An Examination of Red Alder and Western Red Cedar as Alternative Plantation Choices to Douglas-fir

Washington Farm Forestry Association
April 4, 2003


The Pacific Northwest has always been the Douglas fir region

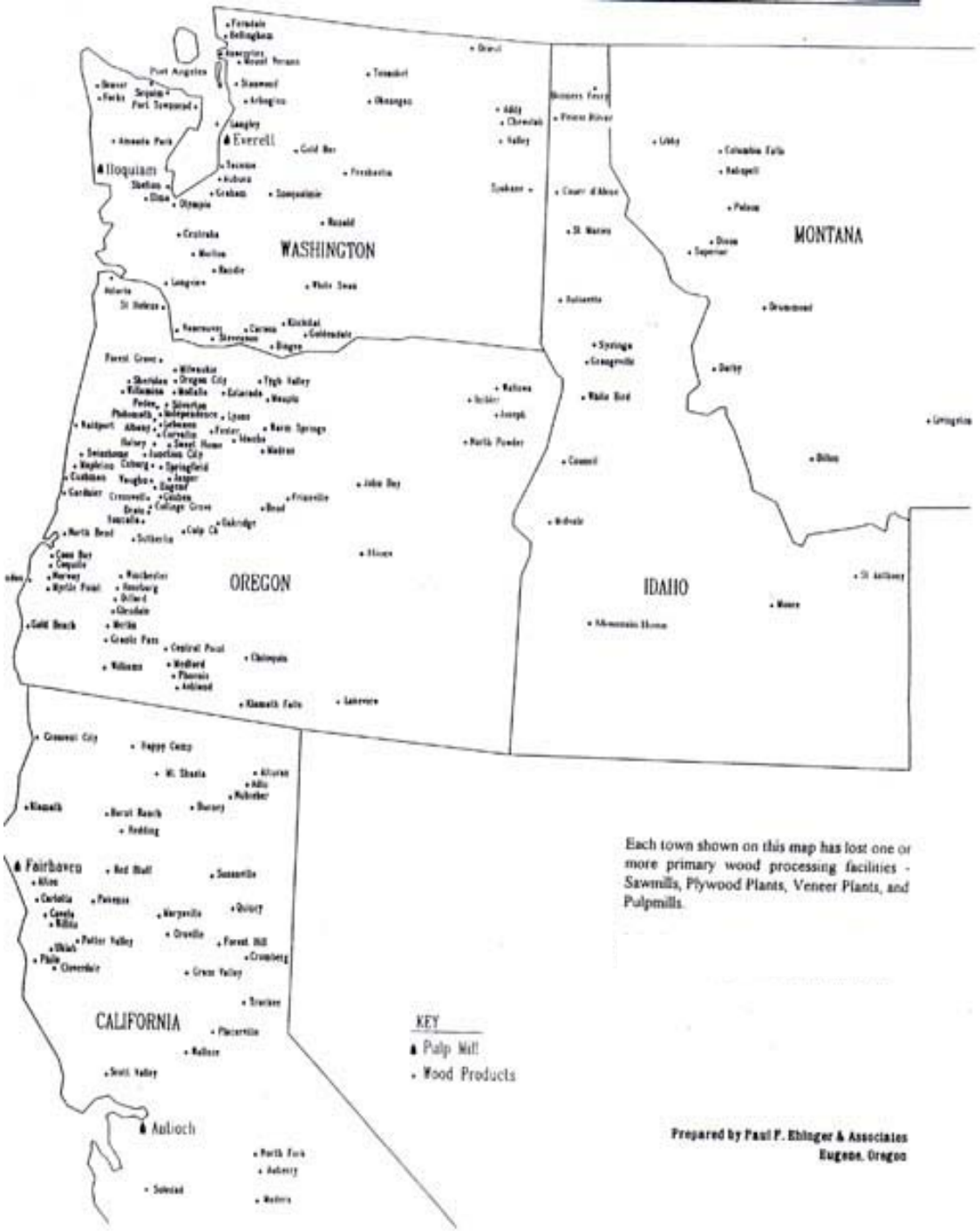
But over now are the large log Douglas fir harvests that made this region famous…

…and gone also are premium prices for large high grade logs. Most mills have either closed or retooled for small diameter second growth logs.

Mill Closures 1989-2002

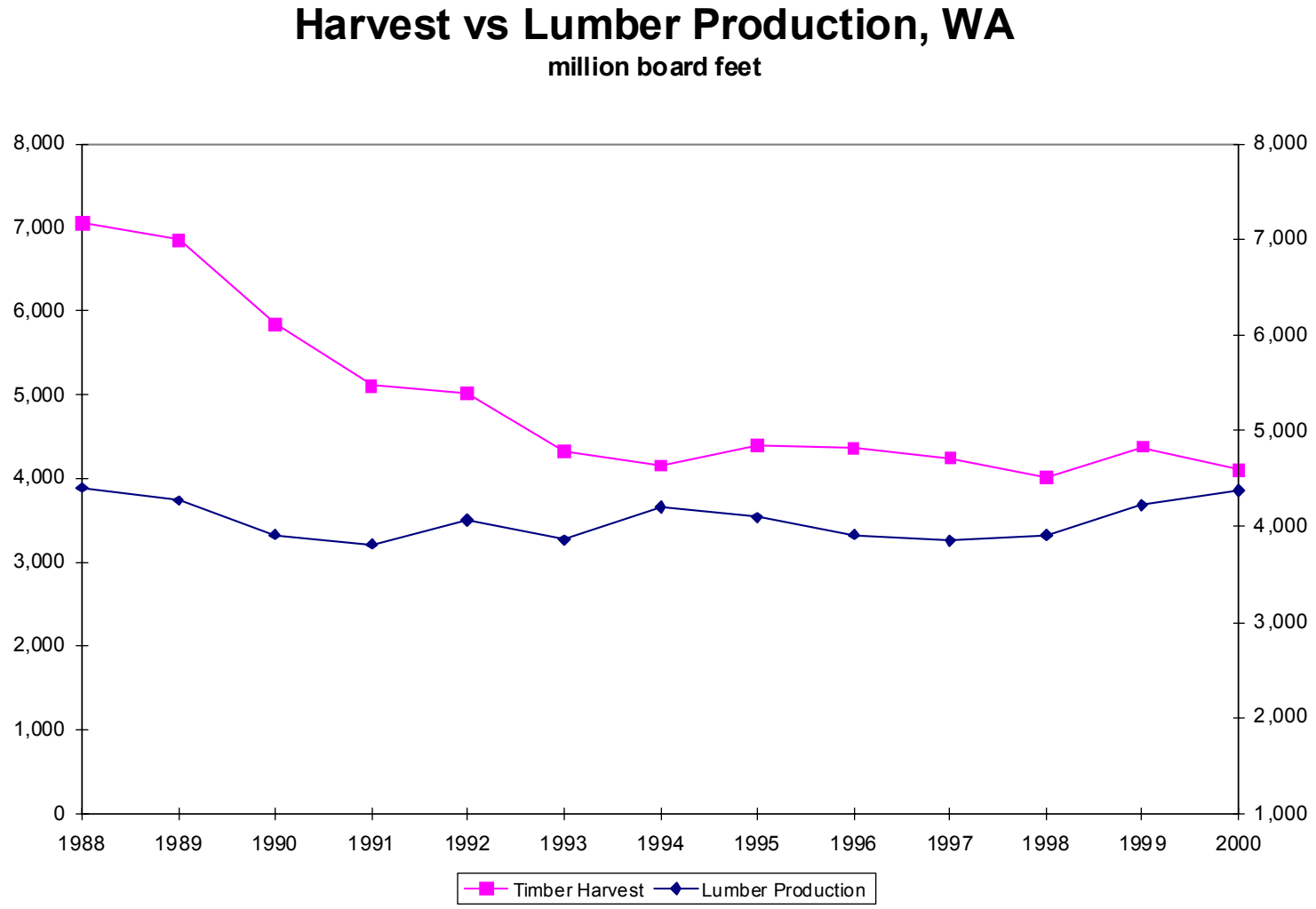
14 years

378 mills



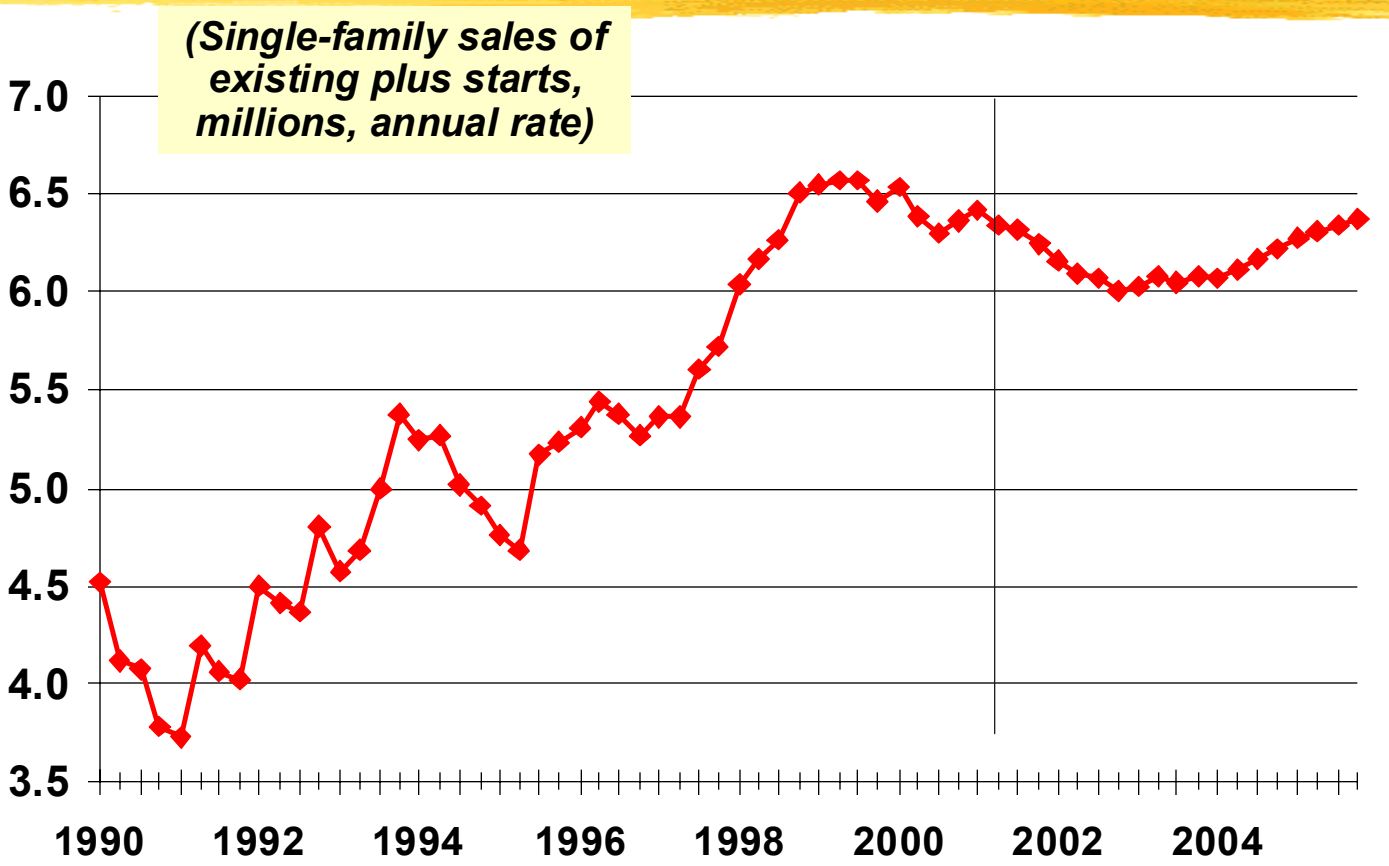
Shorter rotations, smaller logs, commodity products

Developments in small log sawmill technology lead to gains in productivity that help offset harvest reductions



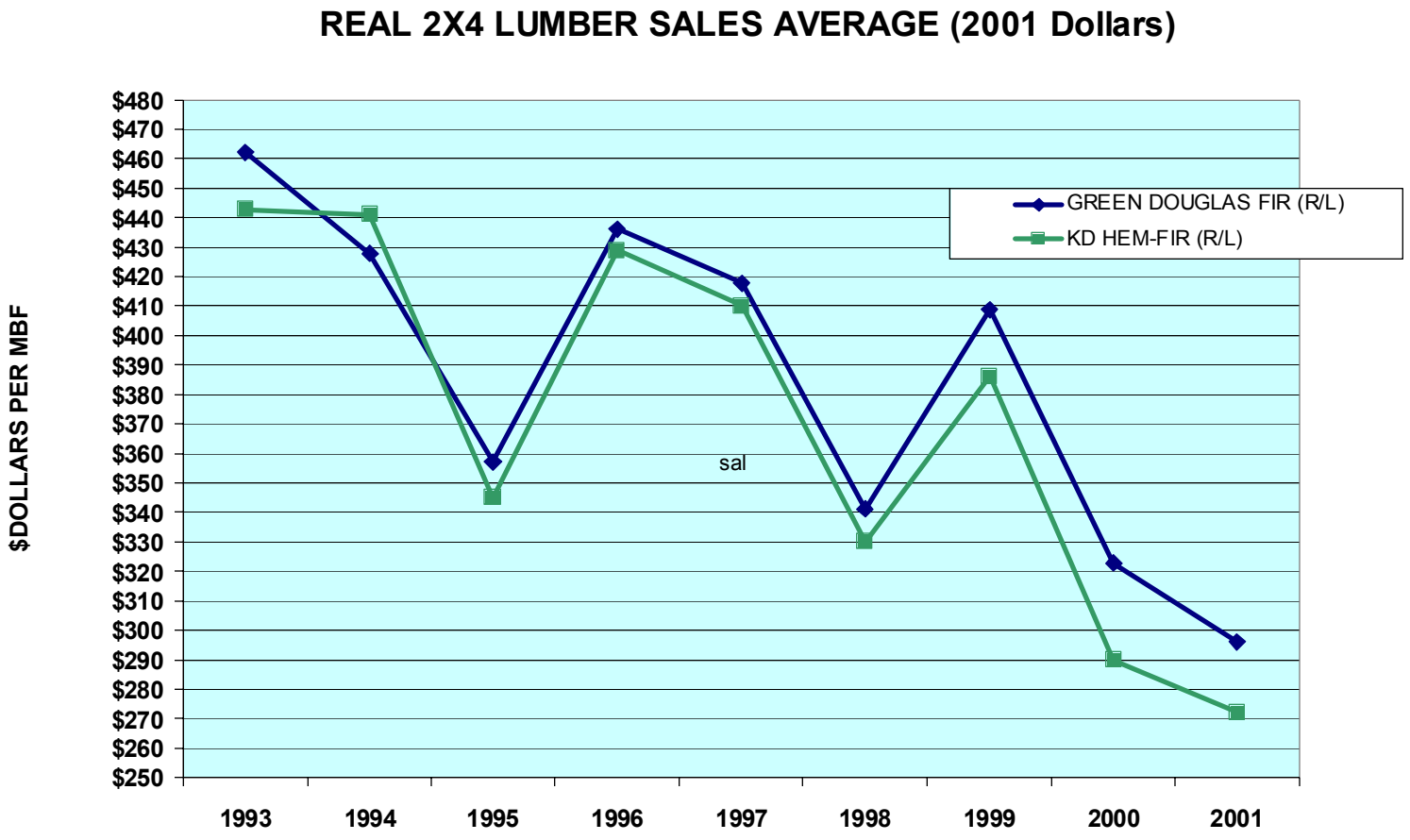
Source: Production, Prices, Employment, and Trade in Northwest Forest Industries, All Quarters 2000; Debra D. Warren; WWPA

Lower Interest Rates Are Keeping U.S. Housing Strong

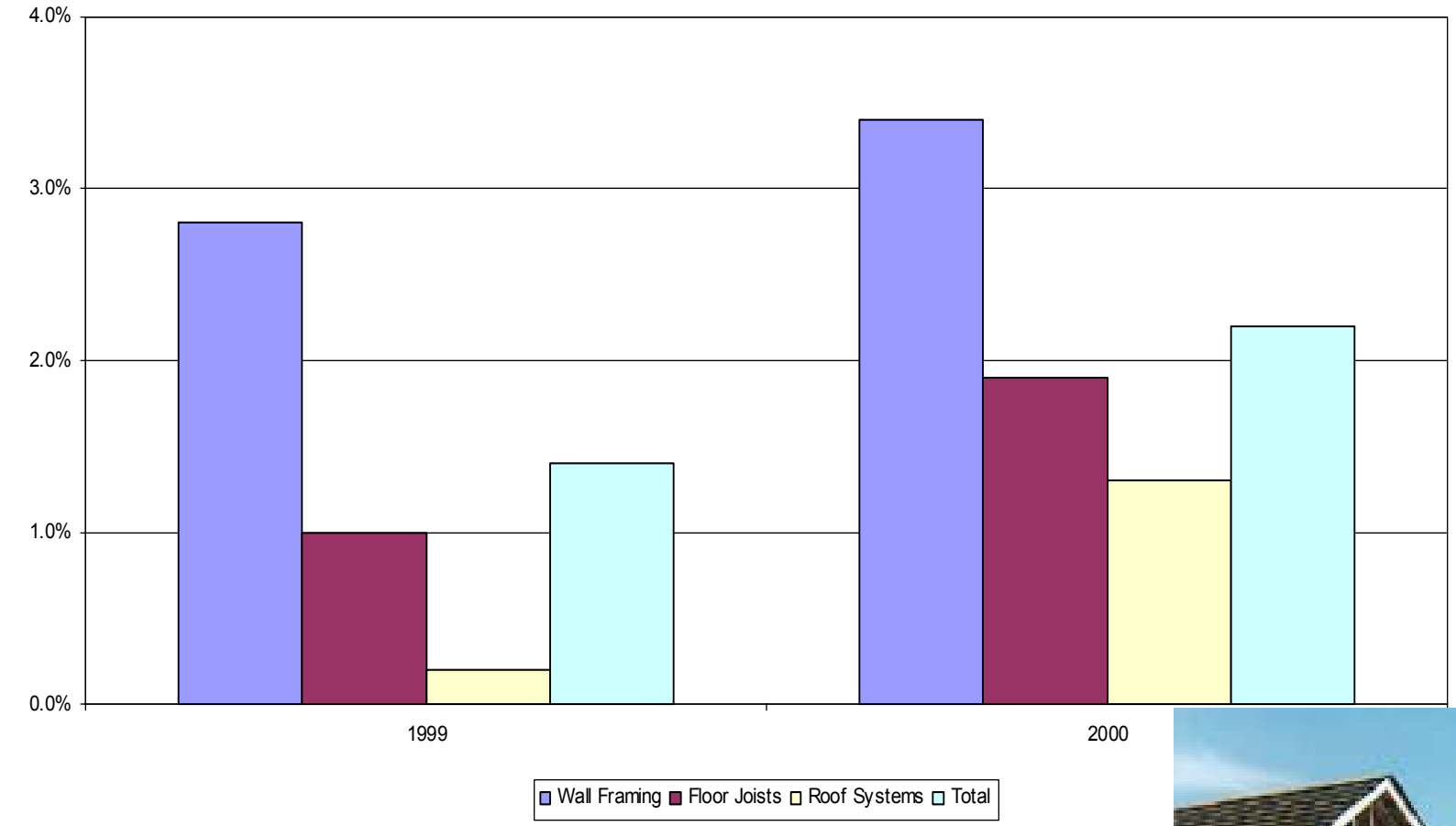


Source: Nariman Behravesh, Chief International Economist & Research Director, DRI• WEFA

But in spite of low interest rates and strong housing starts lumber prices are low



Source: WWPA and Bureau of Labor Statistics

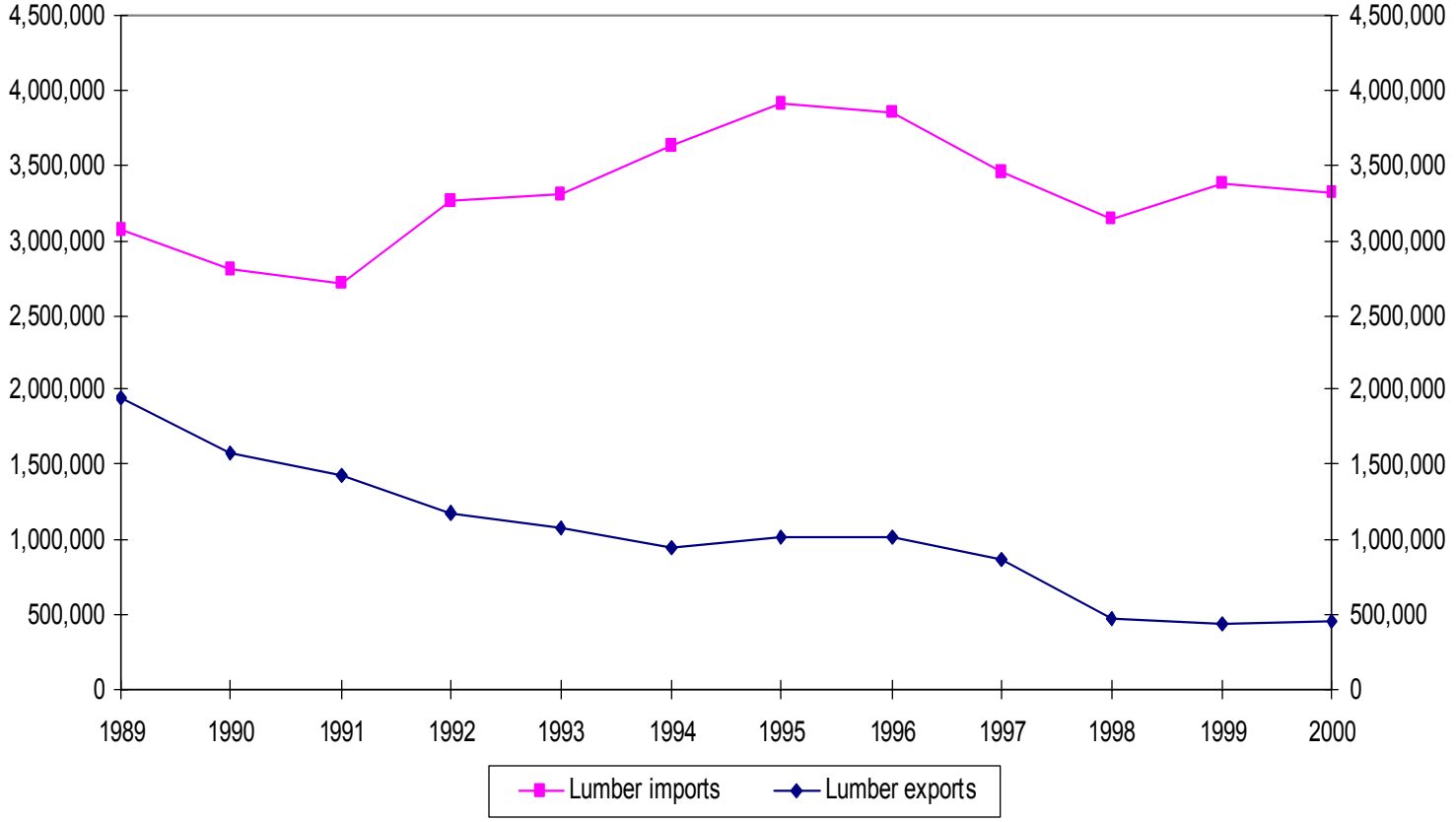


Steel building materials compete favorably and gain market share.

Source: NASFA

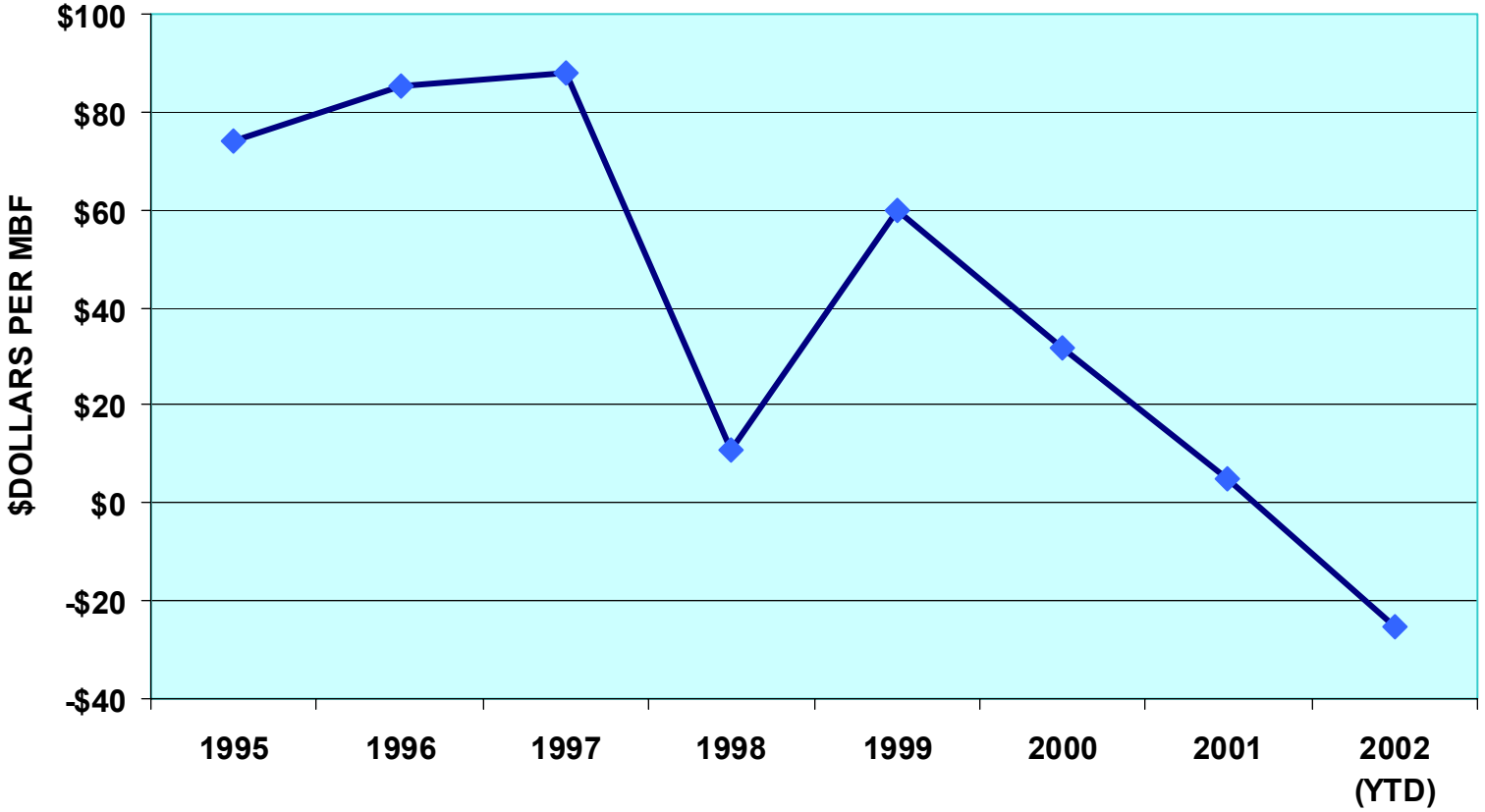
Lumber Imports compete favorably for domestic markets while Lumber Exports decline

Lumber Imports vs Exports, Seattle and Columbia-Snake Customs Districts



Source: US Dept of Commerce, Census Bureau Data

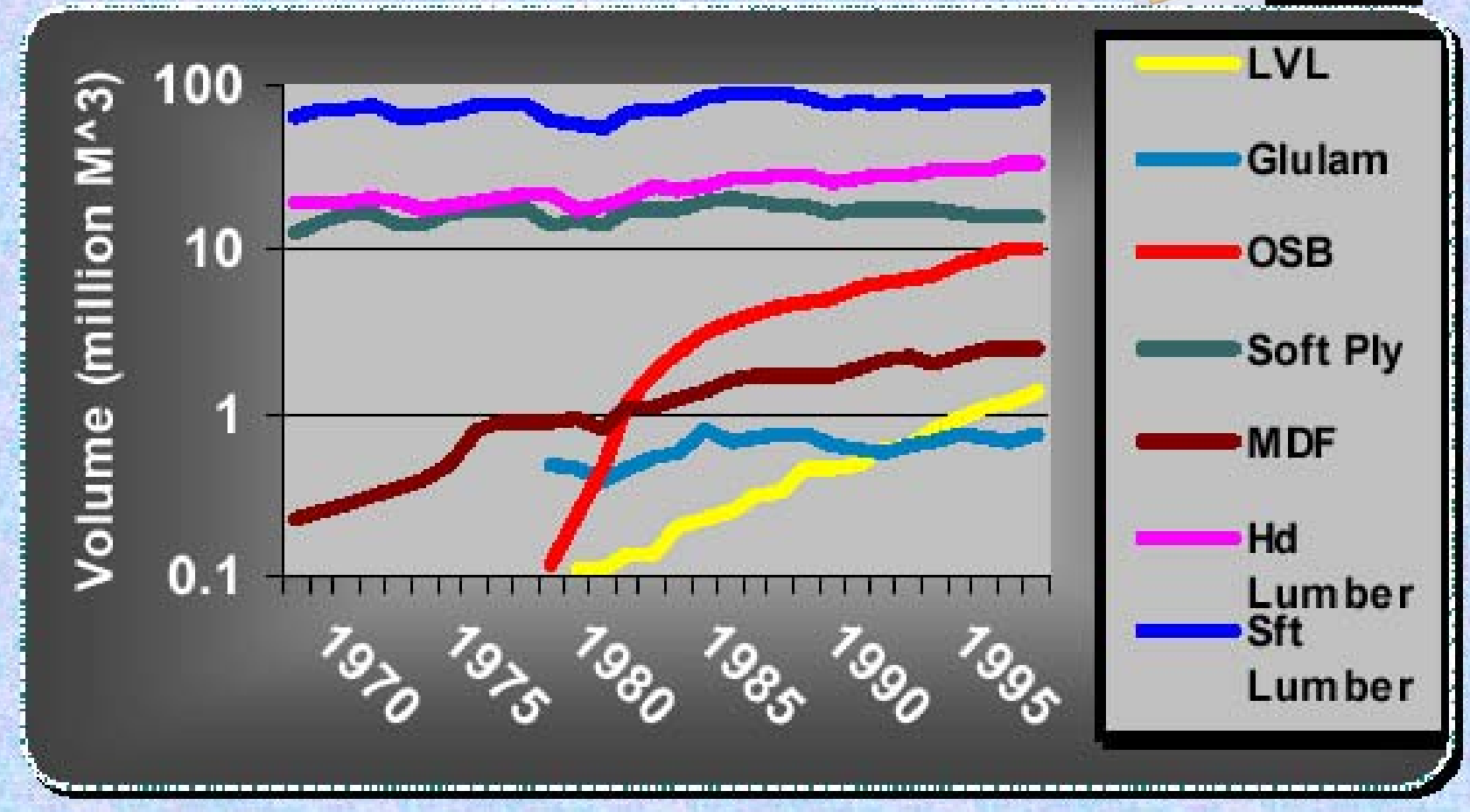
$ Premium in Sales Average Between Green Doug Fir Dimension and Studs*



* Green Doug Fir 2"x10/12" R/L dimension lumber and green Doug Fir studs 2"x4" 8/9'

Source: *Random Lengths*

U.S. Production of Wood & Composites

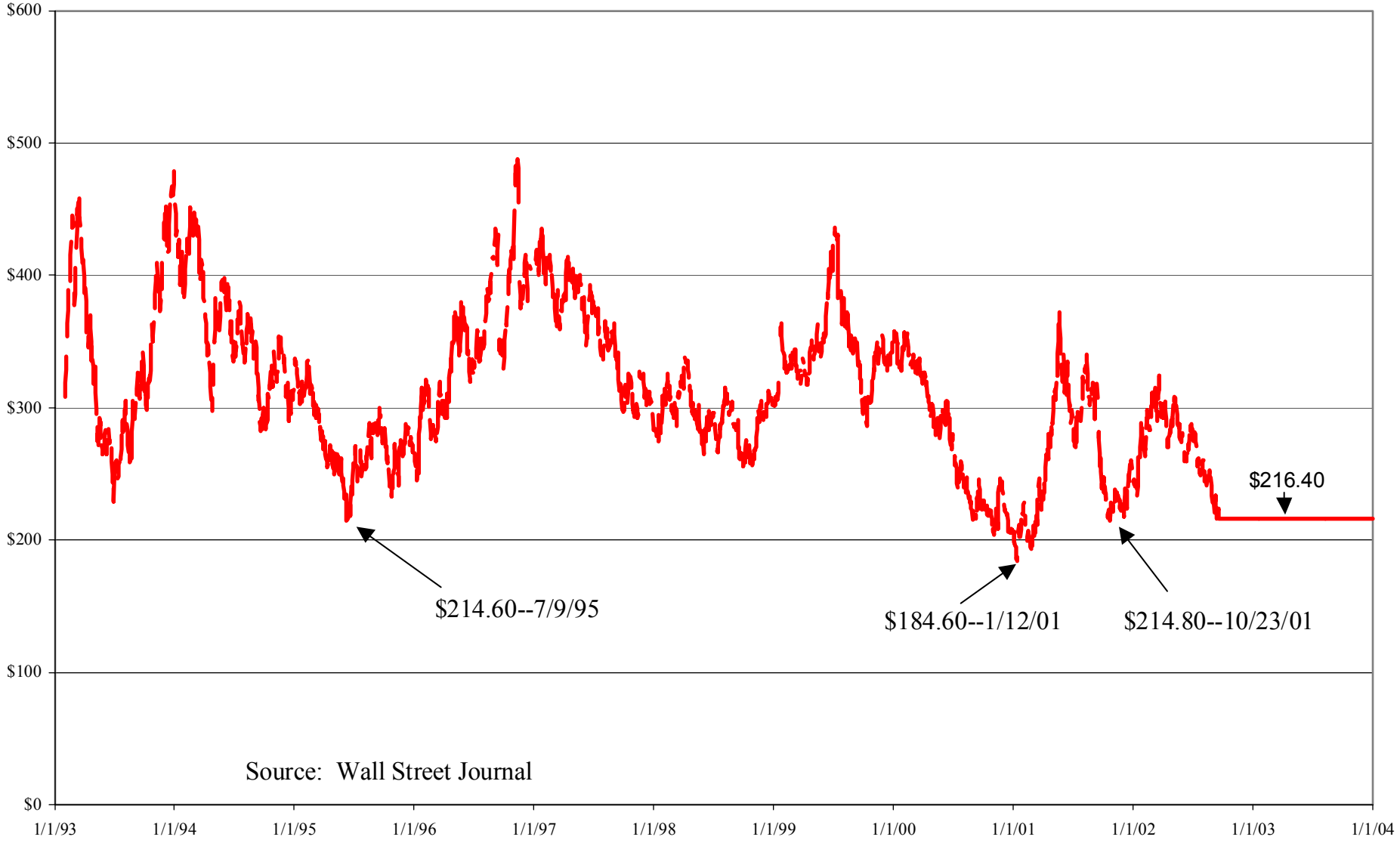


J.Howard GTR-116, 2001

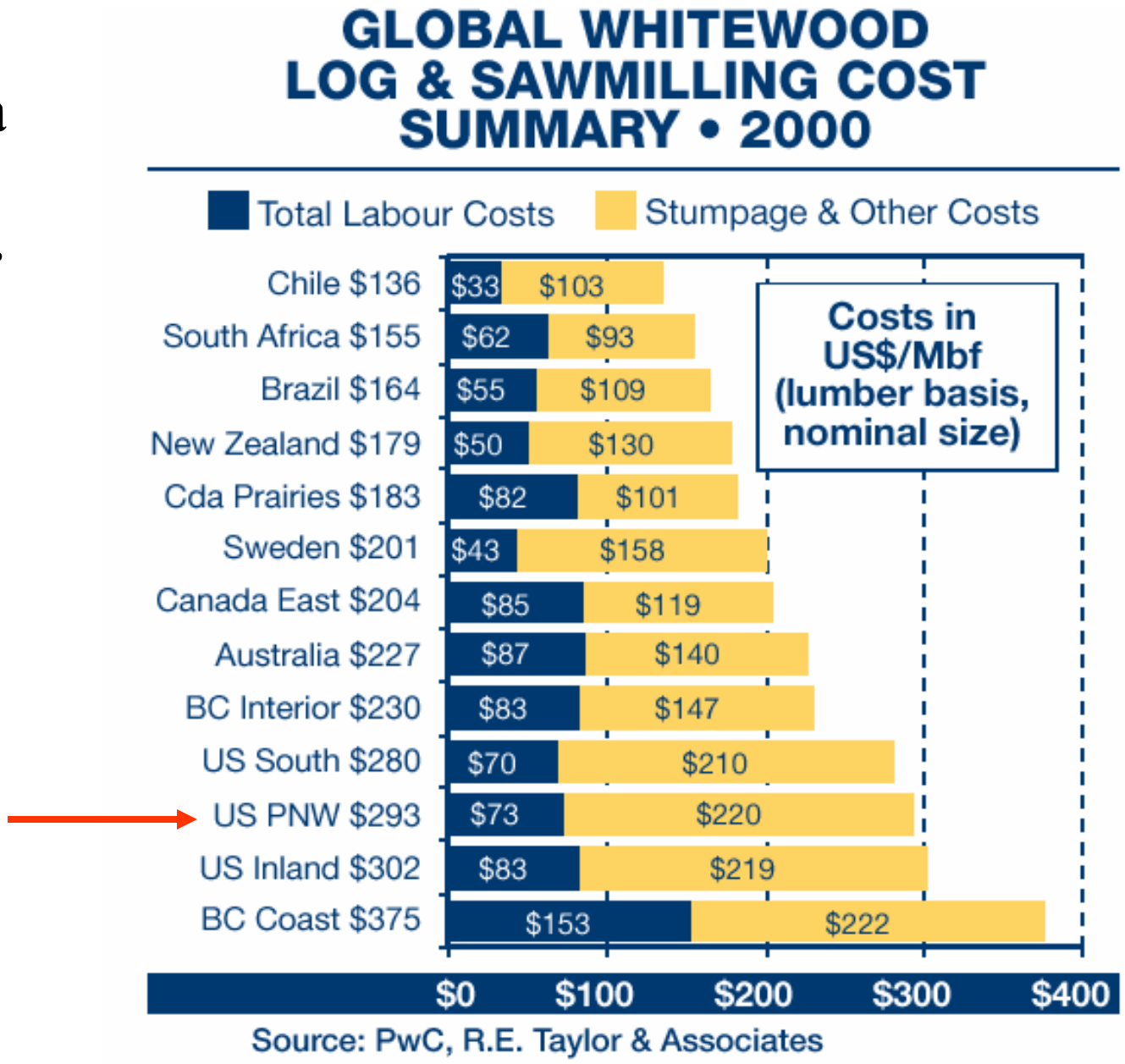
Douglas fir #2 saw log prices retain a $100-150/mbf premium over western hemlock log prices but…

…in a big box store a stud is a stud!

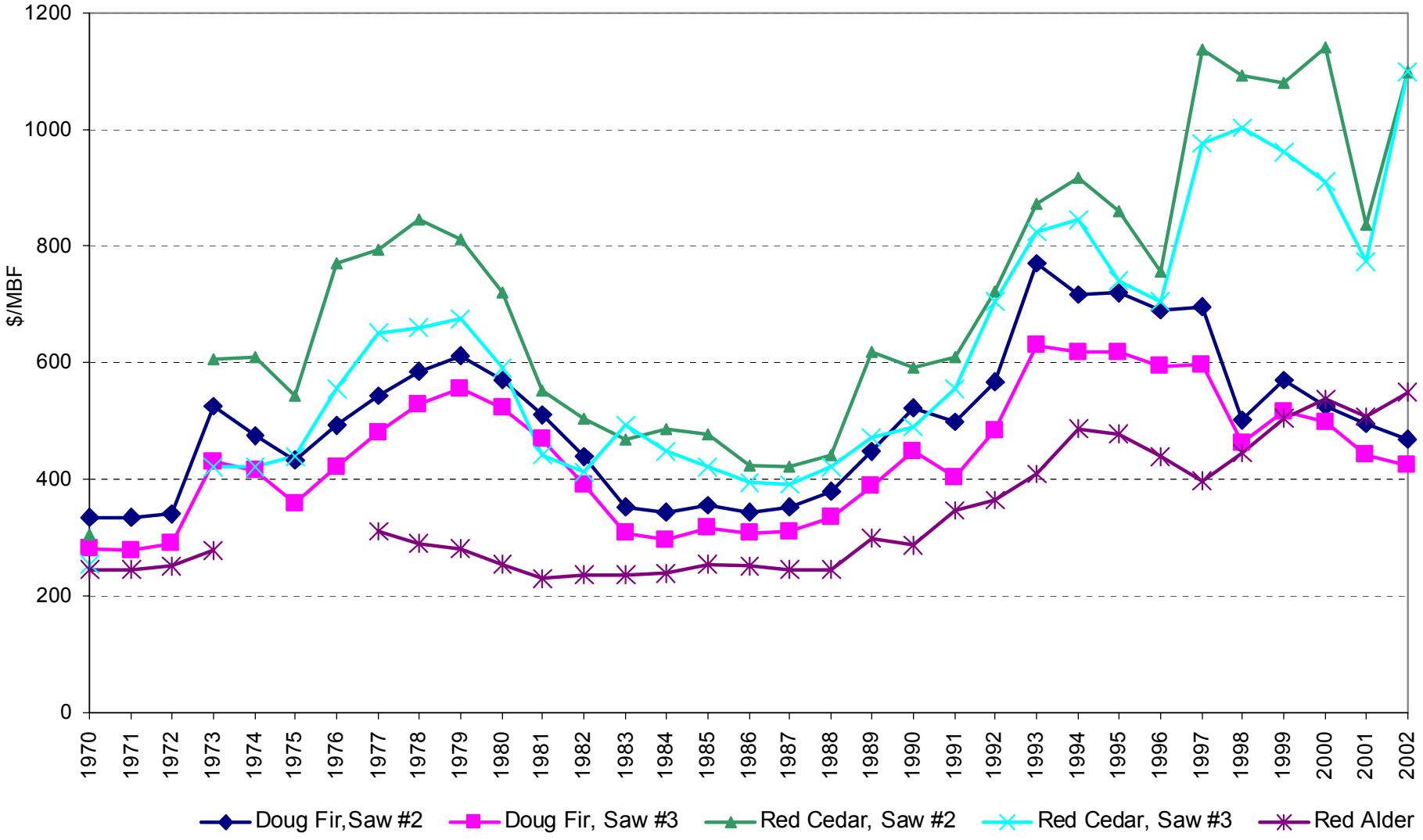
Lumber Futures--Daily Close



PNW is a high cost producer



Region 1 Log Prices, Adjusted for Inflation in 2002 $



Source: Log Lines, Forest Product Price Report, Timber Management Plus

What might be the Silvicultural implications of these circumstances?

There are a few more things to consider…

Source: Swiss Needle Cast Cooperative, USDA Forest Service

On the Oregon coast near Tillamook, an epidemic of **SWISS NEEDLE CAST** began in the 1990's and covers about 50,000 ha. today.

In 1940, Boyce considered Swiss needle cast to be widespread but harmless in the Pacific Northwest. However, since about 1990 observers have noticed increased severity and damage from the disease. It is attacking younger foliage than before and may be causing as much as 50% volume growth loss in some areas.

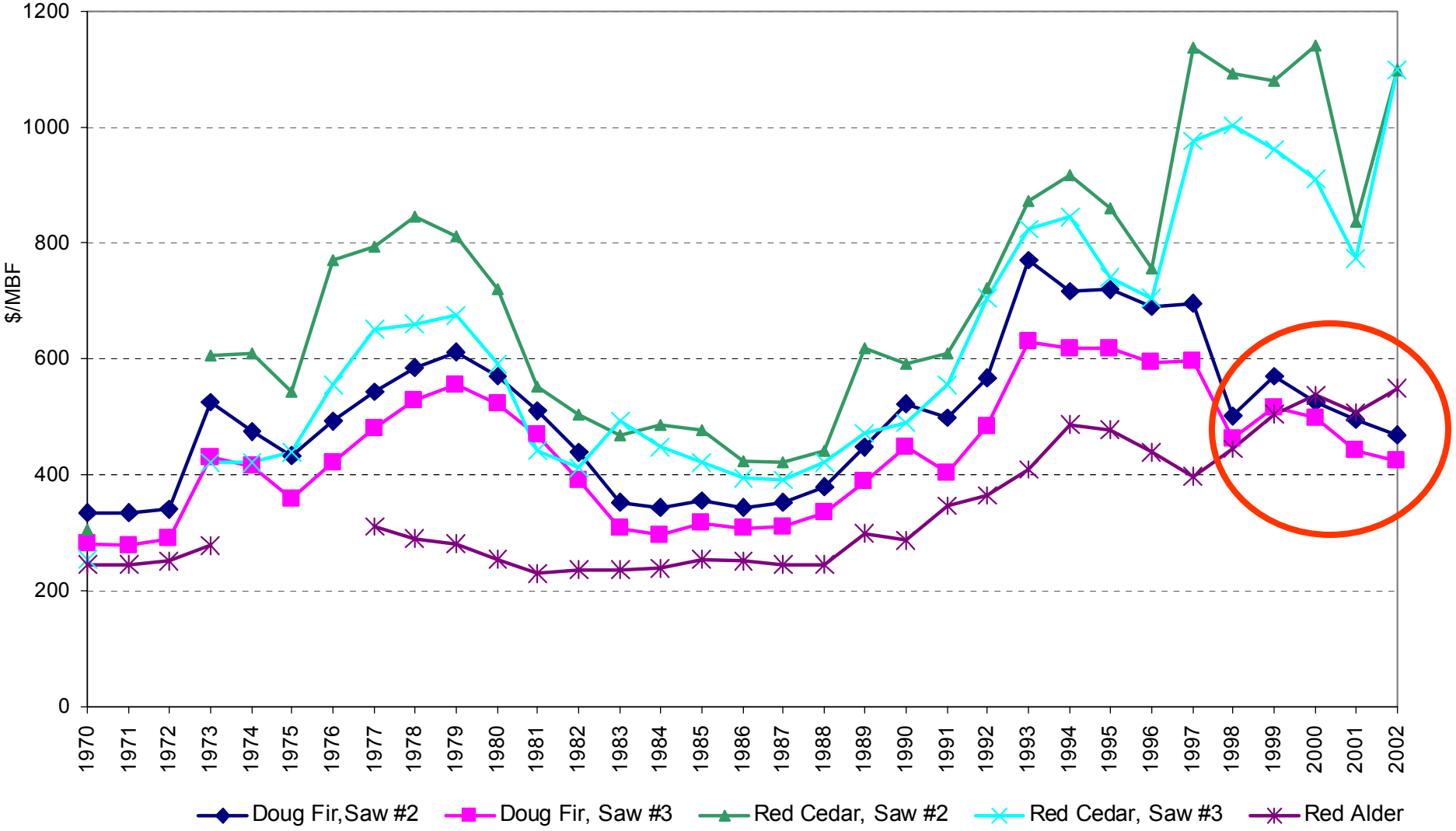
Several types of **ROOT ROT** are estimated to affect about 10% of Douglas fir stands in the PNW. Annual losses are estimated at 4.4 million m^3 (157 million ft^3) of timber in the Northwestern United States and in British Columbia. Infected areas may can remain a hazard to new Douglas fir planting for as long as 100 years.

Source: USDA Forest Service, Dr. Bob Edmonds

On selected sites western red cedar and red alder may be attractive regeneration alternatives to Douglas fir.

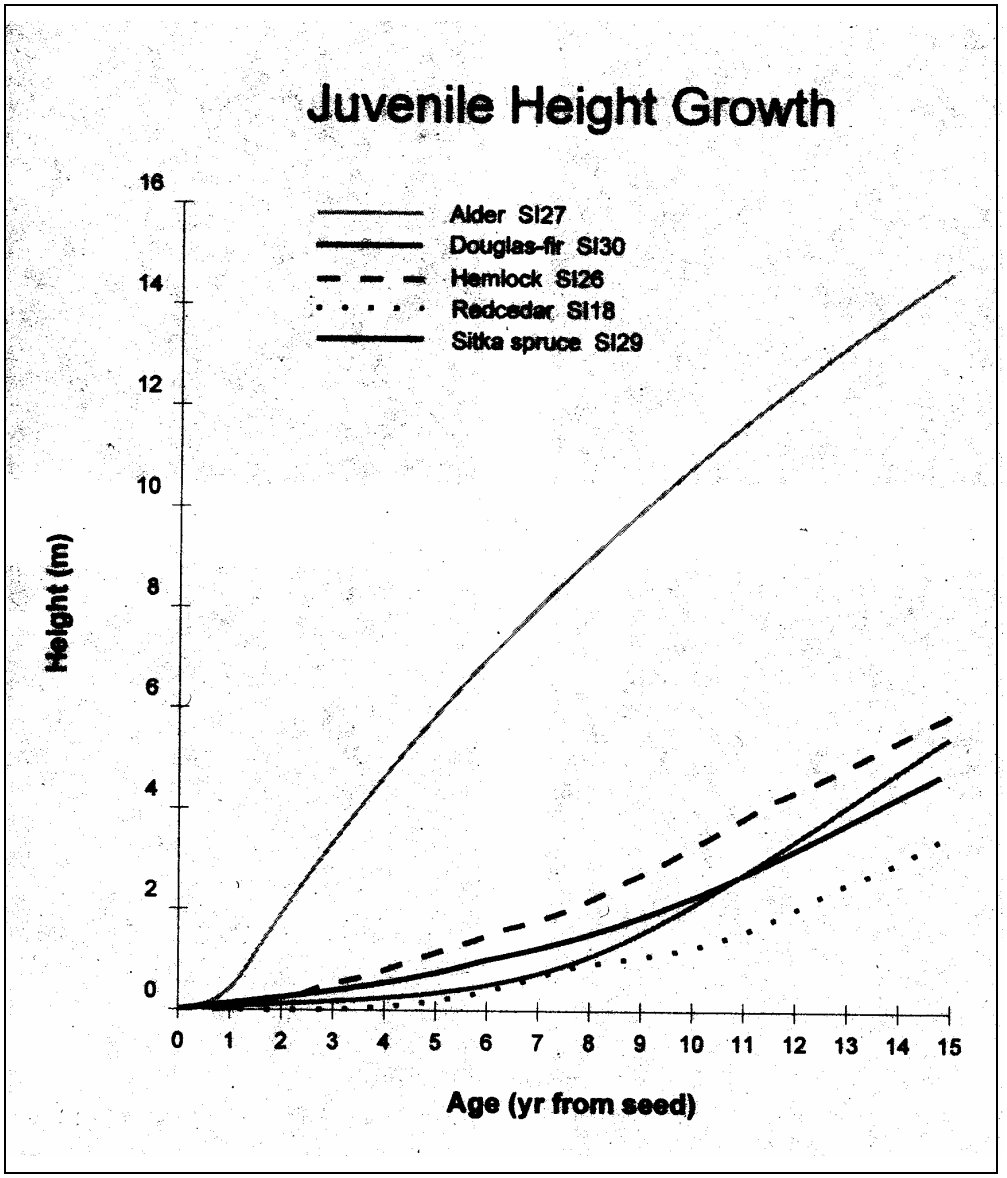
Source: UBC Forestry, Hardwood Silviculture Cooperative

Region 1 Log Prices, Adjusted for Inflation in 2002 $



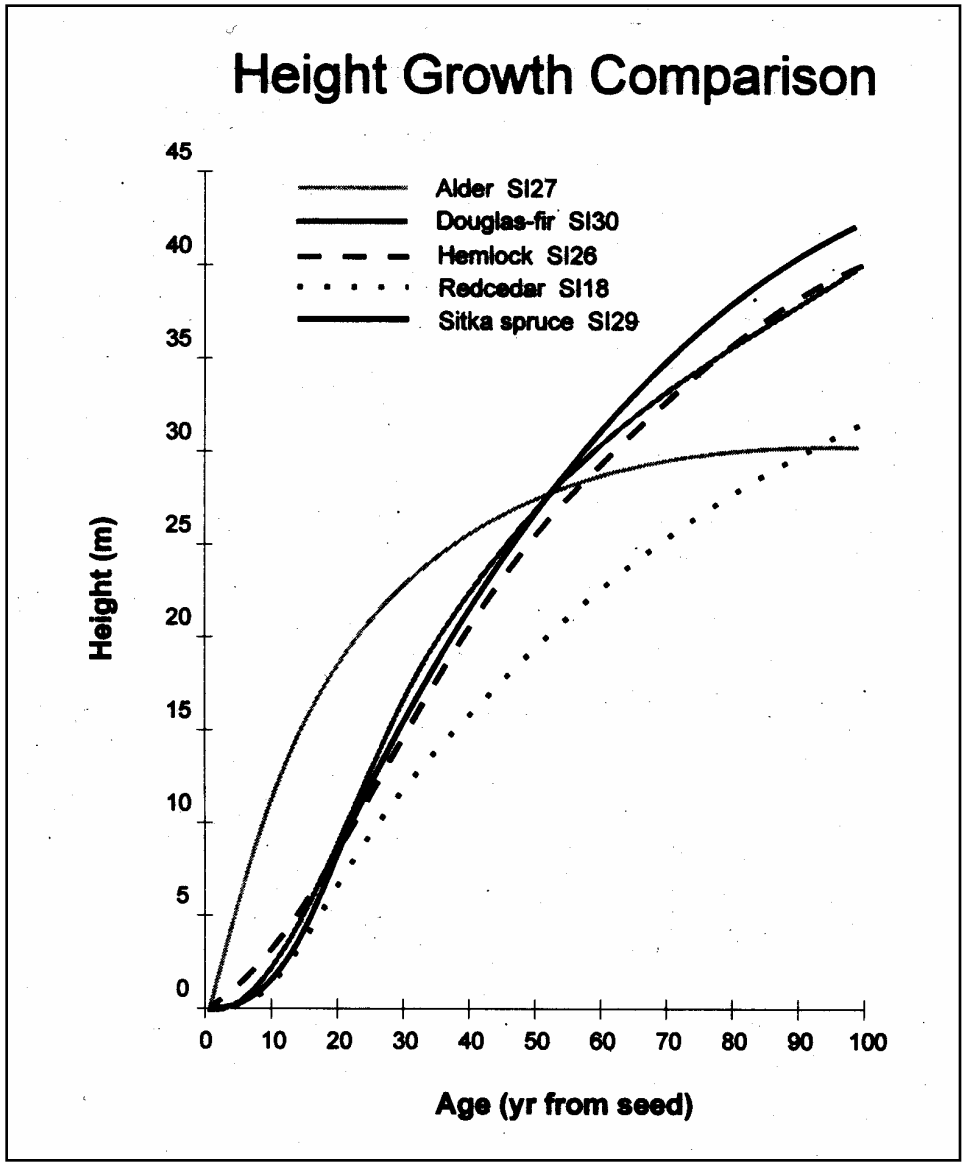
Source: Log Lines, Forest Product Price Report, Timber Management Plus

Red Alder **grows very rapidly if not planted in frost pockets or on south facing slopes.**



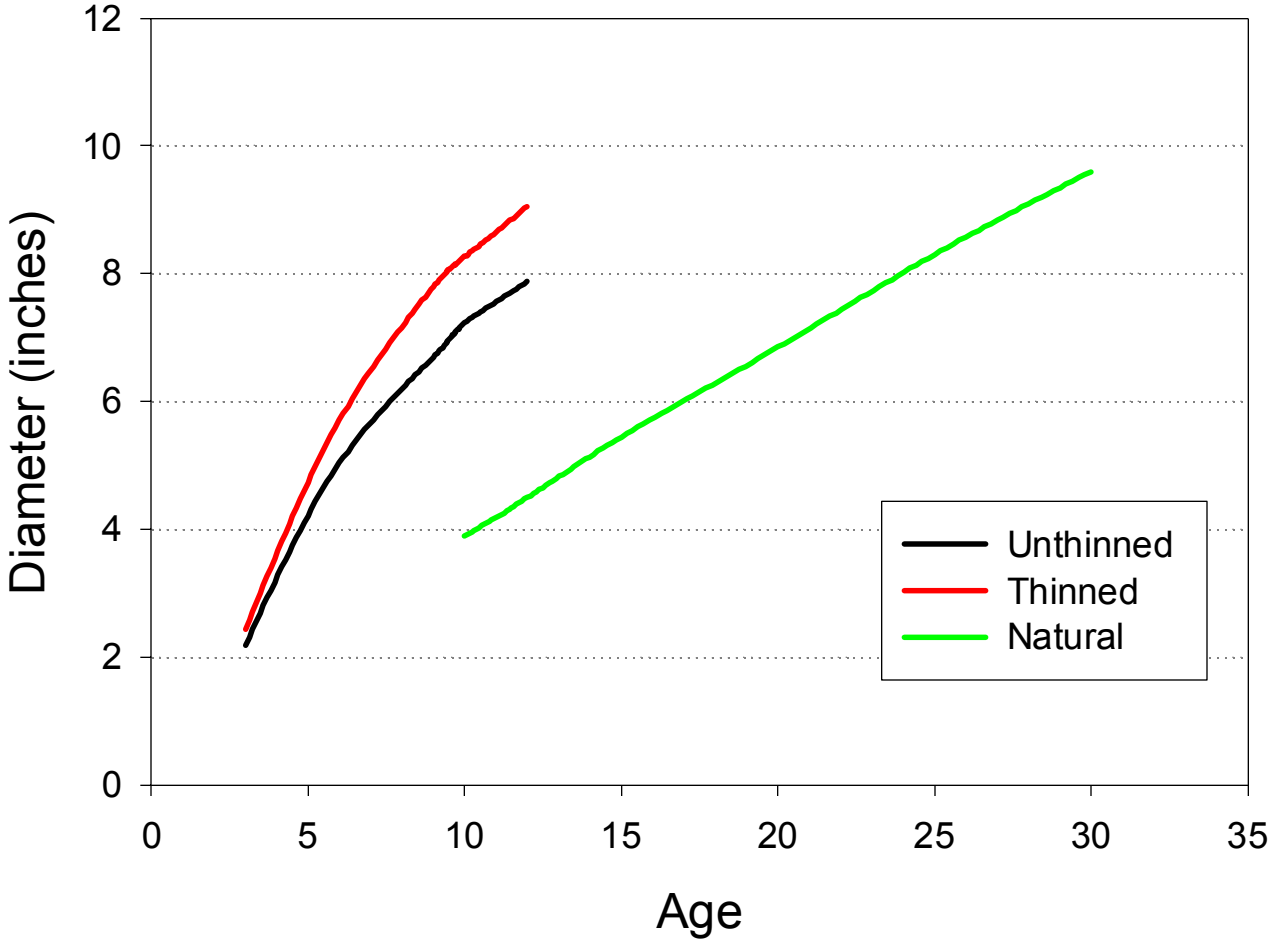
Source: Red Alder Managers' Handbook for British Columbia, Peterson, et. al., 1996. Hardwood Silviculture Cooperative.

Yield tables published by Worthington et al. in 1960 indicated that naturally regenerated alder on good site could produce average volume growth over 700 BF/acre/year averaged over 50 years.



Source: Red Alder Managers' Handbook for British Columbia, Peterson, et. al., 1996. Hardwood Silviculture Cooperative.

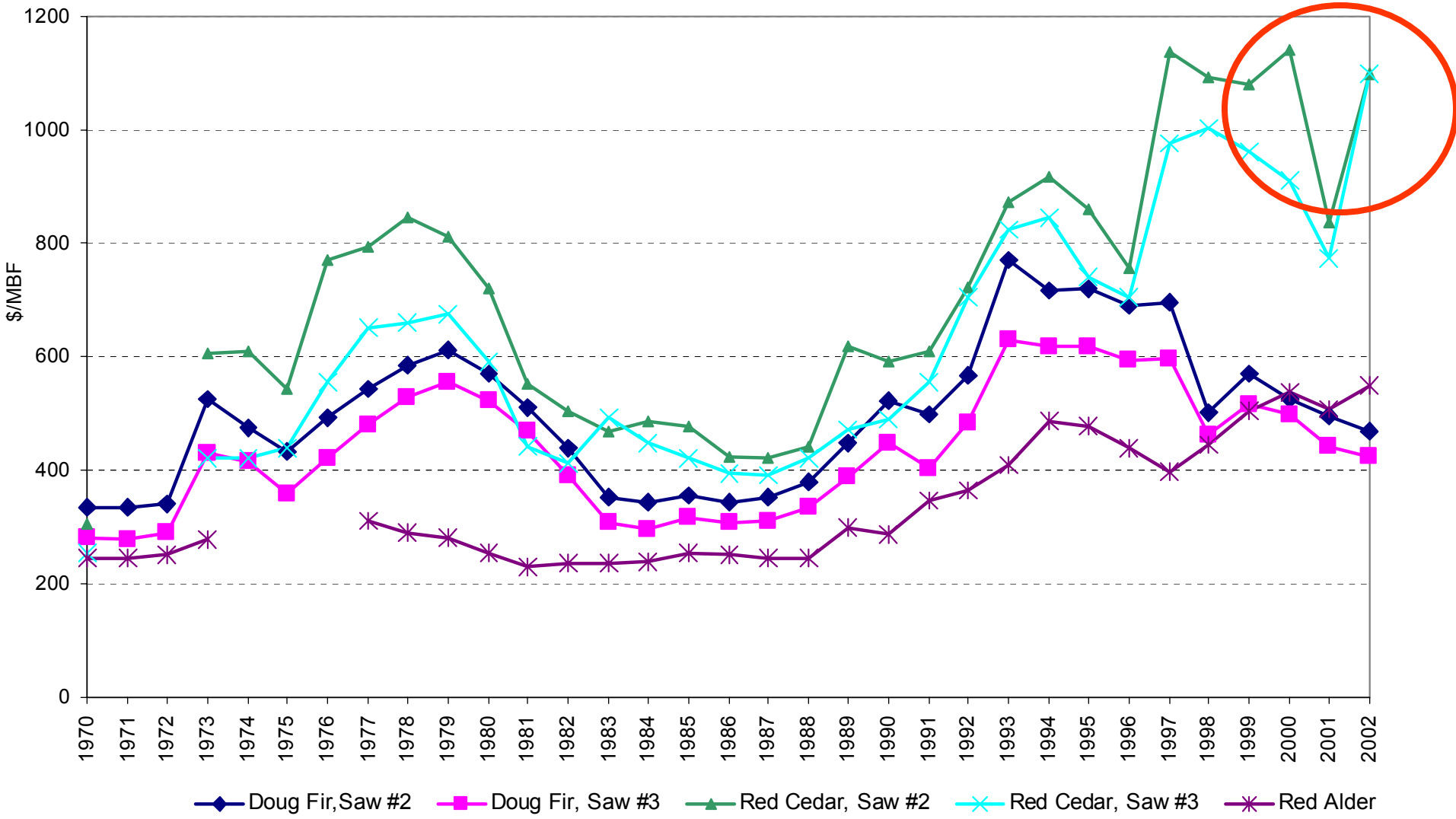
Current research may indicate that plantations will out perform naturally regenerated stands



Diameter growth of one red alder plantation planted at 525 tpa; unthinned and thinned to 230tpa at age 4; and natural alder stands (from Worthington et. al. 1960, SI50= 115ft.)

Source: Hardwood Silviculture Cooperative

Region 1 Log Prices, Adjusted for Inflation in 2002 $



Source: Log Lines, Forest Product Price Report, Timber Management Plus

Western red cedar will grow on wet and dark sites but does best in mesic, well-drained upland areas.

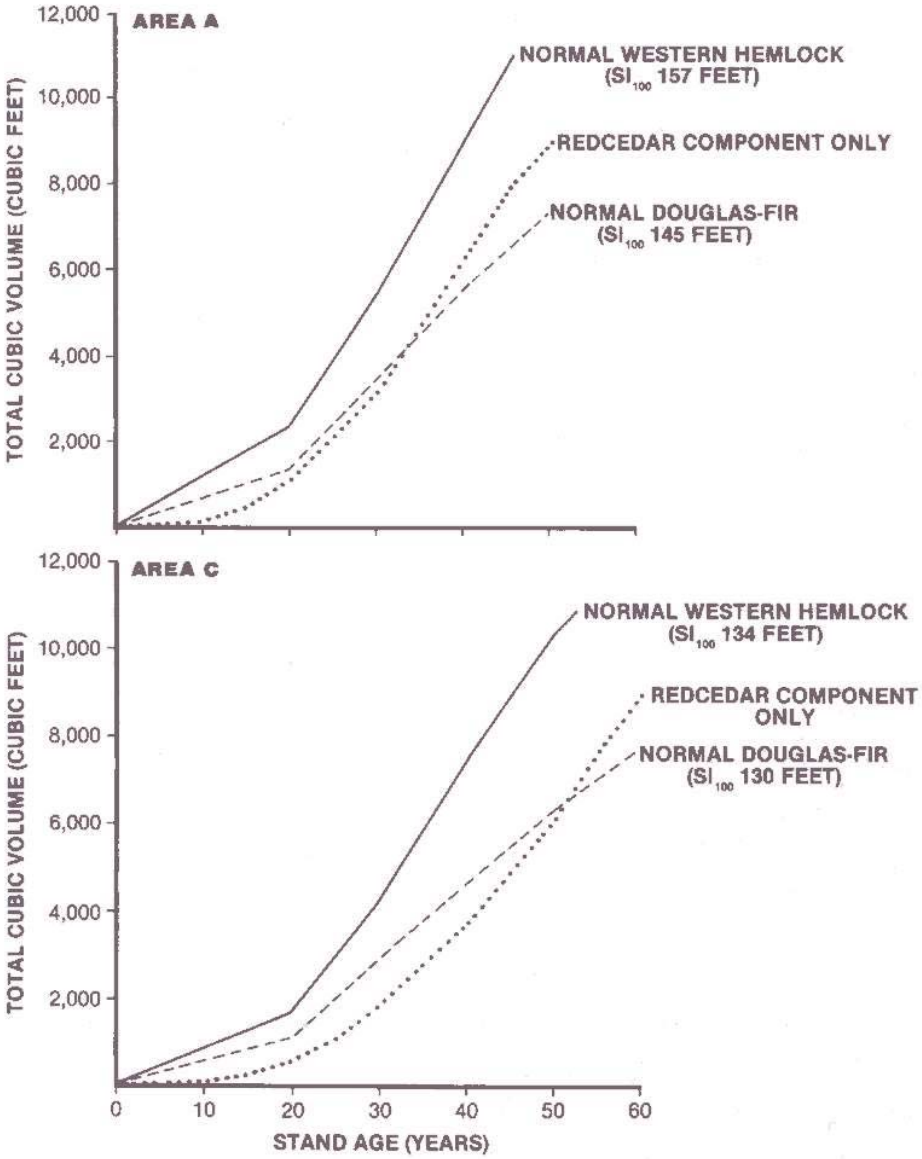


Figure 6.—Comparison of cumulative volume production of western redcedar: estimated normal yields of Douglas-fir and western hemlock.

Nystrom et al. 1984 reported that western red cedar volume production in naturally generated unmanaged stands was comparable to estimated volumes for fully stocked natural stands of Douglas fir and that merchantable yields of western red cedar should be higher in plantations or natural stands with early stocking control.

Blevins et al. 2002 reported that, on unfertilized sites on Vancouver Island, cedar plantations out performed Sitka spruce and western hemlock. Below is a 14 year old plantation.

Source: Nora Berg, SCHIRP. UBC

Red alder and western red cedar have cultural, aesthetic, and environmental characteristics that link them uniquely to the Pacific Northwest. These species are used commercially to serve niche markets.

Financial performance simulations may be helpful.

✓Plantations are hardy and on good site

✓A single rotation is to be examined where prices remain constant

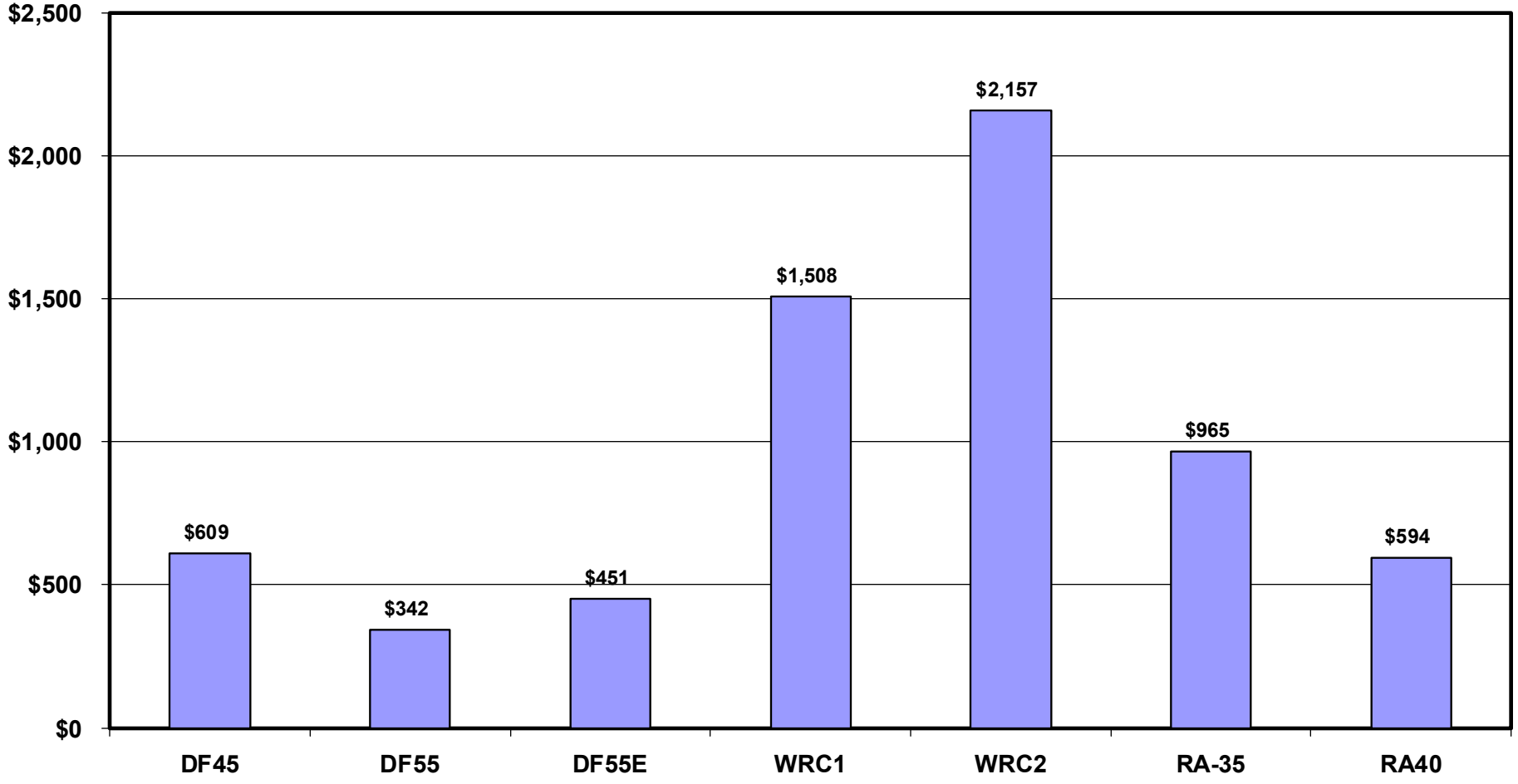
✓5% is the expected rate of return

✓Results are reported before taxes

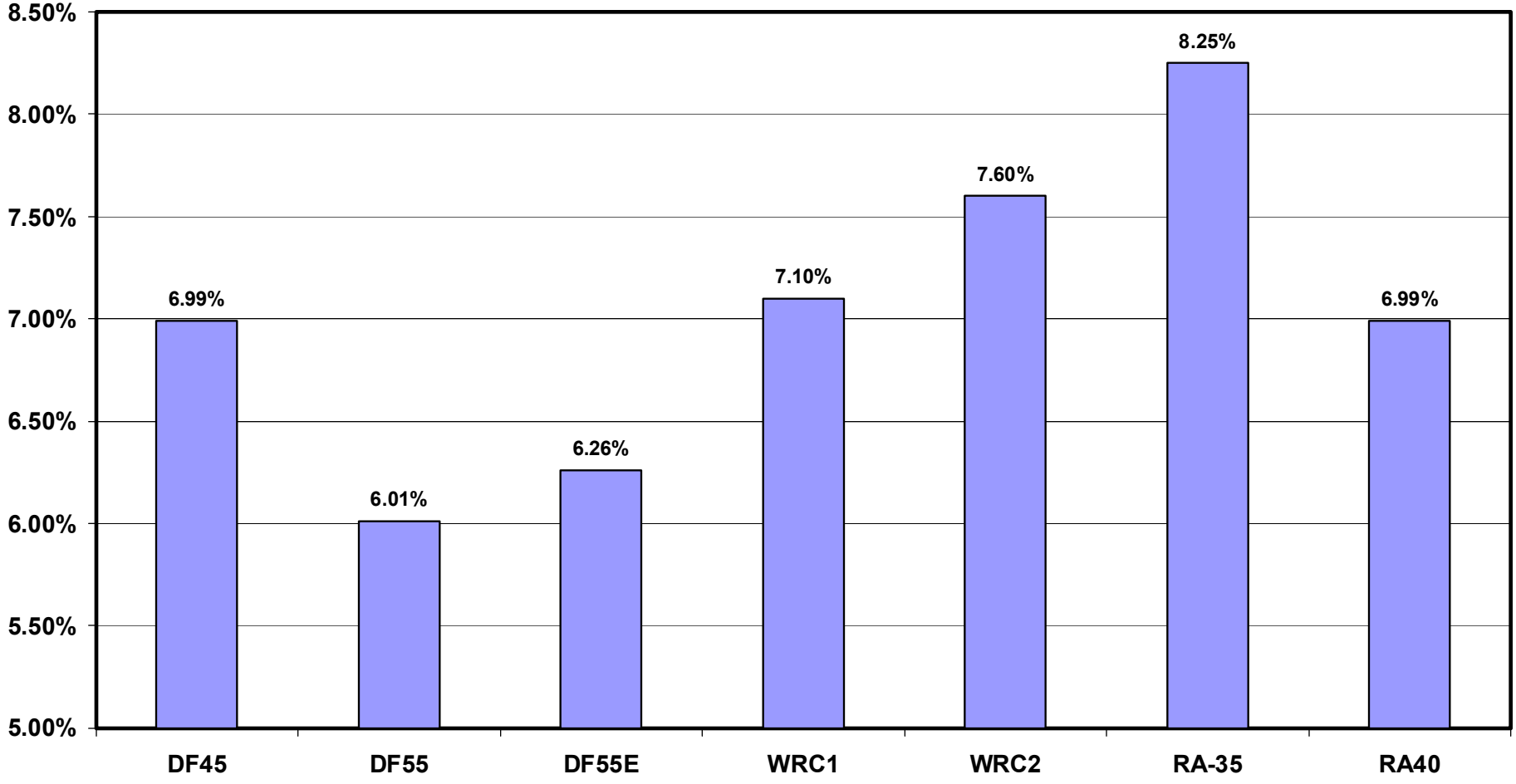
✓Yield estimates are consistent with growth expectations in the literature.

- **DF-45.** A 45-year Douglas fir rotation; no commercial thin. (30 mbf & 70 tons)
- **DF-55.** A 55-year Douglas fir rotation with commercial thin. (40 mbf & 100 tons)
- **DF-55E**. A 55-year Douglas fir rotation with commercial thin and a $150/mbf export premium on 20% of the log volume at final harvest. (40 mbf & 100 tons)
- **RA-35.** A 35-year Red Alder rotation. (20mbf & 30 tons)
- **RA-40.** A 40-year Red Alder rotation; same volume as the 35-year rotation. (20mbf & 30 tons)
- **WRC1-55.** A 55-year Red Cedar rotation with a commercial thin and a final harvest volume equal to 75% of Douglas fir for the same harvest rotation length. (30mbf & 100 tons)
- **WRC2-55.** A 55-year Red Cedar rotation with a commercial thin and a final harvest volume equal to 100% of Douglas fir for the same harvest rotation length. (40 mbf & 100 tons)

NPV at 5%


$2,500
$2,000
$1,500
$1,000
$500
$0
$609
$342
$451
$1,508
$2,157
$965
$594
DF45
DF55
DF55E
WRC1
WRC2
RA-35
RA40

IRR


8.50%
8.00%
7.50%
7.00%
6.50%
6.00%
5.50%
5.00%
6.99%
6.01%
6.26%
7.10%
7.60%
8.25%
6.99%
DF45
DF55
DF55E
WRC1
WRC2
RA-35
RA40

Summary:

- ✓**Financial Performance simulations indicate that if Red Alder and Red Cedar price trends continue into the future then either of these species could provide better returns on investment than Douglas fir.**
- ✓**Red Alder and Red Cedar are desirable planting alternatives to Douglas fir on sites not well suited for fir or that are infected by Swiss needle cast or root rot. Both species offer unique environmental benefits.**
- ✓**Red Alder and Red Cedar are raw material for PNW niche markets which may perform better than commodity production alternatives.**

Summary (continued):

- ✓**Both Red Alder and Red Cedar require more care at time of plantation establishment than Douglas fir. Alder is susceptible to sun burn and freeze damage while Cedar is vulnerable to browse.**
- ✓**Given historic lack of interest in alternative species planting and increased regulatory pressures on riparian zones, will available naturally-regenerated raw material supplies be sufficient to support existing manufacturing infrastructure?**
- ✓**The high value of Red Alder and Red Cedar should warrant more investment in growth and yield research for these species to help inform planting decisions.**

2002-2003 Available Planting Stocks
Webster Nursery

	DNR	Public	Contract	Total
DF	3,075,640	1,981,100	803,900	5,860,640
RC	500,400	102,773	3,900	607,073
WH	125,300	13,791	135,000	274,091
RA	0	10,000	0	10,000

Source: WA DNR

Simulation #1 Douglas fir 45

- ✓Year 1 Plant 400 TPA
- ✓Year 15 Pre-commercial thin 300 TPA
- ✓Year No Commercial Thin
- ✓Year 45 Final Harvest

Interest	5.00%		
Annual Cost	$20		DF 45
Rotation	45		
CT	*Mbf:*	*Tons:*	
Harvest Yield (Mbf)		0	
Delivered Price		$34	
Logging Cost		$30	
H	*Mbf:*	*Tons:*	
Harvest Yield (Mbf)	30	70	
Delivered Price	$450	$50	
Logging Cost	$150	$20	
Operation	**Year**	**Cash Flow**	**PV**
Plant	0	($225)	($225)
Browse	0		$0
Veg			$0
PCT	15	($95)	($46)
CT		$0	$0
H	45	$11,100	$1,235
a			($355)
NPV			**$609**
SEV			**$686**
IRR			**6.99%**

Simulation #2 Douglas fir 55

✓Year 1 Plant 400 TPA

✓Year 15 Pre-commercial thin 300 TPA

✓Year 35 Commercial Thin 180 TPA

✓Year 55 Final Harvest

Interest	5.00%		
Annual Cost	$20		DF 55
Rotation	55		
CT	*Mbf:*	*Tons:*	
Harvest Yield (Mbf)		30	
Delivered Price		$34	
Logging Cost		$30	
H	*Mbf:*	*Tons:*	
Harvest Yield (Mbf)	40	70	
Delivered Price	$450	$50	
Logging Cost	$150	$20	
Operation	**Year**	**Cash Flow**	**PV**
Plant	0	($225)	($225)
Browse	0		$0
Veg			$0
PCT	15	($95)	($46)
CT	35	$120	$22
H	55	$14,100	$963
a			($373)
NPV			**$342**
SEV			**$367**
IRR			**6.01%**

Simulation #3 Douglas fir 55 Export (80/20)

✓Year 1 Plant 400 TPA

✓Year 15 Pre-commercial thin 300 TPA

✓Year 35 Commercial Thin 180 TPA

✓Year 55 Final Harvest

Interest	5.00%		
Annual Cost	$20		DF 55 Export
Rotation	55		
CT	*Mbf:*	*Tons:*	
Harvest Yield (Mbf)		30	
Delivered Price		$34	
Logging Cost		$30	
H	*Mbf:*	*Tons:*	
Harvest Yield (Mbf)	40	70	
Delivered Price	$490	$50	
Logging Cost	$150	$20	
Operation	**Year**	**Cash Flow**	**PV**
Plant	0	($225)	($225)
Browse	0		$0
Veg			$0
PCT	15	($95)	($46)
CT	35	$120	$22
H	55	$15,700	$1,073
a			($373)
NPV			**$451**
SEV			**$484**
IRR			**6.26%**

Simulation #4 Red alder 35

✓Year 1 Plant 600 TPA

✓Year 9 Pre-commercial thin 300 TPA

✓Year 20 Commercial Thin 180 TPA (breakeven)

✓Year 35 Final Harvest

Interest	5.00%		
Annual Cost	$20		RA
Rotation	35		
CT	*Mbf:*	*Tons:*	
Harvest Yield (Mbf)		20	
Delivered Price		$30	
Logging Cost		$30	
H	*Mbf:*	*Tons:*	
Harvest Yield (Mbf)	20	30	
Delivered Price	$550	$55	
Logging Cost	$150	$20	
Operation	**Year**	**Cash Flow**	**PV**
Plant	0	($300)	($300)
Browse	0		$0
Veg			$0
PCT	9	($75)	($48)
CT		$0	$0
H	35	$9,050	$1,641
a			($327)
NPV			**$965**
SEV			**$1,178**
IRR			**8.25%**

Simulation #5 Red alder 40

✓Year 1 Plant 600 TPA

✓Year 9 Pre-commercial thin 300 TPA

✓Year 20 Commercial Thin 180 TPA (breakeven)

✓Year 40 Final Harvest

Interest	5.00%		
Annual Cost	$20		RA 40
Rotation	40		
CT	*Mbf:*	*Tons:*	
Harvest Yield (Mbf)		20	
Delivered Price		$30	
Logging Cost		$30	
H	*Mbf:*	*Tons:*	
Harvest Yield (Mbf)	20	30	
Delivered Price	$550	$55	
Logging Cost	$150	$20	
Operation	**Year**	**Cash Flow**	**PV**
Plant	0	($300)	($300)
Browse	0		$0
Veg			$0
PCT	9	($75)	($48)
CT		$0	$0
H	40	$9,050	$1,286
a			($343)
NPV			**$594**
SEV			**$692**
IRR			**6.99%**

Simulation #6 Western red cedar 55

✓Year 1 Plant and Tube 600 TPA

✓Year 15 Pre-commercial thin 300 TPA

✓Year 35 Commercial Thin 180 TPA

✓Year 55 Final Harvest

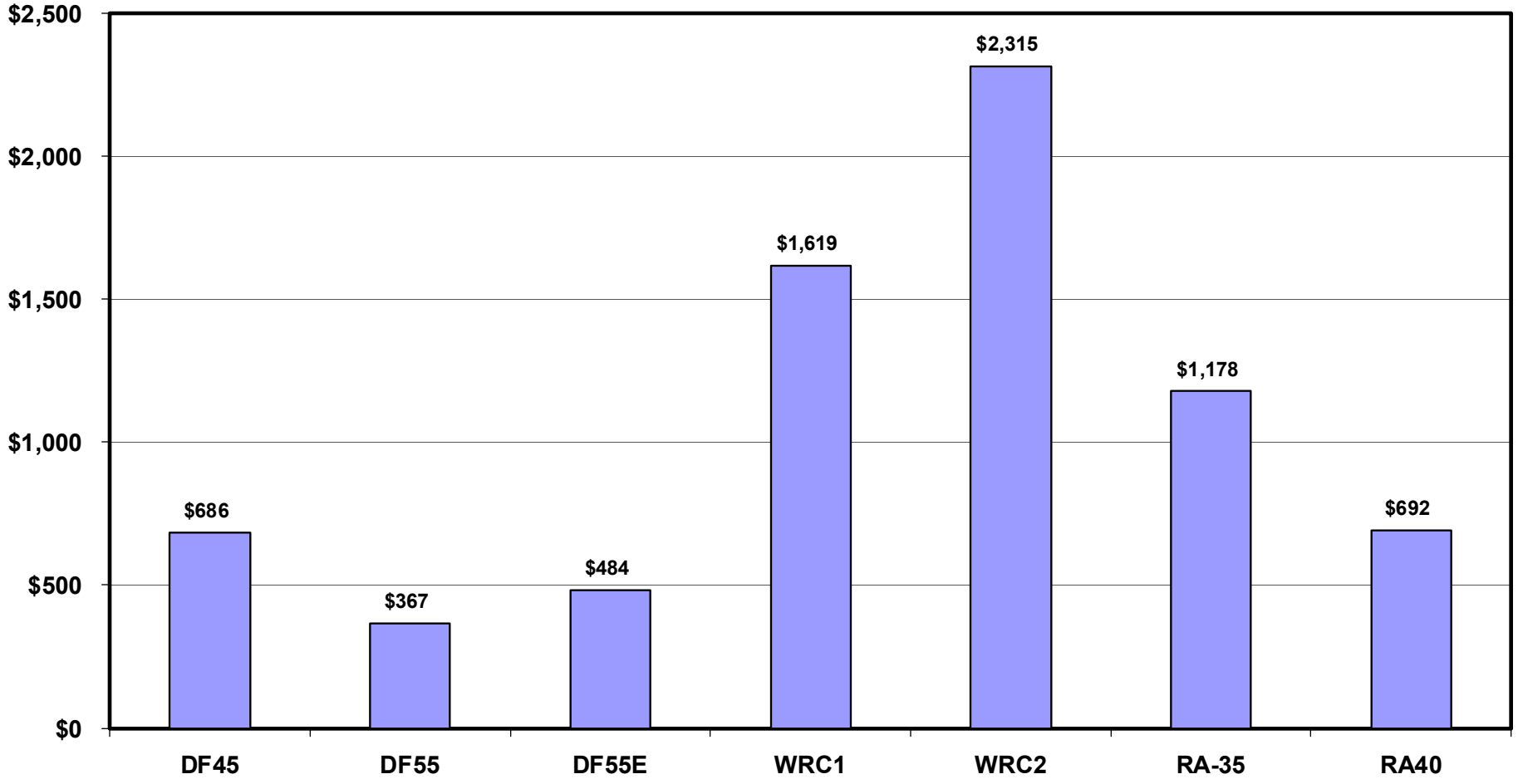
Interest	5.00%		
Annual Cost	$20		RC1
Rotation	55		
CT	*Mbf:*	*Tons:*	
Harvest Yield (Mbf)		30	
Delivered Price		$56	
Logging Cost		$30	
H	*Mbf:*	*Tons:*	
Harvest Yield (Mbf)	30	70	
Delivered Price	$1,100	$100	
Logging Cost	$150	$20	
Operation	**Year**	**Cash Flow**	**PV**
Plant	0	($225)	($225)
Browse	0	($320)	($320)
Veg			$0
PCT	15	($95)	($46)
CT	35	$780	$141
H	55	$34,100	$2,330
a			($373)
NPV			**$1,508**
SEV			**$1,619**
IRR			**7.10%**

Simulation #7 Western red cedar 55 (DF Volumes)

- ✓Year 1 Plant 600 TPA
- ✓Year 15 Pre-commercial thin 300 TPA
- ✓Year 35 Commercial Thin 180 TPA
- ✓Year 55 Final Harvest

Interest	5.00%		
Annual Cost	$20		RC2
Rotation	55		
CT	*Mbf:*	*Tons:*	
Harvest Yield (Mbf)		30	
Delivered Price		$56	
Logging Cost		$30	
H	*Mbf:*	*Tons:*	
Harvest Yield (Mbf)	40	70	
Delivered Price	$1,100	$100	
Logging Cost	$150	$20	
Operation	**Year**	**Cash Flow**	**PV**
Plant	0	($225)	($225)
Browse	0	($320)	($320)
Veg			$0
PCT	15	($95)	($46)
CT	35	$780	$141
H	55	$43,600	$2,979
a			($373)
NPV			**$2,157**
SEV			**$2,315**
IRR			**7.60%**

SEV at 5%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$2,000
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$1,000
$500
$0
$686
$367
$484
$1,619
$2,315
$1,178
$692
DF45
DF55
DF55E
WRC1
WRC2
RA-35
RA40