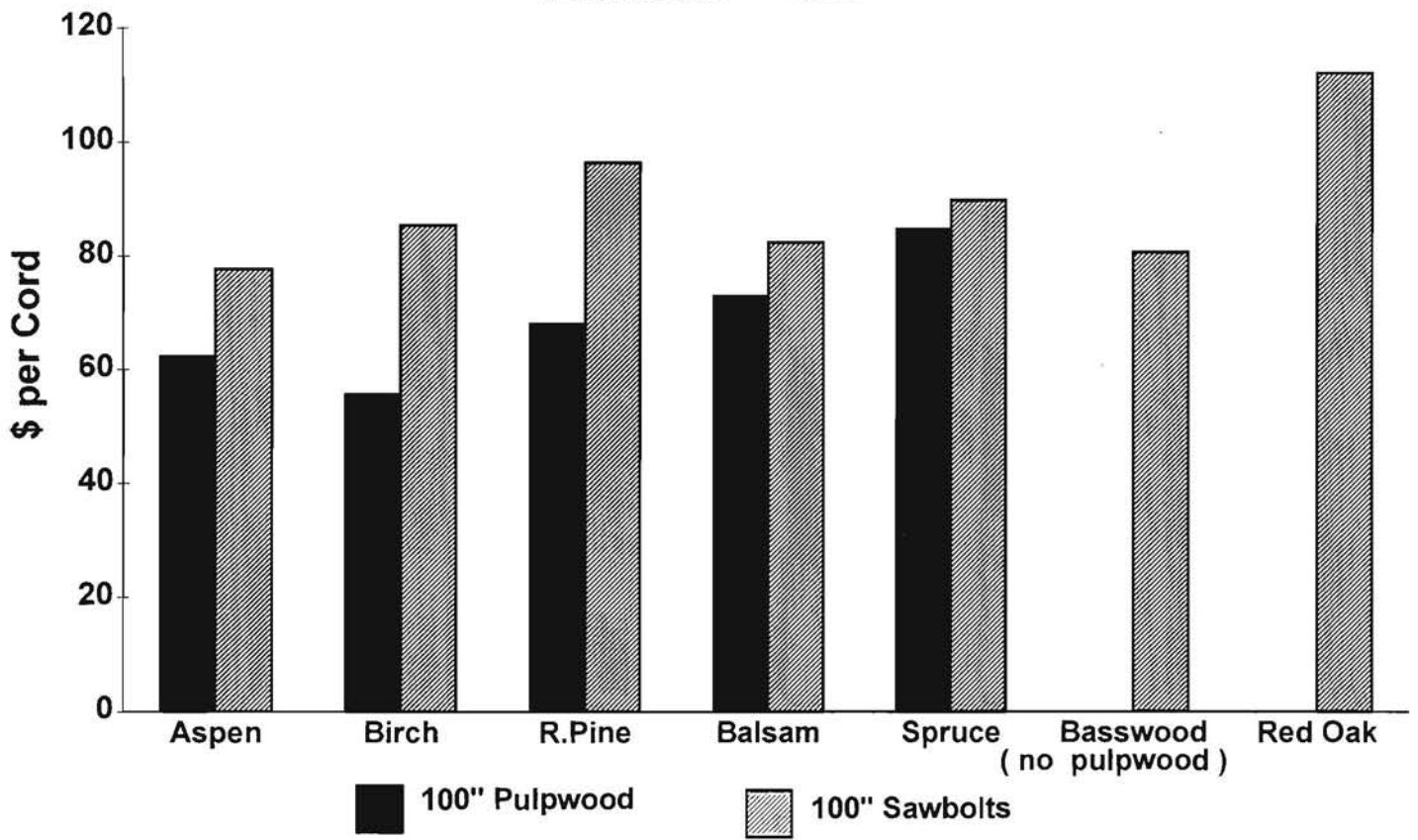
Pulpwood prices based on 1.28 million cords sold; sawtimber based on 115 MMBF.

^a Oak sawtimber prices mainly from public lands in northern Minnesota.

^b Black ash: includes veneer.

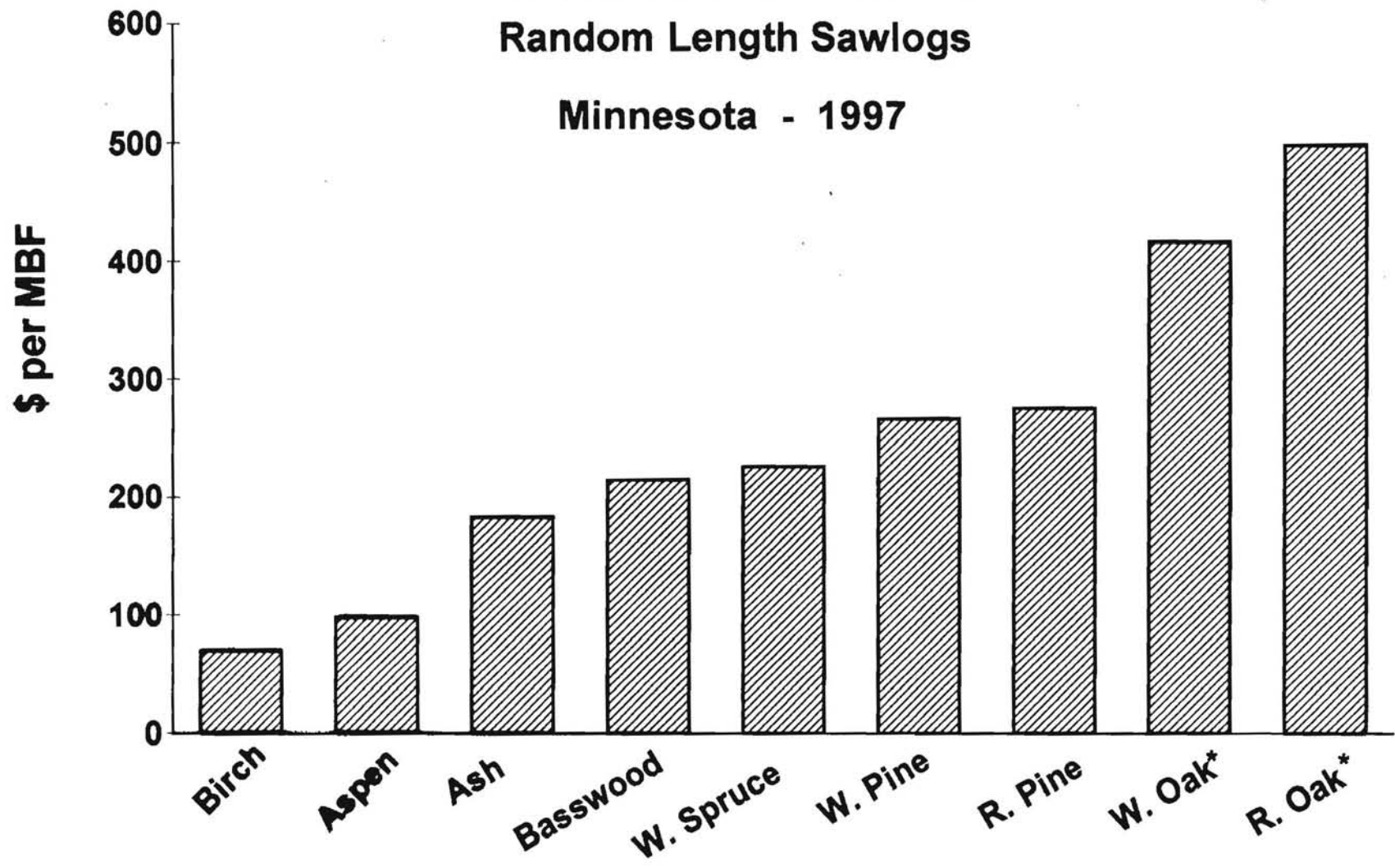
Average prices based on those reported by Minnesota counties. Chippewa and Superior National Forests, Bureau of Indian Affairs, and Minnesota DNR-Forestry.

MILL DELIVERED PRICES Minnesota - 1997



Source : DNR Survey

**MILL DELIVERED PRICES
Random Length Sawlogs
Minnesota - 1997**



* may include some veneer logs

DNR Survey

VENEER LOG SPECIFICATIONS

<u>SPECIES</u>	<u>DIAMETER</u>	<u>LENGTH</u>
Black Ash (export)	12" +	8' 8" ; 9' 8" ; 10' 8"
White /Bur Oak (domestic)	12" +	7' 8" & longer
(export)	16" +	6' 8" & longer
Red Oak (domestic)	16" +	8' 8"
Walnut (export)	16" +	9' 8" & longer
Basswood (domestic)	12" +	6' 6" & longer
Yellow /White Birch (domestic)	12" +	8' 8"
(export)	14" +	8' 8" & longer
Hard Maple (70% sapwood)	12" +	8' 8" & longer

FACTORS AFFECTING FUTURE WOOD SUPPLY in MINNESOTA

1) Improved Utilization Standards

- use trees to 3" top diameter
- untapped stagnant black spruce
- thin kerf sawing technology

2) Technology Improvements

- cut - to - length systems
- other low impact logging
- recycled paper pulp
- wood fiber / plastic composites

3) Insects and Diseases

- spruce budworm
- gypsy moth

4) Other Fiber supplies

- Canadian mill expansions
- alternative species :
birch, maple, tamarack
- thinnings from aspen, white spruce,
and pine
- Wisconsin forest resources
- hybrid and native cottonwood
plantations
- seasonal availability

5) Management Policies

- extended rotation forests (ERF)
- old growth
- riparian considerations
- best management practices (BMP's)
- Aitkin county public land assessment