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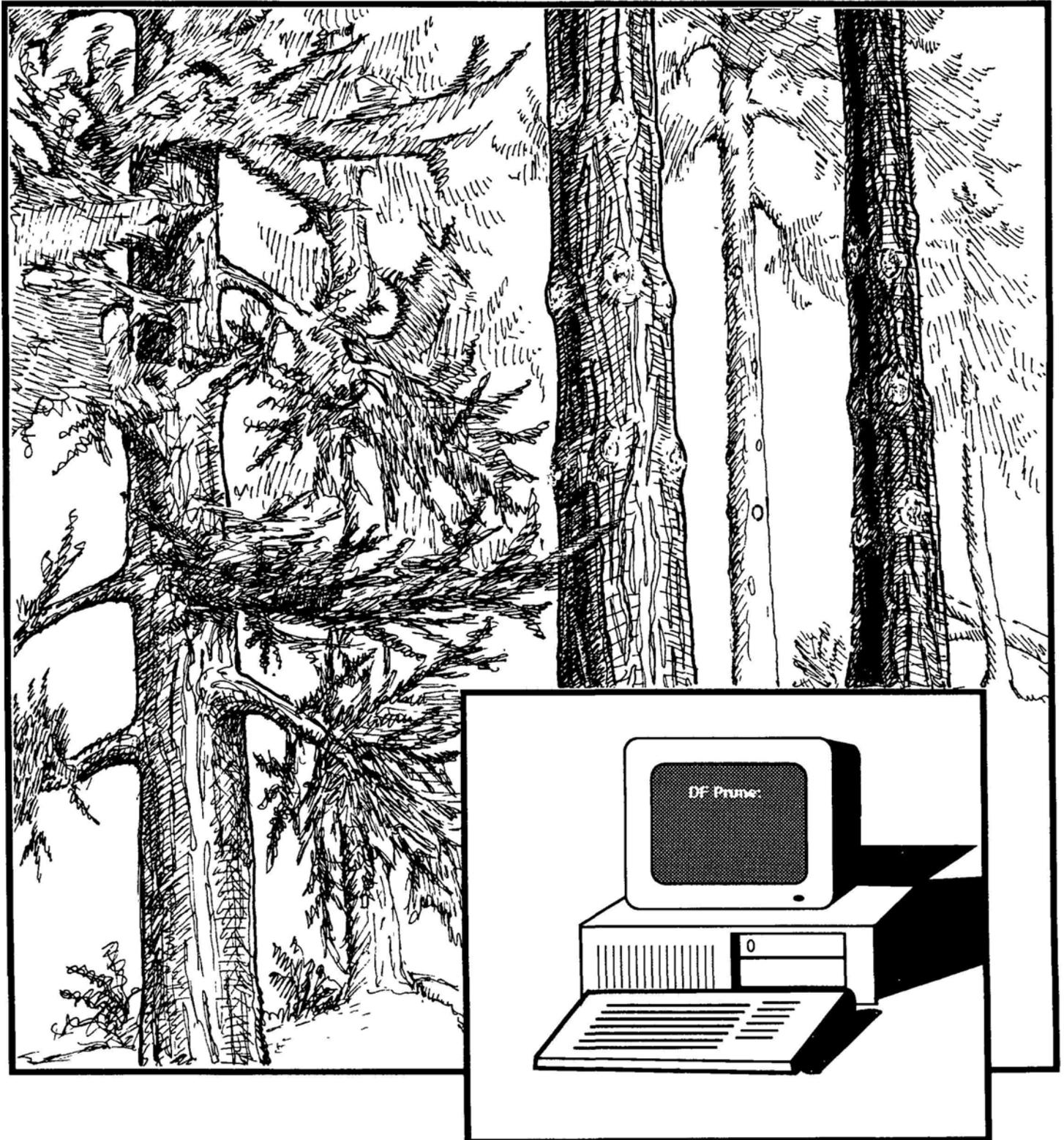
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# DF PRUNE Users Guide

Roger D. Fight, James M. Cahill and Thomas D. Fahey

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## Abstract

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The DFPRUNE spreadsheet program is designed to estimate the expected financial return from pruning coast Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco var. *menziesii*). It is a significant revision of the PRUNE-SIM program. The PRUNE-SIM program was based on the average product recovery for unpruned logs from a single stand that received frequent light thinnings. The DFPRUNE program incorporates new recovery information for unpruned young-growth Douglas-fir and can be used to assess the economic potential of pruning for a wide range of management regimes. Product prices and descriptions of trees at time of pruning and at time of harvest must be supplied by the user. The DFPRUNE program was developed for the Lotus 1-2-3 spreadsheet and should work on versions 2.01 or later.

Keywords: Douglas-fir, pruning, forest product value, product recovery, simulation.

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## Introduction

A recent lumber and veneer recovery study of pruned Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco var. *menziesii*) logs shows significant increases in high-quality lumber and veneer with pruning (Cahill and others 1988). A financial analysis of pruning Douglas-fir (Fight and others 1987a) done with the PRUNE-SIM software (Fight and others 1987b) shows that many situations can occur where the expected return from pruning will exceed a real rate of 4 percent.

In the past several years, pruning has gone from a practice not seriously considered as an operational silvicultural tool on the National Forests to one being used operationally on several National Forests. The number of acres being pruned on National Forests in Oregon and Washington has increased as shown in the following tabulation:

<b>Fiscal year</b>	<b>Pruning on National Forests</b>
	<i>Acres</i>
1987	244
1988	56
1989	422
1990	2433
1991	5768

The DFPRUNE software was developed to estimate the return to pruning by comparing the value of the butt log (16.5 feet for lumber and 17.0 feet for veneer) of a pruned tree with the value of the same log if the tree was not pruned. The comparison can be applied to a range of regimes represented by trees of different sizes at time of pruning and time of harvest.

The DFPRUNE software is a major revision of the PRUNE-SIM software (Fight and others 1987b). This revision incorporates lumber and veneer recovery for unpruned logs from a recent recovery study of intensively managed young-growth Douglas-fir (Fahey and others 1991). Financial analyses of pruning done with the DFPRUNE software are more realistic than those done with PRUNE-SIM, because the recovery from unpruned logs can represent a wide variety of management regimes. The data in the PRUNE-SIM software were representative of a single unpruned stand managed with frequent light thinnings.

The format of DFPRUNE has been redesigned so that all the input data and results for the lumber analysis are contained on the home screen (upper left corner of the spreadsheet). The input data have been grouped vertically to facilitate data entry.

A section has been added to store the tree input data used in a set of analyses. This facilitates making a set of sensitivity analyses with modified data or different price or cost assumptions.

Additional macros have been added to allow the user to more easily do multiple analyses and sensitivity analyses. The macros also print the results of each analysis and save the input data for future reference or use.

## Comparison of DFPRUNE and PRUNE-SIM

### Format

## Input Data

The required input data is the same as for PRUNE-SIM with the exception that it is necessary to add three additional items: limb size on the butt log at time of pruning, limb size on the butt log of unpruned trees at the time of harvest, and the diameter breast height (d.b.h.) at a breast height age of 20. The limb size variable is the average of the largest limb in each quadrant of the butt log. Limb size is used in estimating the grade recovery of the unpruned core of the pruned log and the grade recovery of the unpruned log. The d.b.h. at a breast height age of 20 is used to estimate the proportion of the log that is juvenile wood, which also is used in estimating grade recovery.

The cost of pruning can be input to DFPRUNE. If a cost is used, the increase in present value that results is the increase in present net worth from pruning. If costs are entered, they should include the costs of management and administration as well as the cost of actually doing the pruning. If a cost of zero is used, the increase in present value that results is the breakeven cost of pruning or the maximum that could be spent for pruning and still achieve the specified rate of return. Two present value calculations will be made. If only one interest rate is input, one of those calculations will be made with an interest rate of zero.

Prices required for DFPRUNE are for the same grade categories as those found in Warren (1992) and Haynes and Fight (1992). Grade recovery estimates are for different categories in some cases. The prices for these categories are calculated by the spreadsheet as follows:

1. Price for "SEL" is the average of the prices of C select category and the D select and shop category.
2. Price for "2100f" is 1.05 times the price of structural items.
3. Price for "1650f" is 0.95 times the price of structural items.
4. Price for "1450f" is 1.05 times the price of light framing.

The 1450f, 1650f, and 2100f grades are machine stress rated (MSR) grades for which prices are not readily available.

Users familiar with PRUNE-SIM probably can use DFPRUNE after only a brief study of the new format for input data and results. For those wanting to do an extensive analysis, it also will be helpful to look at the section "Macro Feature in DFPRUNE." A complete description of the DFPRUNE program follows the section on "Cautions."

## Cautions

1. Users should exercise judgment when doing analyses outside the range of the tree sizes sampled and should remember that the recovery estimates are based on pruning of only the first 16.5- or 17-foot butt log.
2. Users should be aware that additional costs of managing pruned stands that occur after the stands are pruned are not considered in this analysis.
3. Users should recognize the uncertainties of predicting future prices of clear wood products.

Grade recovery of pruned butt logs was based on a sample of trees from a range of sites and a small geographic area. The stand was of natural origin and had been repeatedly thinned but was maintained at denser stocking than now is common (Cahill and others 1988). Figure 1 shows diameters of sample trees at time of pruning and time of harvest.

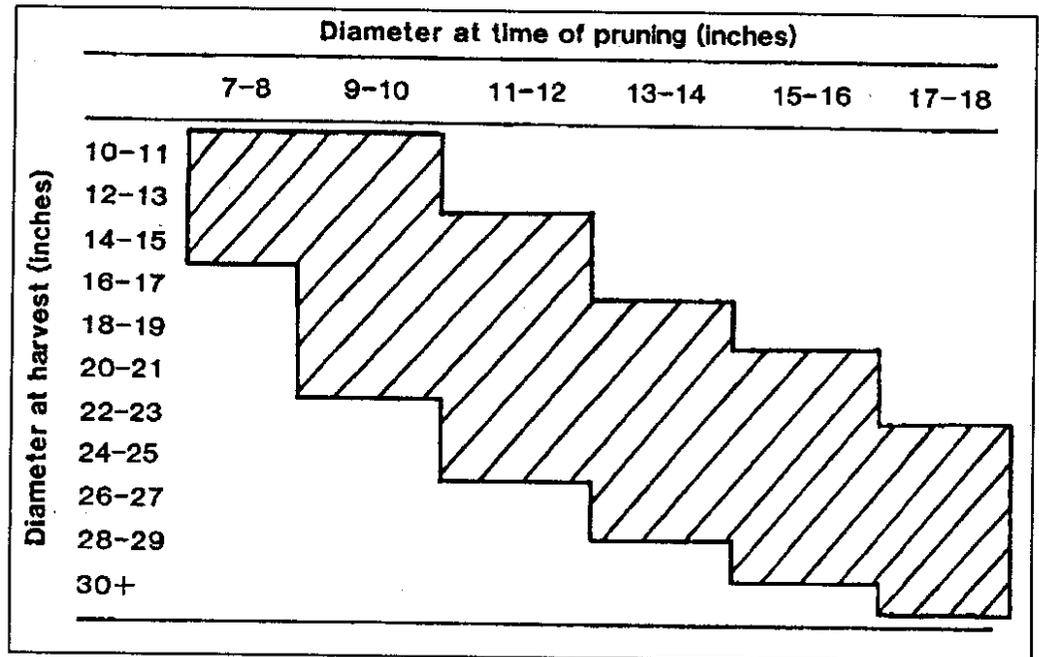


Figure 1- Distribution of sample trees by d. b. h. at time of pruning and d. b. h. at time of harvest

Grade recovery of unpruned butt logs is based on a sample of trees from a wide geographic area, a wide range of ages, and a wide range of stocking. See Fahey and others (1991) for a discussion of the recovery study and the sample trees. So that all the lumber could be machine stress graded, it was agreed that the mill would not cut any material in dimensions larger than 2 by 6 inches. The grade recovery from that study has been adjusted to account for the fact that grade recovery of large logs with large limbs is increased when sawing patterns are selected that produce dimensions larger than 2 by 6.

No statistically significant difference was found in the volume recovery for pruned and unpruned logs in the pruning recovery study (Cahill and others 1988). To eliminate mill differences, the volume recovery estimates in DFPRUNE for both pruned and unpruned logs are based on that study.

The only cost that is used in DFPRUNE is the cost of pruning. This cost should include the cost of management and administration as well as the cost of actual pruning. Additional costs are ignored; for example, additional record keeping. In a reasonably competitive stumpage market, buyers will be willing to pay a premium for pruned logs that reflects the increase in value resulting from recovery of clear wood products. This is the rationale for using the difference in product value as the basis for evaluating the returns from pruning. Convincing buyers of the quality of pruned logs may require records showing tree or stand descriptions. Even if the trees obviously were pruned, documented proof of the size of trees at time of pruning may be necessary so that the amount of clear wood can be estimated.

## How To Use DFPRUNE

The characteristics of clear wood products produced from pruned young-growth Douglas-fir are different from similar products from old-growth Douglas-fir. One key difference is appearance. As long as clear wood products from old growth are available, the market is likely to be biased against clear wood from pruned young growth. This bias likely will diminish when clear wood products from old growth are no longer available in sufficient quantity to meet the demand without large price increases.

The DFPRUNE software was intended to facilitate two types of analysis:

1. The user can enter information for a single tree and a single set of product prices and view the results. All this is done in the home screen of the spreadsheet.
2. Or the user can enter one or two sets of product prices (in section A25..H38) and use the macros to calculate and store the results of a series of analyses for different sites, rotation ages, prices, or other conditions. A more complete discussion of the macros is found below.

The DFPRUNE software has protection on all parts of the spreadsheet except those parts where the user must input data and those parts that must be unprotected for the macros to work. This protection helps to guard against accidental alterations of the equations in the program.

Figure 2 shows the general layout of the DFPRUNE spreadsheet program. The spreadsheet consists of four blocks. The first block contains the lumber analysis, intermediate calculations relating to grade recovery and log diameters, the macros, and the macro subroutines. The second block contains the veneer analysis and the start-up screen for the program. The third block is where the results of a series of analyses will be stored if the macros are used. The fourth block is where the input data from a series of analyses will be stored if the macros are used.

## Program Input and Program Output

Figure 3 is an example of the lumber analysis that shows the input and output for a single analysis of pruning. For a single analysis, prices and other input data are entered in columns B and D. For a single veneer analysis, it is necessary to use both this screen and the one shown in figure 4 where the veneer prices and cost savings are input. When macros are used, the lumber and veneer prices are entered in section A24..H30. Most headings have a hidden definition that can be viewed at the top of the screen by putting the cursor on the heading. Following is a detailed description of the input data:

B1-SITE, site index (optional and not used in the program; any combination of numbers and alpha characters can be used to identify different analyses)

B2-STK, stocking (optional and not used in the program; any combination of numbers and alpha characters can be used to identify different analyses)

B3-AGE2, age at time of harvest

B4-DBH2, diameter of tree at time of harvest

B5-HTH2, height of tree at time of harvest

B6-LDH, average diameter of largest limb in each quadrant of log at time of harvest

B7-TREES, number of trees pruned per acre

B8-AGE1, age at time of pruning

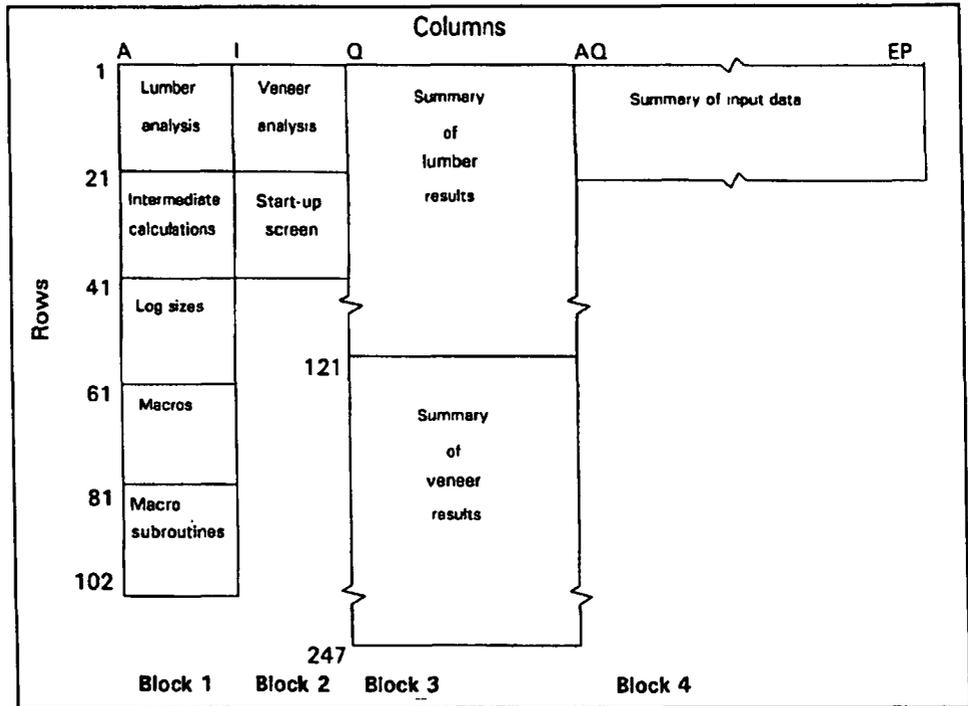


Figure 2—General layout of the DFPRUNE spreadsheet. Letters and numbers refer to columns and rows in the spreadsheet.

	A	B	C	D	E	F	G	H
1	SITE	130		Pruning Analysis for Lumber				02/21/92
2	STK	100	RATE1	0.04		Grade Recovery (%)		
3	AGE2	60	RATE2	0.09		Grade	Pruned	Unpruned
4	DBH2	25.0	LENG	16.5		SEL	52	0
5	HTH2	132	-----			2100f	0	20
6	LDH	1.6	Inside Bark Diams.			1650f	5	38
7	TREES	70	DSP	7.7		1450f	14	21
8	AGE1	22	DLP	13.5		UTIL	26	16
9	DBH1	11.0	DJ	12.6		ECON	2	6
10	HTH1	50	DSH	19.9		Total	100	100
11	LDP	1.4	DLH	26.4				
12	DBHBH20	14.0	TAPER	0.39		\$/mbf	659	445
13	SUCCESS	1.00	JWH	34		BF	401	401
14	COST	\$3.00	CLR	72		\$/Log	264	178
15	PCSEL	1300	CF	42.3		Increase in Value-----		
16	PDSEL&	613	LRF	9.5			Per Tree	Per Acre
17	PSTR	542				PNW RATE1	\$16.39	\$1,147
18	PLTFR	389				PNW RATE2	\$0.26	\$18
19	PUTIL	276						
20	PECON	144						

Figure 3—Spreadsheet example for lumber analysis

B9—DBH1, diameter of tree at time of pruning  
B10—HTH1, height of tree at time of pruning  
B11—LDP, average diameter of largest limb in each quadrant of log at time of pruning  
B12—DBHBH20, diameter breast height at breast height age of 20  
B13—SUCCESS, proportion of pruned trees surviving to harvest  
B14—COST, cost of pruning per tree  
B15—PCSEL, price of C select lumber in dollars per thousand board feet (\$/mbf)  
B1—PDSEL&, price of D select and shop lumber (\$/mbf)  
B17—PSTR, price of structural items (\$/mbf)  
B18—PLTFR, price of light framing lumber (\$/mbf)  
819—PUTIL, price of utility lumber (\$/mbf)  
B20—PECON, price of economy lumber (\$/mbf)  
D2—RATE1, first interest rate used in calculating present values (decimal)  
D3—RATE2, second interest rate used in calculating present values (decimal), optional  
D4—LENG, length of pruned log for lumber (should not be changed)

Following is a detailed description of the results:

D7—DSP, diameter inside bark of the small end of the saw log at time of pruning (inches)  
D8—DLP, diameter inside bark of the large end of the saw log or veneer log at time of pruning (inches)  
D9—DJ, diameter inside bark of juvenile wood cylinder (inches)  
D10—DSH, diameter inside bark of the small end of the saw log at time of harvest (inches)  
D11—DLH, diameter inside bark of the large end of the saw log or veneer log at time of harvest (inches)  
D12—TAPER, saw-log taper at time of harvest (inches per foot of length)  
D13—JWH, percentage of the saw log that is juvenile wood at time of harvest  
D14—CLR, percentage of the pruned saw log that is clear wood at time of harvest  
D15—CF, volume of the saw log at time of harvest (cubic feet)  
D16—LRF, lumber recovery factor (board feet lumber tally per cubic foot of log volume)  
G4..HS—percentage veneer recovery by grade for the pruned and unpruned log  
G12, H12—\$/mbf, value per mbf (thousand board feet) for the pruned and unpruned log

G13, H13—BF, volume of lumber (board feet) (will always be the same for pruned and unpruned logs)

G14, H14—\$/Log, value of pruned and unpruned saw log or veneer log (dollars)

G17, H17—PNW RATE1, increase in present net worth or present value per tree and per acre with the first interest rate (dollars)

G18, H18—PNW RATE2, increase in present net worth or present value per tree and per acre with the second interest rate (dollars)

### Intermediate Calculations

The section in figure 2 labeled "Intermediate Calculations" includes equations for calculating the lumber grade recovery of unpruned logs by log diameter class. The calculations for logs less than 8 inches use the equations directly out of Fahey and others (1991). The calculations for larger logs use equations modified to estimate the effect of cutting patterns that permit production of dimensions larger than 2 by 6. Calculations are made only for the diameter class that contains the size of log in the current analysis. Calculations for veneer grade recovery also are found here. Grade recovery equations for veneer come directly from the study by Fahey and others (1991).

The section labeled "Intermediate Calculations" also contains the cells where prices are entered when macros are used. When a macro is used the prices must be entered here rather than in the home screen.

The section in figure 2 labeled "Log sizes" is where the log diameters at time of pruning and time of harvest are calculated. The procedures described in Ficht and others (1987b) were used.

### Veneer Analysis

Figure 4 shows the analysis of pruning for veneer; it is similar to the section for lumber. The DFPRUNE spreadsheet is designed so that when data are entered in the lumber section, everything common to both lumber and veneer is copied automatically into the veneer input section. These common items are protected to preserve this feature, and users must enter all the common input data in the lumber portion of

1	I	J	K	L	M	N	O	P
2	SITE	130		Pruning Analysis for Veneer				02/21/92
3	STK	100	RATE1	0.04	Grade Recovery (%)			
4	AGE2	60	RATE2	0.09	Grade	Pruned	Unpruned	
5	DBH2	25.0	LENGV	17.0	AB	48	3	
6	HTH2	132	-----			C	37	59
7	LDH	1.6	Inside Bark	Diams.	D	16	38	
8	TREES	70	DSPV	7.6	Total	100	100	
9	AGE1	22	DLP	13.5				
10	DBH1	11.0	DJ	12.6				
11	HTH1	50	DSHV	19.8				
12	LDP	1.4	DLH	26.4				
13	DBHBH20	14.0	TAPERV	0.38	\$/msf	248	121	
14	SUCCESS	1.00	JWHV	34	SF	965	965	
15	COST	\$3.00	CLRV	72	\$/Log	240	117	
16	PAB	325	CFV	43.5	Increase in Value			
17	PC	135	VRF	22.2	Per Tree Per Acre			
18	PD	74			PNW RATE1	\$24.72	\$1,730	
19	CSABP	68			PNW RATE2	\$1.65	\$116	
20	-----							

Figure 4—Spreadsheet example for veneer analysis.

the spreadsheet even if only a veneer analysis is desired. Veneer prices are for green veneer and are quoted per thousand square feet on a finished panel size. All prices must be converted to a 3/8-inch basis. Following is a detailed description of the input data that are different and must be entered from the veneer analysis screen:

J15—PAB, price of AB veneer in dollars per thousand square feet (\$/msf)

J16—PC, price of C veneer (\$/msf)

J17—PD, price of D veneer (\$/msf)

J18—SABP, cost saving on production of AB veneer from pruned logs (\$/msf of AB veneer)

Several calculated variables related to log dimension and characteristics differ from the ones for saw logs because the standard log length with trim for veneer is 17 feet and that for lumber is 16-1/2 feet. Following is a detailed description of the result variables that are different for this reason:

L7—DSPH, diameter inside bark of the small end of the veneer log at time of pruning (inches)

L10—DSHV, diameter inside bark of the small end of the veneer log at time of harvest (inches)

L12—TAPERV, taper of veneer log at time of harvest (inches per foot of length)

L13—JWHV, percentage of the pruned veneer log that is juvenile wood at time of harvest

L14—CLRV, percentage of the pruned veneer log that is clear wood at time of harvest

L15—CFV, volume of veneer log at time of harvest (cubic feet)

Output variables unique to the veneer analysis follow:

L16—VRF, veneer recovery factor (square feet of 3/8-inch dry trimmed veneer per cubic foot of log)

04..P6—percentage veneer recovery by grade for the pruned and unpruned log

012, P12—\$/msf, value per msf from the pruned and unpruned log

013, P13—SF, volume of veneer (square feet of 3/8-inch dry trimmed) (will always be the same for pruned and unpruned log)

## **Diameter of Pruned Trees**

The PRUNE-SIM users guide (Fight and others 1987b) includes a method for estimating average tree diameters when the growth and yield simulator does not provide a listing of individual trees. When a growth and yield simulator that provides a stand table is used, the analysis of pruning can be done with the average pruned tree, or it can be done for several diameter classes and interpolated values used to get an average increase in present value per pruned tree or per acre.

## **Average Limb Diameter on Unpruned Trees**

Most growth and yield models do not provide information on the diameter of limbs. Limb diameters for Douglas-fir can be estimated from equations found in Maguire and others (1991). Although the data base for those equations is southwest Oregon,

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the results were deemed acceptable for use on the Siuslaw National Forest,<sup>1</sup> and although there is ongoing work, we are not aware of any other source of equations for predicting limb diameters that is currently available.

The assumption in the DFPRUNE software is that pruning has no effect on tree growth or that it is small enough to ignore. Users are referred to O'Hara (1991) for a discussion and references to literature on this issue.

Many people will find the DFPRUNE software more useful than any specific analyses we might publish because the number of regimes for which we can provide analyses is limited. The program allows users to do sensitivity analysis for the regimes that are most relevant to their situation; the combinations of prices, regimes, and other assumptions that may be desired in sensitivity analysis will differ. The macros in DFPRUNE are designed to facilitate making simulations for a large number of regimes and for doing sensitivity analyses.

One area for which sensitivity analysis may be desired is price premiums for clear grades of wood products. The problem in deciding what prices to use in the analysis is that the prices are needed now for a period 30 or more years away. Future prices are not simply unknown—they are unknowable. We can look at price projections from various studies of supply and demand for timber and at historical trends, but because we cannot know what future prices will be, we suggest looking at the financial return from pruning for a range of future prices. The prices used by DFPRUNE are the prices for lumber and veneer by product grade. The financial return from pruning depends on the difference in price between clear grades and lower grades of products. In addition to the price difference among AB, C, and D veneers, there is a cost saving for AB veneer produced from pruned logs. The average number of patches per sheet of AB veneer from pruned logs will be substantially less than the average number of patches per sheet of AB veneer from unpruned logs. The cost saving is added to the price in DFPRUNE to determine the increased return with pruning.

In determining priorities for pruning, the user may wish to do a sensitivity analysis on age at time of pruning, age at time of harvest, and site index. A comparison of the return from pruning fertilized stands with pruning unfertilized stands also would be useful. There are some areas where sensitivity analysis can be done only by changing the equations in the spreadsheet model; they include the recovery equations and tree profile equations.

The macros included in DFPRUNE make doing a set of analyses easier by allowing the user to put in two sets of prices and simultaneously doing the analysis for lumber for two sets of prices and for veneer for two sets of prices. All the macros store summary results and save the input data for further use. When any macro is used, the prices found in B25..C30 and F25..G27 will be moved into the appropriate places in the lumber and veneer analysis screens and will be used in the analysis. When macros are used, the prices therefore must be entered at B25..C30 and F25..G27 rather than in the analysis screens. The spreadsheet is set for automatic recalculation

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<sup>1</sup> Personal communication. 1991. Stuart Johnston, silviculturist, Siuslaw National Forest, P.O. Box 1148, Corvallis, OR 97339

of results. If execution is slow, it can be sped up by setting the spreadsheet to manual recalculation; the macros still will work properly. Because all the macros contain a provision to print the results, they will not work unless a printer is available to print the output from a spreadsheet. The printer will use the print setup that already exists in the user's version of the spreadsheet. The macros can be used without a printer only by removing the print subroutines from the macro (accomplished by removing "{ptlum}" and "{ptven}" from the macro and moving the remaining items up to fill in the blank spaces). Worksheet protection must be disabled to make this change.

A macro is executed by holding down the "Alt" key and pressing the macro name: A, B, L, M, V, or W. Following is a detailed description of the macros:

Alt A—Do analysis for both lumber and veneer with two sets of prices for each, print the results of each analysis, save the summary results of each analysis, and save the input data

Alt B—Do analysis for both lumber and veneer with "Hi" prices for each, print the results of each analysis, save the summary results of each analysis, and save the input data

Alt L—Do analysis for lumber only with two sets of prices, print the results of each analysis, save the summary results of each analysis, and save the input data

Alt M—Do analysis for lumber only with "Hi" prices, print the results, save the summary results, and save the input data

Alt V—Do analysis for veneer only with two sets of prices, print the results of each analysis, save the summary results of each analysis, and save the input data

Alt W—Do analysis for veneer only with "Hi" prices, print the results, save the summary results, and save the input data

The section in figure 2 labeled "Summary of lumber results" contains the summary results from a series of lumber analyses. The column heading abbreviations for the lumber analysis are explained below:

SI—site index

STK—stocking

A1—age at time of pruning

A2—age at time of harvest

TRE—number of trees pruned per acre

SUCC—proportion of trees surviving to harvest

COST—cost of pruning per tree

PRICE—price of C select lumber

\$/Mp—value per mbf if pruned

\$/Mu—value per mbf if unpruned

FVT—difference in future value per tree between pruned and unpruned trees

PT1—increase in present value per tree with the first interest rate

PA1—increase in present value per acre with the first interest rate  
PT2—increase in present value per tree with the second interest rate  
PA2—increase in present value per acre with the second interest rate  
%C—percentage of the pruned log that is clear wood at time of harvest  
%SEL—percentage of grade recovery in C and D selects  
DBH1—diameter of tree at time of pruning  
DBH2—diameter of tree at time of harvest  
LDH—average diameter of largest limb in each quadrant of log at time of harvest  
JWH—percentage of the log that is juvenile wood at time of harvest

The section in figure 2 labeled “Summary of veneer results” contains the summary results from a series of veneer analyses. The only column heading abbreviations in the summary of the veneer analysis that are not the same as those for the lumber analysis are:

PRICE—price of AB veneer  
\$/Mp—value per msf if pruned  
\$/Mu—value per msf if unpruned  
%AB—percentage of grade recovery in AB veneer

The section in figure 2 labeled “Summary of input data” is where input data used in a series of analyses will be stored. The row headings are identical to those found in the lumber input and results screen, which are defined above.

The data in these summary areas can be erased to clear them to accommodate new data. Input data can be copied to the input area of the lumber analysis screen to repeat an analysis or do a sensitivity analysis. If data from the results sections are needed in another location in the spreadsheet for graphing or further analysis, they should be moved with the “copy” command. The “move” command should not be used because the summary section from which the results came will then become protected and will not accept the results of new analyses.

## Summary

This spreadsheet program provides a means for simulating the difference between the financial returns of pruned and unpruned trees or stands. It is a significant improvement over the PRUNE-SIM program, which uses average recovery for unpruned logs regardless of the specific regime under which pruning was applied. This program is easy to use for anyone who has access to a personal computer and LOTUS 1-2-3 software.<sup>2</sup> This program should be widely applicable to coast Douglas-fir.

There is a conservative bias in the results of this program because the lumber recovery for pruned logs was based on processing that was more production oriented than grade oriented. A mill oriented to sawing for grade likely would get higher grade recovery from pruned logs than predicted by the model. A bias in the opposite direction results because the analysis assumes that all the increase in product value accrues.

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<sup>2</sup> The use of trade or firm names in this publication is for reader information and does not imply endorsement by the U.S. Department of Agriculture of any product or service

to the landowner. Although in a reasonably competitive market most of the increase in value should be bid into the price of stumpage, it would probably be something less than 100 percent. And there likely are some costs for record keeping that go beyond the pruning cost dealt with in the program.

Market acceptance of clear wood from pruned trees is a further source of uncertainty. Clear wood products from pruned young-growth logs have a different appearance than clear wood products from old growth. Market resistance to clear wood products from pruned young growth is likely; the extent is not measurable. Historical experience indicates, however, that as any high-quality resource gets scarcer and more expensive, people become more willing to use substitutes. Clear wood products from pruned young growth should be a close substitute for clear wood products from old growth for many uses; as old-growth clear wood becomes more expensive, the market resistance to young-growth clear wood is likely to diminish.

## Metric Equivalents

1 inch = 2.54 centimeters

1 foot = 0.305 meter

1 cubic foot = 0.028 cubic meter

1 acre = 0.4047 hectare

## Literature Cited

**Cahill, James M.; Snellgrove, Thomas A.; Fahey, Thomas D. 1988.** Lumber and veneer recovery from pruned Douglas-fir. *Forest Products Journal*. 38(9): 27-32.

**Fahey, Thomas D.; Cahill, James M.; Snellgrove, Thomas A.; Heath, Linda S. 1991.** Lumber and veneer recovery from intensively managed young-growth Douglas-fir. Res. Pap. PNW-RP-437. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 25 p.

**Fight, Roger D.; Cahill, James M.; Fahey, Thomas D.; Snellgrove, Thomas A. 1987a.** Financial analysis of pruning coast Douglas-fir. Res. Pap. PNW-RP-390. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 17 p.

**Fight, Roger D.; Cahill, James M.; Snellgrove, Thomas A.; Fahey, Thomas D. 1987b.** PRUNE-SIM users guide. Gen. Tech. Rep. PNW-209. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 21 p.

**Haynes, Richard W.; Fight, Roger D. 1992.** Price projections for selected grades of Douglas-fir, coast hem-fir, inland hem-fir, and ponderosa pine lumber. Res. Pap. PNW-RP-447. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 20 p.

**Maguire, Douglas A.; Kershaw, John A., Jr.; Hann, David W. 1991.** Predicting the effects of silvicultural regime on branch size and crown wood core in Douglas-fir. *Forest Science*. 37(5): 1409-1428.

**O'Hara, K.L. 1991.** A biological justification for pruning in coastal Douglas-fir stands. *Western Journal of Applied Forestry*. 6(3): 59-63.

**Warren, Debra O. 1992.** Production, prices, employment, and trade in Northwest forest industries. *Resour. Bull.* Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Quarterly.





**Fight, Roger D.; Cahill, James M.; Fahey, Thomas D. 1992.** DFPRUNE users guide. Gen Tech. Rep. PNW-GTR-300. Portland, OR. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station 12 p.

The DFPRUNE spreadsheet program is designed to estimate the expected financial return from pruning coast Douglas-fir (*Pseudotsugamenzies* (Mill.) Franco var *menziesii*). It is a significant revision of the PRUNE-SIM program. The PRUNE-SIM program was based on the average product recovery for unpruned logs from a single stand that received frequent light thinnings. The DFPRUNE program incorporates new recovery information for unpruned young-growth Douglas-fir and can be used to assess the economic potential of pruning for a wide range of management regimes. Product prices and descriptions of trees at time of pruning and at time of harvest must be supplied by the user. The DFPRUNE program was developed for the Lotus 1-2-3 spreadsheet and should work on versions 2.01 or later.

Keywords: Douglas-fir, pruning, forest product value, product recovery, simulation

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