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Report to Congressional Requesters

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FEDERAL TIMBER SALES

Process for Appraising Timber Offered for Sale Needs to Be Improved

GAO

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Resources, Community, and
Economic Development Division

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The Honorable Sidney R. Yates, Chairman
The Honorable Ralph Regula, Ranking
Minority Member
Subcommittee on Interior
and Related Agencies
Committee on Appropriations
House of Representatives

In response to your October 26, 1988, request, this is our report on the systems used to appraise timber offered for sale by the U.S. Department of Agriculture's Forest Service and the Department of the Interior's Bureau of Land Management. It evaluates the two methods currently in use and recommends certain actions to improve the appraisal process.

As agreed with your offices, unless you release its contents earlier, we plan no further distribution of this report until 30 days after the date of this letter. At that time, we will send copies to the appropriate Senate and House Committees; interested Members of Congress; the Secretary of Agriculture; the Chief of the Forest Service; and the Director, Office of Management and Budget. Copies will also be made available to other interested parties.

This work was performed under the general direction of John W. Harman, Director, Food and Agriculture Issues (202) 275-5138. Other major contributors are listed in appendix III of the report.

J. Dexter Peach
Assistant Comptroller General

Executive Summary

Purpose

The Department of Agriculture's Forest Service and the Department of the Interior's Bureau of Land Management (BLM) annually sell billions of board feet of timber from the nation's forests. In fiscal year 1988, receipts from these sales totaled more than $1.4 billion.

The Forest Service and BLM appraise timber to establish an advertised selling price. The Chairman and Ranking Minority Member, Subcommittee on Interior and Related Agencies, House Committee on Appropriations, asked GAO to examine whether the appraisal methods in current use (1) ensure that the government receives fair market value for the timber and (2) result in minimum selling prices that adequately protect the government's interest and enhance revenues.

Background

Various laws and regulations require that the Forest Service and BLM sell timber for its fair market value. Government-wide guidance also provides that sound business management principles generally be used when selling federal resources. However, neither agency is under a legal or regulatory requirement to sell timber at a price that will recover costs.

The two appraisal methods used in government timber sales are called the "transaction evidence" and "residual value" methods. The transaction evidence method establishes an appraisal price based on an average for comparable timber sales, while the residual value method establishes an appraisal price that would enable a purchaser of average efficiency to harvest and process the timber at a "reasonable profit." Three Forest Service regions use the residual value method while the remaining six regions and BLM use the transaction evidence method.

After appraising the timber, the agencies determine a minimum sales price, advertise the sale, accept bids, and award the sale to the highest bidder. GAO analyzed fiscal year 1988 data for 3,316 Forest Service timber sales and 221 BLM timber sales. The Forest Service timber sales were from forests in all nine of its geographic regions; BLM sales were from its forest lands in western Oregon.

Results in Brief

GAO's evaluation shows that using the transaction evidence appraisal method results in advertised prices—the lowest prices at which the government will sell—which are closer to fair market value than does the residual value method. This occurs because the residual value method

has many problems in its implementation due to nonstatistical and outdated data. While the transaction evidence method better estimates fair market value, it is being inconsistently applied by the Forest Service regions using it. Forest Service headquarters has provided only limited guidance and oversight to the regions to better ensure that their appraisals reflect fair market value and increase revenues to the government.

Neither appraisal method is designed to establish a minimum sales price which recovers costs and would protect the government's interest and enhance revenues. At the Forest Service, where a cost-accounting system has been in place since 1987, 40 percent of the total fiscal year 1988 timber sales that GAO reviewed were advertised for less than just the costs of preparing and administering the timber sales. BLM does not have such a cost-accounting system. However, on the basis of cost data provided by BLM, about 1 percent of the BLM sales that GAO reviewed were advertised for less than the costs of preparing and administering the sales.

Principal Findings

Transaction Evidence Method Superior Predictor of Fair Market Value

GAO's analysis of fiscal year 1988 Forest Service timber sales data showed that the transaction evidence method, when consistently implemented, resulted in advertised prices which were closer to fair market value than prices estimated by the residual value method. When aggressive competition exists, the appraisal method used makes little or no difference because competition results in a selling price that equates to fair market value. However, when aggressive competition is lacking, the accuracy of the appraisal method in estimating fair market value is particularly important to protect the government's interests. For example, about 5 percent of the sales were sold at advertised prices in oral auctions with a single bidder. GAO's analysis suggests that the transaction evidence method, on average, results in advertised prices that could range from 14 to 37 percent higher than the residual value method. Consequently, this suggests that the government may be able to enhance its revenues on noncompetitive sales by using the transaction evidence method of appraisal.

The residual value method is being implemented with nonstatistical and outdated data. All but three Forest Service regions have switched to the

transaction evidence method, citing data problems with the residual value method as well as the fact that the transaction evidence method better estimates fair market value and is less costly to maintain. Nonetheless, the Forest Service's two main timber-producing regions continue to use the residual value method and cite limited staff resources and historic use as the primary reasons.

Forest Service regions have received limited guidance or oversight from headquarters in developing or implementing the transaction evidence appraisal method. Accordingly, regions have developed differing approaches. One appreciable difference GAO identified was in the "rollback," or reduction the regions made to their appraisal estimates to stimulate competition and to compensate for any inaccuracies that they believed may have overstated the price developed by their appraisal estimates. One region reduced the appraised price developed by its transaction evidence method by an average of 47 percent in 1988, whereas all other regions reduced the prices within a range of 5 to 25 percent. In fiscal year 1988, this region had 18 sales at advertised prices in single-bidder oral auctions. With a smaller percentage rollback applied in this region, the government might enhance its revenue on such sales.

GAO also found that the Forest Service does not exercise adequate internal control over the timber appraisal process. For example, there is no routine headquarters monitoring of how well regional appraisal systems are establishing bid prices that approximate fair market value.

BLM switched to the transaction evidence method during 1988 because of the residual value method's data problems and cost, and because the agency believed the transaction evidence method better estimates fair market value. GAO's analysis of fiscal year 1988 BLM competitive timber sales showed that sales appraised using the transaction evidence method resulted in selling prices that better approximated fair market value than those appraised using the residual value method.

Costs Not Considered When Setting Prices

Neither appraisal method ensures a minimum selling price that will adequately protect the government's interest and enhance revenues because neither method takes into account the costs of growing and selling the timber. In 1987, the Forest Service started using, on a test basis, a cost-accounting system which identifies all costs associated with its timber sale program. GAO used this system to compare the costs associated only

with the sales preparation and administration functions to the advertised and sales prices. In fiscal year 1988, the Forest Service advertised about 40 percent of the sales GAO analyzed for prices that were less than these costs and actually sold 24 percent at prices where these costs exceeded the sales prices by over $22 million. These costs do not include the costs of growing the timber, overhead, or foregone interest on the government's investment.

BLM does not have a cost-accounting system for its timber sale program. However, BLM furnished GAO with available data on sale preparation and administration costs which GAO did not verify. GAO's comparison of these data with BLM's fiscal year 1988 sales showed that about 1 percent of sales was advertised and that only one timber sale was actually sold for less than its sale preparation and administration costs.

While there can be valid reasons for below-cost sales—e.g., diseased timber may adversely affect other forest resources—GAO believes the reasons for such sales should be documented by the Forest Service. Information regarding the cost and purpose of a sale is not currently documented or considered before a sale is advertised. However, according to Forest Service officials, the agency plans to adopt guidelines and procedures in late 1990 that would provide guidance on timber sales which do not recover costs.

Recommendations

GAO recommends that the Forest Service provide better guidance and oversight to improve its timber appraisal process, including developing and using the transaction evidence method in Forest Service regions and discontinuing the use of the residual value appraisal method. GAO also recommends that the Forest Service complete actions to ensure that the government's costs be considered before a sale is advertised and that the reasons for selling below cost be documented by the appropriate official.

Agency Comments

GAO discussed the information in this report with Forest Service and BLM officials. They generally agreed with the facts presented and with GAO's conclusions and recommendations. GAO included their comments in the report where appropriate. As requested, however, GAO did not obtain official comments on this report.

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Abbreviations

BLM	Bureau of Land Management
GAO	General Accounting Office

Introduction

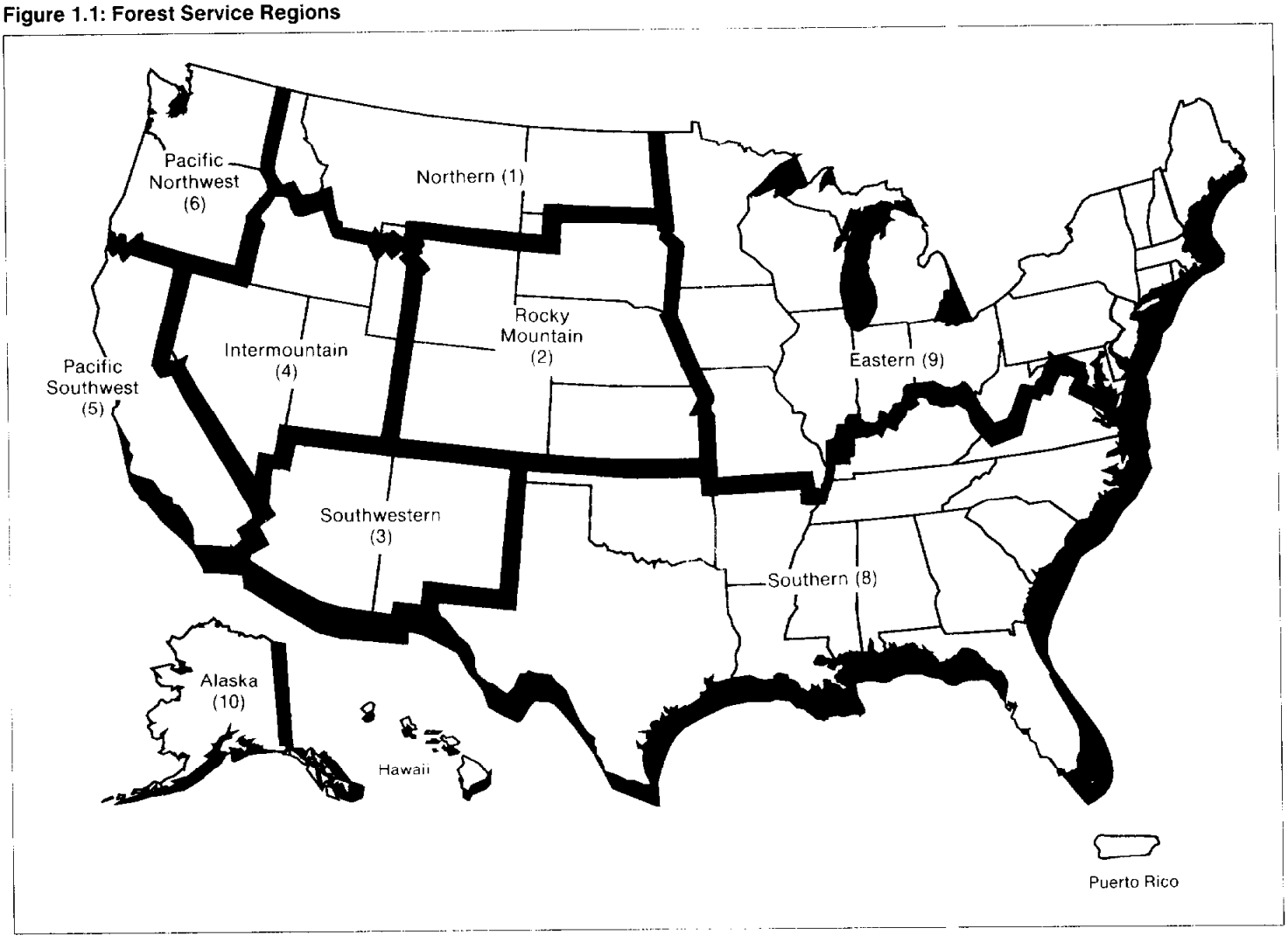
The federal government is a substantial supplier of timber available for harvest. In fiscal year 1988, it sold more than 12 billion board feet of timber.[1] Most federal timber lands are managed by two agencies—the Department of Agriculture's Forest Service and the Department of Interior's Bureau of Land Management (BLM). The Forest Service manages 191 million acres of national forest system land, while BLM manages about 8 million acres. In fiscal year 1988, the Forest Service sold about 11 billion board feet of timber for a total price of over $1.25 billion, and BLM sold more than 1 billion board feet for about $153 million.

The Forest Service is organized into nine regions (see fig. 1.1), with the two regions on the Pacific Coast producing the bulk of the harvested timber in fiscal year 1988. In that year, these two regions, which include the states of California, Oregon, and Washington, accounted for nearly 6.9 billion board feet of timber (about 63 percent of the total timber volume sold) and nearly $1.04 billion (83 percent of the value received), according to the Forest Service's 1988 annual report.

BLM has 12 state offices. Most of BLM's timber volume and value are obtained from sales in western Oregon. In fiscal year 1988, 92 percent of the volume sold and 96 percent of the value received from BLM timber sales came from its western Oregon land.

[1] A board foot is the equivalent of a piece of wood 1 inch thick, 1 foot wide, and 1 foot long.

Figure 1.1: Forest Service Regions



Source: Forest Service

Timber Is Sold Through Bids

In fiscal year 1988, the Forest Service and BLM offered timber in more than 264,000 individual timber sales, ranging in value from less than $300 to over $6 million. Generally, only larger sales—those with selling prices of more than $2,000 or timber volumes of more than 2 million board feet—are appraised.

When the Forest Service and BLM advertise timber for sale, they designate areas to be harvested and solicit bids. The two agencies establish the advertised price, which is the minimum bid that will be accepted, by

appraising the timber before offering it for sale. Once the timber is appraised, it is advertised, bids are accepted, and the sale is awarded to the highest bidder. Bidding is by either sealed bids or written bids followed by oral auctions. With sealed bidding, each potential purchaser submits a written bid, and the contract is awarded to the purchaser whose bid exceeded the advertised price by the greatest amount. With oral auction sales, written bids that equal or exceed the advertised value of the timber are required to qualify potential purchasers for further competition by oral bidding. As with sealed bidding, contracts are then awarded to the purchasers whose oral bids exceed the advertised prices by the greatest amount, provided that the purchaser is otherwise qualified and responsible.

Legal Requirements for Timber Appraisals

Various laws and regulations require the Forest Service and BLM to sell timber for fair market value. However, neither agency is under a legal or regulatory requirement to sell timber at a price that will recover costs. For the Forest Service, the National Forest Management Act of 1976 (16 U.S.C. 1600 et seq.) authorizes the Secretary of Agriculture to sell timber and other forest products "at not less than appraised value." Department regulations promulgated in accordance with this authority (36 C.F.R. 223.6) state in part, "The objective of national forest timber appraisals is to estimate fair market value . . . ." The Forest Service Manual defines fair market value as the "price acceptable to a willing buyer and seller both with knowledge of the relevant facts and not under pressure or compulsion to deal." In addition, GAO's Office of the General Counsel has determined that appraised value referred to in the law means fair market value.[2]

For BLM, two laws primarily dictate the price to be received for timber. The act of 1937 concerning Oregon and California Railroad Grant Lands requires BLM to sell timber from former railroad grant lands "at reasonable prices on a normal market." BLM's main timberlands in western Oregon are included in these former railroad grant lands. BLM's other timber sales are guided by the Federal Land Policy and Management Act of 1976. This act states that the government is to receive fair market value of the use of public lands and their resources "unless otherwise provided for by statute."

Additionally, Office of Management and Budget Circular A-25 sets forth general policies for charging for government services and property. The

[2]In the Matter of W-I Forest Products, Inc., B-204168.2(1), Feb. 17, 1982.

circular provides that, "Where federally owned resources or property are leased or sold, a fair market value should be obtained. Charges are to be determined by application of sound business management practices, and so far as practical and feasible in accordance with comparable commercial practices."

Appraisal Methods in Current Use

Currently, two methods are primarily used to appraise timber. These two methods, explained below, are called the "residual value" and the "transaction evidence" methods. The residual value method is used by three Forest Service regions while the transaction evidence method is used by the other six Forest Service regions as well as BLM's Oregon State Office.

Residual Value Method

The premise behind the residual value appraisal method is that standing timber should be advertised at a price that enables a purchaser to (1) harvest the timber, (2) process it into finished products, and (3) sell those finished products at prices that recover all of the purchaser's harvesting and manufacturing costs and that also allow a margin for profit and risk.

In calculating the price for standing timber, the agency starts with an average price for the finished products that can reasonably be expected to be produced from the timber in the sale. These products include primary products such as lumber and plywood as well as byproducts such as wood chips used for pulp. From this price, the agency subtracts (1) the estimated costs of harvesting the timber and manufacturing it into finished products and (2) an allowance for profit and risk. What remains is the residual value, or appraised price. Table 1.1 illustrates a calculation made under this process in terms of a price per thousand board feet.

Table 1.1: Example of a Residual Value Determination

Selling value of end products		$588
Less: harvesting costs	$293	
manufacturing costs	222	
Total costs		**515**
Price before profit and risk		73
Less: allowance for profit and risk		50
Appraised price using residual value		$23

A major consideration in estimating the selling values is the amount of lumber and other finished products that may be produced from a log of a given size and species. At the Forest Service, the amount of the main products—lumber and plywood—is commonly estimated using product recovery or "mill" studies. These studies are conducted at individual mills and may take up to a year to complete. They involve following selected logs from actual harvesting through the milling process to ascertain which products are produced. This procedure allows an estimate to be made of the relative quantity of the various products and their quality. Product prices obtained from market indexes are then applied to the estimated volumes to produce an anticipated average selling price for the principal products.

The costs included in the appraisal equation are those that contribute to converting the standing timber to the finished product. They include the costs of logging, transportation, and manufacturing, and costs for such items as erosion control and road maintenance. The profit and risk margin is a standard subtraction. At the Forest Service, this margin normally has been in the range of 9 to 13 percent of the selling value of the products, according to a 1987 report prepared by a national working group organized by the Forest Service and National Forest Products Association.

Three Forest Service regions—Region 5 (Pacific Southwest), Region 6 (Pacific Northwest), and Region 10 (Alaska)—use the residual value method as their primary appraisal system. In February 1988, BLM stopped using the residual value method and started using the transaction evidence method as its primary appraisal system in its Oregon forests.

Transaction Evidence Method

The transaction evidence method's objective is to predict the fair market value of timber. Under this method, the Forest Service uses prior timber sales in each appraisal zone within the region to estimate the price that new timber sales can be expected to bring. According to Forest Service officials, transaction evidence method appraisals are based on the premise that, if a competitive market exists, the high bid received is a valid indicator of fair market value. The transaction evidence method assumes that while the timber will sell for a price that is close to the predicted price, half of the time timber will sell above that price and half of the time it will sell below that price.

To develop the appraised price using the transaction evidence method, the appraisers must first calculate the average selling price for timber during a defined period of time. The time period used by BLM and the Forest Service varied in length from 1 to 3 years. The high-bid prices for all timber sales during this time in each area are then segregated by species, weighted by volume, and averaged. These prices then become the base period price upon which other adjustments are made before arriving at the final appraised prices.

Adjustments are made to the base period price for a variety of reasons. For example, an adjustment may be made to reflect market conditions that are different from those that existed in the base period. Adjustments are also made to reflect each sale's individual characteristics. For example, adjustments are made to recognize differences in factors such as the type of logging system that will be used, the distances that felled timber will be hauled for processing, the quality of the timber, and the amount of road maintenance required. In Region 3, these adjustments are made to individual sale appraisals if they exceed $3 per thousand board feet. For example, if a certain sale characteristic is favorable and exceeds this value when compared with the area average (for example, less than average harvesting costs), then the selling price on that sale will be adjusted upwards. If the specific characteristic is unfavorable, the price will be lowered.

In addition to the adjustments described above, a reduction, or "rollback," is made to the predicted sale prices. Because the appraised price is based on averages, which are expected to exceed the price at which the timber will sell for 50 percent of the time, a rollback factor is used to ensure that the advertised price is not set at a level which results in no bids or discourages competition. The value that remains after making adjustments and applying the rollback factor becomes the indicated advertised price.

Forest Service Regions 8 and 9 have used the transaction evidence appraisal method since the 1970s. Regions 1, 2, 3, 4, and BLM's Oregon State Office have all switched from the residual value method to the transaction evidence method since 1986.

Objectives, Scope, and Methodology

In a letter dated October 26, 1988, the Chairman and Ranking Minority Member, Subcommittee on Interior and Related Agencies, House Committee on Appropriations, asked us to examine two issues with regard to the current appraisal methods:

- Whether the current methods ensure that the government receives fair market value for the timber it sells.
- Whether the current methods set minimum selling prices that are adequate to protect the government's interest and enhance revenues to the Treasury.

To respond to the first objective, we obtained data bases of Forest Service and BLM timber sales. For the Forest Service, we obtained a data base from the Forest Service's Fort Collins computer center covering all nine regions. We concentrated our review on those sold sales greater than $2,000 in value or 2 million board feet in size. For fiscal year 1988, the Forest Service data base contained 3,316 sales which met these criteria. The data base that we obtained for BLM timber sales showed that sales comparable in size to those of the Forest Service were concentrated in western Oregon. The BLM data base contained 221 comparable sales, of which 60 were appraised using the residual value method and 161 were appraised using the transaction evidence method.

In order to evaluate how effective each appraisal method is in ensuring that the government receives fair market value, we developed an economic model to explain the relationships between fair market value, government advertised prices, appraisal methods, and other factors. Using the Forest Service's 1988 sales data, we estimated the parameters of the model with regression analysis. These estimates then served as our basis for comparing the ability of the two appraisal methods to result in advertised prices that approach fair market value. For this regression analysis, we used 2,801 of the 3,316 sales contained in the Forest Service data base. Of the 2,801 sales, 1,356 used the residual value appraisal method and 1,445 used the transaction evidence appraisal method. The details of our regression analysis are described in appendix I.

We tested BLM's experience with how well its appraisal methods approximated fair market values. While we did not use regression analysis as a control for other factors, we computed the average advertised and high-bid prices to compare the relative difference in overbids for the two appraisal methods.

To respond to the second objective, we relied on the data bases referred to above. For our analysis, we excluded all sales that were coded "pending" in the Forest Service data base. This resulted in a data base of 3,030 sales for our analysis. We performed a reliability assessment of selected data elements from both the Forest Service and BLM data bases.

We used random sampling techniques for the Forest Service data base and a 100-percent test of the BLM data base. We found an error rate of less than 1 percent for each data base, which we judged to be acceptable for our purposes. All discovered errors were corrected.

In addition, we utilized the Forest Service's Timber Sale Program and Information Reporting System to obtain the costs associated with the basic sales preparation and administration costs for each forest. These costs were then compared, on a per-thousand-board-foot basis, with the advertised and eventual selling prices of the timber to identify sales that were advertised and/or sold for prices that did not recover these costs. BLM does not have a cost-accounting system similar to that of the Forest Service. We relied on figures BLM supplied us with to make a similar comparison. We did not attempt to verify the cost information supplied by either the Forest Service or BLM.

We interviewed headquarters and regional or state officials for both agencies and reviewed pertinent documents. We discussed our findings with appropriate officials and incorporated their comments where appropriate. They generally agreed with the facts presented and with our conclusions and recommendations.

Our review was performed between January and November 1989 in accordance with generally accepted government auditing standards. As requested, however, we did not obtain official comments on this report.

Improvements Needed in Forest Service Appraisal Process to Better Reflect Fair Market Value

Our evaluation of the Forest Service data shows that the transaction evidence appraisal method results in advertised prices which were closer to fair market value than prices estimated by the residual value method. This occurs because the residual value method has many problems in its implementation. Although the transaction evidence method does a better job of estimating fair market value, it is being inconsistently applied. Forest Service headquarters has provided only limited guidance and oversight to the regions to better ensure that their appraisals reflect fair market value and enhance revenues to the government. Our limited analysis of BLM data also showed that BLM's experience with the appraisal methods was consistent with our finding for the Forest Service.

Problems With Residual Value Method

The residual value appraisal method as explained in chapter 1 attempts to set prices that will allow the purchaser "of average efficiency" to harvest the timber, manufacture it into finished products, and make a profit.

Most Forest Service regions and BLM's Oregon State Office have moved away from using the residual value method. However, three Forest Service regions, including Regions 5 and 6, which accounted for 63 percent of all Forest Service timber sold and 83 percent of all Forest Service timber receipts in fiscal year 1988, continue to use the residual value method. Since 1986, four of the nine Forest Service regions have switched from the residual value method to the transaction evidence method, bringing to six the number of Forest Service regions primarily using the transaction evidence method. BLM's Oregon State Office switched from the residual value to the transaction evidence method in 1988. Forest Service and BLM officials cited dissatisfaction with data accuracy, high maintenance costs, and inconsistent appraisal values as reasons for the change. They also stated that the residual value method was outdated and statistically invalid, and that it did not result in a price reflective of fair market value. Here are some of the specific criticisms they voiced:

- Forest Service officials in Region 1 stated that the product recovery studies used for the residual value method were of little or no use and the information they provided could be obtained in less costly ways.
- Forest Service officials in Region 3 stated that industry complained that the residual value method set the price of timber too high in some

instances and in others, the advertised price was set so low that the timber was eventually sold at a price two to three times greater than what was advertised.

- A BLM issue paper cited the failure of the residual value method to predict the value of standing timber and the high maintenance costs as reasons for changing. The paper estimated the short-term savings of implementing the transaction evidence method to be 25 percent of total appraisal cost under the residual value method. BLM also reported that timber purchasers and its own appraisers had long been critical of the residual value method's obsolescence.

Our review of the residual value method showed that the averages used for harvesting and manufacturing costs lacked statistical validity. To calculate the average harvesting and manufacturing costs on which the method is based, in our opinion, it is first necessary to identify the logging and manufacturing companies located in each appraisal zone. If obtaining cost data from all of these companies is not feasible, a statistically valid random sample can be selected. If the sample is statistically valid, an average can be computed that is representative of all companies. According to Forest Service officials in Region 6, they do not use all logging and manufacturing companies located in each appraisal zone to calculate average costs, nor have they identified these companies so that a random sample can be selected. Instead, they rely on companies willing to supply cost data, and they use the same companies year after year whenever possible. As a result, the average cost data being used in the residual value appraisal process is not statistically valid and may not be representative of an "operator of average efficiency."

The problem of statistical validity also applies to the average selling values used. For example, not all mills located in an appraisal zone are used for product recovery studies, and those mills which are used are not selected in a way that ensures statistical validity. As with cost data, only willing mills are used for product recovery studies. These studies can take up to a year to complete and necessitate the positioning of up to 30 people, for a period of 1 week, at all stages of the manufacturing process to mark logs as they go through. This procedure is costly and greatly increases the mills' normal processing times while each individual log's products are identified and measured. The selection of mills is based on their willingness to volunteer for this inconvenience and loss of productivity. An official in Region 5 told us that some of the product recovery studies currently used in the residual value appraisal process are over 30 years old.

Despite the problems and limitations of the method, the residual value method continues as the primary appraisal method in the Forest Service's two main timber-producing regions—Region 5 (Pacific Southwest) and Region 6 (Pacific Northwest). Region 10 (Alaska) also uses the residual value method as its primary appraisal method. In fiscal year 1988, Regions 5 and 6 accounted for 63 percent of all Forest Service timber sold and 83 percent of all Forest Service timber receipts. Officials in these two regions cited limited staff resources and historic use as two reasons for continued use of the residual value method. A Region 10 official cited a lack of comparable sales and a fear of industry collusion as the main reasons for keeping the residual value method.

Transaction Evidence Method Superior to Residual Value Method in Estimating Fair Market Value

Our analysis of Forest Service timber sales data for fiscal year 1988 indicates that the Forest Service's advertised prices more closely reflect fair market value when they are determined using the transaction evidence appraisal method rather than the residual value method. This suggests that the government could be losing revenue on those sales which lacked aggressive competition (for example, oral auctions with a single bidder) and for which the residual value method was used. Our results also show that inconsistent application of rollback factors can greatly affect the different appraisal methods' apparent ability to result in advertised prices which approach fair market value.

Analysis of Timber Sales Data

To conduct our evaluation of which appraisal method was better able to estimate fair market value, we developed an economic model to explain the relationship between final sale prices, or fair market value, and advertised prices as determined by many factors, including the method of appraisal. Using the model, we were able to estimate the effect on advertised prices of selecting one appraisal method over the other, while simultaneously accounting for the influence of many other factors on advertised prices.

In arriving at our estimates of an appraisal method bias in advertised prices, however, we gave special consideration in the analysis to the role of "rollback" factors, or the percentage by which appraisals are adjusted downward in arriving at advertised prices. Rollback factors are important because the actual factors used by the Forest Service are not consistent either across regions or appraisal methods. Further, it is unclear whether or not rollback factors should be considered as components of the appraisal process. Therefore, we conducted several versions of the analysis, including versions in which rollback factors are and are

not considered associated with the appraisal process, and a version which addresses the consistent use of the rollback factors across regions.

The results of our analysis suggest that, either when rollback factors are reasonably consistent across regions or if they are considered distinct from the appraisal process, the transaction evidence method provides a more accurate reflection of fair market value than does the residual value method. In general, we found that the transaction evidence method may result in advertised prices that average anywhere from 14 to 37 percent higher than those derived from the residual value method. (See app. I for a more detailed discussion of our methodology and findings.)

Varied Application of the Transaction Evidence Method

Although agency officials believe the transaction evidence method provides a more accurate reflection of fair market value, we found that in one Forest Service region, it was being applied in such a way as to have the opposite effect. The problem stems from the use of a rollback to set final appraisal rates. As chapter 1 explained, because the appraised price is based on averages, the predicted selling price of any timber sale may be set above what the market is willing to pay half of the time. To compensate for this possibility, a downward adjustment is made to the predicted bid price on all sales by using a rollback factor. There is no headquarters guidance on the purpose of the rollback or parameters established as to its size. Our analysis showed that Region 1's application of the transaction evidence method resulted in the most significant difference between appraisals and high bids of any of the regions using the transaction evidence method. Table 2.1 shows the comparison between the rollback factor used with the average percentage overbid for each Forest Service region using the transaction evidence method.

Table 2.1: Percentage of Overbids and Rollback Factors in Regions Using Transaction Evidence Appraisals

Region	Rollback factor range	Average percentage of overbid on competitive sales[a]
1	47[b]	205
2	5 - 10	70
3	5 - 10	40
4	5 - 10	69
8	10 - 25	39
9	15[b]	48

[a]Excludes single-bid oral auction sales. See appendix I for further discussion of competitive sales.

[b]Actual average rollback for 1988 sales.

In fiscal year 1988, Region 1 had 18 sales at the advertised price that were oral auctions with only 1 bidder.

Higher Advertised Prices Could Enhance Government Revenues on Some Sales

When timber sales are competitive, the advertised price is only a starting point for the competitive bidding. Competition tends to raise the advertised price to fair market value. Accordingly, the accuracy of the appraisal is of little importance when competition exists.

For those sales which lacked aggressive competition in the bidding, advertised prices assume greater importance regardless of which method is used. For example, a single bidder at an oral auction need bid no more than the advertised price to be high bidder, so that the government receives no premium above the advertised price. In fiscal year 1988, about 5 percent of the sales were sold at advertised prices in oral auctions with a single bidder. Therefore, for those sales which lack aggressive competition, the government may enhance revenues by using that appraisal method which results in advertised prices that are closer to fair market value. As previously stated, the transaction evidence method results in advertised prices that average from 14 to 37 percent higher than the residual value method.

BLM's Results Consistent With Forest Service's

We also tested BLM's experience with how well its appraisal methods approximated fair market values. Although we did not use regression analysis to control for other factors, a simple comparison of averages suggests results consistent with those of our analysis of the Forest Service. The transaction evidence method more closely reflected fair market value on competitively bid sales in fiscal year 1988 than did the residual value method. The results are presented in table 2.2. The table

shows that the average percentage of overbids using the residual value method was twice that of the transaction evidence method.

Table 2.2: Comparison of Transaction Evidence and Residual Value Appraisal Methods in 1988 Timber Sales, With Two or More Bidders at BLM

Method	Number of sales	Average advertised price	Average high bid	Average difference	Difference/ advertised price (percent)
Transaction evidence	147	$516,627	$731,315	$214,688	42
Residual value	60	$316,538	$584,809	$268,271	85

Limited Guidance and Oversight in Establishing Appraisal Systems

Although the transaction evidence method is better than the residual value method in reflecting fair market value, we found that the differences in the application of the rollback factor in Region 1 were limiting this method's effectiveness within the Forest Service. The differences between regions reflect, in our view, limited guidance and oversight from Forest Service headquarters.

The Forest Service manual states that the development of appraisal data is a regional responsibility. Forest Service headquarters provides limited guidance to regions in establishing appraisal systems primarily through field trips to provide technical assistance in system design. Forest Service officials told us that while the regions have the responsibility to design their own appraisal systems, considerable influence is exerted through the recommendations of the assistance teams during the field visits. However, the final regional appraisal system does not need formal approval by Forest Service headquarters.

The Forest Service also has little oversight of how the regions conduct the appraisal process. We found no ongoing Forest Service headquarters review of how well each region's appraisal system is predicting the eventual selling price of timber sales. Bids are not being monitored nationally so that appraisal systems can be adjusted accordingly.

An Agriculture Inspector General report on timber appraisals (Audit Report No. 08627-3-SF), dated January 1986, also criticized the Forest Service for poor internal controls over the appraisal process. In that report, the Inspector General criticized the Forest Service for

> the absence of necessary appraisal standards that will ensure compliance with existing laws and regulations and the lack of internal management reviews to

identify and correct Regional appraisal methods which do not result in advertised values which are reasonable estimates of fair market value for National Forest timber.

Along with recommendations for better internal controls, the Inspector General's report also recommended that Region 1 adopt a rollback factor that results in advertised rates being within 75-85 percent of the high bid and that all regions adopt standards that result in advertised rates that are reasonable estimates of fair market value. In April 1990, Forest Service officials informed us that they were finalizing an action plan to address these recommendations.

While we did not make a detailed review of the internal controls over appraisals at BLM's Oregon State Office, our review of selected internal controls indicates that they were adequate. The appraisal system handbook was reviewed by headquarters, and the appraisal system is maintained at the state office. The state office supplies the district offices with the selling values and equations they are to use. Districts may modify these equations to fit specific sale conditions. Bids are monitored by the state office, which prepares a "shadow appraisal" on every advertised sale. This appraisal is compared with the one the district prepares, and major differences are explored.

Conclusions

Our analysis shows that the transaction evidence appraisal method, with consistent application of rollback factors, results in advertised prices which are closer to fair market value than does the residual value method. When competition exists, the appraisal method used makes little difference because competition encourages the receipt of fair market value. However, when competition does not exist, the advertised price is very often the selling price. Accordingly, where comparable sales data exist, it is imperative that the Forest Service switch from the residual value to the transaction evidence appraisal method to increase the return to the government by better approximating fair market value.

We also found that the Forest Service does not exercise adequate internal control over the timber appraisal process. There is no routine headquarters monitoring of how well regional appraisal systems are establishing bid prices that approximate fair market value. As a result, the regions are inconsistently developing and applying appraisal systems. In particular, Region 1's appraisal system establishes the advertised price by using a rollback factor which is nearly twice that of any

other region. We are concerned that in sales without competition, this could significantly reduce revenues to the government.

Recommendations

As a result of our analysis, we recommend that the Secretary of Agriculture direct the Chief of the Forest Service to take the following actions to improve its timber appraisal process:

- Improve the guidance to regions on developing and maintaining timber appraisal systems.
- Require routine headquarters monitoring of how well regional appraisal systems are approximating fair market value.

In addition, we recommend that in order to establish bid prices that better approximate fair market value, the Chief of the Forest Service direct:

- Regions 5 and 6 to switch to the transaction evidence appraisal method.
- Region 1 to reduce its rollback factor to be more consistent with the other regions.

Advertised Price for Forest Service Timber Is Often Not Adequate to Recover Costs of Conducting Sales

The advertised timber prices established by the Forest Service do not ensure recovery of the costs of even preparing and administering the sales. As a result, many sales are advertised and eventually sold for prices which do not recover these costs. We found that 40 percent of the sales in our data base for fiscal year 1988 were offered for less than the Forest Service's estimated costs of preparing and administering them. Twenty-four percent of the sales were sold for about $22 million less than these estimated costs. Moreover, these figures do not include the costs of growing the timber, overhead, or the foregone interest on the government's investment in timber activities.

Before 1987, the Forest Service did not have a cost-accounting system which could develop timber program costs. However, in 1987, the Forest Service developed a cost-accounting system that determines costs associated with growing the timber, preparing and administering timber sales, and general overhead. In this report, we chose to emphasize the fact that timber sales are frequently advertised and/or sold at prices that do not even recover their preparation and administrative costs. If we had included all costs in our analysis, the percentage of sales which did not recover costs would have been much higher.

While the Forest Service is not required by law to recover or consider costs, we believe that Forest Service policy should consider all costs when setting advertised prices. We believe the cost-accounting system should be used to establish minimum advertised prices which will generally promote the recovery of the timber program costs. When the Forest Service chooses to sell the timber at less than these costs, it should document the reasons why the sale is being advertised at a lower price.

BLM does not have an accounting system that establishes timber sales costs. Cost data supplied by BLM on fiscal year 1988 sales in Oregon indicate that three sales, or about 1 percent, were offered for sale at less than the costs of preparing and administering the sales and that one was sold at about $3,900 less than these costs. We did not verify the accuracy or completeness of the cost data BLM reported. Because BLM lacks a cost-accounting system, we believe that it is impossible to draw any conclusions from our comparison of BLM's costs of preparing and administering the sale with advertised or selling prices.

Costs Are Not Used to Establish Advertised Prices

Aside from activities involved in growing the timber to harvest, the Forest Service timber sale process can take over 10 years from the time initial sale planning begins through the harvest. Typically, about 8 years before the sale award, approximate sale boundaries are identified, the general conditions of the area are surveyed, and a brief logging and transportation plan is prepared. Three years later, a sales description, including location and approximate timber volume, is published in each national forest's listing of upcoming timber sales. During the next 5 years, a variety of other sale preparation activities are undertaken such as assessing the environmental impacts of harvesting the timber, estimating the timber volume more accurately, and appraising the timber.

The contract to harvest the timber is awarded under competitive bidding procedures to the highest bidder. The contract terms often call for the timber to be cut in 3 to 5 years, but cutting time can range from 1 or 2 months for small sales to 10 years for large sales. The Forest Service monitors the purchaser to ensure that access roads to the timber are built correctly, only designated trees are cut, the trees are cut according to contract specifications, damage to the soil or streams is minimized, and various other contract requirements are complied with. After the harvest, the area is reforested by natural means or new trees planted.

In addition to the costs of growing the timber, the Forest Service incurs costs to prepare timber for sale, supervise harvesting, and do subsequent reforestation. However, applicable legislation governing sales of Forest Service timber does not require the Forest Service to recover these costs on individual sales. As a result, these costs are not considered by the Forest Service when appraising and setting the minimum advertised price for which timber is offered for sale. This, in turn, often results in the Forest Service's offering and eventually selling timber for less than even the costs of preparing and administering the sales.

Costs Can Now Be Determined

Before 1987, the Forest Service's accounting system could not provide detailed cost information associated with timber sales. In its fiscal year 1985 appropriations, however, the Forest Service was requested to develop a cost-accounting system which would, among other things, provide this information. The Forest Service was instructed to work with us in developing the system. This system was tested in fiscal years 1987 and 1988, and implemented in fiscal year 1989.

The Timber Sale Program Information and Reporting System identifies timber program costs on a forest-by-forest basis. It attempts to match

costs with the revenues they produce by accumulating costs into multiyear pools. A certain dollar amount from the pools is then expensed annually on the basis of a formula which includes the amount of timber actually harvested. If no timber is harvested in a given year, then no costs are expensed from the pools.

Two cost pools accumulate multiyear costs. The first cost pool is called the "sale activity pool." This pool includes costs which can be specifically identified with individual sales on the forest. It contains the costs necessary to plan and prepare timber sales. For example, costs to identify sale boundaries, prepare necessary environmental documents, and advertise sales are placed in this pool. Each year, a certain amount of the accumulated costs is expensed. The amount to be expensed is determined by dividing the total costs in the pool by the volume of sales under contract for that year and then multiplying the result by the volume of timber harvested during the year.

The second cost pool is called the "growth activity pool" and includes those costs related to growing timber. For example, precommercial thinning, pest control, and fertilization costs would be placed in this pool. This cost pool has a much longer life than that of the sale activity pool because the costs associated with it are those necessary to bring the timber to the stage where it is once again available for sale. These costs are generally described to be investments in future timber stands. Again, a certain amount of the costs in the pool is expensed annually on the basis of formulas developed as part of the cost-accounting system. The annual amount expensed from this pool was not included in our analysis.

Other costs associated with the timber sale program are not placed in pools because they are directly related to the revenue generated in the year in which they are incurred. These costs are expensed annually as they occur. These annual charges include forest-level overhead and the costs associated with administering sales actually being harvested.

Finally, the government incurs costs of foregone interest on its investments in timber activities. These costs are not explicitly reflected in the cost-accounting system, but would be relevant to an economic analysis of timber program costs and profitablility.

The annual expensed amount from the sale activity pool and the costs of the annual harvesting expenses were included in our analysis of sales advertised and/or sold below their preparation and administrative costs. The exclusion of growth activity pool costs and overhead costs

from this analysis does not imply that we believe they should not be recovered or considered when setting a timber sale's advertised price. In this report, we chose to emphasize that timber sales are frequently advertised and/or sold at prices that do not even recover their preparation and administrative costs. If we had also included these other costs in our analysis, the percentage of sales which did not recover costs would have been much higher.

Comparison of Costs of Conducting Sales With Advertised and Actual Sales Prices for the Forest Service

Our comparison of the Forest Service's costs of preparing and administering timber sales with advertised sales prices showed that about 40 percent of the fiscal year 1988 sales were advertised at prices that were less than the Forest Service's preparation and administration costs. Twenty-four percent of these sales were sold at prices which did not recover about $22 million of these costs.

Forest Service Advertised Nearly 40 Percent of Its Sales at Less Than Costs of Conducting Sales in Fiscal Year 1988

The Forest Service advertised about 40 percent of the 3,030 fiscal year 1988 sales we reviewed for prices that were less than their preparation and administration costs. Table 3.1 summarizes for each region the total number of sales, the number advertised at less than their preparation and administration costs, and the potential amounts of unrecovered preparation and administration costs. (The results for the individual forests within each region are contained in app. II.)

Table 3.1: Potential Unrecovered Sales Preparation and Administration Costs on Fiscal Year 1988 Timber Sales

		Advertised at less than costs of conducting sales	
Region	Total number of sales	Number of sales	Potential amount[a]
1	304	254	$19,015,266
2	96	57	2,944,998
3	72	28	1,135,952
4	118	59	1,820,740
5	426	208	19,535,714
6	759	110	8,761,883
8	721	216	3,207,848
9	528	282	4,660,160
10	6	5	765,266
Total	**3,030**	**1,219**	**$61,847,827**

[a]Calculated as the difference between the average advertised price per board foot on each sale and the corresponding forest's average preparation and administration cost per board foot.

As table 3.1 shows, the largest amount of potential unrecovered preparation and administration costs occurred in Regions 1 (Northern) and 5 (Pacific Southwest), but all regions had sales which were advertised at less than these costs. If competition had not resulted in higher selling prices, the potential unrecovered preparation and administration costs would have totaled about $62 million.

Not only did Regions 1 and 5 have the highest potential unrecovered preparation and administration costs, but they also had higher average costs per thousand board feet than the other regions. Without doing a detailed analysis, it is difficult to know why these two regions have higher timber sale preparation and administration costs and more potential unrecovered costs than the others.

Forest Service Actually Sold 24 Percent of Its Sales for Less Than the Costs of Conducting Sales

The Forest Service actually sold 24 percent of the sales included in our analysis for $22 million less than their preparation and administration costs in fiscal year 1988. The regions showing the largest amounts of unrecovered preparation and administration costs were also Regions 1 and 5. These results are summarized in table 3.2. (The results for individual forests within each region are contained in app. II.)

Table 3.2: Actual Unrecovered Sales Preparation and Administration Costs on Fiscal Year 1988 Timber Sales

		Sold at less than costs of conducting sales	
Region	Total number of sales	Number of sales	Actual amount
1	304	120	$3,912,639
2	96	49	2,734,758
3	72	21	923,448
4	118	44	1,391,328
5	426	59	4,510,919
6	759	51	3,263,544
8	721	152	2,249,079
9	528	217	3,081,507
10	6	1	45,332
Total	**3,030**	**714**	**$22,112,554**

Comparison of Costs of Conducting Sales With Advertised and Actual Sales Prices for BLM

Our comparison showed that BLM advertised three of its fiscal year 1988 western Oregon timber sales for prices less than their preparation and administration costs, but actually sold only one of their sales for less than these costs. The unrecovered costs on this sale amounted to $3,937. As stated earlier, BLM does not have a cost-accounting system. In order to perform an analysis similar to that conducted at the Forest Service, it was necessary to rely on agency-supplied cost figures. These cost figures represented sale preparation and administration costs on a district office basis and were not independently verified by us. Because BLM lacks a cost-accounting system, we believe that it is impossible to draw any conclusions from our comparison of BLM's basic costs with advertised or selling prices.

Sales Not Recovering Costs May Be Warranted in Some Instances

The multiple use objectives in national forest land use plans include generating a fair return to the government, as well as contributing to local and national economies and to nontimber resources. In general, we believe that advertising sales that are not expected to cover the costs of even preparing and selling the timber are not consistent with sound business management practices. Office of Management and Budget government-wide guidance provides that sound business management principles generally be used when selling federal resources. As private sellers would not generally undertake such sales, they may also be inconsistent with the notion of yielding fair market value. While there can be valid reasons for below-cost sales—e.g., diseased timber may affect other resources—we believe that the reasons for such sales should be documented by the Forest Service.

Forest Service Examines Issues of Sales Which Do Not Recover All Costs

The Forest Service currently has three initiatives underway dealing with the issue of sales which do not recover costs. The first initiative examines the feasibility of establishing national guidelines and procedures, the second initiative is the Below-Cost Commercial Timber Sale Pilot Test contained in the fiscal year 1991 budget proposal, and the third initiative is a study of minimum bid rates. All three initiatives use data from the Timber Sale Program Information and Reporting System.

In August 1989, the Forest Service formed a task force to develop and test draft national guidelines and procedures regarding timber sales which do not recover all costs. The objective of the guidelines is to promote cost efficiency of individual national forest timber sales programs.

A draft of these guidelines states that each national forest should analyze and utilize opportunities to reduce inefficiencies in its timber program by reducing costs and enhancing revenues. If a national forest's timber program is not recovering all costs, the draft guidelines state that one action to be taken would be to increase the minimum acceptable bid price so that it covers all current-year costs. The Forest Service is currently testing the guidelines at four national forests and expects to report on the results later in fiscal year 1990.

The President's budget for fiscal year 1991 included a proposed test to evaluate the implications of phasing out certain below-cost commercial timber sales and to determine whether the loss in local economic activity and revenues can be offset through the expansion of recreational programs. The test will evaluate the effects on 12 national forests.

In March 1990, the Forest Service initiated a study of the minimum bid rates. The current minimum rates were revised in 1979. The objectives of the study are to develop and evaluate alternative approaches for computing minimum bid rates for the timber being offered for sale. The study team will be examining various cost-recovery alternatives using the cost information from the Timber Sale Program Information Reporting System. Forest Service officials believe that a 3- to 5-year phase-in period is needed to allow each national forest supervisor to thoroughly analyze the cost data that are now available so that cost reductions and/or program efficiencies can be identified and instituted.

Conclusions

The Forest Service advertised 40 percent of the fiscal year 1988 timber sales we reviewed at prices which would not have recovered the costs of preparing and administering that sale. If competition had not resulted in higher selling prices, the Forest Service would have experienced about a $62 million shortfall of these costs to revenues. With competition, this potential shortfall was reduced to around $22 million. As previously stated, we did not include all costs of growing and selling the timber in our analysis, but this does not imply that all costs should not be considered when setting the advertised price. If we had included all costs, the percentage of sales which was advertised below these costs as well as the percentage which was sold that did not recover costs would have been much higher. We believe that the main reason why even the preparation and administration costs were not recovered on more sales was that the Forest Service does not, and is not required to, consider costs when setting the advertised price. However, the Forest Service has

started actions to consider all costs related to growing and selling the timber in establishing minimum acceptable bids.

We believe that the Forest Service should consider all of its costs related to timber sales when setting advertised prices for timber sales. In those instances where these costs exceed what the appraisal process predicts the timber is worth, a formal decision needs to be made to (1) raise the advertised price to cover these costs, (2) not proceed with the sale, or (3) sell the timber but document the reasons for doing so.

Recommendations

We recommend that the Secretary of Agriculture direct the Chief of the Forest Service to consider all timber sales costs in establishing advertised prices for timber sales.

We also recommend that the Secretary of Agriculture direct the Chief of the Forest Service to adopt the formal decision-making process described above as an integral part of its forthcoming guidelines and procedures regarding timber sales which do not recover costs.

An Analysis of Appraisal Method Bias in Advertised Prices of Forest Service Timber Sales

This appendix presents our analysis of whether Forest Service advertised prices for timber sales have been significantly higher or lower when the residual value appraisal method is used rather than the transaction evidence appraisal method. An appraisal method bias in Forest Service advertised prices can result, as discussed in chapter 2, from differences in the theory underlying the two appraisal methods and/or the manner in which they are applied across the country. Since the advertised price is the minimum price that the Forest Service will accept on a sale, higher advertised prices generally imply that the Forest Service will obtain more revenues for those sales where there is little or no competition among bidders.

Ideally, we would estimate any appraisal method bias in advertised prices by selecting a representative timber sale and then comparing the advertised price for that sale that would result from each of the two appraisal methods. Although available data did not permit this straightforward method of a controlled experiment, we used regression analysis to approximate such a comparison. For our analysis, we developed a model to explain how variations in timber sale overbid percentage, or sale prices as a percentage of associated advertised prices, are determined by a variety of administrative, market, and appraisal-related factors. By including the appraisal method among the factors that may explain the overbid percentage, we could test statistically for the presence of a bias in advertised prices that is associated with the selection and/or application of an appraisal method. We estimated the parameters of the model with nonlinear regression analysis, facilitating a test for an appraisal method bias while simultaneously controlling for the effects of many other factors on the overbid percentages. Our results suggest that advertised prices are significantly higher (anywhere from 14 to 37 percent) when determined by using the transaction evidence method rather than the residual value method.

This appendix provides (1) the theoretical development of the model of Forest Service timber sales overbids, (2) a discussion of the estimation methodology and data, and (3) a discussion of the estimation results and sensitivity analysis.

A Model of Timber Sale Overbid Percentage

We developed a model of the overbid percentages from expressions for each of the two components of an overbid; the sales price and the advertised price. Equation 1 describes the sales price as equal to timber market value adjusted either up or down because of both administrative factors and other market factors.

Equation 1: Sales price = [timber market value] * [1 + f(administrative factors + market factors)]

Timber market value represents the fair market value of the timber for sale under competitive market conditions. This value should, therefore, reflect supply and demand conditions for the timber of the sale and, in so doing, account for a number of considerations such as extraction costs and profit rates at levels considered to be industry norms under competitive conditions. Many administrative and market factors, however, may deviate from industry norms on some sales and result, therefore, in the deviation of the sales price from timber market value.

Administrative factors include the timber sale contract specifications, e.g., the type of contract and whether the sales price is considered to be a flat rate or will be escalated according to future market prices. Market factors include the nature of the competition surrounding the sale, e.g., the number of bidders or degree of competition and whether the bid method is an oral auction or sealed bid. As administrative or market factors deviate from industry norms on a given sale, so will each bidder's perspective on profit and risk, costs, or his/her own market (monopoly) power, in regards to that sale. Consequently, the resulting bids could result in a final sales price either more or less than the timber market value.

Both the transaction evidence and residual value methods can be viewed as attempts to approximate timber market value prior to a couple of adjustments which result in the final advertised price. Equation 2, then, describes the advertised price as being equal to the timber market value, adjusted by appraisal factors.

Equation 2: Advertised price = [timber market value] * [1 − rollback factor] / [1 + g(salvage and appraisal method)]

One adjustment, or appraisal factor, applied to about 30 percent of all sales, and which results in lowering advertised price, is the classification of the timber sale as salvage. A sale can be classified as salvage if a large percentage (around 90 percent) of the timber is damaged. In such cases, the Forest Service will adjust advertised prices downward because it is anxious to dispose of the timber and minimize bug infestation and other problems associated with damaged or dead timber.

Another adjustment applied to all sales is to rollback the timber market value approximated by the appraisal by some percentage to attract bidders to the sale.[1] The percentage of the rollback can differ across regions as does the application aspect of the different appraisal methods. It is difficult, therefore, to disassociate rollback factors from the application aspect of the two methods of appraisal. Nonetheless, as discussed below, we deal with this issue of appraisal method and rollback factor association by estimating the parameters of the model both with and without the rollback factors considered to be associated with the appraisal process.

Finally, we include the appraisal method among the factors that can affect advertised price. This will permit a statistical test for the presence of an appraisal method bias in advertised prices. We obtain an expression in equation 3 for the overbid percentages (i.e., the sales price divided by the advertised price) by dividing equation 1 by equation 2.

Equation 3: Overbid percentage = [1 + f(administrative factors + market factors)] * [1 + g(salvage and appraisal factors)] [1 − rollback factor]

The advantage of equation 3 is that timber market value, which appeared in both equations 1 and 2, has been divided out, thereby eliminating the need to model the supply and demand for timber. Nonetheless, equation 3 still allows us to test for the presence of an appraisal method bias in Forest Service advertised prices.

Estimation Methodology and Data

We obtained data from the Forest Service on all timber sales of more than $2,000 for fiscal year 1988. The data set contained information on a number of administrative, market, and appraisal factors. Those factors we selected to provide detail to equation 3 are described in table I.1.

[1]Rollback factors are used with transaction evidence appraisals. Residual value appraisals are similarly adjusted downward for profit and risk. Therefore, we refer to the profit and risk adjustment as a rollback factor. The profit and risk adjustments are not theoretical equivalents to rollback factors but will be viewed here as having similar roles in the derivation of advertised prices.

Table I.1: Description of Factors in Overbid Percentages Model

Factor	Description
Administrative factors	
NOSBA	= 0 if the sale is restricted to a Small Business Administration status firm and 1 if not.
SALEMETH	= 1 if the method of sale (final sales price) is a flat-rate, and 0 if the method is quarterly escalation of sale price.
ROADS	= 1 if road costs are included in the advertised price and 0 if otherwise.
FORM6	= 1 if the contract form is a 6 or 6A or 6T, and 0 if otherwise.
FORM9	= 1 if the contract form is a 9 or 9T, and 0 if otherwise.
FORMT	= 1 if the contract form is a 3T, 6T, 6A, or 9T, implying tree measured rather than scaled sale, and 0 if otherwise. The one remaining form not accounted for by any of the FORM factors is contract form 3, which serves as the base case.
Market factors	
BIDDERS	= The number of bidders in auction or closed bid sale.
SEALED	= 1 if closed bid sale and 0 if open auction.
SIZE	= Estimated volume of sale in million board feet.
ACRES	= The acreage of the sale area.
SIZE/ACRES	= A measure of density of the timber stand for sale.
HIGHBID	= 1 if the SBA classification of the high bidder is that of a large firm and 0 if otherwise.
Appraisal factors	
NOSALVG	= 1 if the sale is not classified as a salvage sale and 0 if it is a salvage sale.
TEA	= 1 if transaction evidence method was used to arrive at advertised price and 0 if residual value method was used.
RBF	= Rollback factor preset either to the mean of a range of rollback percentage used in each region (different numbers for each region), or the weighted average of means of ranges for all regions (one number), depending on the nature of the test for appraisal method bias.

The rollback factor can vary both within and across regions; however, variations within a region are constrained within a given range. Table I.2 presents the rollback factor ranges for fiscal year 1988. As indicated in table I.1, we considered two versions of the rollback factor in estimating the parameters of the model to achieve different perspectives on the test for an appraisal method bias. We believe these two perspectives were necessary, in part, because, as can be seen in table I.2, the average rollback factor for Region 1 was appreciably different from that of all other regions.

Table I.2: Rollback Factor and Appraisal Method by Region for Fiscal Year 1988

Region	Appraisal method	Rollback factor range (percent)
1	Transaction evidence	47[a]
2	Transaction evidence	5 - 10
3	Transaction evidence	5 - 10
4	Transaction evidence	5 - 10
5	Residual value	11 - 15
6	Residual value	10
8	Transaction evidence	10 - 25
9	Transaction evidence	15[a]

[a]Represents the actual average rollback factor for 1988. Averages were not obtained from all regions

Substituting the specific factors described in table I.1 for the general terms of equation 3, and taking the natural logarithm of both sides of equation 3, results in equation 4, which can be estimated. The reason for the logarithmic transformation is to convert what we assume to be a multiplicative error structure for equation 3 to an additive error structure in equation 4 in order to facilitate estimation.

Equation 4: Ln(overbid percentage) = Ln[1 + A1 + A2*(1/BIDDERS) + A3*SEALED + A4*(SEALED/BIDDERS) + A5*SIZE + A6*(SIZE/ACRES) + A7*HIGHBID + A8*NOSBA + A9*SALEMETH + A10*ROADS + A11*FORM6 + A12*FORM9 + A13*FORMT] + Ln [1 + A14*NOSALVG +A15*TEA] − Ln[1 − rollback factor], where A1 through A15 are the parameters to be estimated.

The specific factors listed in table I.1 are substituted into equation 3 in a straightforward manner with three exceptions. First, BIDDERS is inverted to impose the assumption that a change in the number of bidders has a relatively larger effect on sales price (or overbid percentage) if the number of bidders is small to begin with rather than large. In other words, we assume that adding one more bidder will introduce relatively more competition if the number of initial bidders is only 2 or 3 rather than 10 or 11. Second, we introduce the interactive term (SEALED/BIDDERS) to account for the fact that the number of bidders is unknown to each bidder in sealed bid sales, whereas the number of bidders is known by all in oral auctions. This term will permit BIDDERS to have different effects on the overbid percentage, depending on the bid method. Third, we include a constant term A1 among the administrative and market factors to account for any factors which are not explicitly represented in the expression.

We estimated the parameters of equation 4 from Forest Service data on timber sales for fiscal year 1988 using nonlinear least squares regression analysis.[2] The entire data set contains 3,316 sales but we used only 2,801 to estimate equation 4. We excluded the six sales from Region 10 (Alaska) from the sample because that region is different in many ways from all others. We also excluded 180 oral auction sales with only one bidder and 161 direct sales (sales made after an auction with no bidders) because they provide no information on how the various factors, including an appraisal method bias, contribute to the overbid percentage. For these sales, the lack of direct competition results in a zero overbid regardless of any other factors. However, we included sealed bid auctions with one bidder in the sample because, when the bidding is sealed, the one bidder will not know prior to submitting his/her bid that there are no other bidders, or competitors, for that sale. In addition, we excluded 168 sales from the sample because either some data fields were missing or we detected inconsistencies indicative of data entry errors.

Estimation Results

Since we consider the issue of whether rollback factors should be associated with the appraisal process as unsettled, we present one set of results, in table I.3, on the basis of the assumption that rollback factors are associated with the appraisal process, and a second set of results, in table I.4, on the basis of the assumption that there is no such association. When considered associated with the appraisal process, variations in rollback factors across regions reflect differences in the application, rather than theory, of the appraisal process. Therefore, we can apply an alternative perspective to the results in table I.3 as compared with those in table I.4, in that the latter isolate the theoretical differences (apart from application differences) between the two appraisal methods because rollback factors are disassociated from the estimate of bias for table I.4 results.[3]

We present two sets of results from the estimation of equation 4 in table I.3. The first set is based on the sample of the 2,801 sales described

[2]In estimating the parameters of equation 4, we assume no variate on the right-side of the equation is jointly determined with the dependent variate, overbid percentage. We recognize that for one variate, BIDDERS, this assumption of independence with overbid percentage (and therefore advertised prices) would not be appropriate, and our estimates would not be consistent if (as we assume is not the case), the number of bidders competing for the sale were appreciably affected by the level of advertised price relative to fair market value.

[3]In treating the table I.4 results as isolated on the theoretical differences only, we also assume that any differences in the application of the appraisal processes, apart from rollback factors, are not significant.

above, while the second set is based on a sample that excludes Region 1 sales from the first set sample, resulting in a sample of 2,571 sales. We estimated equation 4 with and without Region 1 sales to examine the sensitivity of the estimation results to the fact that the rollback factor used in Region 1 is extraordinarily large relative to that used in the other regions.

We obtained the estimates presented in table I.3 by imposing a constant rollback factor across all regions. Specifically, we adjusted the dependent variable, overbid percentage, according to the weighted average of the rollback factors nationwide (the latter version of the rollback factor described in table I.1).[4] This assumption forces any effects on overbid percentages caused by actual differences in rollback factors to be reflected, at least in part, in the estimate of A15, the parameter for transaction evidence method that is used to test for an appraisal method bias. In other words, this assumption results in the treatment of rollback factors as associated with the appraisal process. The statistical significance of the parameter A15, then, is interpreted as a test for the presence of the combination of theoretical and application components (including rollback factors) of any appraisal method bias.

[4]The adjustment is accomplished by adding Ln(1-rollback factor) to both the right and left sides of equation 4.

Table I.3: Estimation Results When the Rollback Factors Are Considered to Be Part of the Appraisal Process

		All regions		Excluding Region 1	
Variate	Parameter	Estimate	T-stat.	Estimate	T-stat.
CONSTANT	A1	1.53	17.56[a]	1.32	15.79[a]
1/BIDDERS	A2	−2.61	−15.83[a]	−2.22	−14.22[a]
SEALED	A3	−.56	−7.32[a]	−.25	−3.25[a]
SEALED/BDDRS	A4	1.75	10.43[a]	1.34	8.30[a]
SIZE	A5	.002	3.14[a]	.002	3.43[a]
SIZE/ACRES	A6	−.19	−1.87	−.14	−1.46
HIGHBID	A7	.10	2.47[a]	.07	1.61
NOSBA	A8	.18	4.59[a]	.15	4.09[a]
SALEMETH	A9	.06	1.23	.05	1.04
ROADS	A10	−.11	−3.23[a]	−.09	−2.63[a]
FORM6	A11	.018	.47	.0003	.01
FORM9	A12	−.02	−.44	.07	1.49
FORMT	A13	−.11	−2.53[a]	−.05	−1.02
NOSALVG	A14	−.25	−15.31[a]	−.21	−12.28[a]
TEA	A15	−.018	−.83	−.15	−6.61[a]
R-SQUARED		.30		.33	

[a]Significantly different from zero at the 95-percent confidence level for a two-tailed test.

In general, the two sets of results in table I.3 are similar. One notable exception is the estimate of the parameter associated with the transaction evidence method variable, A15. When we include all regions, the estimate of A15 is not statistically significant, suggesting that there is no appraisal method bias in advertised prices. However, when we exclude Region 1 sales from the sample, A15 is statistically significant and negative, suggesting that overbid percentages are smaller, and consequently, advertised prices are relatively higher, when the transaction evidence method is used by the Forest Service to determine advertised prices.[5]

The statistical significance of A15 is sensitive to the inclusion of Region 1 in the sample for two reasons: (1) these estimates are made with the assumption that rollback factors are a component of the appraisal process so that differences in the factors across appraisal methods are

[5]We translate the transaction evidence method's effect of lowering the overbid percentages into higher advertised prices (rather than lower sales prices) following the logic that only competitive sales are included in our samples, and sales prices for competitive sales (typically well above advertised prices) are determined by competitive forces, such that the advertised price serves only as a starting point in the bidding but does not really influence the resulting sales price. Therefore, all influence of an appraisal method on the overbid percentage of a competitive sale must be through its effect on the advertised price component of an overbid rather than the final sales price.

reflected in the estimate of A15 and (2) Region 1 sales were all done with the transaction evidence method, and the average rollback factor applied to Region 1 sales was more than twice that of all other regions.[6] The inclusion of Region 1 in the sample, then, appreciably increases the average rollback factor for all transaction evidence method sales relative to residual value method sales in the sample. Since larger rollback factors result in lower advertised prices, all else equal, it is not surprising that the significance of A15 is sensitive to the inclusion of Region 1. These results suggest that such a large difference or inconsistency in the application aspect (use of rollback factors) of the different appraisal methods is capable of dominating the effect on advertised prices of any theoretical differences, or differences prior to rollback adjustments, that might exist between appraisal methods.

Results in table I.3 which are consistent with or without Region 1 sales include negative and significant parameter estimates both for 1/BIDDERS, A2, suggesting that the overbid percentage rises with the addition of bidders (i.e., more competition), and for NOSALVG, A14, suggesting that a sale classified as salvage implies a lower advertised price and therefore a greater overbid percentage. Further, the parameter estimate for SEALED, A3, is negative and significant, suggesting that sealed bid auctions result in smaller overbid percentages. However, this result must be interpreted in conjunction with the interaction term SEALED/BIDDERS, which is intended to account for the fact that bidders in sealed auctions do not know the number of other bidders with whom they are competing. The estimate of its parameter, A4, is positive and significant, and when evaluated at the mean number of bidders in sealed bid auctions suggests that sealed bids do not result in a smaller overbid percentage than oral auctions.[7]

Other consistent results include positive and significant parameter estimates for SIZE and NOSBA, A5 and A8, suggesting that there are economies of scale (lower average costs) associated with large timber volumes and large firms, respectively, that are not adequately captured in the

[6]The relationship between fair market values (sale prices), and appraised values, prior to application of the rollback factor, for Region 1 is similar to that for other regions. Consequently, the relatively large rollback factor for Region 1 causes the relationship between fair market value and advertised price (appraised value adjusted by the rollback factor) in Region 1 to be inconsistent with that of other regions.

[7]These results should not be considered as providing further evidence on the theoretical equivalence between oral and sealed bid auctions because there is no control for the risk aversion of the bidders or other considerations of such a test. However, these results may be interpreted as de facto evidence concerning the equivalence of oral and sealed bids for Forest Service timber sales.

appraisal or advertised price, and that can result in larger overbid percentages.[8] One last consistent result is the negative and significant parameter estimate for ROADS, A10. We expected this result because A10 serves to mathematically correct for a distinction between the observable and the true advertised prices for sales with roads. Road costs are included in the observable advertised price and, therefore, also are reflected in the sales price (i.e., road costs are included in both the numerator and denominator of overbid percentage), but the government compensates the winning bidder for those road costs.[9] The negative estimate of A10, then, accounts for a negative adjustment to overbid percentage for sales with roads because the observable overbid percentage would have been greater had road costs been netted out of both the numerator and denominator of overbid percentage, as is effectively accomplished from the perspective of bidders through government compensation for road costs.

Table I.4 presents results of an alternative test for the significance of an appraisal method bias. For this estimation, we adjusted overbid percentages by the mean of the range of the rollback factor for each region to reflect advertised prices prior to the application of rollback factors.[10] This effectively precludes rollback factor differences from influencing the estimate of A15. The estimate of A15, then, should reflect all theoretical and application components of a bias in appraisal methods apart from rollback factors, and thus will not be sensitive to rollback factor differences as are the results in table I.3 (where sensitivity to rollback factor differences across appraisal methods resulted in our presentation of results determined from samples with and without Region 1). Further, if we assume that any application components of a bias apart from the rollback factors are small, then any appraisal method bias evident in the estimate of A15 would be interpreted as entirely due to theoretical differences in appraisal methods.

[8]The NOSBA variate also reflects the barrier to entry (which should result in lower overbids) when the sale is restricted to Small Business status firms.

[9]Compensation is set according to the Forest Service's estimate of the road costs.

[10]The means of the ranges, or averages when available, of rollback factors were used for this adjustment only because we do not have data on the actual rollback factor associated with each sale.

Table I.4: Estimation Results When the *Rollback Factors Are Not Considered* as Part of the Appraisal Process

		All regions	
Variate	**Parameter**	**Estimate**	**T-stat.**
CONSTANT	A1	1.53	17.75[a]
1/BIDDERS	A2	−2.52	−15.64[a]
SEALED	A3	−.37	−4.82[a]
SEALED/BDDRS	A4	1.59	9.54[a]
SIZE	A5	.002	3.29[a]
SIZE/ACRES	A6	−.16	−1.58
HIGHBID	A7	.09	2.12[a]
NOSBA	A8	.12	3.00[a]
SALEMETH	A9	.016	.34
ROADS	A10	−.07	−2.02[a]
FORM6	A11	−.004	−.10
FORM9	A12	.13	2.52[a]
FORMT	A13	.004	.10
NOSALVG	A14	−.19	−12.41[a]
TEA	A15	−.19	−10.21[a]
R-SQUARED		.34	

[a]Significantly different from zero at the 95-percent confidence level for a two-tailed test.

The results presented in table I.4 are similar to those presented in table I.3 for the sample which excludes Region 1 sales. Specifically, the estimate for parameter A15 is negative and significant, suggesting that the overbid percentages are smaller, and therefore advertised prices are relatively higher, when the transaction evidence method is used by the Forest Service to determine advertised prices.

In comparing the size and significance of the estimates for parameter A15, the results suggest that the appraisal method bias is stronger when rollback factors are considered apart from the application component of the appraisal methods. On the basis of the sample means of the different factors of equation 4 and the estimated parameters in table I.4 and table I.3 (for the sample excluding Region 1 sales), we evaluated the estimates of A15 in terms of how much higher advertised prices have been when determined from the transaction evidence method rather than the residual value method. On the basis of the results presented in table I.3 for the sample that excludes Region 1, or if rollback factors are considered as part of the appraisal process but applied in a reasonably consistent manner, our estimate of A15 suggests, with 95-percent confidence, that the transaction evidence method will result in advertised prices from 14 to 29 percent greater than the residual value method. On the basis of the results presented in table I.4, or if rollback factors are not

considered a part of the appraisal process, our estimate of A15 suggests, with 95-percent confidence, that the transaction evidence method will result in advertised prices from 22 to 37 percent greater than the residual value method. Combining these two analyses, or regardless of the association between rollback factors (when consistently applied) and the appraisal process, our estimates of A15 suggest that the transaction evidence method results in advertised prices between 14 and 37 percent greater than under the residual value method.

Sensitivity Analysis

We conducted several other estimations to examine the sensitivity of the results presented above to alternative samples and specifications of the model. Specific alternative samples we tried included dropping all salvage sales, adjusting overbid percentages to exclude road costs from both the sales and advertised price components, and excluding some observations which were suspected of being influential (too highly weighted). The alternative specifications we examined included a log linear, rather than nonlinear, structure, and different locations for the constant term in the nonlinear structure version. Finally, we also compared the mean overbid percentages across appraisal methods but without any attempt to control for the effects of other factors. None of these alternative estimations or approaches produced results concerning the existence of an appraisal method bias which were different from those presented above.

Conclusions

The results presented above suggest that the question of the existence of an appraisal method bias is dependent on the role assigned to the rollback factors in the appraisal process and the extent to which the rollback factor is similarly applied. If rollback factors are considered as a component in the application of appraisal methods, then our results suggest that there was not an appraisal method bias for fiscal year 1988. However, the results also suggest that an appraisal method bias would have been found, indicating that transactions evidence appraisals result in advertised prices from 14 to 29 percent higher than residual value appraisals, if the rollback factor for Region 1 alone had been more in line with that of all other regions, or put differently, if rollback factors were applied in a more consistent manner across regions. Further, this bias appears strongest, resulting in advertised prices, determined with the transaction evidence method, of from 22 to 37 percent greater than those determined with the residual value method, when rollback factors are considered not to be associated with the appraisal methods in any way.

Higher advertised prices achieved with the transaction evidence method rather than the residual value method imply that the government would likely increase revenue on sales for which there is little or no competition if the advertised prices were determined by the transaction evidence method. In 1988, at least 167 sales involved no competition; specifically only one bidder was involved in an oral auction. There may have been other sales with less aggressive behavior on the part of the bidders, although we can cite no evidence to document this possibility.

Potential and Actual Unrecovered Sales Preparation and Administration Costs on Fiscal Year 1988 Timber Sales, Forest Service

Forest	Total number of sales	Advertised sales: Number below cost	Advertised sales: Potential nonrecovery	Sold sales: Number below cost	Sold sales: Actual nonrecovery
Region 1					
Beaverhead	5	4	$231,785	4	$116,853
Bitterroot	9	9	610,700	5	210,722
Panhandle	80	60	4,370,841	19	356,682
Clearwater	35	25	1,411,183	12	316,003
Custer	3	3	164,417	3	84,377
Deerlodge	8	8	858,971	6	221,374
Flathead	29	28	1,977,008	14	402,795
Gallatin	•	•	•	•	•
Helena	9	9	476,428	8	225,432
Kootenai	82	67	3,702,584	20	447,488
Lewis & Clark	6	6	278,770	6	217,774
Lolo	23	23	2,973,285	17	1,067,483
Nezperce	15	12	1,959,294	6	245,656
Totals, Region 1	**304**	**254**	**19,015,266**	**120**	**3,912,639**
Region 2					
Big Horn	5	1	41,850	•	•
Black Hills	24	4	246,814	3	245,061
Grand Mesa-Uncompahgre-Gunnison	17	16	530,724	16	529,232
Medicine Bow	6	3	29,102	2	23,337
Nebraska	2	2	17,761	2	17,759
Rio Grande	9	5	20,818	1	2,839
Arapaho Roosevelt	6	6	218,199	6	217,565
Routt	5	4	379,700	4	369,168
Pike & San Isabel	3	3	310,917	3	308,576
San Juan	4	2	14,539	2	8,165
Shoshone	8	5	24,977	4	17,779
White River	7	6	1,109,597	6	995,277
Totals, Region 2	**96**	**57**	**2,944,998**	**49**	**2,734,758**

(continued)

Forest	Total number of sales	Advertised sales: Number below cost	Advertised sales: Potential nonrecovery	Sold sales: Number below cost	Sold sales: Actual nonrecovery
Region 3					
Apache-Sitgreaves	16	2	6,774	•	•
Carson	12	8	185,962	6	110,382
Cibola	2	•	•	•	•
Coconino	8	1	33,282	1	1,962
Coronado	•	•	•	•	•
Gila	3	2	516,360	2	483,598
Kaibab	9	1	11,018	1	11,018
Lincoln	7	7	248,415	5	187,084
Prescott	2	2	4,147	2	4,145
Santa Fe	11	5	129,994	4	125,259
Tonto	2	•	•	•	•
Totals, Region 3	**72**	**28**	**1,135,952**	**21**	**923,448**
Region 4					
Ashley	17	17	442,538	11	317,110
Boise	20	4	53,800	1	17,630
Bridger-Teton	3	2	55,415	2	35,005
Caribou	2	1	8,505	•	•
Challis	1	1	30,943	1	12,529
Dixie	5	•	•	•	•
Fish Lake	1	1	34,178	1	25,070
Humboldt	•	•	•	•	•
Manti-LaSal	3	1	350	1	350
Payette	23	2	4,016	1	3,440
Salmon	9	7	359,736	5	229,357
Sawtooth	•	•	•	•	•
Targhee	27	18	701,286	16	634,179
Toiyabe	2	2	33,838	2	32,905
Uinta	1	•	•	•	•
Wasatch	4	3	96,135	3	83,753
Totals, Region 4	**118**	**59**	**1,820,740**	**44**	**1,391,328**

(continued)

Forest	Total number of sales	Advertised sales: Number below cost	Advertised sales: Potential nonrecovery	Sold sales: Number below cost	Sold sales: Actual nonrecovery
Region 5					
Angeles	•	•	•	•	•
Cleveland	•	•	•	•	•
Eldorado	26	8	75,351	2	10,774
Inyo	5	4	185,267	•	•
Klamath	51	46	6,275,129	14	1,504,398
Lassen	44	8	1,711,969	2	1,051,062
Los Padres	•	•	•	•	•
Mendocino	17	12	984,927	6	778,992
Modoc	8	2	384,906	1	33,475
Six Rivers	21	8	1,316,655	1	97,043
Plumas	85	26	763,748	9	421,431
San Bernadino	•	•	•	•	•
Sequoia	13	10	765,352	5	322,498
Shasta	16	7	307,605	•	•
Sierra	26	3	389,776	1	3,411
Stanislaus	41	35	3,164,871	13	176,457
Tahoe	37	13	666,376	4	71,156
Trinity	36	26	2,543,782	1	40,222
Lk. Tahoe Basin	•	•	•	•	•
Totals, Region 5	**426**	**208**	**19,535,714**	**59**	**4,510,919**
Region 6					
Deschutes	21	8	1,193,485	7	966,982
Fremont	28	2	169,639	2	169,639
Gifford Pinchot	75	6	403,580	2	76,391
Malheur	44	4	49,515	2	44,670
Mt. Baker-Snoqualmie	57	3	53,141	1	7,164
Mt. Hood	57	9	527,745	4	216,416
Ochoco	13	•	•	•	•
Okanogan	9	4	285,376	3	229,182
Olympic	39	8	275,674	3	18,975
Rogue River	49	5	540,417	1	207,906
Siskiyou	41	18	3,070,609	2	65,495
Siuslaw	53	2	7,756	2	7,756
Umatilla	15	6	664,442	4	590,124

(continued)

Forest	Total number of sales	Advertised sales		Sold sales	
		Number below cost	Potential nonrecovery	Number below cost	Actual nonrecovery
Umpqua	127	1	15,461	1	10,261
Wallowa-Whitman	31	9	674,742	6	380,869
Wenatchee	8	1	3,573	•	•
Willamette	27	2	9,230	1	7,658
Winema	34	13	586,292	6	230,442
Colville	31	9	231,206	4	33,614
Totals, Region 6	**759**	**110**	**8,761,883**	**51**	**3,263,544**
Region 8					
Alabama	32	8	50,554	5	18,887
Daniel Boone	25	13	148,521	5	37,790
Chattachooche-Oconee	30	10	48,345	6	25,719
Cherokee	15	5	100,350	5	83,256
Florida	32	4	19,284	3	8,381
Kisatchie	85	6	8,856	2	1,423
Mississippi	130	25	358,490	24	323,399
Geo. Washington	32	31	683,300	30	621,663
Ouachita	109	14	74,097	7	26,340
Ozark-St. Francis	47	11	105,561	5	47,289
North Carolina	39	33	829,026	24	426,033
Francis Marion Sumter	53	10	103,226	6	82,716
Texas	65	21	222,941	6	180,342
Jefferson	27	25	455,297	24	365,841
Totals, Region 8	**721**	**216**	**3,207,848**	**152**	**2,249,079**
Region 9					
Chequamegon	49	48	749,954	45	573,266
Chippewa	41	32	450,391	22	179,229
Huron-Manistee	32	13	62,489	9	27,805
Mark Twain	98	8	30,704	5	11,540
Nicolet	35	30	438,869	17	195,628
Ottawa	44	36	489,736	24	315,510
Shawnee	8	7	452,492	7	445,515
Superior	46	40	1,093,290	38	838,211
Hiawatha	38	32	335,651	25	183,590
Wayne-Hoosier	5	1	1,635	•	•
Allegheny	38	•	•	•	•

(continued)

Forest	Total number of sales	Advertised sales		Sold sales	
		Number below cost	Potential nonrecovery	Number below cost	Actual nonrecovery
Green Mountain	18	16	385,577	16	257,696
Monongahela	28	5	43,444	4	35,049
White Mountain	20	14	125,928	5	18,468
Manistee	28	•	•	•	•
Totals, Region 9	**528**	**282**	**4,660,160**	**217**	**3,081,507**
Region 10					
Chugach	•	•	•	•	•
Tongass	6	5	765,266	1	45,332
Totals, Region 10	**6**	**5**	**765,266**	**1**	**45,332**
Grand Totals	**3,030**	**1,219**	**$61,847,827**	**714**	**$22,112,554**

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