Committee on Resources

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Witness Statement

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The Future of the Forest Service

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The Forest Service has abandoned its multiple-use mandate and with it any semblance of sound forestry. A vaguely defined concept of ecosystem management is taking hold and eliminating many uses of our national forest lands. Draconian reductions in timber harvest and expanding de-facto wilderness come at great cost to forest health, forest users, and timber communities. While highly motivated special interest groups gain the right to lockup national forests to meet their particular goals, taxpayers pay the price through shrinking recreational access and returns on the valuable assets, wasteful government spending, and poor land stewardship.

Under the guise of ecosystem management, the Forest Service, the Clinton administration, and a number of environmental groups claim forest health, diversity, and productivity are improved. Based on the claim that the national forests are ill-suited for timber production, even some conservative groups (e.g. American Taxpayers' Union) are led to believe that the elimination of timber harvests will lead to substantial fiscal benefits. Mounting evidence indicates otherwise.

The U.S. Forest Service manages 192 million acres of federal land - an area the size of Texas and Louisiana combined. Rapidly growing restrictions already cover one-third of it and more and more land is being harbored under limited use; 35.2 million acres are managed under wilderness statute, 24 million acres under the Northwest Forest Plan, 3.4 million as national monuments, 1.2 million acres are protected as wild and scenic rivers, and 1.2 million as game refuge and wildlife preserves (FS 2000). Heralding a new directive, the Forest Service has proposed to prohibit road construction on 54 million acres of the land under its dominion. This will effectively remove 34 percent of the remaining non-wilderness areas from multiple use and hamstring public land managers from taking an active role to ensure forest health.

Now more than ever, our national forests are in need of more, not less, management to reduce the risk of catastrophic wildfire. A century of fire suppression and past management practices have changed the structure of many forests (Fretwell 1999). Without fire to repress undergrowth, some federal forests have become as much as 82 percent denser than they were in 1928 (WCSHF 1997, 3). These forests have lost the

habitat and forage they once provided for wildlife and are now less resilient to disease, insect infestation, and wildfire.

Management of our national forests by the Forest Service is not cheap. Whether providing for commodity production, recreation, wilderness, or healthy ecosystems, the Forest Service spends nearly $3.5 billion annually, the lion's share of which is paid by taxes (USDA 2000). But Americans are not getting sound fiscal or environmental management on national forests.

With 35,000 full-time employees, the Forest Service is appropriated the largest budget of all the federal land agencies. In 1998 it received $3.4 billion but generated only $788 million in revenues covering less than one-fourth of its budget (FS 1999, table 52). Considering the valuable resources, one would expect a rich the return to Forest Service. Though the Forest Service generates revenues from the sale of timber, livestock grazing, minerals, oil and gas, and some recreational activities, the agency is not required to generate a profit. Moreover, the majority of revenues collected by the agency are returned to the general treasury and are not linked by Congress to the budget.

There is one important exception, however. A portion of receipts from timber and grazing remain with the agency for unappropriated expenditure. As a result, even though legislated to provide equally for the multiple-uses, timber and grazing have been used by Forest Service management to enhance budgets. Prior to the 1990s, Forest Service managers often emphasized these activities at the expense of environmental amenities (Hyde 1981, O'Toole 1988,92). The retention of these receipts provides an important source of funding. These funds are used for forest restoration including reforestation, stand improvement, habitat enhancement, stream restoration, trails and road maintenance, facility construction, and the list goes on (GAO 1998, 16-19).[(1)] These are the very activities that ensure forest health and infrastructure are properly maintained.

Unfortunately, without incentive to maximize Forest Service asset values or keep costs low, there is little prospect for sound fiscal management. Between 1974 and 1978, more than one-half of the national forests did not recover the costs of timber management and reforestation from timber sales (Fedkiw 1996, 220). A trend that continues more than 20 years later. According to the agency, 70 percent of the national forests in 1997 did not recover costs from the timber program which amounted to a combined loss of $88 million (FS 1998a, 6).[(2)]

While critics claim that below-cost timber sales are the result of harvesting lands not economially viable for timber production, agency inefficiencies appear to be the more likely reason. A 1995 study comparing state trust and national forest timber sale programs in Montana for the 1988 to 1992 period support this argument. State forests generated $2 for every dollar spent on timber sales, while adjacent national forest timber sales yielded only $0.50 in revenue for each dollar spent (Leal 1995, 6). A later study reveals that these results are no fluke. Combining results from Montana, Washington, Idaho, and Oregon, the numbers are even more dramatic. In these states the national forest average yield in 1996 was $0.93 in timber revenues for each dollar spent on the timber sales program. State managed forests in these states yielded $7.42 in revenue for each dollar in costs - an eight-fold performance margin for the state managed lands.[(3)]

It might be thought that the states' lower costs are the result of skimping on environmental protection. In fact, just the opposite appears to be true. Evaluations carried out by independent audit teams (including state, federal and industry experts and representatives from environmental groups) show that environmental protection and economic performance go hand in hand. State forests rated higher than the national forests in

mitigating the impacts from logging and protecting watersheds (Leal 1995, 11).

The states' superior environmental and economic performance is the result of their clear incentive to maximize the long-term value of assets while keeping costs low. State law for most western states mandates that state forests be managed to provide returns for the public schools and other state institutions. In contrast, national forests are mandated to "achieve quality land management under the multiple-use, sustained yield concept to meet the diverse needs of the people (FS 1998b, 11)." This vague goal provides no real direction for Forest Service managers. Almost any set of environmental or economic outcomes is consistent with this mandate. Therefore, almost any degree of economic waste or in some cases deteriorating forest ecology fulfills the Congressional directive.

Under the current system of funding, the prosperity of the Forest Service is tied to a budget that it augments in a variety of ways. Budgets are escalated through increased staff and greater construction - one reason for the massive road system. Most Forest Service roads are permanent, costing an average of $50,000 per mile built. They are constructed with high specifications for safety and environmental stewardship (FS 1993). In comparison, state timber roads cost between $4,000 and $8,000 per mile built and are obliterated after harvest and regeneration (Leal 1995, 9).

The construction, reconstruction, and maintenance of federal timber roads are funded through appropriations and provide for timber harvest, resource management, and public access. This inter-disciplinary provision of services is another facet of below-cost sales. Timber harvest and management provide a variety of amenities including roads, which are used 99 percent of the time by recreationists. In fact, between 1994 and 1996, recreationists received greater financial benefits from national forest management than all other users. Recreation management cost the Forest Service $315 million more per average year than the revenues it generated compared to $245 million lost by timber management and $25 million lost by grazing activities (Fretwell 1998).

Under the new ecosystem approach to management, road construction has been temporarily halted and timber harvest reduced to a trickle. Timber output has declined 75 percent, from 12.6 billion board feet in 1988 to 3.2 billion board feet in 1998. Timber receipts have similarly declined from an inflation adjusted $1.8 billion to around $500 million (FS 1999, table 52). But costs of the timber program have not reciprocally declined. As a result of increased regulations, reduced harvest, and smaller tree size, timber program costs have increased from $75 per thousand board feet to $182 (O'Toole 1999). Though timber output has fallen, the overall agency budget has continued to hover around $3.5 billion annually since 1988 (OMB 1999, see chart 1).

The Forest Service budget request for 2001 is $3.6 billion, up from $3.4 billion in 2000 (USDA 2000). This budget promises 3.2 billion board feet of timber and 8.2 million animal unit months of grazing allotments. Nearly all other outputs are left unquantified. Even recreation visits are left uncounted and have not been reported since 1996. Under the new planning regulations, levels of goods and services provided are not enumerated and the forest plan will no longer specify a time period for achieving goals and objectives (Fedkiw 1996, 202). Thus, it is nearly impossible to calculate the cost per unit of output for most agency activities. It is therefore even more arduous to ensure accountability.

Though the ecosystem approach has swung the pendulum from timber interests to environmental ones, without institutional reform there will be no real change in management. Fiscal responsibility is taking a backseat to poorly defined ecosystems, which are far more difficult to measure than physical outputs like timber and grazing allotments.

As long as Congress continues to fund the agency's budget and the majority of receipts are sent to the general treasury there will be little incentive for cost control or concern for asset values. At the same time, some revenues from timber harvest can be retained by the agency, and thus become powerful incentives to manage for harvest rather than for ecological concerns. The new budget with ambiguous goals only allows more abuse.

The real tragedy of federal management is poor resource stewardship. One-fifth of the National Forest System is at known risk of catastrophic wildfire. Over 6 million acres of federal forests in the Blue Mountains of eastern Oregon and Washington are loaded with dead and dying trees from insects and disease. Wildlife habitat is diminishing on many national forests. Hundreds of thousands of miles of forest roads are in desperate need of repair and cause erosion that damage streams, water quality and fish habitat.

The problem is not too much commodity production and too little wilderness protection or the converse. Nor is it the result of inept managers. The key problem is the perverse incentives and the procedural requirements that hamstring managers from responding to the resources under their care. The institutional rules have not changed for nearly a century and will not change without fundamental reforms in the public policy that controls national forest management.

The Forest Service was created to provide scientific management, yet from the beginning, the agency has been unable to use scientific information for resource management. For nearly a century, the Forest Service suppressed fire across the federal landscape even though as early as 1920 strong evidence showed certain forest types are fire dependent (Nelson 2000, 99). By the 1960s, the understanding of the ecological role of fire in forest landscapes led many national parks to adjust policy allowing some fires to burn and prescribing others.

The public perception of the Forest Service, however, was based on the Smokey the Bear campaign, the most popular advertising campaign in the 1940s. To change this perception would be to lose faith in the prevailing "scientific management" and question the legitimacy of the agency. The type of science used in Forest Service management is typically "political" science. A historian of the Forest Service, Ashley Schiff, noted over 40 years ago that the "internal culture of the Forest Service was antagonistic to the generation and use of sound scientific information (Nelson 2000, 98)."

It was not until 1979 that the agency recognized the need for a more comprehensive fire policy, adopting a small prescribed burn policy. Even then fire suppression was based on the "10 am policy," which meant fires must be put out by 10 a.m. the following morning. All the while, the ecological systems of many forests were being substantially altered.

In the absence of frequent fire, once open savannahs of ponderosa pine have turned into dense fir and pine forests. Competition for sunlight, moisture, and soil nutrients leaves the forest susceptible to disease, insect outbreaks, and intense wildfire. More than 39 million acres of national forests in the west are reported in this high risk condition (GAO 1999, 29). Another 18 million acres of national forests are ecological systems where periodic fire should be a normal part of the process (Nelson 2000, 19).

As the structure of the forest has changed so too has the wildlife habitat that it provides. Increased forest density and a move toward older age stands limits both the availability of forage for wildlife and the diversity of habitat. Elk are disappearing from the Clearwater National Forest in Idaho that was once considered a Mecca for wildlife. Much of the Clearwater basin burned in the great fires of 1910 that were

the impetus for the fire suppression policies adopted by the Forest Service. Since then, the forest has been managed in the absence of fire resulting in an even-aged stand of dense fir. Without the openings and meadows historically created by fire, the elk have nowhere to graze. The dense thicket of undergrowth blocks the sunlight and prevents the growth of essential forage. Over time, elk and other wildlife have virtually disappeared from the forest ecosystem (Fretwell 1999, 22). Other areas in this forest have been so ravaged by timber harvest that stream sedimentation has eliminated fish habitat (Wilkinson 1998, 192).

Hardwood forest stands in the Cherokee National Forest in Tennessee have grown too old to provide nesting habitat for the golden-winged warbler. During the 1999 breeding season the warbler was missing. These birds require very young stands of northern hardwood forest, intermixed with herbaceous cover. Controversy over logging has so restricted harvest that the youngest stands are now too old for warbler habitat. The birds have moved to adjacent lands where timber harvest continues. Other species are also at risk. The majority of upland game species, including quail, grouse, deer, rabbits, and turkey, require young-age forests with forest edge and openings (McCabe 1999, 1-2).

Many years ago wildfire burned through the forests randomly re-creating small forest openings and providing forage for wildlife. Today, however, allowing wildfire to play its role can be devastating. As the density of the forests have increased, so has the accumulation of biomass. The frequent ground fires that once cleared underbrush in ponderosa pine forests without damaging the fire resistant pines, now have enough fuel to explode into destructive crown fires. On the other hand, lodge pole pine, a fire-dependent species, requires stand replacing fires for regeneration.

The fire suppression policies of the past century have been more than just a response to public sentiment. Budgetary incentives played a role. Fire suppression provides a significantly enhanced budget. In inflation adjusted dollars, fire protection and fire fighting expenditures by the Forest Service have expanded from about $225 million in 1970 to $951 million in 1994 (FS 1995, 26). A figure the Forest Service projects will increase another $19 million every year into the future (Nelson 2000, 35).

Outside interests depend on fire fighting funds as well. Missoula, Montana, is a firefighting depot that supplies the needs for regional fire crews. A high fire year can bring millions of dollars into the economy as well as fill the pockets of firefighting crews. Responding to fire within its borders alone, the Lolo National Forest just outside Missoula, spent more than $9 million on fire fighting in 1994, a high fire year. This compares to only $900,000 in 1993, a wet summer (*High Country News*, September 15, 1997).

Even with expenditures of nearly $1 billion a year, it is becoming increasingly difficult to squelch wildfire. Jack Ward Thomas, former Chief of the Forest Service commented that once a forest fire "reaches a large size, putting it out is a joke (quoted in Nelson 2000, 36)." After spending $120 million and risking the lives of 25,000 firefighters, then Superintendent of Yellowstone Bob Barbee said of the 1988 fires, "it was ultimately uncontrollable no matter what you did (quoted in Fretwell 1999, 8)." The Yellowstone fire burned almost unhampered by firefighting efforts, only to be snuffed out by seasonal rain and snow.

The effort to suppress wildfires clashes with both science and policy goals. It has fostered the accumulation of fuels and biomass in many forest types normally frequented by fire. To deal with it, federal policy now advocates prescribed burn. This has led to a situation where one federal manager is fighting fire while another is lighting it.

This dire ecological state sometimes places both the lighter and then the fighter on the same fire-line. This was the tragedy of Los Alamos in the spring of 2000. The Cerro Grande prescribed fire was set to remove

excess brush and reduce wildfire hazard in Bandelier National Park. High fuel loads and bad weather powered the burn into an unstoppable fire that consumed 47,000 acres, destroyed 260 homes, and threatened the Los Alamos National Laboratory. Sadly, this was not the first nor will it be the last wildfire, prescribed or not, to take out homes, lives, and property. In Arizona's Tonto National Forest, six fire fighters lost their lives in 1990 when wildfire overran their crew. In 1991, the Oakland-Berkeley Hills fire killed 25 people and damaged or destroyed 3,000 structures causing more than $1.5 billion in damage. In 1994, more than 14,400 fires were fought on 1.5 million acres accompanied by the tragic loss of 28 lives (Fedkiw 1996, 234).

The paradox is that to correct the travesty of past federal fire management requires the "unnatural" action of active timber management. Thinning and prescribed burn are proven remedies for many forests to reduce the wildfire risk and return the forest to a more resilient state. Unfortunately, a list of more than 200 regulations limits managers' ability to respond to the resource. And an abhorrence of logging has been the impetus for an ever-increasing land base restricted from commodity production. Such set-asides and harvest restrictions create another dead-end that frustrates managers as they attempt to respond to the changing conditions of the forest.

A look at Forest Service timber practices during the 1960s and 1970s helps explain why logging restrictions were adopted that today hamper proper management. In some areas of our national forests, harvest and road building were unjustified by any definition of proper forest management. In fact, some areas have been so ravaged that they are known as "industrial forests" and their managers are commonly referred to as "timber beasts." The Bitterroot National Forest in western Montana provides a case in point. It is here that an over-emphasis on timber by the Forest Service was brought to light.

The Bitterroot National Forest contains steep mountains with rugged terrain. The slopes are carpeted with ponderosa and lodge pole pine and pocketed with high mountain lakes that are surrounded by snowy peaks. In the 1960s and 1970s, aggressive timber harvests clear cut large swaths and cris-crossed the land with logging roads. Poor prospects for regeneration meant the harvests were more extractive than renewable and earned the designation "timber mining." Regeneration costs alone were estimated to be at least 35 times the value of the timber (Bolle 1970, 19). The cut-over slopes were terraced with bulldozed trenches to mechanically plant seedlings and reduce competition from other vegetation.

The nearby town of Missoula did not stand idly by to watch the devastation. Citizen objections came in many forms and conservation groups defied the Forest Service actions. Even local loggers took a stand realizing that the excessive harvest would put them out of business rather than perpetuate the industry for years to come. "The timber stands in our area are being ruined for the next three generations," said Ernie Townsend of Darby, Montana, a third generation logger (quoted in Burk 1970, 11).

Similar citizen objections echoed to other timber plans across the nation. In the Bridger Wilderness in Wyoming it was argued that Forest Service harvest was poorly planned and was destroying the esthetics of the area. Demonstrators protested logging on the Willamette National Forest in Oregon (Burk 1970, 6-7). The Secretary of Agriculture directed a committee to report on the abuses of Forest Service timber harvest in Idaho and Montana. It was becoming clear that the agency was building timber roads and harvesting without "commensurate consideration" of other forest uses as required by the Multiple-Use and Sustained Yield Act (Burk 1970, 8). The Bitterroot and similar forests were the epitome of single-use management.

Resource production goals of an agency being run out of Washington, D.C. were given priority over land management considerations that would make more sense at the local level (see Bolle 1970). , The federal appropriations process encouraged timber harvest. Forest plans estimated the maximum volume of timber

that could be sold without subverting other forest values. Known as the "allowable sales quantity" (ASQ) the measure was intended to be a ceiling instead of the yearly target that it became. Many foresters, among others, claim that ASQs were exaggerated volumes that could only be ecologically sustainable at levels one-half to three-fourths of those given (Wilkinson 1998, 29). Congress rewarded the agency with funding for all programs if these "targets" were met. Foresters refusing to achieve timber quotas dictated by Washington were often harassed and transferred to desk jobs (Wilkinson 1998, 29). Facing such political incentives, most managers strived to meet performance targets regardless of the productivity of the forest, ecological damage, and dollar costs.

The allowable sales on most forests has since been reduced. And public input has a much greater impact on agency decisions. Many regulations have been adopted requiring environmental concerns be addressed as part of timber harvest planning. The agency claims that ecosystem management, has moved it away from ecologically damaging production. But neither the incentives nor the institutional structure of the Forest Service has changed.

The reversal of the political climate as witnessed by the Northwest Forest Plan is moving Forest Service management toward less active management. In response to the 1990 listing of the northern spotted owl as an endangered species, 24 million acres of federal land were set aside under the Northwest Forest Plan. Timber harvests on federal lands in Oregon and Washington have fallen from about 5 billion board feet per year to 300 million board feet.

Similarly, a hands-off approach is emphasized under the new Forest Service proposal prohibiting road construction on 43 million acres of national forest land. These examples parallel the ecosystem approach to wilderness management - for preservation and protection in their existing condition, unimpaired, and untrammeled by man.[(4)] But human intervention has already significantly affected the condition of these lands through a century of recreation use, fire suppression, and timber harvest. Like the scientific management approach where managers were unable to use scientific evidence to make decisions, the ecosystem approach appears to ignore ecological function. In reality, both forms of management ultimately respond to political incentives.

Without real institutional reform, there is no reason to believe that the ecological integrity of the national forests will assume the highest priority under the ecosystem management approach. Current policies of walking away and letting nature now take its course may in fact be more damaging to the environmental amenities and the ecology of the forest than an active management program.

To take a hands-off approach toward old growth forests with high fuel loads and other compromising health conditions may well be their death knell. Professor of silviculture and forest ecology, Chad Oliver of the University of Washington says of the forests in the Pacific Northwest, by leaving these old growth forests to nature, "we have no assurance that forest set-asides will actually grow older, there is a greater probability they will burn up or blow down first (quoted in Nelson 2000, 55)."

A striking example is the late-seral reserve in Northern California's Shasta-Trinity National Forest. Set aside to provide habitat for late-seral species such as the spotted owl, the forest has become known as the "Valley of Death." Ravaged by disease and insects, the giant trees are crashing to the forest floor. Each lost tree thins the overstory which in turn reduces the closed canopy and changes the habitat. Managers are unable to respond because of a maze of regulation that is only exacerbated by the forest's reserve status under the Northwest Forest Plan. The area of tree mortality is expanding at a rate of more than 300 acres each year.[(5)]

Elsewhere, a disaster is waiting to happen in the Lake Tahoe basin of the Sierras. Surrounding the beauty of one of the clearest, deepest lakes in the world is a tinderbox forest of dead and dying trees. In the sequence of fire suppression, tree competition, and drought, the Lake Tahoe Basin National Forest has been blighted by bark beetles and disease. Ironically, forest management practices have put at risk the very qualities they were supposed to save. Environmental regulations have delayed management actions and restricted timber harvests and forest treatments. In the meantime tree mortality has reached 80 percent in many overstocked stands (Fretwell 2000, 14).

Contrary to what some would believe, active forest management is not synonymous with environmental destruction. Look at Mount St. Helens in Washington after the violent volcanic eruption in 1980. The explosion destroyed 150,000 acres of forest land in western Washington leaving Weyerhaeuser Company with 68,000 acres of burned, fallen trees smothered under ash. A helping hand from man in the form of Weyerhaeuser workers salvaged the timber and restored large areas. A healthy forest now towers 45 feet above abundant fish and wildlife habitat. Adjacent to company land sits the Mount St. Helens National Monument. Preserved to document the natural restoration process, the forest has yet to restore itself (Fretwell 1999, 28-29).

With already one third of the national forests relegated to limited use, the new roadless proposal brings the tally of untouchable land to more than one hundred million acres (an area the size of California) or one-half of the land managed by the National Forest Service. However, locking out the public does not create healthier forests. We are losing their productivity for man and wildlife while reducing their pristine value and our enjoyment of them.

Though the powerful influence of the timber industry on Forest Service actions has given way to equally powerful environmental interests, it is unlikely that the Forest Service will stop cutting trees in areas where it makes little sense to do so. Without institutional reform, the incentives are unlikely to change. This is one area where groups on all sides agree. Melinda Pierce, Public Lands lobbyist for the Sierra Club says, "It will require sweeping structural reform" to get "real change in the Forest Service (quoted in Wilkinson 1998, 54)."

The changing of the guard was spurred by a new public awareness of the environment Though the pendulum has swung from a commodity emphasis to one of no-use, the opportunity costs remain unrealized by and irrelevant to political decision-makers. Timber that was once harvested with little regard to other environmental amenities is now left standing without regard to the economic or ecological costs.

Despite the prevailing opinion, prescribed burns, restoration, and silvicultural treatments do not guarantee good resource stewardship. Like the historical timber targets, if these management practices begin to drive budgets, we will likely see an over-emphasis of these activities without regard to their fiscal or environmental costs. For example, a treatment of thinning and prescribed burn that is appropriate for an overly dense ponderosa pine forest with historical fire frequency of 5 to 25 years could be ecologically devastating to a lodge pole pine forest with a natural fire cycle of 50 to 300 years. Only by changing the incentives and allowing forest managers to respond to the conditions of the forests, rather than the political climate, will we see good long-term stewardship on our federal lands.

Future prospects for national forest management remain dim with current budgetary incentives. Under the current set of political constraints, it would be absurd to expect the Forest Service to react any differently. A twenty-year veteran of the Forest Service, biologist Sandy Knight says "while some staffers are trying to push the agency toward responsible, science-based management, the incentive system pulls them the other

direction" (quoted in High Country News, March 30, 1998). The current incentives do not provide for good land stewardship or sustainable production.

The use of market forces could end the conflict and polarization of federal land use. In a world of limited resources, it makes sense to weigh the values of different land uses. Forests in the Pacific Northwest, for example, are the most productive softwood forests in the United States (Powell et al 1993, 7). One acre of timber harvest there requires as much as four or more acres of harvest elsewhere.(6) To restrict harvest on 20 million acres in the Pacific Northwest may cost 80 million acres of timber cut in another place. Without a relative value on these lands and their multiple assets it is easy to lock them away without regard to the consequences of hands-off management.

The management of our federal lands is political. Land managers respond to the incentives they are provided, which ties them to congressional whim. As politicians respond to the special interest of the day, so too must federal land managers. Whether providing timber for industry or wilderness for wild lands advocates, the science is being passed over. Instead, the political clout and public opinion of highly-organized special interests directs forest management. These political operatives benefit from a management approach that responds to their agenda, while taxpayers foot the bill through budgets, foregone revenues, and lost resources.

Only through institutional reform that changes the incentives for Forest Service managers will we get beyond the status quo. Harnessing markets so that the relative value of the various land uses becomes known would ensure that lands valued most for conservation purposes are properly cared for. Those providing high timber productivity would be sustainably harvested to ensure future timber values. By providing incentives that encourage managers to protect asset values while constraining costs, the Forest Service could be held fiscally and ecologically accountable.

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Notes:

1. The Knutson-Vandenberg Act of 1930 and amendments (16 USC 576-576b) allow a portion of timber sale receipts be retained by the agency for forest restoration, all salvage sale receipts are retained to cover the direct costs of sale preparation and harvest of salvage timber, and 10 percent of the National Forest Fund is retained for trails and road maintenance.

2. As defined by the Forest Service's timber sale accounting system (TSPIRS). Critics argue that this is an inaccurate measure and actual loses are even greater. See O'Toole 1999, S-1, and McKetta 1994, 10.

3. See also Fretwell 1998, 6. Data provided by *Forest Service Budget Explanatory Notes 1998*; telephone and written communication with Beth Ann Christensen, Accountant, and with Bob Burke Scaling Supervisor, Idaho Department of Lands, Boise; Montana Department of Natural Resources, *Annual Report*, 1996, Trust Division; written and telephone communication with Pat Flowers, Bureau Chief, Forest Mangement, Montana Trust Land Division, Helena; telephone and written communication with Faye Pitts, Accountant, and Dan Korgan, Business Section, Oregon Division of State Lands, Salem; and Washington Department of Natural Resources 1996, *Annual Report*, Olympia.

4. P.L 88-577, 78 Stat. 890; 16 U.S.C. 1 1 21 (note), 1 1 31-1136. 5. Written communication with Nancy Ingelsbee, Klamath Alliance for Resources and the Environment, Yreka, CA, January 12, 1999. See also Fretwell 1999.

6. Telephone interview with Bruce Lippke, Director for the Center for International Trade in Forest Products, August 10, 2000.

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