

Economic Issues Underlying Proposals to Conduct Salvage Logging in Areas Burned by the Biscuit Fire

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INTRODUCTION AND SUMMARY

What should managers of a national forest do with lands that have been burned by a forest fire? Back away and leave the recovery process to Mother Nature, step forward gingerly to speed the process here and there, or act boldly to push the process in new directions? Leave burned trees to rot in place, selectively log a few, or clearcut large landscapes?

These questions and related issues are now being addressed in southern Oregon, site of the 500-million-acre, 2002 Biscuit Fire, where staff of the Siskiyou National Forest are preparing an environmental impact statement identifying and evaluating alternative approaches for managing the area. Much of the effort and the public's attention is focused on proposals to initiate significant salvage logging of trees burned during the fire.

The purpose of this paper is to help forest managers and the public understand the underlying economic issues and the potential economic consequences of the different, salvage-logging alternatives. These issues embrace three central concerns:

1. *Will salvage logging yield net economic benefits? That is, will the logs, plus any other products, be worth more than the cost of producing them?*
2. *What will be the net economic impact of salvage logging on jobs and incomes? To what extent will there be negative impacts that offset the positive ones?*
3. *How will the economic consequences of salvage logging be distributed among different groups? Of particular interest: will the benefits accrue to one group while another bears the costs?*

The answers to these and related questions can be revealed by completing an analytical process known as full-cost accounting. This process measures all the benefits and costs expected from proposed salvage-logging, compares them, and determines if the proposal is economically worthwhile.

Full-cost accounting is especially relevant here because many see logging of burned trees as an imperative, a way to get some good from what otherwise is a total catastrophe. Economic reality, however, is not that simple. Logging is an expensive enterprise, and experience — with these lands before the Biscuit Fire, and with burned lands elsewhere — shows that the value of any logs produced may be overwhelmed by the costs of planning, executing, and cleaning up after a logging operation. Only by tracing through the full costs of a given salvage-logging alternative, can the Forest Service reassure the American public that implementing the alternative will not compound the damage from the fire and do more harm than good.

The principles of full-cost accounting are straightforward. Figure 1 illustrates how they would apply to an evaluation of salvage-logging proposals by describing a generalized equation for determining the net economic benefits of a forest-management alternative. To determine the net economic consequences of salvage logging, one must accurately estimate the gross economic benefits of the logs (and other products, if any) that would be produced and subtract the full suite of expected costs. It also is important to account for uncertainty regarding the ability of a given logging proposal to deliver the predicted outcomes and the risk that the outcomes could be worse than expected. From an economics perspective, the best alternative will be the one expected to produce the largest net benefits with the greatest certainty and the least risk.

Figure 1: Major Principles of Full-Cost Accounting

This equation illustrates the major principles for applying full-cost accounting to salvage-logging alternatives proposed for the area burned by the Biscuit Fire:

The Net Economic Benefits of a Selected Salvage Logging Alternative

<i>equal</i>	The alternative's gross economic benefits Economic benefits include monetary revenues derived from the sale of logs, plus any increase in the value of non-monetized goods and services—such as increases in environmental quality, if any—derived from the forest.
<i>minus</i>	The alternative's direct and indirect costs Economic costs include monetary expenditures associated with implementation of the alternative, plus any increase in future expenditures, plus any decrease in the (monetized or non-monetized) value of goods and services derived from the forest. Direct costs are incurred by the Forest Service. Indirect costs accrue to others, e.g., other forest landowners, local residents, and the general public.
<i>taking into account</i>	Differences in uncertainty and risk between this and other alternatives The net economic benefits of a given alternative are reduced to the extent that there exists uncertainty about its ability to generate the expected benefits and/or risk that it may generate costs substantially higher than expected.
<i>and</i>	The distribution of costs and benefits A forest-management alternative may not be desirable if it is seen as grossly unfair because one group bears the costs and another enjoys the benefits.
<i>and comparing with</i>	The net benefits forgone by not selecting the next-best alternative Comparison of alternatives should account for all potential benefits and costs, levels of uncertainty and risk, and the degree of fairness.

Gross benefits. The primary aim of salvage logging will be to produce logs. If the Forest Service sells the logs through a competitive process, then the prices it receives should fairly represent the logs' economic value. Log prices can be highly variable, however, and difficult

to predict. Prices (at the mill) in the region have declined over the past 10 years, and are currently around \$525 per thousand board feet (MBF).¹

Species, size, and wood quality are important factors affecting prices received for logs. Lowell et al. (1992), in their summary of the literature on fire-killed and fire-damaged timber, found that 30 to 50 percent of fire-damaged Douglas fir board foot volume will experience general deterioration within two years.² The authors concluded, “After 3 years, the sapwood of most softwoods has deteriorated beyond use” Wallis et al. (1974) found that peeler and saw logs, damaged by insect and decay after a fire, that reached the mill within two years, suffered a dollar value loss of 4 to 11 percent.³ They also found that dollar value losses after four years ranged from 10 to 21 percent. It should be noted that these price declines are for logs that reached the mill. There were certainly many other trees too deteriorated to be profitably harvested.

Beyond volume and value deterioration due to fire, insect, and decay damage, prices might be driven even lower by other factors, such as the prospect that rising mortgage rates may chill housing construction and the possibility that salvage logging elsewhere, especially in British Columbia where there have been large forest fires, might flood the market. Changes in milling technologies mean that, although they once commanded a high premium, logs larger than 24 inches in diameter have fallen dramatically in price over the past decade.⁴

Salvage logging will generate some jobs and incomes, but the economic benefits of these, especially for communities adjacent to the Biscuit Fire, may be much less than many anticipate. There are about 800 jobs in Oregon’s timber industry for every 100 million board feet (MMBF) of timber harvested.⁵ Salvage-logging operations, especially if massive, may yield a smaller net impact on jobs. Such an outcome would materialize to the extent that logs from the Biscuit Fire depress regional log prices and induce other landowners in the region to reduce logging on their lands. Alternatively, if lumber producers feel that the

¹ The (unweighted) average price per MBF for Douglas fir 2S and 3S from Regions 2, 3, and 4 (Roseburg, Coos Bay, and Grants Pass) for 2nd quarter 2002 was \$525. Source: ECONorthwest, using log-price data from Oregon Department of Forestry.

² Lowell, E., S. Willits, and R. Krahmer. 1992. *Deterioration of Fire-Killed and Fire-Damaged Timber in the Western United States*. Forest Service. April 1992. Deterioration, such as fungal decay, making the wood unsuitable for use is termed “general deterioration” These estimates are based on Douglas fir 11 to 30 inches in diameter.

³ Wallis, G.W., Godfrey, J.N., Richmond, H.A. 1974, *Losses in Fire-killed Timber*. Victoria, BC; Pacific Forest Research Center. 11 p.

⁴ For example, see *Big Trees Take a Fall* Puget Sound Business Journal, November 5, 2001; *New Demand for Small Logs Changes Practices, Prices*, Oregonian, October 24, 1999.

⁵ ECONorthwest calculations based on Oregon Employment Department and Oregon Department of Forestry data. Jobs per MMBF was calculated as the sum of Oregon’s employment in SIC 2411, 2421, and 2436, divided by the total timber harvest. This was done for each year, 1997 – 2000, and then averaged.

Biscuit salvage is a reliable source of logs, they may respond by increasing capacity (e.g. adding additional shifts and/or operating days).

Moreover, jobs associated with salvage logging will go to workers from outside the immediate vicinity, insofar as the short-term pulse of salvage logging, and other on-the-ground activities, attract crews from elsewhere, and the logs go to mills throughout western Oregon and beyond. Expenditures directly associated with salvage logging will ripple through the economy and generate additional jobs in other sectors, but these so-called multiplier effects in local communities will be dampened and may not even be detectable if salvage logging generates few net, new jobs for local workers in the timber industry, and if the salvage logging is completed in a short period of time.

Some have argued that salvage logging would produce additional benefits, such as ecological improvements that Mother Nature would not produce if left to herself. The extent of these potential benefits is widely disputed and uncertain, however, and many scientists believe there is insufficient evidence to support claims that manipulations of a burned landscape will yield significant ecological benefits (Beschta et al 1995).

Costs. The direct costs of any salvage logging on the lands burned by the Biscuit Fire are those associated with the logging itself. These include the costs of planning and administering the timber sales, felling the trees, moving the logs to a landing site where they can be loaded onto trucks, building roads to accommodate logging-related traffic, and trucking logs to a mill. Direct costs can vary widely, depending on the number of issues that must be addressed in designing a timber sale, the slope of the terrain, the use of helicopters to move logs to a landing, and other factors. For example, logging and hauling costs in western Oregon generally average about \$125 to \$225 per MMBF,⁶ but can run significantly higher with helicopter logging and long haul times.

There also will be numerous indirect costs. These include, but are not limited to:

- *The value of work left undone because Forest Service employees and others are diverted from their normal tasks to work on salvage logging.*
- *Loss of existence values, if roads and other development occurs in roadless areas.*
- *Ecological damage, e.g., from the logging itself, road building, increased traffic on forest roads, increased risk of landslides, the introduction of weeds, and higher risk of future fires in plantation forests that are established after the logging.*
- *Wear and tear on local roads and other infrastructure from increased logging-related traffic.*
- *Reduction in natural-resource amenities that might result, for example, if salvage logging diminishes water quality in streams.*
- *Increases in the price other landowners would have to pay for logging-related workers, equipment, and supplies, such as tree seedlings to be planted in logged areas.*

⁶ Oregon Department of Forestry
http://www.odf.state.or.us/divisions/management/asset_management/LOGPDEF.htm

History shows that the value of logs produced by past logging of unburned trees on the Siskiyou National Forest often failed to cover the Forest Service's direct costs. For the period, 1992 – 2002, for example, revenues fell short of the agency's costs 10 years (see Figure 2).⁷ Additional, off-site costs arose from logging's negative impacts on water quality in streams and other environmental attributes. Given this background, the agency faces a considerable challenge to demonstrate that the sale of less valuable, burned logs as part of a program that entails extraordinary planning and oversight requirements will do better.

Uncertainty and risk. Nobody can guarantee that a salvage-logging program will yield the expected net benefits. Hence, when evaluating different forest-management proposals for the burned area, one should account for differences in uncertainty. Differences in risk, i.e., the likelihood that actual outcomes will be significantly worse than expected are especially important.

Several factors indicate that, the greater the amount of salvage logging, the higher the economic risks. Larger logging operations, for example, will entail more intrusion into areas with steep slopes and more road building, raising the risk of unexpected costs from landslides and other ecological damage. They also are more likely to involve high-cost logging technologies, such as helicopters. A large tree-planting effort following logging may exceed the supply of appropriate seedling, driving prices up and, perhaps, causing other landowners to forgo planting. A large pulse of logs from salvage logging may be more likely to displace logging on other lands, reducing the net benefits. It also may attract enough transitory workers to create boom-bust problems in nearby, small communities.

Some of the risks may not materialize immediately. For example, planting of seedlings in logged areas might yield dense, plantation forests that have a higher fire risk.

Distribution of costs and benefits. The distribution of costs and benefits among different groups can be important. This is especially true when one group bears the costs and another enjoys the benefits, and this disparity is seen to be grossly unfair.

Comparison of alternatives. Economic comparison of alternatives for managing the burned area should consider not just how much timber can be salvaged and sold, but the full array of potential benefits and costs, the levels of uncertainty and risk, and the distribution of costs and benefits.

The remainder of this report briefly summarizes some of the literature and data regarding the application of full-cost accounting to salvage-logging proposals for the area burned by the Biscuit Fire. This discussion only a preliminary presentation, and is not intended to address all relevant studies, reports, and data.

LOG VALUES AND LOGGING COSTS

What prices should Siskiyou NF managers expect for timber salvaged from the Biscuit Fire? The amount timber buyers are willing to pay depends on the species, size, and quality

⁷ When payments to counties are excluded from the calculations, the forest's timber sale program lost money 5 years.

of the timber, the expected difficulty of the harvesting operation, and the distance and quality of roads traveled from landing to mill. Further, timber buyers face risk and uncertainty in the market. Lumber prices have been extremely volatile over the past decade and even over the past year.⁸ Because of this, the riskiest timber sales—those requiring helicopter logging, located in sensitive areas, or containing large volumes of medium or low value timber—will either be shunned by potential buyers or will receive bids with low prices reflecting the perceived market risk.

The overall economic outcome from salvage logging will depend considerably on how the forest Service responds to the market's perceptions of the risks. Will the Forest Service leave such parcels unsold? Will the agency sell the timber at a price below its cost of administering the sale? Or will the agency combine such parcels with more valuable—perhaps even healthy—timber stands to make them more attractive to bidders?

There are multiple sources of timber price data (e.g. from the Forest Service or Oregon Department of Forestry) one may consider reasonable estimates of the prices Siskiyou managers might expect for timber sold from the Biscuit Fire. However, the best log price estimates may not come from within Oregon, but from California, just south of the border. The California State Board of Equalization (CSBE) is responsible for collecting timber taxes on timber harvested in California and uses current data on log prices and harvesting costs to create biannual estimates of timber prices. In effect, the CSBE conducts a *residual value* analysis, in which timber prices are the residual of log prices minus logging costs. These prices are estimated on a regional, species, and log-size basis. Included in the nine *timber value areas*, is the Siskiyou *area*, which encompasses the California portion of the Siskiyou mountain range.⁹

Oregon's Siskiyou Mountains are uniquely different from the rest of western Oregon (geologically, ecologically, and meteorologically) and represent the “northern half” of the Siskiyou range, which extends south into California. Because of this and because the CSBE collects these data on an ongoing basis in order to assess taxes on timber harvests, the CSBE price data are a valuable tool for estimating timber values from the Biscuit Fire.

Table 1 contains data on the value of salvage timber harvested by species and average log size for the California Siskiyou *timber value region*. As mentioned above, the price of timber varies by species, size and harvesting method, with large ponderosa pine being the most valuable species/size combination and yarder/skyline and helicopter logging being more expensive than tractor logging. Further, timber quality has a large impact on price. The CSBE discounts the value of salvage timber by 25 percent or more over green timber. Larger discounts would apply if burned trees are not logged soon after a fire.

⁸ For example, the *Framing Lumber Composite Price* index, reported weekly by Random Length, was \$382 for the week of September 5, 2003—an increase of \$94 from a year ago. During the past year, the composite index was as low as \$250.

⁹ The Siskiyou *timber value area* encompasses the portion of Siskiyou County, California that lies west of Interstate 5.

Table 1: Salvage Harvest Timber Values for the Siskiyou *Timber Value Region* of California.

Species (log size)*	Harvest Value (tractor log)	Harvest Value (yarder/skyline)	Harvest Value (Helicopter)
Ponderosa pine (large)	\$370	\$330	\$230
Ponderosa pine (medium)	\$290	\$250	\$160
Ponderosa pine (small)	\$200	\$160	\$60
Hem/fir (any size)	\$110	\$70	-\$30
Douglas fir (large)	\$290	\$250	\$150
Douglas fir (medium)	\$260	\$220	\$120
Douglas fir (small)	\$230	\$190	\$90

Source: California Board of Equalization

* Large logs are those containing more than 300 BF per log; medium logs are those containing 150 to 300 board feet per log; small logs are those containing less than 150 BF per log.

JOBS

Though it constitutes only 2 percent of state employment, the timber industry is a more significant employer in southern Oregon (see Table 2). It provides 5 percent of employment in Jackson County, and as much as 17 percent in Douglas County.

Table 2: Total Employment and Timber-Industry Employment, by County, 2000

County	Total Employment	Timber Employment	Percent of Total
Josephine	22,370	1,473	7%
Jackson	73,614	4,038	5%
Douglas	37,751	6,347	17%
Curry	6,338	608	10%
Coos	21,192	1,387	7%
Oregon	1,607,911	31,502	2%

Source: Oregon Employment Department, Covered Employment and Payroll (2000)

Note: County-level employment is reported only at the 2-digit SIC level and, therefore, contains many jobs in secondary wood products manufacturing. These jobs will likely be little affected by harvests on the Biscuit Fire.

DIRECT COSTS

The timber sales program on the Siskiyou and other national forests is a complex and generally costly activity. On the surface, the activities associated with a timber sale are:

- Planning and preparing the timber sale
- Advertising the sale and accepting sealed bids or conducting an oral auction
- Administering the timber sale

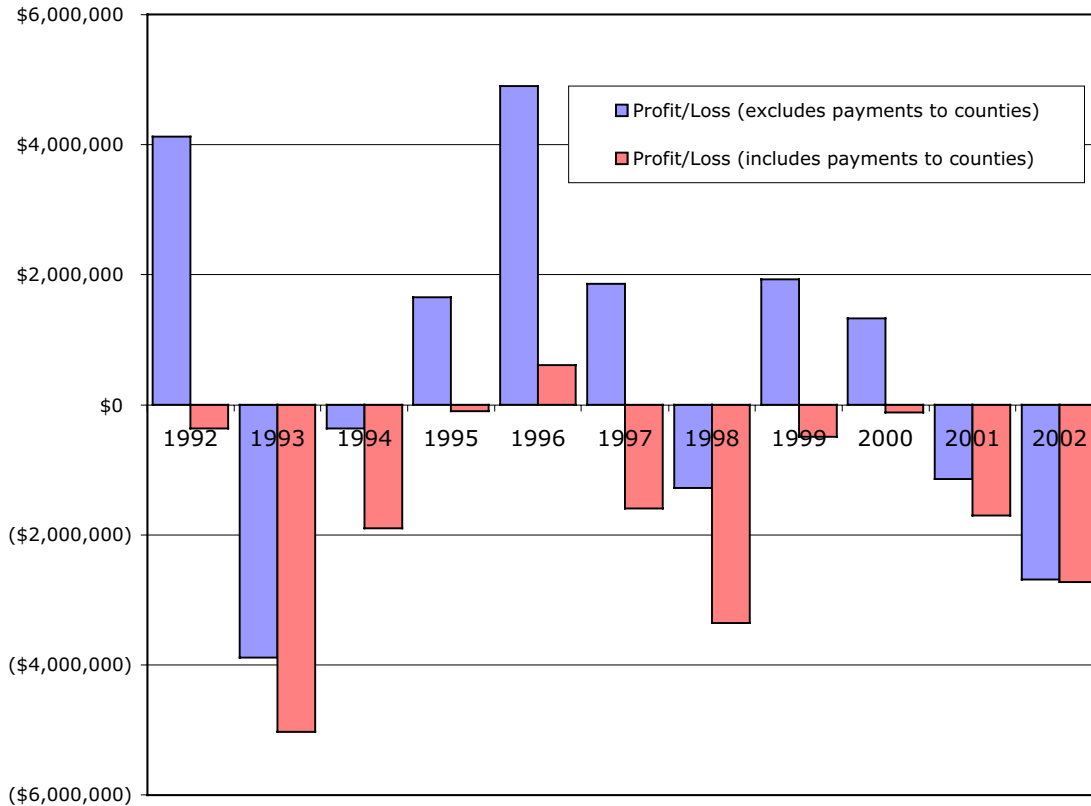
However, there is generally much more to do after the timber has been harvested. The Forest Service will oversee the burning of slash, the obliteration of temporary roads and log landing, the preparation of the logging site for regeneration and the planting of seedlings, and one or more stand exams after planting.

While the Forest Service does earn revenue from its timber sale program, it is widely recognized that these revenues often do not cover all of the costs associated with the timber sales. According to a watchdog group, Taxpayers for Common Sense, the Forest Service's national timber sale program lost more than \$400 million in 1998.¹⁰ Of the 111 national forests, 105 failed to return as much money as they spent to manage the timber sale program. National forests in Oregon topped the list of biggest money losers—losing more than \$100 million in 1998.

Though the Siskiyou National Forest did not top the list of money losers in 1998, it did have a very poor year, losing \$3.4 million—when payments to counties are included (see Figure 2). Since 1992, the Siskiyou NF timber sale program has been in the black only one year, 1996, when considering all costs associated with the timber sale program.

¹⁰ Oppenheimer, J., 2001, *In the Red: National Forest Logging Continues to Lose Millions*. Taxpayers For Common Sense.

Figure 2: Siskiyou Timber Sale Profit/Loss, 1992 Through 2002¹¹



Source: Robert E. Wolf. Fellow, Society of American Foresters

It is likely that the majority of the Siskiyou National Forest’s timber sales completed in the last 10 years were on matrix lands near established roads; that the terrain was relatively moderate and the cost of harvest relatively low. In other words, recent historical data are likely an indication of the best-case scenario—with respect to profit—of large-scale harvesting of salvage timber from the Biscuit Fire. Timber damaged by fire on steep slopes and/or in unroaded areas are more likely to go unsold or to generate revenues below the costs of setting-up and administering the sale, and preparing and planting the site after the sale.

¹¹ Payment to counties is estimated to be 25 percent of yearly timber harvest-related revenue. The actual methodology used by the national forests for determining payments to counties has changed substantially since the mid-1980s and is substantially more complex than the simple proportion of revenue displayed in Figure 2.

INDIRECT COSTS

One particularly important, potential indirect cost of salvage logging would materialize if logging, road-building, and other development were to encroach on unroaded areas within or near the perimeter of the Biscuit Fire. The economic importance of unroaded areas is illustrated by a 1997 analysis by Forest Service economists of the goods and services derived from federal lands in the interior Columbia Basin.¹² They found that:

“the existence of unroaded areas is by far the most valuable output of [Forest Service] and [Bureau of Land Management] lands in the Basin today, and will continue to be so in the year 2045....”

Unroaded areas represented more than 46 percent of the total value of the goods and services derived from federal lands. By contrast, timber represented less than 12 percent in 1995, and the analysis predicted that this would fall to less than 6 percent by 2045.

The primary value of unroaded landscapes on federal lands stems from their existence as public areas without development and development-related activities. Lands with similar characteristics in and near the area burned by the Biscuit Fire probably have similar economic values. Logging or building roads in these areas would threaten, if not markedly reduce these values, and the loss in value should be considered an indirect cost of salvage logging.

DISTRIBUTION OF ECONOMIC CONSEQUENCES

The positive and negative economic effects of salvage logging will not be distributed equally. Some costs, benefits, and impacts will accrue to local residents and communities, but not all. The dominant size of mills in counties to the north, relative to those in Josephine and Curry counties, indicates a strong likelihood that most mill-related jobs generated by salvage logging will materialize outside communities adjacent to the burned area.

If the volume of logs harvested from the Biscuit Fire is large enough, the prices paid at the mill gate low enough, and the supply reliable enough, mill owners may be motivated to add shifts or increase operating days. To the extent that these actions occur, the prices paid for non-Biscuit timber should not be greatly adversely affected (i.e., will not be depressed). However, if mill owners elect not to increase production, but are nevertheless motivated to accept large volumes of timber from the Biscuit Fire, then demand and, hence, prices for logs from other public and private timberlands in the region will likely be depressed.

If the Forest Service’s administrative costs exceed its revenues from timber sales, then salvage logging will impose costs on U.S. taxpayers. These costs would constitute a subsidy

¹² Haynes, R.W. and A.L. Horne. 1997. “Chapter 6: Economic Assessment of the Basin.” *An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins, Volume IV.* Edited by T.M. Quigley and S.J. Arbelbide. General Technical Report PNW-GTR-405. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. June. Pgs. 1715-1869

to sawmills, logging companies, helicopter operators and others who earn incomes from the logging.

As explained above, the existence value of unroaded lands in the area could be reduced markedly if the Forest Service allows road building and other development activities on or near them. This loss would accrue to all Americans who ascribe an existence value to the lands in their unroaded state. Thus, logging and road-building would generate benefits for those in the timber industry who earn income from these activities, at the expense of Americans throughout the region and nation.

DISCUSSION

What economic consequences should we expect from salvage logging on the Biscuit Fire? The truth is nobody knows for sure. Within the fire's perimeter there are certainly dead or dying trees of significant value due to their physical characteristics and proximity to established roads and landings. At first glance, it may appear that it would be an economic crime not to log the trees and realize their economic value.

With more reflection, however, it is apparent that the value of the burned logs is not the only factor that matters. Logging costs also are important. Many trees in the burned area are either of marginal value or of no market value to regional mills because they are too small, too degraded by the fire, or too far from established roads and landings. Even the most valuable trees may not be worth the costs of bringing them to market and cleaning up after logging is finished. It is important to explicitly compare the potential value of the logs against the costs of logging before determining whether or not the trees can be harvested profitably.

This is nothing new. During the 2nd-half of the twentieth century, the importance of comparing timber values with logging costs was illustrated by numerous studies that documented instances where logging on national forests produced timber that was worth less than the total logging-related costs.¹³ What is different here is that, following the fire,

¹³ See, for example, (Alkire 1994; Gorte 1994; Hanson 1999; McKetta 1994; O'Toole 2002; Oppenheimer 2001; Rice 1989; U.S. General Accounting Office 1998); Alkire, C. 1994. *Financial Losses from Logging on National Forests, FY 1993*. The Wilderness Society. November; Gorte, R.W. 1994. *Below-Cost Timber Sales: Overview*. Congressional Research Service, Library of Congress. CRS Report for Congress. 95-15 ENR. December 20; Hanson, C. 1999. *Ending Logging on National Forests: The Facts*. The John Muir Project. Summer; McKetta, C.W. 1994. *Socio-Economic Implications of a Below Cost Timber Program on the Wallowa-Whitman National Forest*. Analysis Was Commissioned by: The Combined County Commissioners of Union and Wallowa Counties State of Oregon. February 9; O'Toole, R. 2002. *Reforming the Fire Service*. Thoreau Institute. July; Oppenheimer, J. 2001. *In the Red: National Forest Logging Continues to Lose Millions*. Taxpayers for Common Sense. June; Rice, R.E. 1989. *National Forests Policies for the Future: The Unaccounted Costs of Logging*. The Wilderness Society; U.S. General Accounting Office.

many people believe the burned trees will be wasted if not logged and, with a focus on avoiding the waste, see only the benefits of logging and not the costs.

with an eye on both the benefits and the costs of salvage logging, how should the Forest Service market timber from the Biscuit Fire? In the abstract, an economically efficient approach would have the Forest Service sell only those stands that will yield logs whose value exceeds the sum of all direct and indirect costs associated with salvage logging.

Unfortunately, things may not always reduce to such as simple calculus. Any decision regarding logging within the burned area will trigger these questions:

1. Will taxpayers subsidize uneconomical harvests from the Biscuit Fire?
2. Is logging a viable form of ecosystem restoration for certain parts of the Biscuit Fire?
3. Will logging increase or decrease the probability of other catastrophic burns on the Siskiyou NF in the near future (next 50 years)?
3. How will benefits and costs from logging be distributed locally, regionally, nationally?
 - To what extent will timber harvesting, hauling, and milling jobs be filled by local workers?
 - How much timber, cut from the Biscuit Fire, will flow out of the local and regional economies?
 - Will jobs—especially local jobs—related to the Biscuit Fire salvage be tracked in order to better understand the impact of salvage logging on local and regional economies?
5. What mechanisms will the Forest Service use to ensure protection of the ecosystem services provided by lands that are to be logged?
 - Will healthy trees be harvested from salvage units?
 - Will slash be hand or machine piled?
 - Will ecologically important areas, damaged but not destroyed by the fire, be protected from logging?
6. Will any new roads be built?
 - How many miles of new roads?
 - Will they be built in roadless areas? In old growth reserves?
 - Who will pay for the new roads?
 - What will happen to the roads after harvesting is completed?

1998. *Forest Service Distribution of Timber Sales Receipts, Fiscal Years 1995 Through 1997*. GAO/RCED. 99-24. November.

The full-cost accounting approach, outlined above, provides a framework for clarifying and responding to these interrelated, economic issues. As a reference point for working through the framework, consider this example. During the past five years (1998-2002), the Siskiyou National Forest sold/logged 75 MMBF of timber, generating revenues of \$30 million (2002 dollars) and costs for the agency of \$31 million.¹⁴ On average, each million board feet (MMBF) of timber generated revenues of \$400,000, and costs of \$413,000. The average net outcome was a loss of \$13,000 per MMBF. It would be reasonable to expect salvage sales would perform just as well, all else equal. But all else, of course, will not be equal. The data from California, for example, indicate the prices of burned timber will be at least 25 percent lower, or \$300,000 per MMBF, and salvage logging would yield a net loss of \$113,000 per MMBF.

Thus, as an initial, reference point, one should anticipate that salvage logging of the burned area could yield losses of about \$100,000 per MMBF. Of course, there may be factors that can turn this loss around. A large salvage sale, for example, might have economies of scale not found in recent, smaller sales. Conversely, there are other factors that could make the losses even greater. For example, prices could be much lower, given that the trees will not be logged until two years after the fire and logging may require the use of helicopters. Only a thorough tracing of all the factors, using the full-cost-accounting framework, can provide a solid basis for judging the overall economic consequences of salvage logging in the area burned by the Biscuit Fire.

¹⁴ Note: total cost (\$31 million) does not include payments to counties; 2002 Siskiyou NF harvest was estimated as the average harvest over the period 1997 through 2001.