



United States
Department of
Agriculture

Forest Service

Northeastern Forest
Experiment Station

Research
Paper NE-527

1983



The Personal-Use Firewood Program on Three National Forests: a Cost Analysis

Floyd G. Timson



The Author

Floyd G. Timson graduated from the Stockbridge School of Agriculture, University of Massachusetts, in 1951 with a major in forestry, in 1979 with an A.S. degree in agricultural business management, and from the University of New Hampshire in 1959 with a B.S. degree in agriculture. He joined the USDA Forest Service at the Lake States Forest Experiment Station in 1961. He transferred to the Northeastern Forest Experiment Station in 1965 and is now a research forester at the USDA Forestry Sciences Laboratory at Princeton, West Virginia.

Manuscript received for
publication 4 November 1982

Abstract

The national forests provide a substantial volume of firewood for America's households. The 17 national forest districts studied spent over \$148,000 to provide over 25,000 personal-use firewood permits during the calendar year 1981; 86 percent of the permits were for freewood mostly in the form of dead or down wood. The remaining 14 percent were for greenwood sold either to households in the form of pickup load sales or through the sale of personal-size boundaries of marked timber. It cost the 17 districts almost \$6.00 per permit to provide this service. The cost per permit varied by the district issuing the permit and by the system used to provide the wood. The cost by district ranged from less than \$0.50 to \$32.00 per permit; by system the cost ranged from approximately \$2.80 for a dead or down permit to over \$56.00 a permit to prepare a personal-size sale.

Introduction

The public forests of the United States, particularly the national forests, are becoming an important source of personal-use firewood. Until 1973, only residents within or near a national forest boundary could obtain a permit to cut firewood on the forests for their own use. However, in 1971 only a small percentage of even the rural population used firewood and of those residents eligible, only a few were requesting permits; for example, the Monongahela National Forest issued less than 300 permits that year.

In 1972, the first energy crisis occurred. The demand for wood increased, and wood started to regain its place as an important alternative home fuel. From July 1972 to June 1973, 64,000 free-use permits were issued by the USDA Forest Service nationwide. This increase in requests for wood was followed by the USDA announcement in late fall of 1973 that even more people would be allowed to cut national forest firewood for their own use.¹ In 1977, as the oil problems continued and a very cold winter caused heating costs to soar, the rules for issuing wood permits in the eastern national forests were further liberalized.² Today, all who wish to cut wood for their personal use may apply for a permit for Forest Service firewood.

In 1981, when this study was initiated, the national forest firewood program was being operated under

Interim Directive No. 60, Forest Service Manual 2460, that instructed all Forest Service officers to make personal-use firewood available to all potential users so long as other resource values were protected and consistent with manpower and budget constraints. The permits issued to cut personal-use firewood were to be free, but under situations demanding increased use of manpower or resources, fees could be charged. In February 1981, the interim directive was replaced by Amendment 124, Forest Service Manual 2460.

"Freewood" is still the norm; however, the selling of wood ("feewood") has been increasing in some forests. This increase in feewood has been due in part to demand that has depleted the accessible firewood in many areas and increased the cost of preparing additional firewood areas and protecting the other resources.

Each district decided how to make wood available to potential users. Although a major portion of the wood leaving the forest is still given to the user, it is not a cost-free activity for the Forest Service. The cost of making firewood available to the public accrues to the Forest Service except in a few situations where it would cost more to dispose of residue and other normally unwanted wood than to make it available for firewood.

My study was undertaken to determine what it costs a national forest district to provide firewood for personal use. I considered the relative merits of the numerous systems used to provide firewood, which is that wood from a national forest for one's own energy use and not to be resold, traded, or otherwise transferred.

Procedure

Cost data pertaining to firewood were collected for 12 months from January 1 through December 31, 1981. The data were gathered from a total of 17 districts of the George Washington, Jefferson, and Monongahela National Forests. The study area was in the central Appalachians and covered a variety of demand situations from those of rural-scattered to urban-compact populations, resulting in a large range in the number of permits issued by the ranger districts.

The information collected from each of the 17 ranger districts included a description of each system used to transfer wood to individuals and the number of permits issued under each system. A permit is an authorization issued by the forest district at the request of or purchased by an individual that allows the removal of a given volume of wood or the designated wood from a given area within each system. The following cost-related items were recorded:

Labor (for each employee who did work within the personal-use firewood program)

- Job classification, grade, and pay rate
- Pay differential—if any: overtime, night, Sunday
- Number of hours or portion thereof worked

Vehicle (mileage charges)

- Class or type
- Miles driven

Other

- Office supplies, including mailing costs
- Field supplies

¹U.S. Department of Agriculture, Forest Service. USDA to let public cut free firewood to ease energy situation. In the Forest Service Firewood Program (by Susan Johnson, Policy Analysis), Appendix Ib, News, USDA 3558, 1973. 2 p.

²U.S. Department of Agriculture, Forest Service. Forest Service expands free firewood policy. In the Forest Service Firewood Program (by Susan Johnson, Policy Analysis), Appendix Ib, News, USDA 321, 1977. 1 p.

- Monthly vehicle charges
- Contractual costs
- Forest Service equipment charged by the operating hour

Labor and vehicle use also were recorded as administrative (e.g., permit writing, inspection, law enforcement) or nonadministrative (tree marking, road work).

For any activity conducted primarily for the production of firewood, all times and expenses were entered on the study data sheets. However, if firewood was a byproduct of some activity, only those additional times and expenses incurred in making the firewood available to the public were recorded.

Labor costs were computed by multiplying the times worked by the appropriate pay classification scale and then by pay differential, if any. The vehicle costs were computed by multiplying the miles driven by the vehicle class rates for the appropriate region. We used pay scales and vehicle rates in force for the month that work or travel was accomplished and for districts in which the employee or vehicle was assigned.

Permits Issued and Systems of Transfer

In the study area, individuals can obtain wood by one or more of six systems, or a variation thereof. These systems vary among forests and among districts within a forest. These systems listed in descending order by number of districts using the system are:

- 1—Free dead or down wood (usually for up to 5 cords or equivalent Ccf's [one Ccf = 100 ft³] per permit)
- 2—Small sale units (greenwood, usually marked, within a defined boundary)
- 3—Pickup load sales (usually cut your own)
- 4—Small free units (greenwood, usually marked, within a defined boundary—marked units usually less than 1 acre)
- 5—Free greenwood (individually marked trees within a district)
- 6—Areas set aside for or sold to groups (e.g., a senior citizens cutting area)

In the study area for the 12-month period ending December 31, 1981, over 25,000 firewood permits

were issued. The breakdown of permits issued for forests A, B, and C was 54, 34, and 12 percent, respectively (Table 1). One basic reason why forest C issued relatively fewer permits than forest A or B is differences in forest setting. Some of the districts in A and B are very similar to districts in C. But, in general, forest C differs in a number of respects from A or B as follows:

- Low population density
- No population center within easy driving range
- Accessible privately owned wood

Permits issued within a given system for the whole study area ranged from 89 for System 5 to over 20,000 for System 1. System 1 or some variation thereof was the only system used by all 17 districts. The dead or down permit accounted for 82 percent of all permits issued in the study area (Table 1). Only three districts issued less than 69 percent of their total permits as dead or down; in five districts it was the only system used. The remaining five systems all involved mostly greenwood (live standing trees).

Table 1.—Permits issued by system and forest, in percent

Permit Systems	Forest A N = 13,583	Forest B N = 8,682	Forest C N = 3,067	Total N = 25,332
1. Dead or down	81(57-100) ^a	91(69-100)	62(17-98)	82(17-100)
2. Small sale unit	2(0-6)	2(0-22)	3(0-7)	2(0-22)
3. Pickup load sales	17(0-43)	7(0-21)	—	12(0-43)
4. Small free unit	—	—	32(0-81)	4(0-81)
5. Free greenwood	—	—	3(0-24)	<0.5(0-24)

^aNumbers in parentheses are the ranges, in percent, among the districts.

The most common greenwood system, System 2, involves the selling of marked trees within small boundaries ranging up to 10 acres. However, the unit is usually a small area containing 3 to 5 cords. Units are offered to the public as follows: by bid, where the buyer sets the price; by lottery, where the seller sets the price; or on a first-come, first-served basis, where the seller sets the price. However, where demand exceeds supply, the last method has caused problems and user complaints. Although nearly one-half of the districts use System 2, it accounts for only about 2 percent of the total permits issued, but it is gaining popularity among the districts.

System 3 (truckload sales) has been used or tried by nearly 30 percent of the districts. Under this system, areas with marked trees, stands which are to be clearcut, and sometimes areas of logging residue are set aside and the wood is sold by the truckload. Recipients cut and load their wood and pay a set fee for the load. System 3 accounted for 12 percent of the total permits issued. On one district, 43 percent of the permits were for truckload wood.

In System 3, the number of permits does not equal the number of recipients because each truckload is considered a permit and a recipient may purchase more than one load for his own use.

Of the three remaining systems, only System 4 is relatively important. System 4—small free units of marked firewood—is carried on by two districts and accounts for 4 percent of total permits issued in the study area. However, for the forest in which the two districts are located, almost one-third of the permits were issued under this system. The units usually are about one-half of an acre and contain 3 or more cords of firewood. The material to be cut is marked, the unit boundaries marked, and the units numbered. They are then assigned on a first-come, first-served basis.

One of the two districts offering free firewood in this form of small units of timber has plans to sell these units in the future.

System 5 and 6 account for 3 percent of the total funds expended for the firewood program and less than 0.5 percent of the permits issued. System 5 is free greenwood from specifically marked trees scattered throughout a district. Permits are issued under this system by only two districts. Most of the other districts provide greenwood in this form but allow it to be cut under a standard or modified dead or down permit.

System 6, active on only 1 of the 17 districts at this time, provides personal-use firewood to groups. In this system, areas are set aside and then given or sold to a designated group (e.g., a senior citizen area or an area acquired by a co-op for use by their own members). Four units were made available under this system; however, the number of persons cutting from these areas is unknown, so this system was not included in Table 1.

Cost and Analysis

The three categories of expenditures for this study broke down as follows: transportation, and other costs accounted for 20 percent of the firewood program expenditures; the remaining 80 percent was for labor. By district within the study, the labor costs ranged from 69 to 100 percent (Table 2).

The 17 districts spent over \$148,000 to operate the personal-use firewood program during calendar year 1981. The average cost was just over \$8,700 per district. The range of expenditures per district was from less than \$300 to over \$25,000 (Table 2).

It cost an average of \$5.85 (Table 3) to provide a permit for firewood by one of the six basic systems. The respective costs for forests A, B, and C were \$4.32, \$7.58, and \$7.69 (Table 4). The forest with the lowest cost issued the most permits, 53 percent of the total for the study area during 1981.

At the district level, the overall cost per permit ranged from less than \$0.50 to over \$32.00. Both the

Table 2.—Breakdown of cost by expense category and forest, in percent

Expense category	Forest A \$58,647 (4.8–40.1) ^a	Forest B \$65,839 (0.4–38.0)	Forest C \$23,583 (9.2–42.8)	Total \$148,070
Labor	78(69–90)	78(71–100)	90(75–96)	80
Vehicle use	6(2–14)	13(0–21)	6(4–13)	9
Office supplies	2(0–3)	1(0–8)	2(0–6)	1
Field supplies	6(0–13)	1(0–4)	2(0–8)	4
Other	8(0–16)	7(0–12)	—	6

^aNumbers in parentheses are the ranges, in percent, of districts' share of forest cost.

**Table 3.—Cost analysis for the study area
(Permits issued = 25,329)**

Item	Nonadministrative	Administrative
Hours worked (number)		
Forest Service funds	6,901	6,835
NonForest Service funds	1,683	1,522
Wages paid (dollars)		
Forest Service funds	54,444	53,062
NonForest Service funds	5,640	5,169
Vehicle operation		
Mileage (miles)	27,119	23,590
Cost (dollars)	6,337	4,366
Other (dollars)		
Field supplies	5,148	
Vehicle rent (FOR)	1,250	1,088
Contractual services	1,660	
Forest Service equipment operation	7,722	
Nonfield supplies		2,164
Total (dollars)	82,201	65,850
All costs (dollars)	148,051	
Cost per permit (dollars)	3.25	2.60
Total cost per permit (dollars)	5.85	

Table 4.—Cost per permit by forest and district, in dollars

National forest	District						Average
	1	2	3	4	5	6	
ALL SYSTEMS							
A	4.82	4.80	3.66	4.48	2.79	5.26	4.32
B	.33	4.97	32.61	6.35	3.92	6.34	7.58
C	4.69	8.34	14.64	6.46	3.77	—	7.69
Area Average							5.85
DEAD OR DOWN (SYSTEM 1)							
A	3.24	2.14	2.33	1.35	2.79	0.81	2.16
B	.33	4.81	11.32	6.34	1.46	2.62	3.95
C	3.56	1.76	1.09	1.70	1.67	—	2.20
Area Average							2.81
SMALL SALE UNITS (SYSTEM 2)							
A	21.32	58.22	29.99	(a)	(a)	236.50	49.84
B	(a)	198.07	66.07	(a)	(a)	(a)	68.17
C	53.55	134.28	(a)	(a)	37.46	—	42.73
Area Average							56.82
PICKUP LOAD SALES (SYSTEM 3)							
A	40.11	8.13	(a)	7.45	(a)	(a)	7.99
B	(a)	(a)	37.03	(a)	(a)	20.72	21.35
C	(a)	(a)	(a)	(a)	(a)	—	(a)
Area Average							10.93
SMALL FREE UNITS (SYSTEM 4)							
A	(a)	(a)	(a)	(a)	(a)	(a)	(a)
B	(a)	(a)	(a)	(a)	(a)	(a)	(a)
C	(a)	9.61	21.71	(a)	(a)	—	15.11
Area Average							15.40

(a) District did not use this system.

lowest and highest permit costs were for two districts on the same forest (Table 4). The low-cost district (under \$0.50 per permit) had a fairly active firewood program in the years before this study. But because of problems and costs associated with the free firewood program, they moved toward selling to firewood entrepreneurs. They now operate a very modified firewood program issuing down-only permits and provide no other service.

The high-cost district (\$32.00 per permit) views the firewood program as an integral part of its overall district program. They have tried various systems to provide firewood, and they maintain a very active program. With the approach of last year's firewood season, this district had to build access roads to firewood areas. The road building was one factor in their high-cost permits.

The above district is typical. In fact, its costs may be very typical of a district's firewood program for any given year. The firewood program is a relatively new program for the Forest Service and as such, new problems arise. Demand for wood continues to increase and accessible wood is depleted, so new areas need to be opened, and new ways of providing wood are tried. Solutions to the problems result in cost fluctuations. This has occurred already in some districts; it will occur in others.

The cost of providing a firewood permit is related to the system used.

Among the six systems, the average cost per permit ranged from \$2.81 for the dead or down system to over \$56.00 to prepare a small sale unit (Table 4). Within this range it cost \$10.93 to provide a pickup load and \$15.40 to provide greenwood from a given free cutting unit. One district expended \$19.76 to provide firewood through marked scattered firewood trees. Within each system, the cost per permit fluctuated among the districts (e.g., dead or down permit ranged from \$0.33 to \$11.32).

A leading cause of cost variation is the philosophy of the ranger and those assigned to the firewood program on a given district. The control of the firewood program since its inception has been left very much to the district. Therefore, the portion of a district's resources that is assigned to the firewood program lies with the ranger and his staff. How they view the program has a definite influence on the assigned resources and the system(s) used in carrying out the Forest Service firewood program.

One district may elect to issue down-only permits and to provide no other service. On another district, in addition to issuing a permit for dead as well as down wood, the district may provide one or more of the following services: maps depicting possible firewood locations, personal aid in locating wood, dead trees designated by some form of marking, and temporary roads constructed into areas containing a concentration of dead and/or down timber.

General economic conditions also are causing increased program costs. Commercial timber sales are down and as a result, less logging residue is available for firewood. Consequently, other sources of firewood must be found, made accessible, and prepared for the public. Because some of these added costs in 1 year benefit the program for 2 or more years, the cost fluctuates from year to year and district to district.

Another reason for cost differences is the size of the program in relation to other service programs. The firewood program is relatively small compared to other district operations. So, even small changes in input cost factors are somewhat magnified and influence the permit cost accordingly.

Special-program personnel (Young Adult Conservation Corps [YACC], Older Americans) in the firewood program are another viable cost factor. These employees work on Forest Service projects but are paid from appropriations of another agency. Pay rates are lower than those for other Forest Service employees. In the study area firewood program, special-program personnel account for 19 percent of the hours worked but only 9 percent of the labor costs (Table 3). Replacing special-program personnel with Forest Service personnel and maintaining the firewood program at or near its present level would cost 2 to 2-1/2 times that of the special-program personnel. Under present policies, this cost would have to be absorbed by the affected districts.

Volume

Volume was not considered in this study because of the difficulty in determining actual volume removed. The volume usually allowed under the dead or down permit or the free permit area is 5 cords or equivalent in Ccf's. Some people probably took the allowable volume. But forest personnel estimate that the majority removed somewhat less than the allowable amount. One ranger estimated that only 2 cords per permit were removed. In addition, substantial volumes of marked firewood are not tallied. Some districts only estimate the volume of designated firewood, others tally only that wood in the sawtimber or pulpwood-size category.

Monetary Returns of the Program

Monetary return does not directly aid the district or forest because monies received go to the General Treasury. Therefore, the cost to the district remains the same regardless of any income from a firewood activity. Income to the General Treasury from the firewood system offsets general appropriations to the Forest Service.

Districts that offered some form of firewood were asked to compile an account of the monies received from the sale of personal-use firewood during the study period. The computation was complicated because the study period covered parts of 2 fiscal years. Further, there is no

firewood functionary account and incoming monies were recorded under other accounts. However, most districts provided a fairly accurate estimate of monetary return.

Two districts returned a profit of over \$54.00 per sale for the small-sale-unit permits. When all costs of all permits for these districts were accounted for, one district realized a profit of \$0.35 per permit; income for the other district served to reduce the average cost per permit from \$4.82 to \$0.51. Other districts using the firewood systems were able to reduce overall per-permit expenses by up to 60 percent (Table 5).

Table 5.—Actual district cost and effective general revenue per permit for selected districts selling firewood, in dollars

Districts	District cost			Effective general revenue		
	All permits	Small cutting units only	Small cutting units and pickup loads	All permits	Small cutting units only	Small cutting units and pickup loads
A1	4.82	21.32	24.82	– 0.51	+ 54.63	+ 37.90
A2	4.66	58.22	49.42	– 2.29	(^a)	+ .19
A3	3.66	29.99	(^b)	+ .35	+ 54.71	(^b)
A6	5.26	236.50	(^b)	– 2.44	– 129.00	(^b)
B3	32.61	66.07	60.95	– 19.39	(^a)	– 30.06
B6	6.34	(^c)	20.72	– 5.31	(^c)	– 15.71
C5	3.77	37.46	(^b)	– 1.48	+ 1.57	(^b)

^aRevenue from sale of small cutting units and pickup loads not reported separately.

^bPickup system (3) not used.

^cSmall cutting unit sales system (2) not used.

Conclusion

- In terms of growth and service to the public, the firewood program is a success. Increased demand has forced many districts to open up additional accessible firewood sources.
- It now costs an average of almost \$6.00 to issue a permit for firewood, and this cost will likely increase. In calendar year 1981, some districts spent \$200.00 or more to provide wood to one permittee.
- Although some general revenue is derived from the program, the districts must bear the full cost of the operations.
- The program has grown and should be considered a functional program that merits specific budget accounts (at least in areas of high demand).

Timson, Floyd G. **The personal-use firewood program on three national forests: a cost analysis.** Res. Pap. NE-527. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 8 p.

The national forests' personal-use firewood program was studied to determine operating costs. Seventeen national forest districts studied expended over \$148,000 to provide over 25,000 personal-use firewood permits during the calendar year 1981; 86 percent of the permits were for freewood, mostly dead or down wood. The remaining 14 percent was for greenwood sold to households in the form of pickup load sales or personal-size boundaries of marked timber.

ODC 649:831.1

Keywords: timber utilization; energy wood

Headquarters of the Northeastern Forest Experiment Station are in Broomall, Pa. Field laboratories are maintained at:

- **Amherst, Massachusetts, in cooperation with the University of Massachusetts.**
 - **Berea, Kentucky, in cooperation with Berea College.**
 - **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, Morgantown.**
 - **Orono, Maine, in cooperation with the University of Maine, Orono.**
 - **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, Syracuse.**
 - **University Park, Pennsylvania, in cooperation with the Pennsylvania State University.**
 - **Warren, Pennsylvania.**
-