



United States  
Department of  
Agriculture

Forest Service

**Northeastern  
Research Station**

General Technical  
Report NE-338



# **Cost of Sawing Timber (COST) Module**

## **Version 1.0 for Windows®**

**A. Jefferson Palmer, Jr.  
Janice K. Wiedenbeck  
Robert W. Mayer**



---

---

## Abstract

The Cost of Sawing Timber (COST) Module calculates the per minute and per thousand board feet for a hardwood sawmill. It is a companion to the SOLVE sawmill analysis program but can be used independently. Cost figures are calculated by the cost module based on information entered by the user. Sawmill managers use these costs as benchmarks in addressing a wide range of operational questions. SOLVE uses the cost-per-minute figure in calculating the break-even log cost for logs of different species, grades, diameters, and lengths.

---

---

---

---

## The Authors

A. JEFFERSON (JEFF) PALMER, JR. is a computer specialist with the USDA Forest Service, Northeastern Research Station in Princeton, WV. He received a B.S. degree in business management and computer science from Bluefield (WV) State College, and joined the Northeastern Research Station in 1991.

JANICE K. WIEDENBECK is a research forest products technologist and project leader with the USDA Forest Service, Northeastern Research Station in Princeton, WV. She received a B.S. degree in forestry from the University of Michigan in 1980 and M.S. and Ph.D. degrees in forest products from Virginia Polytechnic Institute and State University. She joined the Northeastern Station in 1994.

ROBERT W. MAYER is a forestry and forest products industry consultant in Indiana. Most recently he was Vice President of Operations for the Frank Miller Lumber Company.

---

---

Manuscript received for publication 24 February 2005

The computer program described in this publication is available on request with the understanding that the U.S. Department of Agriculture cannot assure its accuracy, completeness, reliability, or suitability for any other purposes than that reported. The recipient may not assert any proprietary rights thereto nor represent it to anyone as other than a Government-produced computer program.

This software program is provided "as is" without warranty of any kind. The authors (USDA Forest Service, Northeastern Research Station) do not warrant, guarantee, or make any representations regarding the use or the result of the software or documentation in terms of their correctness, reliability, currentness, or otherwise. The entire risk as to the results and performance of the software is assumed by you. In no case will any party involved with the creation or distribution of the software be liable for any damage that may result from the use of this software.

The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement or approval by the U.S. Department of Agriculture or the Forest Service of any product or service to the exclusion of others that may be suitable.

---

---

Published by:  
USDA FOREST SERVICE  
11 CAMPUS BLVD SUITE 200  
NEWTOWN SQUARE PA 19073-3294

For additional copies:  
USDA Forest Service  
Publications Distribution  
359 Main Road  
Delaware, OH 43015-8640  
Fax: (740)368-0152

October 2005

---

---

The Cost of Sawing Timber (Cost) Module: A Cost Information Tool.....	1
System Requirements.....	1
Installing Cost.....	1
Application Overview.....	3
Options Available.....	6
File Menu.....	6
Starting Work on a COST Data Set.....	6
Saving Data.....	6
Printing Cost Summaries.....	6
Tools Menu.....	6
Calculator and Metric Conversion Utilities.....	6
Options Menu.....	6
Application Settings.....	6
Sawmill ID.....	6
Help Menu.....	7
Inputting Data.....	7
Order Of Entry.....	7
Data Input Options.....	7
Entering Single Cost Figure.....	7
Low- and High-end Cost Estimates.....	7
Itemizing Costs.....	7
Section 1: Production.....	8
Section 2: Log Yard Inventory.....	9
Section 3: Capital Investments.....	9
Section 4: Procurement Costs.....	9
Section 5: Work Shifts.....	12
Section 6: Wages and Salaries.....	13
Section 7: Overtime and Downtime.....	14
Section 8: Holidays and Leave.....	15
Section 9: Miscellaneous Information.....	15
Section 10: Employment Expenses and Contract Labor.....	15
Section 11: Business Income Taxes.....	16
Section 12: Insurance.....	16
Section 13: Maintenance and Repairs.....	16
Section 14: Utilities.....	16
Section 15: Administrative Expenses.....	16
Section 16: Miscellaneous Expenses.....	17
Cost Analyses.....	17
Sawmill Cost Summaries.....	17
Weekly Work Shift Activity.....	17
Annual Nonpayroll Operating Costs.....	17
Annual Wage and Salary Costs.....	18
Annual Procurement Costs.....	18
Total Operating Cost.....	18
Conclusion.....	18

## The Cost of Sawing Timber (Cost) Module: A Cost Information Tool

The long-term success of a hardwood sawmill requires an effective cost management system. A well-designed system can provide sawmill managers critical information for successfully planning and controlling their operations. When information on sawmill activities is collected and analyzed, managers can refine daily activities and thereby reduce costs and improve efficiency and profitability.

The Cost of Sawing Timber (COST) Module, a stand-alone companion to the SOLVE-2003 sawmill analysis program, is designed to calculate a sawmill's cost per minute and per thousand board feet (Mbf). The per-minute cost can be entered into SOLVE, which provides a comprehensive analysis of sawmill recovery, efficiency, and profitability per log. Inputs to COST are easily adjusted so that the user can determine the effect of operational and financial changes on total costs. Summary information includes charts that demonstrate the relative size of different cost components.

### System Requirements

The following are *minimum* system requirements for the COST Module:

- IBM<sup>®</sup> compatible PC.<sup>1</sup>
- Microsoft Windows<sup>®</sup> 95 or above.
- At least 32 megabytes of random access memory (RAM).
- 8 megabytes of available hard disk space.
- Color monitor with a resolution of at least 1024 x 768 pixels.
- CD-ROM drive.

### Installing Cost

Before running the setup program, make sure that your system's default font size is set to "small fonts." For example, in Windows 95, the default font size can be adjusted by right-clicking the desktop, selecting **Properties**, and then **Settings** (Fig. 1). To install COST, place the setup CD in the CD-ROM drive. If the setup program does not start automatically, click **START** from the task bar and select **RUN**. Enter **D:\SETUP.EXE** (or your CD-ROM's drive letter if different from D:).

As you navigate through COST's setup utility, you will be asked to specify a directory to which the application files will be installed (Fig. 2). You can use the default location or specify your own.

---

<sup>1</sup>The use of trade, firm, or corporation names in this publication is for information and convenience of the reader. Such use does not constitute an official endorsement or approval by the U.S. Department of Agriculture or Forest Service of any product or service to the exclusion of others that may be suitable.

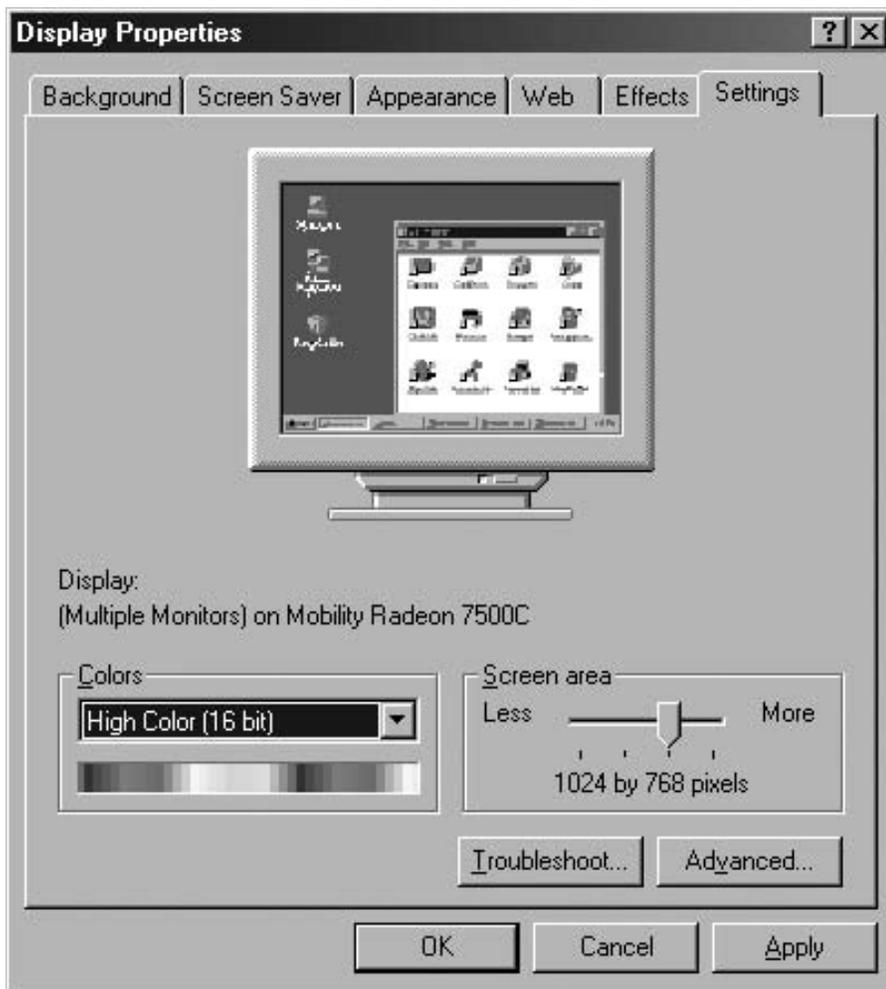


Figure 1.—The Display Properties dialog box.



Figure 2.—Dialog box asks the user to specify a directory to which COST will be installed.

## Application Overview

The visual layout of the COST Module consists of a navigator, menu bar, and data entry areas (Fig. 3). The navigator contains selectable hyperlinks that allow quick access to a particular data entry section. The menu contains commands that are similar to those in other Windows-based applications, e.g., File|Save, Edit|Copy, and Help|Contents. Each data entry area contains table edit fields that allow users to enter sawmill cost information. This interface makes it easy to enter, edit, review, or save mill information at any time. To simplify data entry, the COST Module has been organized into sections. Table 1 describes data entry shown.

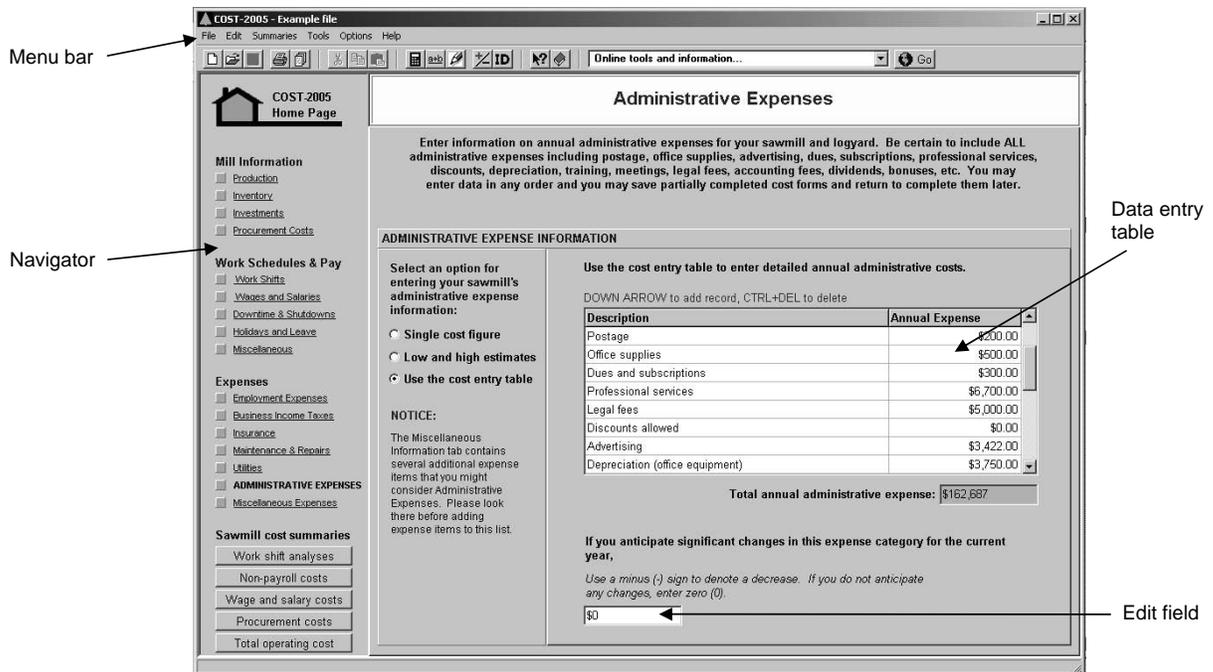


Figure 3.—COST Module's user interface.

**Table 1.—Sections within COST Module**

Section	Description
<b>Mill Information</b>	
Production	Accepts information on products manufactured at the sawmill.
Logs	Requests daily log consumption and the rule used to measure log volumes.
Lumber	Requests total annual lumber production (in Mbf).
Chips	Requests chip production and price.
Bark	Requests bark production and price.
Sawdust	Requests sawdust production and price.
Log Yard Inventory	Accepts information on sawmill's log yard inventory.
Capital Investments	Annual depreciation expense on sawmill equipment.
Procurement Costs	Wage and salary cost information. Includes three options for entering annual cost of wages and salaries.
Introduction	Provides instructions and rationale for entering procurement costs.
Log Purchases	Distribution of logs procured from different sources is entered here. Users can enter a single procurement cost figure or detailed costs that will be used to compute a single cost figure.
Log and Timber Buyers	Accepts cost information on log and timber buyers.
Logging Crews	Accepts cost information on logging crews.
Buyer Vehicles	Allows users to enter annual cost of operating owned or leased vehicles or cost of reimbursing buyer for personal vehicle use.
<b>Work Schedules and Pay</b>	
Work Shifts	Accepts information on work shifts; users can define up to three shifts.
First Shift	Allows users to define additional shifts operated by the mill. Scheduled hours and meal and other breaks for this shift also are entered here.
Second Shift	Users can define the type of shift, scheduled hours, meal breaks, and other breaks for this shift.
Third Shift	If the mill employs a third shift, users can define the type, scheduled hours, and meal and other breaks for this shift.
Holidays and Leave	Requests information on vacations, holidays, and sick days.
Wages and Salaries	Allows users to enter detailed wage and salary information.
Single Cost Figure	Allows users to enter a single annual wage and salary cost figure.
Low and High Cost Estimates	To estimate an annual cost, users can enter low and high estimates to obtain an average cost.
Wage and Salary Table	Allows users to enter detailed wage and salary information using a table.
Wage Costs	Allows users to enter detailed wage information in a table.
Salary Costs	Allows users to enter detailed salary information in a table.
Overtime and Downtime	Requests information on overtime hours worked, downtime, and shutdown days per year.
First Shift	Accepts entries for overtime, downtime, and average number of overtime hours worked per week for first shift. Shutdown days per year also are entered here.

**Table 1.—Continued**

Section	Description
Second Shift	Accepts entries for overtime, downtime, and average number of overtime hours worked per week for second shift.
Third Shift	Accepts entries for overtime, downtime, and average number of overtime hours worked per week for third shift.
Miscellaneous Information	Accepts entry of additional maintenance and nonmaintenance labor and displays operating and productive hours per year.
Maintenance Labor Cost	Maintenance labor costs incurred during days when the sawmill is not running, e.g., sawmill shutdown week, are calculated based on wage and scheduled maintenance data.
Nonmaintenance Labor Cost	Labor costs associated with nonmaintenance personnel who are scheduled to work on shutdown days.
Operating and Productive Hours	Summarizes calculated total operating and productive hours and provides opportunity to adjust these figures.
<b>Expenses</b>	
Employment Expenses	Annual cost of employee benefits (excluding holiday, sick leave, and vacation pay) and contract labor.
Employment-Related Expenses	Annual benefit costs are entered here.
Contract Labor	Annual cost of contract labor is entered here.
Business Income Taxes	Federal, state, local, and other annual tax costs.
Insurance	Insurance information. This page includes three options for entering annual cost of insurance.
Single Cost Figure	Allows users to enter a single annual insurance cost figure.
Low and High Estimates	To estimate an annual cost, users can enter low and high figures to obtain an average cost.
Cost Entry Table	Allows users to enter detailed insurance information using a table.
Maintenance and Repairs	Cost of maintaining and repairing sawmill equipment. This page includes three options for entering annual cost of maintenance.
Single Cost Figure	Allows users to enter a single annual repair and maintenance cost figure.
Low and High Estimates	To estimate an annual cost, users can enter low and high figures to obtain an average cost.
Cost Entry Table	Allows users to enter detailed maintenance cost information using a table.
Utilities	This page includes three options for entering annual cost of utilities.
Single Cost Figure	Allows users to enter a single annual utility cost figure.
Low and High Estimates	To estimate an annual cost, users can enter low and high figures to obtain an average cost.
Cost Entry Table	Allows users to enter detailed utility cost information using a table.
Administrative Expenses	This page includes three options for entering annual cost figure.
Single Cost Figure	Allows users to enter a single administrative cost figure.
Low and High Estimates	To estimate an annual cost, users can enter low and high figures to obtain an average cost.
Use the Cost Entry Table	Allows users to enter detailed administrative cost information using a table.
Miscellaneous Expenses	Cost information not addressed elsewhere in the program is entered here.

## **Options Available**

### **File Menu**

#### **Starting Work on a COST Data Set**

You can open an existing COST file that you previously created and saved or begin work on a new analysis by selecting the File|Open or File|New menu option. If you select File|New, the new COST analysis pages will contain either blank entry boxes, default numbers in certain entry boxes, or numbers from an example analysis. You can specify a new file format by selecting one of the three startup options from the Options|Application Settings menu.

#### **Saving Data**

We recommend that you save your changes regularly to prevent the loss of information. To save data to disk, select File|Save or File|Save As... from the menu. If you make changes to a new or existing COST data form and elect to open a new or different saved form, you will be prompted to save the changed file before proceeding to the new one. Only one data form can be open at a time. Saving different sawmill cost scenarios under different COST file names is a good way to establish comparison files for assessing the relative cost impact of alternative production strategies.

#### **Printing COST Summaries**

Several summary reports for the COST program that include both tables and graphs formatted for printing can be accessed under the File|Print menu. These include work shift analysis, operating cost, wage and salary cost, and procurement cost summaries and a five-page full COST report. You can print other pages of the program by copying the screen image to the clipboard. To do this, simultaneously press control, shift, and print screen then paste the image into another program (e.g., a word processor to print it).

### **Tools Menu**

#### **Calculator and Metric Conversion Utilities**

Two utilities can be accessed under the Tools menu. One is the standard calculator and the other is a metric conversion utility created by personnel at the Northeastern Research Station at Princeton, West Virginia. The latter automatically converts the number entered in the upper right entry box to the number below the light blue line. The conversion result appears so unobtrusively that it can seem that nothing has happened. Both the calculator and metric conversion utility remain open in the background. To close them, click on the x in the top right corner of the utility's box.

### **Options Menu**

#### **Application Settings**

Selecting the Application Settings brings up three tabs that offer startup, keyboard, and navigator bar options. The startup options discussed previously enable you to specify the format of the COST data pages that will appear when a new COST analysis is begun. The keyboard options tab allows you to choose whether the Enter and tab keys will function similarly when data are entered and worksheets are navigated. The navigator bar option allows you to select the color scheme for the navigator bar when running COST.

#### **Sawmill ID**

The Sawmill ID option allows you to enter sawmill data such as mill name and address. These entries appear on the COST reports. To run "what-if" analyses to explore how changing certain cost inputs would affect total costs, give each cost scenarios a distinctive name.

## Help Menu

In the Help menu, select Contents to obtain a full listing of the help topics; the help text is hot linked to the listing. Select Current Section to jump to the specific section of COST's help manual that pertains to the section of the program in which you are working. The same content-specific help information can be obtained at any time by pressing the F1. For information on the program's developers and on the COST version that you are running, select About.

## Inputting Data

### Order of Entry

To navigate easily through the COST Module, begin with the *Production* section and end with the *Miscellaneous Expenses* section. Usually, pages within a section are completed in a left-to-right format. When all entry boxes on all pages of each section are completed, the bullet to the left of the completed section title on the navigator bar switches from red to green. When required information has been submitted, click on one of the buttons at the bottom of the navigator to view *work shift analyses*, *annual non-payroll operating cost*, *annual wage and salary cost*, *annual procurement cost*, and *total operating cost* summaries.

### Data Input Options

For five of the program's data entry sections (*Wages and Salaries*, *Insurance*, *Maintenance and Repairs*, *Utilities*, *Administrative Expenses*), you have the option of entering data in one of three ways: (1) by entering a single cost figure for the cost category, (2) by entering low- and high-end estimates of your cost, or (3) by entering an itemized list of costs.

### Entering Single Cost Figure

This option is recommended if you have high confidence in your cost data and historic numbers. If a single total dollar figure for the entire year is entered, you will be asked to enter the amount of any anticipated increase or decrease in total costs for the current year. The increase or decrease is added to or subtracted from the single total dollar amount to produce a revised expense figure.

### Low- and High-end Cost Estimates

Use this option if you are doing a quick cost estimate using cost data from the previous year or want to enter data that demonstrates the effect of cost uncertainties. The cost figures should be entered as annual figures. On several summary pages, these estimates will be reflected in the results' tables that include low-, average-, and high-end cost figures. When low- and high-end cost estimates are entered under more than one cost tab, COST derives overall low- and high-end cost summary figures from all low-end and all high-end cost entries. A calculator function is provided to assist in converting monthly figures to annual amounts.

### Itemizing Costs

This option allows you to itemize cost information in a table. You can define the heading in the table's first column and enter associated annual costs in the second column.

## Section 1: Production

In the *Production* section, information can be entered about your mill's log consumption, lumber production, and the production of chips, bark, and sawdust byproducts. Although a sawmill's principal product is lumber, significant costs and incomes are derived from byproducts. The *Production* page contains five blocks that request production data for *Logs*, *Lumber*, *Chips*, *Bark*, and *Sawdust*.

### Logs

There are two input fields in the *Logs* block of the *Production* page. The first is for entering your mill's average daily log consumption in Mbf. The second allows you to select the log rule used to measure the volume of logs consumed. Log rules available are Doyle, International ¼-inch, Scribner, and Scribner Decimal C. It is important that the log volume figure you enter is accurate because it is used to calculate the operating cost per Mbf of logs input into the sawmill.

### Lumber

Use the *Lumber* input block to report average daily lumber production (in Mbf). Include cants, shims, miscuts, outs, blocking, and other low-value or no-value lumber in addition to grade lumber production. You are asked to estimate the volume of low-value or no-value lumber if records on below-grade lumber are not maintained. Since the volume figure entered is used to calculate the operating cost per Mbf of lumber produced, it is important that it be accurate.

### Chips

In the *Chips* block, enter the average quantity of chips (in tons or cubic yards) produced per time period (day, shift, week) by your mill. In the last field, state the green chip price freight-on-board (F.O.B.) your mill (in dollars per green ton). Do not include chip production from nonsawmill sources, e.g., tailings from dry grading stations, log yard waste, or other secondary processes, nor transportation costs regardless of who pays these costs. The chip volume/weight and price data are not used by COST in its calculations but are summarized in the full COST report. Select *File* and *Print* to print the reports. If you are unsure about chip production and do not want to take the time to collect this information, you can enter an estimate or leave this blank without affecting the program's cost estimate. However, data on chip production and pricing are required if SOLVE is used to evaluate production efficiency and break-even log costs.

### Bark

The figures entered in this block are for *unprocessed* bark produced directly from the sawmill via the debarker. In the input fields, enter the average quantity of bark (in tons or cubic yards) produced per time period (day, shift, week) by the sawmill. In the last input field, enter the bark price F.O.B. your mill (in dollars per green ton). Data on bark volume/weight and price are not used by COST in its calculations but are summarized in the full COST report. If you are unsure about bark production and do not want to take the time to collect this information, you can enter an estimate or leave this blank without affecting the program's cost estimate.

### Sawdust

The *Sawdust block* requests information about the production of *green* sawdust (versus kiln-dried). Do not include sawdust or shavings from nonsawmill processes. In the input fields, enter the average quantity of sawdust (in tons or cubic yards) produced per time period (day, shift, week) by your

sawmill. In the last field, enter the sawdust price F.O.B. your mill (in dollars per green ton). If you are unsure about sawdust production and do not want to take the time to collect this information, you can enter an estimate or none at all without affecting the program's cost estimate.

## **Section 2: Log Yard Inventory**

The *Inventory* section accepts information on a mill's log yard inventory. The requested entries for this section are:

- Average log yard inventory (in Mbf). It is assumed that the log rule used is the one selected when you provided data on log consumption under the *Production* tab.
- Inventory maintenance method used (bar code tags, batch system, educated guess, or pencil and paper).
- Average green lumber inventory (Mbf).

Indicate whether your mill uses a First In, First Out (FIFO) log inventory system by checking the accompanying box. As was the case for sawmill residue data, information on the log inventory is collected so that it can be included in the full COST report, which provides a comprehensive compilation of your sawmill's operations. As such, the report is useful for decisionmaking, external briefings, and data entry for SOLVE.

## **Section 3: Capital Investments**

Capital investments such as mill machinery, buildings, forklifts, and log loaders typically are subject to depreciation. In the *Capital Investments* section, you are prompted to enter a total dollar figure for the annual depreciation expense for all sawmill equipment (*excluding dry-kiln department investments*) for the last 12 months of operation. Or you can enter your total depreciation expense as reported on the most recent tax return. You also are asked to estimate any increase or decrease in this expense resulting from changes in depreciation rate or equipment during the current year. This estimate is added to or subtracted from the depreciation expense to obtain an updated depreciation figure. Because U.S. tax law limits the dollar amount of newly acquired depreciable property that can be reported as an expense based on a depreciation schedule, you might consider the full purchase price of a piece of equipment as a cost of doing business in the year the investment is made or in the years the payments are made. For example, if you purchased a new log loader this year for which you are making a series of payments, the annual cost of these payments might be the "depreciation expense" entered on this page.

## **Section 4: Procurement Costs**

The *Procurement Cost* section contains an introductory page that explains how to enter procurement costs as well as pages that accept inputs for these costs, which are not components of a sawmill's true operating cost. Logically, procurement costs must be incorporated into raw material costs. The data requested in this section is used to calculate a mill-specific procurement cost per Mbf of logs purchased. This cost should be added to the base cost of logs to derive the total log cost.

### **Introduction**

Since raw material costs account for more than 55 percent of the cost of goods sold for the average hardwood sawmill, you are strongly encouraged to complete the *Procurement Cost* section to validate or perhaps improve the raw material cost figures used when pricing logs. The *Procurement Costs Entry*

*Options* section is the starting point for determining procurement costs (*found on Introduction page*). If you track procurement costs on a regular basis and are confident that the figures are accurate, select Yes and enter a single procurement cost per Mbf of log input into your sawmill. If you do not have an accurate figure, COST presents data entry pages for log and timber buyers, logging crews, resale and remote yards, and timber and log buyer vehicles.

### **Log Purchases**

On this page, click on *Log Purchases* to begin entering log procurement data. There are three groups of data entry blocks beginning with one requesting the total volume of log purchases (in Mbf) by your mill during the previous year. When entering this value, include all logs purchased from every available source. Also, if portions of your logs are purchased using different log scales, use the scale selected under *Production* in reporting your log volume.

In the second data entry block, you are asked to specify the percentage of logs procured from standing timber purchases, concentration yards, woods side purchases, gate-log purchases, and sources such as company-owned lands and landowner cooperatives.

The third data entry block asks you to indicate whether a premium is paid for gate logs and if so, to enter the average price premium paid per Mbf. While COST does not add any premium amount paid for gate logs to other procurement costs, the premium can be considered as a “procurement cost” paid to the independent logger for delivery of logs to your sawmill. Your log pricing structure for gate logs is not used by COST in its calculations but is summarized in the [full COST report](#).

### **Log and Timber Buyers**

The first procurement information requested from those who use the COST to determine total procurement costs is related to costs associated with employing timber buyers, timber spotters, and others involved with the purchase of cut logs or standing timber. The following information is required:

- Number of full-time buyers employed by your mill.
- Total annual salary or wages for *all* buyers (full-time and part-time).
- Average employment benefits stated as a percentage of base salary for full time buyers.
- Buyer expense items and associated costs (excluding buyer vehicle expenses which are entered on another page).
- Payment method used to compensate timber spotters.
- Approximate total annual expenditure for timber spotters.

As with all cost information entered into COST, include only those portions of the procurement expense that pertain to the sawmill for which you are calculating operating costs. For example, if a timber buyer purchases logs for multiple company sawmills, provide a best estimate of his/her total salary, benefits, and related expenses that should be allocated to the sawmill that is being evaluated.

### **Logging Crews**

Although difficult to calculate, the total cost of logging crews also must be incorporated into the procurement cost. The following logging-related cost items should be included in your cost estimate:

- Personnel wages, salaries, and fringe benefits.

- Support costs, e.g., secretarial support and equipment hauling.
- Machinery depreciation.
- Skidders/forwarders/crawlers, etc.
- Over-the-road tractor trailers.
- Fuel/lubricants.
- Licenses.
- Insurance.
- Maintenance and repairs.
- Administrators.

The entry fields for inputting logging crew costs are under the *Company-Owned Logging Crews* and *Contract Logging Crews* tabs. If your company has its own logging crews, click on *Company-Owned Logging Crews* and enter the:

- Number of company-owned logging crews employed by your mill.
- Percentage of standing timber purchased that is harvested by company loggers.
- Total annual cost of all company-owned logging crews.

The approximate cost per Mbf of standing timber harvested, skidded, bucked, and delivered to your home mill by company logging crews is shown at the bottom of this page. This cost is calculated by multiplying the percentage of standing timber harvested by company logging crews (entered on this page) by the percentage of total log inputs from standing timber (from *Log Purchases* page), multiplying this amount by total log volume (also from *Log Purchases*), and then multiplying this total by the total annual cost of company logging crews (entered on this page).

If your mill employs contract logging crews, click on *Contract Logging Crews* and enter the following:

- Average price per Mbf paid to contract loggers.
- Percentage of standing timber purchased that is harvested by contract loggers.
- Average annual payment to contract loggers.
- Approximate annual cost for contractual or custom hauling of logs from the woods to one of your satellite log yards or to your home sawmill log yard. This is applicable only if the annual payment to contract loggers excludes the cost of log transport to your log yard(s).

### **Resale and Remote (Satellite) Yards**

Some mills may resale (merchandize) logs that cannot be economically utilized by the mill. If this is the case at your sawmill, the income generated from log resales should be deducted from your log procurement costs. If your log procurement and satellite yards serve multiple company sawmills, you need to devise an appropriate formula for proportioning the income from log resales to your mills. COST asks you to provide the following log resale (merchandizing) information:

- Approximate total volume (Mbf) per year of all merchandized logs sold.
- Approximate sales value (dollars) per year of all merchandised logs.
- Profit or loss resulting from log merchandizing.

If you operate one or more satellite log concentration yards (log yards other than the one that is co-located with your sawmill), you can enter the total number of satellite yards that you operate and the approximate total annual cost of all satellite yards (including office, staff, fringe benefits, vehicles, utilities, rolling stock, land, and rent). If you have multiple mills that are served by the satellite yard(s), you need allocate only a portion of the satellite yard costs to the procurement costs to the individual sawmill.

### **Timber and Log Buyer Vehicles**

The cost of your company vehicles used *solely* in log or standing timber procurement must be included in log costs. This page includes three options for entering vehicle costs:

- Itemize the costs of vehicles provided to log/timber buyers.
- Enter a single total dollar amount for vehicles provided to log/timber buyers.
- Enter reimbursement costs to buyers if you do not provide transportation but reimburse them for mileage if they use their own vehicles.

If you itemize the cost of buyer vehicles, you are asked to provide the total annual operating cost for all buyer vehicles. Include insurance costs for log buyer vehicles under this tab rather than under the insurance tab so that these costs are allocated correctly as a procurement cost.

### **Section 5: Work Shifts**

In the *Work Shifts* section, you are asked to describe the type of work performed during Shifts 2 and 3 (if these are multiple shifts per day), define the start and end times for each shift, choose the type of meal break schedule used (uniform or staggered), and other paid and unpaid breaks.

#### **Work Shift Description**

While it is assumed that Shift 1 is a production oriented shift, Shifts 2 and 3 often are used for maintenance, cleanup, or catch-up production. Fields are provided that allow you to describe the nature of the work performed during Shifts 2 and 3. The shift choices provided by the program are:

- Formal operating—lumber is produced during this shift.
- Partial—for certain machines only.
- Interim—used only on occasion.
- Maintenance/cleanup only.

If you indicate that either Shift 2 or 3 is dedicated to maintenance and cleanup, the hours per week associated with this shift are not used in calculating either operating or productive hours. However, costs associated with this shift are included in the total operating cost figures.

The work shift section is one of COST's components that can be used in what if comparisons. For example, enter your current shift schedule and then revise your COST data file, making changes both here and to the *Wages and Salaries* data to investigate the cost impact of implementing an additional production shift. COST's results pages will predict the relative change in operating costs resulting from the schedule change.

## Weekly Work Schedule

COST allows you to define weekly work schedules for each shift that you operate. You can enter a weekly schedule summary including information on total weekly meal and break periods. Or, you can use a table to list schedules for each day of the week in which the shift operates. Whether the summary or detailed option is used, COST calculates the total number of paid operating hours per week, a critical figure in calculating operating costs for the sawmill. Note that the term “scheduled hours” as used in COST refers to the total number of hours between the beginning and ending of the shift. For example, if the shift is scheduled to begin at 6:30 a.m. and end at 4:00 p.m., the number of scheduled hours is 9.5. When entering schedules into COST, use decimal equivalents rather than standard minutes, i.e., enter 8 hours and 30 minutes as 8.5 hours.

## Breaks

Sawmills schedule breaks in a variety of ways. Most find uniform breaks more efficient and cost effective. Some mills stagger breaks to maintain a productive flow throughout the shift. With uniform breaks, production is halted for the duration of the mill-wide break. By contrast, production may be slowed for the duration of staggered breaks.

When the sawmill takes a paid break in which the mill stops running, the time is counted as downtime. If your mill uses staggered break times and you want to compute the equivalent amount of downtime associated with staggered breaks, double-click on the field that corresponds with the day of the week during which staggered breaks are taken. This brings up a data entry form for entering the estimated average decrease in productivity (if any) suffered during staggered break periods. For example, if you estimate that production is slowed by 15 percent while employees are taking staggered breaks (this could be due to any number of causes, e.g., less experienced operators breaking out primary equipment operators and the fact that fewer people are on the sawmill floor to keep things flowing when material hangs up) and the period of staggered breaks in both the morning and afternoon is 2 hours, the equivalent “shutdown” period associated with the staggered break system is 36 minutes (0.60 hours) per day. This figure is input automatically into the work shifts data entry table. This option is available for meal and other breaks.

## Section 6: Wages and Salaries

Before entering annual wage and salary expenses for your mill, remember to:

- *Exclude* dry kiln and log procurement wages and salaries.
- Include clerical, administrative, and support staff wages and salaries that are related to the sawmill’s operation.
- Include all other labor costs if they are directly associated with the sawmill.
- Prorate wages and salaries for employees providing labor or services to the sawmill in addition to other nonsawmill profit centers, e.g., dry kiln, remanufacturing operation, log procurement.
- Include costs associated with operating your primary log yard at the sawmill on the *Wages and Salaries* page rather than under *Procurement Costs*.

The *Wages and Salaries* page includes four options for entering wage and salary costs. The first allows you to input a single total dollar figure for the entire year. The second option asks you to state a

low- and high-end wage and salary cost estimate on a monthly or yearly basis. The third allows you to itemize both wages and salaries using cost entry tables. The fourth cost input option allows you to enter wages and salaries for individual employees. This fourth option offers both tabular and form-based input formats.

With respect to the salaries of sawmill managers, there is a column for entering the “percent of time directly related to the sawmill.” Since many managers working for primary hardwood processors are involved in many aspects of the business, only that portion of work time and effort that relates directly to sawmill operations should be charged to the mill. The COST program calculates and automatically enters the salary amount that should be included in calculations of sawmill costs. The wage entry table does not offer this option because it is assumed that wage employees work for a single department (cost center) within the operation, though this is not always the case. If an employee’s time is split between two departments, the best way to adjust for this is to reduce the hourly wage rate in proportion to the departmental time allocation. So if a forklift operator whose wage rate is \$12 per hour is assigned half time to the sawmill and half time to the dry kilns, enter the operator’s wage rate as \$6 per hour in the sawmill wage table.

**WAGE AND SALARY COSTS**

Select an option for entering your sawmill's wage and salary expense information:

- Single cost figure
- Low and high estimates
- Job title & classification
- Individual employee

**NOTICE:**  
Exclude dry kiln and log procurement wages and salaries. Include clerical, administrative and support staff wages and salaries, and all other labor costs if directly associated with the sawmill. Pro-rate wages and salaries for employees providing labor or services to the sawmill in addition to other non-sawmill profit centers. Costs associated with operating your primary log yard at the sawmill should be included here rather than under procurement.

Job Title	Category	#	\$/hr.
Log loader operator	Material handling	2	\$0.00
Debarker operator	Machine operator	1	\$0.00
Head sawyer	Machine operator	1	\$0.00
Edger operator	Material handling	1	\$0.00
Trim saw operator	Machine operator	1	\$0.00
Grader	Grader	1	\$0.00
Green chain handlers	Material handling	4	\$0.00
Sawfiler	Sawfiling	1	\$0.00
Maintenance	Maintenance	1	\$0.00
Forklift operator	Material handling	1	\$0.00

Figure 4.—The cost table entry option of the *Wages and Salaries* page allows you to enter the job titles of your employees, the number of people employed in each type of job, and their average hourly wage rate.

## Section 7: Overtime and Downtime

In the *Overtime and Downtime* section you can enter the overtime rate of pay, average downtime for each shift, and average number of shift operating hours that are paid at the overtime rate of pay. If the downtime figure you provide already includes as downtime any regular paid breaks given to employees, indicate this by checking the box in the bottom-left section of the page. If you do not

include paid breaks in overtime calculations, leave the box unchecked. COST will add the time associated with paid breaks to your downtime figure if you have not already done so. The number of shutdown days per year can be entered on the *First Shift* page in the bright green box. For second and third shifts, this section allows you to enter a shift premium. When specifying overtime and downtime, you can enter your values as percentages or dollars-per-hour figures.

## **Section 8: Holidays and Leave**

In the *Holidays and Leave* section, you can enter the following:

- Average number of paid holidays per year per employee.
- Average number of paid sick days per year per employee.
- Average number of paid personal days per year per employee.
- Other paid days when the mill does not operate (average per employee).

If your mill does not provide any of these day-off benefits, check the box at the bottom of the list to set all of the entries to 0.

## **Section 9: Miscellaneous Information**

COST assumes that your mill is shut down entirely during shutdown days and that the entire maintenance crew works during these days. If you entered your wage and salary data using the single figure or high-low ranges, you need not enter additional data on wages paid during shutdown week since these amounts should have been included in the wage figure(s) you provided. But if you used the wage cost entry table to determine wages, you must estimate the total wages paid to maintenance employees and others called out to assist with sawmill improvement projects during the shutdown period. The two data entry pages for entering this data are *Maintenance Labor Cost* and *Nonmaintenance Labor Cost*. The total wage amount entered here is added to the total that COST calculates for the days in which the sawmill is producing lumber.

Also under *Miscellaneous Information* is the *Operating and Productive Hours* page. Here you will find the total mill operating and productive hour figures derived by COST. Check these numbers to see if they seem reasonable. If they do not (for example, if the ratio of productive hours to operating hours is lower than it should be), you may want to go back and recheck some of your entries, particularly those related to shift operating hours, downtime, holidays and leave, and overtime. If after rechecking you still are not convinced that the hours calculated by COST are correct, enter adjustments to the operating hours or the productive hours or both in the boxes at the bottom of the page. COST uses the adjusted figures to derive your sawmill's operating cost estimates. You still might want to rerun the program using the operating and productive hours calculated by COST so that you may see how this variance affects your results. If the effect is large, it may be worthwhile to study the difference more closely to ensure that your adjustment is appropriate.

## **Section 10: Employment Expenses and Contract Labor**

The *Employment Expenses* section includes the *Employment Related Expenses* and *Contract Labor* pages. For *Employment Related Expenses*, enter the annual cost of all employment-related expenses *except* holiday, sick leave, and vacation pay amounts (which were entered earlier in the *Holidays and Leave* section). As with all sections of the COST program, be sure that the employment-related expenses that you report are related to sawmill operations. Employment-related expenses for procurement

personnel should have been entered under the *Log and Timber Buyer's* page. Employment-related expenses for value-added operations' personnel such as dry-kiln employees also should be removed before entering this figure. Most of the numbers for employee related expenses can be found on Federal forms 941 and 990. If you employ contract labor for sawmill operations, maintenance, or saw filing on a regular or periodic basis, use the *Contract Labor* page to enter a single annual cost figure. If an increase or decrease in this expense category for the current year is anticipated, an entry field is available for inputting a dollar value that reflects that change. COST adds or subtracts the increase or decrease from the single total dollar amount to derive a more accurate contract labor cost.

### **Section 11: Business Income Taxes**

The *Business Income Taxes* section includes a two-column table that allows you to itemize your sawmill's tax burden for the past year. COST provides both federal and state tax headings, and the tax expense adjustment field (just below the tax table) allows you to define significant changes in your tax expense for the current year. COST computes the total annual tax expense by totaling the itemized tax figures and applying the value in the tax expense adjustment field to the total tax amount.

### **Section 12: Insurance**

COST provides three options for entering insurance expense values. The first allows you to input a single total dollar figure for the entire year. The second asks you to state a low- and high-end annual insurance cost estimate. The third allows you to itemize each annual insurance expense item using a cost entry table. The default entry file provides a significant list of possible insurance expenses that can help you formulate your own comprehensive list so that none of these expenses is omitted.

### **Section 13: Maintenance and Repairs**

The *Maintenance and Repairs* section includes three options for entering costs associated with maintenance and repairs. Use the first option to enter a single total dollar figure for the entire year. The second allows you to enter a low- and high-end cost estimate on a monthly or yearly basis, and the third allows you to itemize each annual cost item using cost entry table (see Table 1 for an explanation of these options). *When entering repairs and maintenance costs, enter only the prorated sawmill portion of maintenance costs for rentals and supplies if the materials also are used by areas of your operation apart from the sawmill.*

### **Section 14: Utilities**

Your mill's utility expense should include only sawmill expenses and those related to the primary log yard. Do not include the *dry kiln portion*. Again, the *Utilities* page includes three options for entering cost data. You can enter a single total dollar figure for the entire year, a low- and high-end cost estimate per month or year, or itemize each annual utility expense item using a cost entry table.

### **Section 15: Administrative Expenses**

Your mill's administrative expenses can be entered as a single total dollar figure for the entire year, a low- and high-end monthly or yearly estimate, or as an itemized list using a cost entry table. The *Miscellaneous Information* tab that follows contains several additional expense items that you might consider as administrative expenses. Look there before adding expense items to this list.

## Section 16: Miscellaneous Expenses

The *Miscellaneous Expenses* section is the last data entry section. This page allows you to enter any annual sawmill expenses not defined elsewhere in COST. A two-column table provides space for entering expense item descriptions and the dollar amount of each. The miscellaneous expense adjustment field (bottom of the page) allows you to input significant changes in the miscellaneous expense category for the current year. COST computes the total annual miscellaneous expense by summing the itemized expenses and applying the value in the adjustment field to the total miscellaneous expense figure.

## Cost Analyses

### Sawmill Cost Summaries

Once the required information is entered into COST, you can view the cost analysis pages by clicking one of the summary buttons located in the lower section of the navigator bar. This brings up tables and charts that describe your mill's annual wage and salary, procurement, and operating costs.

### Weekly Work Shift Activity

On the basis of the information you supplied, COST generates an analysis for each work shift specified. The report contains a table that provides a quick look at the shift's scheduled hours, unpaid breaks (in minutes), and paid and productive hours. A graphical comparison between scheduled work hours, paid hours, and productive hours for each shift is provided. The information in this report can be printed by printing out the full COST report that you can access by selecting File|Print from the top menu bar.

### Annual Nonpayroll Operating Costs

Your sawmill's total annual nonpayroll operating cost per minute is computed by dividing the total annual nonpayroll operating cost by the number of annual sawmill paid hours (in the *Miscellaneous Information* section). The *Nonpayroll Annual Operating Cost Report* page contains a table and chart that show the distribution of annual nonpayroll operating costs. This report also includes a table and chart that show the distribution of costs. The following cost areas are shown in the summary table:

- Depreciation expense.
- Business income taxes.
- Insurance.
- Maintenance and repairs.
- Utilities.
- Administrative expense.
- Miscellaneous information.

A chart displays these same items as well as the percentage of the total annual operating cost apportioned to each. The total annual nonpayroll expense amount is divided by the sawmill's annual productive hours (*Miscellaneous Information* section) to arrive at a nonpayroll cost per minute figure. The total annual nonpayroll costs per Mbf of lumber produced and per Mbf of logs processed also are displayed. This information can be printed from the File|Print menu.

## **Annual Wage and Salary Costs**

The *Annual Wage and Salary Costs Report* page displays a summarized description of your mill's distribution of annual wage and salary costs (providing you entered wage and salary information using the cost-entry table). The total annual cost of wages and salaries is divided by the sawmill's annual productive hours (*Miscellaneous Information* section) to arrive at a cost-per-minute figure. The total annual wage and salary costs per Mbf of lumber produced and per Mbf of logs processed also are displayed. Wage breakdowns by shift are given if wage and salary information were input using the cost entry table. Overtime, premium pay, employment related expenses, and contract labor expenses are included in the total annual wage and salary calculation and are itemized on this summary page. This information can be printed from the File|Print menu.

## **Annual Procurement Costs**

The summary of your annual procurement costs is presented in the form of a table, chart, and data field that show the total procurement cost for the year. Also, minimum and maximum industry benchmarks are provided so that you can see how your total annual procurement costs compare to the sawmill industry as a whole. The procurement cost items shown in the table are:

- Timber buyer wages and salaries.
- Timber buyer benefits.
- Annual buyer expenses.
- Timber spotter expenses.
- Annual logging cost.
- Satellite yard cost.
- Cost of buyer vehicles.

The chart also shows these same annual expense items and the percentage of the total procurement cost apportioned to each. This information can be printed from the File|Print menu.

## **Total Operating Cost**

Your sawmill's total annual operating cost (total annual nonpayroll costs *plus* total annual wage and salary and employment-related costs) is broken down to a cost-per-minute figure (total annual operating cost *divided by* the number of total annual operating hours (*Miscellaneous Information* section)). An established feasible range for operating cost per minute based on 2004 expense ratios is \$4 to \$25. A statement below the cost- per-minute figure indicates whether your operating cost falls within this range. Using the production numbers input under the *Production* tab for log inputs and lumber production combined with the work schedule information that you provided, COST also provides the operating cost per Mbf of logs utilized and lumber produced.

## **Conclusion**

The COST Module is designed to help you derive and examine your sawmill's cost information using a format that should lead you to a reasonably accurate estimation of sawmill operating cost per minute. It should be beneficial for all sawmill owners and financial officers to work through the detail page of each cost category at least once. The list of expense items might provide ideas that can be incorporated into your existing costing system. The COST program is not intended to serve as a replacement for your existing managerial accounting system.

**To obtain additional copies of the COST Module or inquire about its operation contact:**

USDA Forest Service, Northeastern Research Station  
Forestry Sciences Laboratory  
241 Mercer Springs Road  
Princeton, WV 24740  
Telephone: 304-431-2700; Fax: 304-431-2772; E-mail: jpalmer01@fs.fed.us

Palmer, A. Jefferson, Jr.; Wiedenbeck, Janice K.; Mayer, Robert W. 2005.  
**Cost of Sawing Timber (COST) Module (Version 1.0) for Windows®.  
[Computer Program].** Gen. Tech. Rep. NE-338. Newtown Square, PA: U.S.  
Department of Agriculture, Forest Service, Northeastern Research Station. 18 p.  
[Includes CD-ROM].

The Cost of Sawing Timber (COST) Module calculates the cost of operations per minute and per thousand board feet for a hardwood sawmill. It may be used independently or as a source of cost information for use in sawmill efficiency software such as the SOLVE program. Cost figures are calculated on the basis of information entered by the user. Sawmill managers use these costs as benchmarks in addressing a wide range of operational issues. SOLVE and similar sawmill analysis programs use the cost-per-minute figure derived by COST in calculating the break-even cost for logs of different species, grades, diameters, and lengths.

**Keywords:** sawmill, software, operating cost, SOLVE, efficiency





---

---

**Headquarters of the Northeastern Research Station is in Newtown Square, Pennsylvania. Field laboratories are maintained at:**

**Amherst, Massachusetts, in cooperation with the University of Massachusetts**

**Burlington, Vermont, in cooperation with the University of Vermont**

**Delaware, Ohio**

**Durham, New Hampshire, in cooperation with the University of New Hampshire**

**Hamden, Connecticut, in cooperation with Yale University**

**Morgantown, West Virginia, in cooperation with West Virginia University**

**Parsons, West Virginia**

**Princeton, West Virginia**

**Syracuse, New York, in cooperation with the State University of New York, College of Environmental Sciences and Forestry at Syracuse University**

**Warren, Pennsylvania**

---

---

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternate means for communication of program information (Braille, large print, audiotope, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, DC 20250-9410, or call (800)795-3272 (voice) or (202)720-6382 (TDD). USDA is an equal opportunity provider and employer.

*“Caring for the Land and Serving People Through Research”*