

**OLD-GROWTH FOREST IN THE PACIFIC
NORTHWEST**

HEARING
BEFORE THE
SUBCOMMITTEE ON PUBLIC LANDS AND FORESTS
OF THE
COMMITTEE ON
ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE
ONE HUNDRED TENTH CONGRESS
SECOND SESSION
TO
RECEIVE TESTIMONY REGARDING OLD-GROWTH FOREST SCIENCE,
POLICY AND MANAGEMENT IN THE PACIFIC NORTHWEST

MARCH 13, 2008



Printed for the use of the
Committee on Energy and Natural Resources

U.S. GOVERNMENT PRINTING OFFICE

43-391 PDF

WASHINGTON : 2008

For sale by the Superintendent of Documents, U.S. Government Printing Office
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OLD-GROWTH FOREST IN THE PACIFIC NORTHWEST

THURSDAY, MARCH 13, 2008

U.S. SENATE,
SUBCOMMITTEE ON PUBLIC LANDS AND FORESTS,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:30 a.m. in room SD-366, Dirksen Senate Office Building, Hon. Ron Wyden presiding.

OPENING STATEMENT OF HON. RON WYDEN, U.S. SENATOR FROM OREGON

Senator WYDEN. The subcommittee will come to order.

The purpose of today's hearing is to receive testimony about old-growth forest science policy and management in the Pacific Northwest.

For too many years, old-growth forests have clearly been a political battleground, but recently the groundwork for an ideological truce has started to emerge. If all sides can agree to bury the hatchet when it comes to protecting this country's natural resources, we can also find common ground for sustainable forest management in less sensitive areas.

When you take the pulse of the public, the resounding outcome is that citizens want their old-growth protected. It's my hope that today's hearing will highlight the unique role of these forests, and help guide us to a policy that leads to the protection of the public.

It's also been my sense that it is critical to stop the needless, excessively costly battles, particularly legal battles, surrounding efforts to log old-growth. It's been shown again and again, there's disproportionate cost, energy, and time spent on planning and litigating unpopular projects, such as logging old growth, and this eats up the limited funds that our agencies require to plan more urgently needed forest health projects. Of course, those projects are exactly the kind of projects needed to get ahead of the fires that now eat up more than half of the Forest Service budget.

So absent compelling forest health concerns, it is time to end logging of our ancient forests and close this chapter of the debate on timber management.

As I've indicated in prior hearings, addressing the forest restoration needs in the Northwest is an issue that I will be moving forward very quickly with, with legislation.

It's clear that there is a need to thin out the overstock stands, there are hundreds of thousands of acres there of merchantable,

you know, timber, and I think it is possible to thin out those stands while still protecting the old growth that our citizens care so much about.

We are going to have a particularly hectic morning, with lots of votes on the floor, so I'm going to put all of my remarks into the record, and I think Senators who do come will do the same.

We want to welcome Linda Goodman, in particular. I know you will be retiring before long, we thank you for your terrific service. William Peter Wyden, and Eva Rose Wyden are very grateful to have those wonderful t-shirts that were delivered yesterday, they will be wearing them, and wearing them proudly.

Mr. Caswell, we welcome you, we welcome all of you. At 10:15 this morning, we also will be taking a moment of silence here in the committee to honor the wonderful men and women who serve this country in uniform, with such courage and valor.

So, it's going to be a hectic morning, and we'll start with Linda Goodman, Regional Director of Pacific Northwest Region, from my home town, the Honorable James Caswell, Mr. Caswell, we're glad that you're here, you have colleagues, as well.

I would like to ask each of you to put your prepared remarks in the record, and just summarize your key concerns—I know there's always a kind of almost biological compulsion to read, kind of, statements, and if you can just kind of recognize—we'll put them in the record, and just highlight your principal concerns, we'll have some time for questions, that would be great.

We're also very grateful to Senator Barrasso and all his good staff folks. We work in a bipartisan way in this subcommittee, that's why we've be able to work successfully on county payments and forest health, and the folks sitting in back of me, on both the Democratic and Republican side are true professionals, and we're anxious to follow up on your concerns.

So, we'll go right to you, Ms. Goodman. Welcome.

STATEMENT OF LINDA GOODMAN, REGIONAL FORESTER, PACIFIC NORTHWEST REGION, FOREST SERVICE, DEPARTMENT OF AGRICULTURE

Ms. GOODMAN. Thank you.

So, I will shorten my opening remarks, and tell you that I'm pleased to have Dr. John Lawrence here with me. He's the Program Manager of the Pacific Northwest Research Stations Ecosystem Processes Programs.

So, I will submit my formal testimony, and I also want to submit the first decade results of the Northwest Forest Plan. This certainly gives you a lot of background information that will be helpful for you.

So, I'd like to give you a little perspective on what we in the Forest Service have learned about the science of old growth. Of course, the question is really, what is old growth? Old-growth forests mean many things to people. They are often perceived as icons of stability, but they were not immune to disturbance by nature over the centuries.

Today's old-growth forests result from a long journey through time, and scientists are learning that the journey forests take as they become old matters.

So, I think you know that we've heard lots of different definitions about old growth. There isn't a widely accepted old growth definition. The term "old growth" did not come from science, but from foresters in the early days of logging. So I want to give you one general definition developed by Tom Spies, Research Forester from the Pacific Northwest Region Research Station, and Jerry Franklin, Professor of Ecosystem Analysis, College of Forest Resources at University of Washington in 1989.

It reads, in part, "Old-growth forests are ecosystems, distinguished by old trees, and related structural attributes that may include tree size, accumulation of large, dead, woody materials, a number of canopy layers, species composition, and ecosystem function."

To many people this translates to large trees, large down logs, and a feeling of awe. Others think of relative islands of trees that have been unchanged by time and disturbance. Our research has taught us that this last picture, in particular, is not accurate.

Others, such as Tom Bonnicksen, in his book, *America's Ancient Forests*, offers an additional perspective on how forests have been shaped and changed over hundreds and thousands of years, by physical and biological forces, including people—we'll also enter this into the record, so I won't quote you page by page of information, here.

But what old-growth forests look like, depends on where you are. Old forests look strikingly different across the Pacific Northwest, and different management is appropriate. So, I want to give you a couple of examples.

The first is a wet old—if you look over here—the first is a wet old-growth forest, and you've seen these many times, Senator Wyden. It's characterized by very large Douglas Fir and Western Hemlock trees, multiple layers in the canopy and large dead logs on the forest.

The second is on the east side, the Ponderosa Pine Stand, more open and park-like, with a simpler canopy and little undergrowth on the ground. You might notice that the bases of these trees are charred from a low-severity fire on the, burn fuels on the forest floor.

So, let me talk a minute about threats to old-growth. Although old-growth forests developed in the face of natural adversity, they face many contemporary threats, particularly fire, insects and disease.

In the dry forest of Eastern Oregon and Washington, fire and insects constitute the most important threat these days. Landscapes with too many trees and not enough open spaces are vulnerable to high-intensity fire, different from what occurred historically—they can kill large old trees.

We see many stands with too many trees, that are vulnerable to insect attacks, that also kill old trees.

In moister areas, where the fire regimes are referred to as mixed, meaning, historically, fires were of higher intensity and lower frequency than in dry forests, fire still remains the greatest threat to old forests, due to the accumulation of fuels.

In wet forests, such as on the west side of the Cascades, large, infrequent fires are the greatest natural threat, but typically, those

fires occur hundreds of years apart. For instance, the last major fire on the west side, Biscuit, occurred in July 2002 and burned approximately 500,000 acres across all jurisdictions.

An emerging threat that causes us a great deal of uncertainty and concern, is a rapidly changing climate, and how it will affect natural threats to old forests. For example, regional droughts could affect tree vigor across entire watersheds. This, in turn, can invite beetle infestations across whole landscapes, and we're seeing that right now in Colorado, and British Columbia.

For thousands of years, forests of the region developed without active management, in largely unpopulated areas. That's not the case now. Our current management, and that for the foreseeable future, will continue to focus on developing a landscape with a diversity of forest agents that will accumulate—accelerate the development of old growth. You know, it's working. Between 1994 to 2003, gains well outpaced losses from all causes, included limited stand replacing, harvest and fire.

In dry and moist forests, that will mean fuels and density management. This poster shows a before and after example. The first picture was taken before a fuel treatment, the second, after B&B. Same area, after the B&B fired in Central Oregon burned through the treated stand, and the old trees survived as a result of that treatment. You can see, the same area that—how densely populated it was, many stands, we treated it, we did prescribed burning, and when the fire went through, the old trees survived.

Although science helps inform our management of current forests of all ages, it's only part of the equation. You can see that we get out quite a bit and spend time with our scientists. The public's interest in the social, economic and intangible values associated with old growth can not be overlooked or underestimated, and you mentioned that in your opening statement—the public really cares about old growth.

Some members of the public espouse the precautionary principal—don't touch the forests at all. Other members of the public expect us to be more aggressive in our management, and want us to get the work done now. In an ideal world, we would have a balanced approach everyone could agree on. However, as we've seen through numerous appeals and litigation, the ideal world does not exist.

As an agency, we continue to seek to strike a balance, while fulfilling our professional responsibility to manage the land for the public good.

We all know that if we reduce fuels in and around forested ecosystems, including old-growth forests, we will protect them from fire. Yet, there are those who say, "Let nature take its course." Hundreds of years ago, that approach worked, but now that humans have become a large part of the old-growth ecosystem, we must play an active role in managing these systems.

Science can and does help us devise a portfolio of management approaches to protect and develop diverse old-growth forests. We believe science hold the keys, successfully ensuring old-growth forests are always part of our legacy. We also believe with the key of science, comes the responsibility to use it properly, and I'm proud to say, we do.

So, let me finish by what we should be doing now. I believe we must use all the resources we have at hand to manage existing and future old-growth forests. This means we need to protect current old growth from fire, insects and disease that are threats because of conditions that we know are not right—high fuel loads and old Ponderosa Pine on the East Side, for instance. This means that we need to use the best science available, coupled with innovative management to implement new approaches to accelerate the development of complex forests, that function as old growth, perhaps before their time.

It is our duty to work with all of the people to ensure the forests of today become vibrant, living, legacies for future generations to use and enjoy.

Thank you for letting me talk to you today, and I look forward to your questions.

[The prepared statement of Ms. Goodman follows:]

PREPARED STATEMENT OF LINDA GOODMAN, REGIONAL FORESTER, PACIFIC NORTHWEST REGION, FOREST SERVICE, DEPARTMENT OF AGRICULTURE

Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to testify on old growth management in the Pacific Northwest. I am Linda Goodman, Regional Forester for the Pacific Northwest Region for the USDA Forest Service. I would like to share with you our perspective on science and management of old growth forests in dry, wet, and mixed forest types across the Pacific Northwest.

GENERAL CHARACTERISTICS

Old growth forests have high ecological, social, and economic values and mean many things to people. While they are often perceived as an icon of stability, old growth forests have not remained undisturbed for centuries by nature. Today's old growth forests developed and are continuing to develop along multiple pathways with many low-severity and some high-severity disturbances along the way. Scientists are learning that, as a result of the multiple pathways and different timeframes forests take towards becoming old growth, heterogeneity exists in old growth ecosystems.

What is an old growth forest? This is a simple question without a simple answer for there is no single, widely accepted definition of old growth. The term "old growth" did not originate as a scientific term but came first from foresters in the early days of logging and later from others who sometimes replace the term with the more dramatic, but even less precise "ancient forests". There are many strong opinions from different scientific disciplines and policy perspectives on the appropriate definition(s) of old growth, including from forest ecology, wildlife ecology, recreation, spirituality, economics, and sociology. In 1989 a general definition for the Pacific Northwest was developed by Tom Spies (Research Forester, Pacific Northwest Research Station) and Jerry Franklin (Professor of Ecosystem Analysis, College of Forest Resources, University of Washington). The definition reads, in part: "Old growth forests are ecosystems distinguished by old trees and related structural attributes . . . that may include tree size, accumulation of large dead woody material, number of canopy layers, species composition, and ecosystem function." Most scientists would now include vertical and horizontal diversity in tree canopies as important attributes of old growth forests.

The common features of many old growth forests are old trees and structural complexity. We have learned that old growth forests are diverse, varying in structure, function, and role of disturbance. In the wetter provinces,¹ old growth is characterized by dense multi-layered forests; in drier provinces, by relatively open crown canopies and understories. Many scientists believe that the diversity of forest types within the Pacific Northwest and elsewhere necessitate multiple definitions of old growth, and that these definitions should reflect the inherent patterns and dynam-

¹The Northwest Forest Plan (NWFP) area has 12 distinct provinces, classified by their differences in climate, vegetation, geology, and landforms. One especially important difference is the fire regime, or characteristic combination of fire frequency, intensity, seasonal timing, and fire size in an ecosystem. Provinces are considered to be dry and fire-prone are the Washington and Oregon Eastern Cascades, Oregon and California Klamath, and the California Cascades.

ics of the forest landscape mosaic of an area. Just as there are many different types of forests for the diverse array of climates, soils, and topography, there are many different types of old-growth forests.² For example, old growth forests east of the Cascades and in the Klamath Province of southern Oregon historically ranged from open, patchy stands, maintained by frequent low-severity fire, to a mosaic of dense and open stands maintained by mixed severity fire. In these areas, old growth structure and composition were varied and were shaped by a complex disturbance regime of fire, insects, and disease.

Tree (or stand) age or tree size are not by themselves adequate descriptors of either the structure or function of old growth forests, yet these two attributes are commonly used descriptors by the media and public. Others use the absence of clearly visible human activity as a necessary criterion for old growth, but there is no consensus on this in the scientific community nor any real basis in experience or fact.

CURRENT SCIENCE

Science has made great strides in refining our understanding of the ecological roles of older forests and the structure associated with those forests, which are important in the understanding of what old-growth is in healthy, dynamic forest ecosystems. The ecological functions of old growth include unique wildlife habitat, high levels of carbon storage and cycling of nutrients, and capture, storage, and release of clean water into streams and rivers. The Forest Service, drawing on its research expertise, is exploring management strategies to accelerate the development of multi-storied, complex structure (old-growth) in forests of the Pacific Northwest where it has been lost through previous logging or fire suppression and where, through that loss, forest ecosystem function and resiliency are diminished or impaired.

Research has demonstrated that, historically, the amount of old growth forest across the Pacific Northwest region ebbed and flowed, with natural disturbances creating a patchwork of forest ages across landscapes. By 2004, ten years after the approval of the Northwest Forest Plan,³ the total area of late-successional and old growth forest (often referred to as “older forest”) in the Northwest Forest Plan area ranged from about 3 million acres to 8 million acres, depending on the definition of late successional and old-growth forest. Monitoring during this time has shown that the rate of increase of acres of older forest is somewhat higher than expected. Between 1994 to 2003, gains well outpaced losses from all causes, including limited stand-replacing harvest and wildfire. Overall losses from wildfire are in line with what was projected, but the rates of loss have been highly variable among different locations, with the highest rates of loss occurring in the dry provinces. Increased densities of fuels and development of ladder fuels increase the probability of high-severity fire and the loss of late successional forest. Increasingly widespread and prolonged outbreaks of insects and disease that, in turn, can lead to higher and more widespread mortality and the cascading effects of increased fire severity have the potential to further lower the overall amount of older forests and trees. Monitoring suggests that rates of fuel treatments and restoration of structure and disturbance regimes in fire-dependent older forest types have been considerably less than is needed to reduce potential for losses of these forests to severe disturbance.⁴ As a consequence the old growth forests and landscapes of the dry provinces are among the most threatened and degraded coniferous forest ecosystems within the Northwest Forest Plan area.

CLIMATE CHANGE

Changes in climate increase the uncertainty associated with forest development and associated management. Climate and weather have changed periodically during the development of our old forests. They will continue to change at uncertain rates into the future (thereby constituting a disturbance in their own right). Climate also

² See, for example, PNW-GTR-720, January 2008, First-Decade Results of the Northwest Forest Plan and Supplemental Materials, as well as Kaufman et al. 2008. Defining Old Growth for the Fire Adapted Forests of the Western United States, *Ecology and Society* 12(2): 15.

³ In April, 1994 the Secretaries of Agriculture and Interior issued a Record of Decision (ROD) for the Northwest Forest Plan (NWFP). The ROD affects the management and administration of 22.1 million acres of Federal land within 19 national forests in western Oregon, western Washington, and northern California administered by the Forest Service and Bureau of Land Management. The NWFP created 10 million acres of reserves where development of late successional or riparian habitat is the primary objective.

⁴ See PNW-GTR-720, January 2008, First-Decade Results of the Northwest Forest Plan and Supplemental Materials.

interacts with other disturbance factors that shape the development of forests. With in the Pacific Northwest, the natural disturbance agents potentially affected by climate include insects, disease, windthrow, and fire. These disturbances often occur sequentially or in combination. For example, when regional droughts affect tree vigor across entire watersheds and contiguous blocks of host trees are available, beetle populations can build and attack trees across whole landscapes or regions. The resulting increase in dry fuels increases the probability of fire. As a result of warming trends, it is possible that insect and disease outbreaks could become quite large, as we already are seeing in Colorado, British Columbia and elsewhere.

MANAGEMENT IMPLICATIONS

The mission of the Forest Service is to sustain the health, diversity, and productivity of the nation's forests and grasslands to meet the needs of present and future generations. The National Forest Management Act (NFMA) establishes the goals of maintaining species diversity and ecological productivity on National Forest System lands. Ensuring a diversity in forest ages and stand structures across landscapes and the region supports this goal and mission. Old growth has an important role in that mixture, in ecosystem dynamics and in providing unique wildlife habitat. In many cases active management is needed to restore old growth or reduce the risk of loss of old growth to high severity fire. We believe that, on the east side of the Cascades, it will be necessary to treat stands to manage fire and insects to re-establish and maintain a diversity of forest age and stand structures. On the west side, thinning and other such treatments are necessary to accelerate and/or continue the development of desired future structural conditions in dense, uniform young forests.

Current research supports the view that to achieve conservation outcomes it is best to avoid "one-size-fits-all" approaches as much as possible. Using different definitions of late successional and old-growth will result in different silvicultural approaches taking into account the differences in the role of fire, insects and disease for the different forest types. In managing old growth forests, it also is important to consider multiple spatial scales including trees, stands, landscapes, and regions. This is why we develop site-specific integrated management prescriptions at the stand and landscape level. The classic conservation approach of dividing the landscape into reserves and production areas may not work well in dynamic landscapes—new approaches need to be tested and applied using adaptive management principles.

Because dry old-growth forests (such as ponderosa pine) likely developed as a result of frequent low intensity fires that created relatively open forests with scattered large trees and patches of regeneration across the landscape, re-establishing the structure of these forests and the natural role of fire will require a combination of mechanical removal of trees and the use of prescribed fire on a site-by-site basis. Many such projects have been implemented in the dry forest on the east side of the Cascade Mountains, for instance near Black Butte Ranch in Oregon, with demonstrable success. In more moist forests (such as mixed conifer), fire has also been a predominant force historically, but the fire regime is more variable and includes some infrequent, large, intense fires, but with significant patchiness, leading to a more complex mosaic of forest on the landscape. Management might make use of strategically placed area treatments (SPLAT) to reduce fuels and protect important older forest stands in mixed types. This strategy has been implemented at the Sagehen Experimental Forest and is part of an amendment to the Sierra Nevada Forest Plan. The wetter old growth forests typically developed following infrequent stand replacement disturbances that were sometimes caused by fire, but in coastal areas, could also be caused by extreme wind. Such disturbances killed most or all of the canopy trees and created large patches of diverse young forest that required centuries to become structurally complex old growth. In the Coast Range of Oregon, active management projects, such as the Five Rivers Landscape Management Project, are testing alternative approaches to accelerating the development of old-growth characteristics through thinnings, dead wood management, and riparian rehabilitation.

Management treatments to accelerate the development of complex structure can be undertaken in any of the forest types and are most effective in younger, uniform stands including both natural stands and plantations, or dense older forests where fire suppression has allowed dense understories to accumulate, increasing the risk of high severity fire. It should be noted that many of the habitat values of old growth forests can occur in younger forests where some structural complexity (e.g. large old live and dead trees, shrubs, canopy openings etc.) occurs. Management might be appropriate at many ages to achieve a goal of re-establishing the dynamic mosaic of forest ages across the landscape, especially in light of changes in manage-

ment of private forest lands. This highlights the need to evaluate older forests in the context of landscape-level planning and longer time frames. Our forest planning process provides the best vehicle for accomplishing this assessment. By contrast, broad 'one-size-fits-all' legislative prescriptions are less useful.

CONCLUSION

Multiple definitions of old growth are appropriate for the diversity of forest types within the Pacific Northwest. Old growth definitions and management strategies should be refined to reflect the inherent patterns and dynamics of the forest landscape mosaic of an area.

To re-establish a diversity of forest age and stand structures in some locations it will be necessary to treat stands on the east side of the Cascades to manage fire and insects. On the west side of the Cascades, treatments will be needed in some locations to accelerate and/or continue the development of desired future structural conditions in dense, uniform young forests.

The most threatened and degraded coniferous forest ecosystems within the Pacific Northwest are the old growth forests and landscapes in dry provinces. Conserving the ecological diversity of these forests is a major challenge. Increasing the amount of active management through use of mechanical treatments and prescribed fire is critical to restoring and protecting these important landscapes. On the westside of the Cascades, thinning tree plantations and other silvicultural practices can help to restore ecological diversity in young forests and accelerate the development of old growth characteristics.

We are committed to using all the tools at our disposal to ensure that landscapes include older forests that are sustainable through time and able to weather the multitude of changes that are predicted to occur in the future. We are also committed to using these tools to produce the myriad ecological and economic values the public demands from the National Forests.

I will be happy to answer any questions the Subcommittee Members may have.

Senator WYDEN. Thank you for your professionalism, and I note that you began your career when Mary Gautreau, who is a terrific member of our staff, began her career at the Forest Service. We thank you for all of your professionalism and your many years of service.

Ms. GOODMAN. Thank you, sir.

Senator WYDEN. We'll have some questions in a minute.

Mr. Caswell, welcome.

STATEMENT OF JAMES CASWELL, DIRECTOR, BUREAU OF LAND MANAGEMENT, DEPARTMENT OF THE INTERIOR

Mr. CASWELL. Thank you, Senator.

Mr. Chairman, Senator Craig. It's a pleasure to be here today. I will also abbreviate my oral statement further from the testimony that's already been submitted.

BLM manages about 3.5 million acres of forests, woodlands, about 2.2 million acres generally known as the O&C, contains some of the most productive forests in the world. They're in a checkerboard ownership, intermingled with private lands that are generally managed from an industrial timber production base.

Old-growth forests have engendered passionate debate from a wide spectrum of interested parties, and we recognize that discussions on this issue are highly charged.

Due to the differing opinions about the appropriate management, as well as divergence as to the actual definition of old growth, generally, scientists agree that on the west side of the Cascade Range, old-growth Douglas Fir and Western Hemlock forests contain certain structural characteristics. Large over-storied trees, multiple tree canopy levels, large, coarse, woody debris, a lush under story shrub layer, and infrequent stand replacement fires.

Science has contributed to our understanding of the complexity of these older forests, and the ecological functions these forests provide on the landscape. This complexity increases the resiliency of the forest systems to disturbance, and provides a suite of environmental services, including clean water, clean air and wildlife habitat

In addition to the ecological benefits, however, the forests of O&C provide substantial social and economic benefits to the communities. In fact, the O&C Act of 1937 requires the BLM to manage these lands for several purposes, including a permanent source of timber supply, and contributing to the economic stability of local communities and industries.

The BLM also must comply with requirements of statutes enacted, subsequent to the O&C Act, including the Endangered Species Act, the Clean Water Act, and of course, the National Environmental Policy Act.

Since 1994, BLM has managed these lands under the Northwest Forest Plan, which categorizes old growth as 200 years, or older. The Northwest Forest Plan had dual purpose—one was to maintain late successional old-growth ecosystems, and the second was to provide a predictable, sustainable supply of timber.

The Northwest Forest Plan has met its first objective, but not its second. In the 14 years since the plan was implemented, about 3,500 acres of old growth have been harvested from BLM-managed lands in Western Oregon, and approximately 41,000 acres of ingrowth has occurred. Since 1998, there have been very little harvest of old growth or late succession forests in the Pacific Northwest.

The majority of harvest during this period has come from thinning in stands less than 80 years of age. This cannot continue. I testified before the subcommittee last December, thinning alone does not constitute sustainable forestry.

BLM has proposed revisions to our existing land-use plans that would balance the environmental, economic and social needs of these unique Western Oregon forests. More than half of the land base, BLM land base, about 51 percent would be managed for conservation of habitat needed for the survival and recovery of listed species, and for other purposes.

About 49 percent of that land base would be managed for the permanent production of timber in conformity with the principles of sustained yield, consistent with the O&C Act and, of course, subject to all other laws.

Proposed revisions acknowledge that not all acres can be managed to achieve all outcomes, but we believe that if these proposed revisions to our land-use plans take effect, BLM can manage the O&C Forest to both provide late successional habitat, and contribute to the economic and social benefits and communities throughout Western Oregon.

In 1950, the standing volume on the O&C Lands was estimated to be greater than 50 billion board feet. Fifty years later, after the harvest of some 45 billion, over that 50-year period, the standing volume today is estimated at 70 billion board feet.

Given the sensitivity and controversy over these issues, we are certain the dialog will continue, and Mr. Chairman, I'd be glad to stand for any questions.

[The prepared statement of Mr. Caswell follows:]

PREPARED STATEMENT OF JAMES CASWELL, DIRECTOR, BUREAU OF LAND
MANAGEMENT, DEPARTMENT OF THE INTERIOR

Thank you for the opportunity to discuss the status of old-growth forests on public lands managed by the Bureau of Land Management (BLM) in the Pacific Northwest region. As a lifelong forest manager, these issues are of particular interest and importance to me.

Approximately 69 million acres of diverse forests and woodlands are managed by the BLM throughout the western United States, including more than 3.5 million acres in the Pacific Northwest states of Oregon and Washington. The BLM's largest forest management program is in western Oregon, and my comments will focus primarily on this program. I will also briefly address the BLM's management of Public Domain forest resources in eastern Oregon and Washington.

FOREST MANAGEMENT BY THE BLM

Old Growth Forests have engendered passionate debate from a wide-spectrum of interested parties. We recognize the importance of old growth forests from an ecological, social, and economic perspective. We also recognize that discussions on this issue are highly charged, due to differing opinions about appropriate management as well as divergences at a more fundamental level concerning the definition of old growth. Science has contributed to our understanding of the complexity of older forests and the ecological functions these forests provide on the landscape. The complexity found in older forests increases the resiliency of these forest systems to a variety of disturbances and helps maintain healthy and dynamic forest ecosystems that provide a variety of environmental services, including clean water, wildlife habitat, carbon sequestration, along with a variety of recreational opportunities.

While there is disagreement on when a forest reaches old-growth condition, generally scientists agree that west of the Cascade Range, old-growth Douglas-fir and western Hemlock forests contain certain structural characteristics. These characteristics consist of old large overstory trees, multiple tree canopy levels, large course woody debris, a lush understory shrub layer and infrequent stand replacement fire events. In contrast, the dryer eastern and southwest Oregon old-growth forests generally contain widely-spaced or small groups of large overstory trees with a more open grassy understory maintained by frequent low intensity fire.

Overlying these issues are additional factors that add to the complexity of the BLM's management. The BLM must comply with a distinct statutory mandate, the O&C Act. The lands managed by the BLM are in a checkerboard ownership pattern, intermingled with private lands, which are generally managed for industrial timber production. Forest science informs the sustained yield management of the O&C forests. Compliance with environmental laws and policy guidance add another layer of scientific considerations. The BLM's forest management actions are analyzed by an interdisciplinary team of specialists, including wildlife biologists, soil scientists, forest ecologists and hydrologists. These specialists utilize the available body of science in their discipline to design, implement and monitor the BLM's forest management actions. Other environmental factors, including climate change, affect natural disturbances such as fire, insects, disease, windthrow or storm damage, which have a profound impact on the health of the forests under BLM's care.

O&C LANDS

The BLM's western Oregon districts manage 2.5 million acres that contain some of the most productive forest lands in the world. Of these, about 2.4 million acres are managed under the "O&C" lands designated by Congress in the "Revested Oregon and California Railroad and Reconveyed Coos Bay Wagon Road Grant Lands Act of 1937" (O&C Act). The O&C Act directs the BLM to manage the western Oregon public lands ". . . for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities" (43 U.S.C. Sec.1181a).

Consistent with this statutory mandate, the BLM recognizes that the dominant use of the O&C lands is the management of timber resources, including cutting and removal. A 1990 opinion by the 9th Circuit Court of Appeals affirmed this interpretation and recognizes that the O&C Act places limitations on BLM's discretion on managing the O&C lands. The BLM also complies with the requirements of statutes enacted subsequent to the O&C Act such as the Endangered Species Act of 1973 and the Clean Water Act of 1972. The Federal Land Policy and Management Act (FLPMA), enacted in 1976, specifically provides that if there is a conflict between the O&C Act and FLPMA relating to the management of timber resources, the O&C Act shall prevail. Neither the O&C Act nor Federal Land Policy and Management Act, however, contains specific provisions that govern the management of old-growth.

In addition to these statutes, the BLM's management of public land resources in the Pacific Northwest is guided by administrative policy. Until 1990, BLM's implementation of the O&C Act was conducted in such a way that the volume sold approached the calculated and declared allowable harvest from the available timber lands. From 1950 to 1990, the BLM averaged over one billion board feet of timber sold annually. In 1950, the standing volume on the O&C lands was greater than 50 billion board feet (BBF). Fifty years later, after selling 45 BBF, the standing volume is now 70 BBF due to better information, in-growth and rapid reforestation of harvested lands.

Since 1994, the BLM has managed the forested lands in western Oregon under the guidance of the Northwest Forest Plan (NWFP). The NWFP was adopted by the Department of the Interior and the Department of Agriculture for federal forests within the range of the northern spotted owl as an "ecosystem management plan for managing habitat for late-successional and old-growth forest related species." The NWFP has a dual purpose—to maintain the late-successional old growth ecosystem and to provide a predictable and sustainable supply of timber. The NWFP has met the first objective, but not the second objective. Since adoption, timber outputs have been at just 49 percent of the called-for harvest levels. Balancing the dictates of the O&C Act, the Endangered Species Act, and other laws with the policy in the NWFP has been a constant struggle for the BLM over the past 14 years.

BLM-managed lands comprise ten (10) percent of the NWFP's total area of 24 million acres in Oregon, Washington, and northern California. In very broad terms, the NWFP, prior withdrawals, and Congressional designations placed approximately 80 percent of this entire area in reserves, and thus excluded them from the calculation of the allowable sale quantity (ASQ).

In 1995, the BLM's land use plans for western Oregon were amended to incorporate the policy guidance of the NWFP. The NWFP categorizes old-growth forests as 200 years and older. Age is not the only factor in management decisions regarding old-growth forests. NWFP policy requires the BLM to manage the reserved areas for the purpose of "managing habitat for late-successional and old-growth forest dependent species." Standards and guidelines, applied in association with timber harvest, require the retention of snags, live trees, down logs and woody debris, measures designed to promote diversity and protect late-successional and old-growth forests and associated species.

The BLM's existing land use plans for western Oregon respond to multiple, often competing, needs for late successional—old-growth—habitat, and for forest products. Late-successional, old-growth habitat is needed to promote a healthy forest ecosystem that will support populations of species protected under the Endangered Species Act. A predictable, sustainable supply of timber and other forest products is needed to help maintain the stability of local and regional economies and contribute valuable resources to the national economy. To meet these multiple objectives, our western Oregon land use plans provided that some mature and old-growth stands would be harvested and that younger stands would be thinned.

As a result, BLM had anticipated that approximately 3 percent of late-successional and old-growth forests (approximately 11,000 acres) outside of the reserves would be harvested during the first decade of the NWFP's implementation. That level of harvest has not occurred. Since the inception of the NWFP in 1994, 3,500 acres of old-growth has been harvested from BLM-managed lands in western Oregon; approximately 41,000 acres of in-growth have occurred. Since FY 1998, there has been very little harvest of old-growth or other late-successional forests in the Northwest. The majority of harvest during this period has come from thinning in stands less than 80 years of age.

The NWFP's policy objective of "maintain[ing] the late-successional and old-growth forest ecosystem and provid[ing] a predictable and sustainable supply of timber, recreational opportunities and other resources at the highest level possible" has been extraordinarily difficult to implement on-the-ground. For example, under the

NWFP, approximately 500,000 acres of BLM-managed land are available for timber harvest. Under the NWFP, BLM's target is 203 million board feet per year of allowable sale quantity and 100 million board feet of non-sustained yield LSR thinning volume pursuant to the settlement agreement in *AFRC et al. v. Clarke*. Each year the BLM comes closer to achieving the target. The majority of the volume offered has come from thinning sales.

The BLM is striving to balance the environmental, economic, and social needs of these unique O&C lands. Under the proposed revisions to the existing Western Oregon land use plans, BLM-administered lands in western Oregon will be managed for a variety of outcomes including late successional habitat for listed species, riparian objectives to protect aquatic habitats and water quality, and to contribute to economic and social benefits. The proposed revisions acknowledge that not all acres can be managed to achieve all outcomes. In the preferred alternative, more than half of the land base (51 percent) would be managed for objectives other than forest products, including conservation of habitat needed for the survival and recovery of listed species. About 49 percent of the land base in the BLM's western Oregon districts would be managed for permanent forest production in conformity with the principles of sustained yield, consistent with the O&C Act. BLM management activities on these acres will also comply with all other applicable laws.

PUBLIC DOMAIN FORESTRY

I turn now to address the BLM's Public Domain forest program, under which the BLM manages approximately 67 million acres of diverse forests and woodlands throughout the western United States and Alaska. In eastern Oregon and Washington, the BLM's Public Domain forestry program manages about 223,000 acres of commercial forests (ponderosa pine, lodgepole pine, and Douglas-fir) and 815,000 acres of woodlands (predominantly western juniper) under the principles of multiple use and sustained yield as directed by the Federal Land Policy and Management Act (FLPMA).

Since 1993, BLM policy direction for Public Domain forestry has shifted away from commercial outputs and toward a balance of natural resource benefits to current and future generations, to "maintain and enhance the health, productivity, and biological diversity of these ecosystems." Timber harvest is used as a tool to meet a variety of objectives, where appropriate. Many Public Domain acres, however, are not suitable for commercial forest products, and therefore the BLM does not calculate an annual ASQ.

Under the BLM's Public Domain forest management policy, forests and woodlands are managed to maintain or create desired forest conditions, including those that contribute to biodiversity and wildlife habitats. Where appropriate, forests are treated to reduce hazardous fuels buildups to provide for public safety.

The Public Domain forestry program manages those areas that contain old-growth (native species that are at least 150 years old) stands where they exist in their natural range. A certain percentage of old-growth occurs in non-commercial forest types, such as the juniper woodlands of eastern Oregon. The continued health and vigor of these older trees is considered in the treatments that are designed to improve forest resiliency, reduce wildfire hazards, and support a high level of biodiversity.

Most older forest communities on BLM lands are choked with higher tree densities than in the past when periodic low-intensity fires maintained these systems. In many cases these are no longer natural self-sustaining forest communities. Active management, with thinning from below and the introduction of prescribed fire, is necessary to return these forest communities to fully functioning ecosystems.

CONCLUSION

The BLM recognizes the importance of old growth forests from an ecological, social, and economic standpoint. Given the sensitivity and controversy over these issues, the unique characteristics of old growth forests, the importance of old growth for the health of forest ecosystems and the wildlife who live there, the statutory mandate under the O&C Act to provide for permanent forest production on a sustainable yield basis, other environmental statutes including the Endangered Species Act, and the NWFP, we are certain the dialogue on old-growth will continue.

Mr. Chairman, this concludes my prepared statement. I will be pleased to answer any questions that you or other members of the Subcommittee may have.

Senator WYDEN. Thank you very much, Mr. Caswell.

We've been joined by Senator Craig and Senator Smith. I'm going to say to my colleagues, as I announced earlier, we're going to have

a moment of silence at 10:15, we've got the votes at 11, so we're going to have to really speed through this, and I'll take 5 minutes, and Senator Craig, Senator Smith will all take 5 minutes, and see if we can get this accomplished. Thank you all for putting up with what's going to be a challenging morning.

First question to you, Ms. Goodman, we had Secretary Rey here recently, and of course his knowledge in the forestry area—he has so much expertise. We finally, after a bit of sparring back and forth, got him to say that the budget for thinning this year would be less than last year's budget. This strikes me as a very wrong-headed approach to our challenge. Because, somehow we've got to break this cycle of skewed priorities in forestry. What happens is, you don't have enough work being done in the thinning area, and then we have these huge fires, these infernos, and all of the money then goes off to fire suppression.

So, my first question to you is, isn't it correct—from a purely forestry standpoint—set aside all of the debate about what's being spent in the accounts—that if you have more thinning and forest health projects funded, doesn't that provide an opportunity to reduce the amount of money that gets burned up by the fire suppression budget?

Ms. GOODMAN. I certainly agree with you that there's a lot of work that needs to be done, Senator Wyden, and I—

Senator WYDEN. But just—a yes or no on the question of, if you do more thinning and forest restoration, isn't that an opportunity to reduce some of the money that gets chewed up on fire suppression?

Ms. GOODMAN. Long term, the answer is, yes. You saw the pictures where we actually did some thinning, and the fire burned through and the old-growth trees survived.

So, yes, long term. Short term, we won't see that major reduction, and that's why we need assistance with our—

Senator WYDEN. Fair enough.

I've been very impressed with the kind of projects going on in the Siuslaw and in Lakeview. They've essentially been the restoration thinning kind of approach, in terms of plantations, and they go out and they get the timber industry folks together and the mills and the environmental people and your folks and a good cross-section of people. It strikes me that this is a pretty good model to pursue. The Government Accountability Office, I guess, is releasing a report today, indicating it's a pretty good model.

I gather that you all have been interested in this, as well. Can you tell us your thoughts about restoration and thinning, and why you think maybe this is a chance to reduce some of the public controversy and delay and litigation as compared to what's gone on in the past?

Ms. GOODMAN. I certainly agree with you, it's a great model, and actually, we've taken that model past Lakeview and the Siuslaw—you see it in almost every forest. We have collaborative approaches. In fact, HEFRA has really helped us on the East Side, where we're bringing folks together to talk about what should be done on the landscape. We're seeing thinning models throughout the region, where we are using a collaborative approach, and it is working. We're seeing less litigation, even though we still have people taking

their right to appeal and litigate, but we certainly are seeing that collaborative approach throughout the region. So, I agree wholeheartedly it's a good model.

Senator WYDEN. What's your sense about the transformation of the timber industry's infrastructure? My sense is that we've got a lot of mills now, we're putting a great deal of effort into making the changes in their infrastructure—their equipment and the way they run their business—to move away from old growth. Do you have any sense of how fast that transformation is taking place?

Ms. GOODMAN. I really don't. I know that a lot of the mills are spending millions of dollars improving their millworks, and I think you'll have somebody testifying on the next panel who could probably answer that better than I.

Senator WYDEN. Last question for my round is, Mr. Caswell, the Forest Service, to their credit, is indicating that they're trying to move away from planning old-growth sales in responding to the public. But BLM continues to plan a number of old-growth sales, and the Western Oregon Plan revision proposes a large-scale resumption of old-growth logging in BLM lands. My guess is this is going to be a huge lawyer's full-employment program, that there's going to be a tremendous amount, you know, of litigation.

Why can't we get you all to pick up on some of the thinking that Ms. Goodman just described as so promising?

Mr. CASWELL. Mr. Chairman, first of all, I think you still have to reflect back to the O&C Act and the purpose around which the O&C lands were established, that's No. 1.

No. 2, within the matrix of the Northwest Forest Plan that's currently in place, you know, there is a really large component of the harvest level, the ASQ that was prescribed, that was to come from those lands. Now, some of that is old growth, some of that is thinning. I mean it's, you know, it's a mix of age classes. Over 14 years, however, almost all of those projects in the matrix that was available, was called for as part of that second objective of Northwest Forest Plans has had the, you know, we've been met with the same kind of resistance. We work very hard—we do the same kind of collaborative things the Forest Service does. We have groups that get together and try to plan sales and operations. But, the fact remains that if folks want to stop the activity, they can certainly do that.

If we are going to uphold our responsibilities under the O&C Act for the benefit of the O&C counties, and given the land pattern that we have, and the stand structures that we have, we have to manage timber at a larger scale in older stands.

I'm not necessarily talking about stands 200 years and plus. I mean, we can argue a long time about where that cutoff is, that's why age really doesn't work very well. So, there's stands in the 160 to 180 and the 150 to 160 that look like old growth—there's stands that are 140 that look like old growth, or people would be inspired to believe that they are, in their mind, and that's fine.

But those are also part of the solution, here, to provide a sustainable supply of timber.

**STATEMENT OF HON. LARRY E. CRAIG, U.S. SENATOR
FROM IDAHO**

Senator CRAIG. Thank you very much, Mr. Chairman. I appreciate our panelists being with us this morning, and reexamining as this committee ought to, on a regular basis, forest policy.

You and I and Senator Smith have been involved in forest policy a long while. I've been involved in it 28 years here in Congress, so I've seen a reasonable span of time, and a reasonable change—different changes in policy, right through, of course, the Pacific Northwest, through the Northwest Forest Plan in the 90s, and what I believe was a false base for its creation. I've been very blunt and very bold about it. I've followed the debate and participated in the debate as it relates to late successional forests and the complex forest policy that we tried to design to do that.

I've drawn a rather simple conclusion based on the last few years. We saved the tree from the logger, but we haven't saved it from Mother Nature. Because an old-growth tree is, quite simply, a tree that has matured and is starting to die. Now, it may take 200 years for it to get there, but it is no longer the robust, active, growing tree that it once was in its youth.

While I know that has been the mantra of the large part of the debate, it is fascinating to me the phenomenal destructiveness we've turned loose in the system. That is, because of our involvement with Mother Nature, our fire suppression for 80 or 90 years, and a failure to replicate a fire-like scenario by man's presence in the forest. Now we're having unprecedented situations occur, that I must tell you, when Mother Nature decides to start burning, she will not burn up to the old-growth line and say, "Oops, gotta stop there, because policy won't allow me to touch that." She will sweep through, and in a catastrophic way destroy—and destroy in a way, oftentimes, that we've not seen in the past. The intensity of these fires are phenomenal.

So, we wring our hands, we try to do something different. Ron and I became involved in trying to create a new policy of thinning and cleaning and changing the dynamics of our forests through the Healthy Forests Act.

Then we get to something like this, Ms. Goodman. In giving us an estimate of what we might do with NEPA, or ESA or the National Forest Management Act and the requirements for a typical forest management project, Undersecretary Rey mentioned when he was last here, when we said, "OK, we develop categorical exclusions in healthy forests, what does it cost to do that?" Roughly \$50,000, but then we've got a judge that says, "No, no, no, you can't do all of that kind of thing. That's wrong."

So, then, OK, then let's do an environmental assessment—what does that take? That's roughly \$250,000, and about a year to put together.

What about a full-blown environmental impact statement? That requires a million dollars and 2 or 3 years to put together. The last time I looked at the statistics and the fuel loads in our forests, and the ramping up of fires that are going on out there, Mother Nature isn't waiting for us—she's taking over. We're simply following along. I understand there's a great satisfaction on the part of some communities, that fire is a natural episode, and we can praise its

coming and its going, and hope that the forest moves up from the ashes. I don't think it will, as readily and as—in the way we want.

The question of you, Jim, the O&C lands are a unique parcel, I wish they were in Idaho and not in Oregon. Because they are a phenomenal resource, and over the years they have served our nation well, and certainly served Oregon well, and serving those counties well.

You just gave us a scenario that I think is absolutely fascinating. Because the Northwest Forest Plan would suggest that we were just cutting the heck out of the O&C lands, when in fact we were harvesting them on a reasonable approach that kept the watershed quality up, that kept a productive life going on out there for the human species, and for a lot of wildlife.

Your statistics tell me that there is as much as 40 percent more standing timber in the O&C lands than there was in 1937. Is that an accurate statement?

Mr. CASWELL. Senator Craig, I would say that's fairly—I mean, in round numbers, I would say that's right.

Senator CRAIG. I find that remarkable, because that isn't the story we were told. That isn't what we led to believe, by those who were so dramatic in pushing forth a plan that, at best, was never met. It's certainly frustrated me, and it's frustrated the Senators from Oregon, it has destroyed jobs and industry and counties and infrastructure, and yet there's now 40 percent more timber on those lands than there was in 1937. Thank you.

Senator WYDEN. I thank my friend.

Senator Smith.

**STATEMENT OF HON. GORDON SMITH, U.S. SENATOR
FROM OREGON**

Senator SMITH. Mr. Chairman, I have a statement I'm anxious to give. It may be 5 minutes, it may be a few more than that.

Senator WYDEN. Why don't we have that statement and—I would just say, Senator Smith, we're going to have the moment of silence—

Senator SMITH. Exactly.

Senator WYDEN. At 10:15, and I want to be accommodating and get everybody in.

Senator SMITH. But stop me if I'm anywhere close to that.

Senator WYDEN. You go ahead.

Senator SMITH. All right.

I thank you, my colleague, for holding today's hearing on the management of old growth. Since our time together in the U.S. Senate, we've used our positions on this committee to bring constructive oversight to the management of Oregon's forests, and I thank you for that.

We'll continue to act on forest protection proposals that have the support of local elected officials, and also protect Oregon's ability to sustainable harvest of timber for generations to come.

Reasonable people can agree on specific and unique places to protect, including older stands of trees. However, to set aside every old tree in every forest, is something that has always been met with distrust from timber-dependent communities.

The reason for that distrust is history. Time after time, acre by acre, Oregon communities have watched the manageable public land base erode by roughly 92 percent. They've been told that, if we just protect this area, you can continue—or even increase—logging in the remaining areas.

But protection on a map does not always materialize into protection on the ground. Keeping timber towns alive from an ever-shrinking forest is an unmet Federal promise, proven by the county payments crisis, and alarming unemployment rates in rural Oregon.

The public policy debate over old growth is decades old. It is inseparable from the saga of the Northern Spotted Owl.

In 1976, shortly after the Endangered Species Act became law, an Oregon State graduate by the name of Eric Forsman, published a Master's thesis. It surmised that the Northern Spotted Owl of Oregon was declining as a result of habitat loss. That habitat was, ostensibly, old growth—a phrase that defined the legal effort to preserve older forest stands.

In their own words, those who have sought for preservation of these forests needed a surrogate species—one that lived in, and needed, old growth for its habitat. At a law clinic in 1988, one of these activists stated, and I quote, “Thanks to the work of Walt Disney and Bambi, and his friends, wildlife enjoy substantive statutory protection. While the Northern Spotted Owl is the wildlife species of choice to act as the surrogate for old-growth protection, and I've often thought—thank goodness the Spotted Owl evolved in the Northwest, for if it hadn't, we'd have to genetically engineer it. It's a perfect species for use as a surrogate. First of all, it is unique to old-growth forests, and there is no credible scientific dispute on that fact. Second of all, it uses a lot of old growth, that's convenient because we can use it to protect a lot of old growth.”

After years of litigation surrounding the survival of the Spotted Owl, the loss of over 35,000 timber jobs in Oregon, then-newly elected President Bill Clinton offered a middle path between old-growth protection and owl protection and timber harvest. The ensuing Northwest Forest Plan promised to produce a predictable and sustainable level of timber sales that will not degrade or destroy our forest environment.

The predicted harvest level was 1.1 billion board feet. The sad irony is that neither the 1.1 billion board foot harvest level, nor the recovery of the Spotted Owl has been accomplished. The 2004 Federal status review of the Spotted Owl introduced a new antagonist to the saga—not the logger, not the loss of old growth—but another owl.

The Barred Owl is not native to the Pacific Northwest. It is larger, more aggressive, more successful in predation and reproduces faster than the Spotted Owl. Eric Forsman, the Oregon State University Master's student who wrote the first major opus on the decline of Spotted Owls in 1976, is now a biologist for the Forest Service, and a leading researcher of the Barred Owl.

He recently commented, and I quote, “In the past, we could assume that what we were seeing in terms of habitat would help us to understand what was happening with the Spotted Owl. Now we

don't know if the Spotted Owls aren't there because there is no habitat for them, or because of the Barred Owls."

The second question haunts our discussion of old growth management and protection. Why more old growth forest has resulted in fewer Spotted Owls? A 10-year review of the Clinton Northwest Forest Plan found that there are 600,000 more acres of old growth in Western Oregon and Washington than there was a decade ago. However, the sharpest decline in Spotted Owl populations actually occurred where the least amount of Federal timber harvest took place, namely the Olympic peninsula of Washington State.

This is also the location of the greatest number of Barred Owls. The owl actually increased its population in Southern Oregon, where the most Federal harvest activity took place, and had the smallest incident of Barred Owl invasion.

These paradoxes remind us to ask, what have we been protecting Old growth for? What are we really protecting old growth from?

The discussion of old growth protection must acknowledge that wildfire—not timber harvest—is the primary threat to old-growth habitat. Over 100,000 acres of old-growth habitat were severely burned over the last 10 years. Most of this was in the 2002 Biscuit fire, the largest fire in Oregon's history and the most expensive to fight in Forest Service history, costing in excess of \$150 million.

The Biscuit fire incinerated 65,000 acres of Spotted Owl habitat, as seen in this picture. This is more than four times the amount affected by timber sales in the 50 years preceding the fire. One notable difference is that the areas harvested were replanted. As old growth continues to burn, we will face the same dilemma of land managers after the Biscuit fire—how do we get old growth back? If old growth characteristics are important, then they should be used as forest management, namely salvage and reforestation, to accelerate their return after a fire.

These are questions that need to be answered in the old-growth discussion. What I do know is that after 15 years of not logging in old growth, growing new old growth, and burning protected old growth, the Federal Government really isn't sure what to do for the Spotted Owl.

But worse, the Federal Government doesn't know what to do with Oregon's timber towns and counties that are facing cataclysmic consequences of the failure to produce jobs in the woods.

The poem, Rhyme of an Ancient Mariner, tells of a ship driven far off course. The ship's crew lament their painful thirst in the famous words, "Water, water everywhere, but not a drop to drink."

In Oregon, the ship of our Federal forest policy has drifted too far astray. Timber, timber everywhere, nor any stick to cut.

Thank you, Mr. Chairman.

Senator WYDEN. Thank you, Senator Smith.

We'll give you all the last word, and then we'll have to move on. Ms. Goodman, Mr. Caswell, anything else you'd like to add?

Mr. CASWELL. Thank you, Mr. Chairman.

I would like to add something to what Senator Smith said—Senator WYDEN. Briefly.

Mr. CASWELL. Briefly, it'll be brief.

That is that the irony, further, is that the Barred Owl which—if we do determine, ultimately, that it is one of the key, the very

key components to the demise of the Spotted Owl—is further protected under the Migratory Bird Treaty Act. So, I mean, you were truly on the horns of a dilemma as to what to do in this situation.

Senator WYDEN. Ms. Goodman.

Ms. GOODMAN. Thank you for letting me come here today, Senators. I really appreciate the opportunity. What I'd like to say is that I would ask you not to try to define old growth by using an age class or a size class. We need to have all the tools in our toolbox to be able to manage old growth, so that we do have protection, and we do have diversity of our landscape.

So, thank you for this opportunity.

Senator WYDEN. We'll be working closely with you, and Ms. Goodman, we hope to have something to show you on our legislation before you retire, and we wish you well, and the twins will wear those shirts with pride.

Ms. GOODMAN. Thank you very much.

Senator WYDEN. Thank you both.

Let's go right to our next panel, Dr. David Perry of Oregon State, Dr. John Tappeiner of Oregon State, Marvin Brown, Oregon Department of Forestry, Paul Beck with Herbert Lumber in Riddle, Oregon, Randi Spivak of the American Lands Alliance.

We're very pleased that Senator Barrasso has taken such a great interest in forestry issues, and I would ask unanimous consent that his statement be put into the record, his opening statement, without objection, that will be done.

[The prepared statement of Senator Barrasso follows:]

PREPARED STATEMENT OF HON. JOHN BARRASSO, U.S. SENATOR FROM WYOMING

Thank you, Chairman Wyden, for scheduling today's hearing on old growth in the Pacific Northwest.

I am told this Subcommittee held a similar hearing on this very subject back in the fall of 2001.

I look forward to hearing about new developments since then.

I want to thank both the Administration and the public panel for agreeing to testify at this hearing.

I am especially pleased that Professor David Perry (Emeritus) and Professor John Tappeiner (Emeritus) both from Oregon State University have agreed to testify. They have decades of forestry experience and will provide us wise counsel I am sure.

As we discuss forest health issues in the Northwest today, many of us from the West are watching carefully.

I am concerned that whatever happens with forest issues in Oregon tends to ripple eastward.

Your trends seem to drive how those issues get dealt with in other states.

Having said that, I have to make a few observations:

- Oregon and Washington have approximately 41 million acres of Forest Service and Bureau of Land Management lands.
- Of that, approximately 7-8 million acres are considered to be large and older stands.
- Since the Pacific Northwest Forest Plan was put in place, the number of acres of large and older stands has grown by 1.25 million acres. This is about double what was predicted and five times the amount of older stands that have been harvested.
- During this same time period only 17,000 acres of large, old stands of trees have been harvested or thinned.
- Most disturbing is that we have seen wildfires significantly impact 102,500 acres of large old stands within the Pacific Northwest Region.

Given that the number of acres of older stands are growing; Given that wildfire has out paced harvesting by six-fold; It would seem to me fundamentally unwise to deny any future opportunities to manage and protect these areas.

I am not a forester, but have observed that nature often completely modifies the forest environment all on its own. I have to question the wisdom behind efforts to pass a law in Congress that demands permanent and full protection for old growth, expecting nature to alter its normal course.

Rather, I think of events like Mount Saint Helens, and the large insect epidemics we are currently seeing in Wyoming, Colorado, South Dakota, Alaska and other states. These events suggest to me that we should give our federal land managers the maximum flexibility to adapt to both man-made and natural events.

Giving resource managers the opportunity to adapt to changing conditions and to optimize forest health priorities just makes more sense.

I mention fires because I found Professor K. Norman Johnson's answer to my question at our December hearing unsatisfactory.

I asked about how to deal with older forests in northern Colorado and Wyoming that are currently being ravaged by pine beetles. He answered that in high elevation intermountain forests, insects and fire are a natural part of the system. He also shrugged and said there may not be much we can do to avoid mega-forest disasters in these forests.

Given the dead and dying forests of Southern Wyoming, we cannot take the attitude that "there may not be much we can do to avoid this." The people of Wyoming should not be forced to accept that outcome.

True, we cannot eliminate fire and insect issues, but we can reduce the amount of devastation through effective management.

It is clear that there were steps we could have—and should have—taken over the last 20 years to ameliorate the disaster we are now seeing.

And there are steps we need to be taking now to protect our forests for the future.

When I think about that apathetic attitude about thinning and combine it with the "lock-up-all-old growth policy" being articulated by some, I do not believe it will be an acceptable policy in any State.

Thus, Chairman Wyden I applaud you for having this hearing and searching for a third path through the forest wars, including these old growth issues.

Data from the Pacific Northwest Forest Plan implementation would suggest to most people our problem is not protecting old growth from logging; it is protecting it from fires. And I fear lines on a map cannot provide the protection for those forests that many hope to provide.

Finally, I hope that you will carefully consider the scope and potential consequences of any policy you might include in legislation. When forest policy in Oregon gets nudged to the left or right, forest practices and policy in the intermountain states tends to run completely off the road.

Senator WYDEN. Thank you all very much for coming.

What we're going to do, I told colleagues, we're going to have you all testify and at the time that the Senate floor, the Senate—as a body—is going to be taking time today to recognize the extraordinary courage of our men and women serving in our military, we're going to take a break for a moment of silence here, in the room, so we're going to have to try to coordinate that. We thank you for your patience.

We'll make your prepared remarks as part of the hearing record in their entirety. I know the compulsion is just to put your head down and read, and if you can summarize your key concerns in 5 minutes, or so, that will leave us some time for questions.

Welcome to all of you, and to have so many Oregonians on hand is a privilege, and we're glad you've made the long journey.

Dr. Perry, please begin.

STATEMENT OF DAVID A. PERRY, PROFESSOR EMERITUS, DEPARTMENT OF FOREST SCIENCE, OREGON STATE UNIVERSITY, CORVALLIS, OR

Mr. PERRY. My name is David Perry, I am an Emeritus Professor in the Department of Forest Science at Oregon State University.

Let me begin by quoting a recommendation of the National Research Council's Panel on Environmental Issues in Pacific North-

west Forests. Their recommendation goes, "Forest management in the Pacific Northwest should include the conservation and protection of most or all of the remaining late successional and old-growth forests. The remaining late successional and old-growth forests could form the cores of regional forests, managed for truly and indefinitely sustainable production of timber, fish, clean water, recreation and numerous other amenities."

A great deal of evidence indicates that when Euro-Americans arrived in the Pacific Northwest, about two-thirds of the forested landscape west of the crest of the Cascades was old growth. East of the crest of the Cascades, the number was probably closer to three-quarters.

The most recent studies that we have, show that of that about 28 percent is left on the, in both areas—west side and east side. Of that that's left, on the west side, 14 percent has some degree of protection, and on the east side, the number of protected forest is much lower, it's closer to 5 percent.

These numbers are far below what conservation biologists would consider is a minimum amount of habitat needed to support the species. I'd like to point out that the Spotted Owl—as central as it is—there are many more species involved in these forests than just the Spotted Owl.

So, if we protect what's remained, we push the amount that's saved up into the area—which is a bare minimum of what conservation biologists would believe is necessary to maintain species that depend on that habitat.

So, there's no question in the scientific community that these forests are centers of biological richness. What else are they? Before I get into what else they are, I want to just clarify some definition here. What—and again, I'll go to the NRC Panel on Environmental Issues, and quote them, "Old-growth forests are forests that have accumulated specific characteristics related to tree size, canopy structure, snags in woody debris and plant association. Ecological characteristics of old-growth forests emerge through the processes of succession. Certain features do not appear simultaneously, nor at a fixed time in stand development. Specific attributes of old-growth forests develop through forest succession until the collective properties of an older forest are evident."

So, there's no one age that you can stand at and say, "On this side is old growth, on the other side, it isn't." We have—most scientists will say that all of these properties have been accumulated by the time a forest gets to be 180, 200 years old. But, forests younger than that, or what I would term emerginal growth, are exhibiting a number of these properties, probably beginning at least when they're 120 years old.

So, why are we interested in saving what's left? The habitat and biological richness is one reason. Another reason is their carbon storage—it's clear that they store huge amounts of carbon. A study done about 15 years ago showed that if those forests were harvested, even accounting for the storage of carbon in boards, that it will take at least 200 years for the young re-growing forest—

Senator WYDEN. Dr. Perry, excuse me for interrupting you. The moment of silence is just beginning on the floor. This is a very important time, because we recognize the 5 years of service and sac-

rifice of our troops in Iraq, as well as those serving in Afghanistan and around the world. We want to honor the families, especially, who have given so much—the husbands and wives, and let us now, as part of this effort in the entire Senate this morning, let us take a moment of silence to appreciate those who, with such courage, serve our country.

[Moment of silence observed.]

Senator WYDEN. We are very grateful—very, very grateful, as a Nation, to all who have served our country.

Let us begin, again, with you, Dr. Perry.

Mr. PERRY. So, we have—we have biological diversity as an issue, we have carbon storage as an issue, water regulation is a third issue. Studies have clearly shown—controlled studies—that the old-growth forests are much better at regulating water flows, especially during peak run-off periods in the spring, than younger forests.

Finally, we have the fire-resistance—and fire has come up a number of times, and it should come up a number of times—and let me make it really clear, that under the proper—under severe weather conditions, anything is going to burn up. Under mild weather conditions, nothing is going to burn up.

What we're got to be concerned with right now is that broad middle ground. It's really clear from the evidence over the last few years, plus just common sense, that in that broad middle ground, a fire is much more likely to go into the crowns of a young stand than it is into the crowns of an old-growth stand. So, keeping those old-growth stands out there helps control the chance of mega-fires across the landscape, which we're going to be looking at more chance of that with climate change.

Now, I want to emphasize that—in the dry forest types that you've heard in past testimony, I'm sure, there is a problem. We've got to get into those old-growth forests and reduce fuels, and we've got to do that by going to the source of the problem, which is with those smaller trees, and we've got to do it in such a way that we protect the necessary closed forest habitat and so, also, water.

But, we do need to deal with that problem, and that's part of the protection issue, in the dry forest.

So, I think my time is close to up, and I'd just like to summarize by saying, old-growth forests are centers of biological diversity, they perform unique functions with respect to carbon storage and hydrologic regulation, and they serve as a relatively stable components of the landscape.

These forests begin exhibiting these properties probably as young as 120 years, maybe even younger. The area of old growth has been sharply reduced, compared to historic, and amounts currently protected are far below what conservation biologists say are needed to protect species.

Saving all remaining, greatly enhances the probability of protecting these successional species, and rebalances the landscape and makes it more stable in the face of what's going to be coming up to a pretty stressful time, because of climate change.

Thank you very much.

[The prepared statement of Mr. Perry follows:]

PREPARED STATEMENT OF DAVID A. PERRY, PROFESSOR EMERITUS, DEPARTMENT OF FOREST SCIENCE, OREGON STATE UNIVERSITY, CORVALLIS, OR

Mr. Chairman, Senators, thank you for the opportunity to testify regarding pending legislation to protect old-growth forests in Oregon and Washington.

My name is David A. Perry.

I am a Professor (emeritus) in the Department of Forest Science, Oregon State University.

I am a member of the National Commission on the Science of Sustainable Forestry, and serve on the Board of Directors of the National Center for Conservation Science and Policy. I am a former member of the Marbled Murrelet Recovery Team, The Scientific Societies Panel on Interim Protection for Old Growth Forests in eastern Oregon and Washington, and the National Research Council's Panel on Environmental Issues in Pacific Northwest Forests.

I'll begin by quoting a central recommendation of the National Research Council's Committee on Environmental Issues in Pacific Northwest Forest Management (NRC 2000):

Forest Management in the Pacific Northwest should include the conservation and protection of most or all of the remaining late-successional and old-growth forests The remaining late-successional and old-growth forests could form the cores of regional forests managed for truly and indefinitely sustainable production of timber, fish, clean water, recreation, and numerous other amenities of forested ecosystems.

Note the terminology used here differs somewhat from other uses. By "late-successional", the NRC panel refers to what is also called "mature", the seral stage immediately preceding old-growth.

In the following I'll first discuss the common definitions for old-growth and its current status as compared to historic. I'll then briefly go into the ecological rationale for protecting what remains. I'll close by discussing mature forests and the rationale for protecting them as well as old-growth.

I. DEFINING OLD-GROWTH

Both old-growth (OG) and mature are best defined by their structure (which may vary with forest type). From an ecological standpoint, the most accurate definition for OG is that given by the National Research Council Panel of Environmental Issues in Pacific Northwest Forests (NRC 2000)

Old-growth forests are forests that have accumulated specific characteristics related to tree size, canopy structure, snags and woody debris and plant associations. Ecological characteristics of old-growth forests emerge through the processes of succession. Certain features—presence of large, old trees, multilayered canopies, forest gaps, snags, woody debris, and a particular set of species that occur primarily in old-growth forests—do not appear simultaneously, nor at a fixed time in stand development. Specific attributes of old-growth forests develop through forest succession until the collective properties of an older forest are evident.

It is generally accepted that forests develop the full set of OG characteristics by 180 to 220 years, although as the NRC definition indicates there is no sharp dividing line and forests usually begin displaying OG characteristics at a younger age; I will refer to these as "emergent OG". Note also that not all of the characteristics cited in the above quote hold in all forest types. In particular, multi-layered canopies are not a characteristic of old-growth pine on dry sites.

II. THE CURRENT EXTENT OF OLD-GROWTH FORESTS IN OREGON AND WASHINGTON IS ONLY A SMALL FRACTION OF THE ORIGINAL

The amount of OG at the time of European settlement varied by region, but for the two states together is estimated to have composed nearly two-thirds of the total land area of western Oregon, western Washington and the east slopes of the Cascades (Strittholt et al 2006). Historic proportions in the Blue Mountains, Klamath Plateau, and Colville area were similar; a USFS inventory of the latter three areas in the mid-1930's classed 65 per cent of forests as either as OG or, in types where OG wasn't distinguished, as "large". This was after a 20 year period of heavy logging, so it is reasonable to assume that the pre-logging area of OG forest in the eastern portions of the two states was even greater than in the western portions.

Strittholt et al (2006) used remote imagery to document current OG amounts in western Oregon, western Washington, and the east slopes of the Cascades (forests

within the range of the northern spotted owl (NSO). At the turn of the 21st century approximately 28 per cent of the original OG remained, largely concentrated on public lands (Strittholt et al. 2006). One-third of the OG remaining on public lands, representing approximately 7 per cent of the original, is in relatively secure protected status (e.g. Wilderness, National Parks). OG contained within Late Successional Reserves and Designated Roadless Areas is less securely protected (e.g. the recent attempt by the USFWS to include a no-LSR option in the draft NSO Recovery Plan), but including these areas increases the proportion of original OG within the range of the NSO that is presently in protected status to approximately 14 per cent. Remote imagery detects complex canopy structure rather than age per se, and it's almost certain that the OG cover measured by Strittholt et al (2006) includes emergent OG stands that are younger than 180 years.

In eastern Oregon and Washington outside the range of the NSO, Henjum et al. (1994) estimated that one-quarter of the original OG remained on National Forest Lands in the mid-1990's, 22 percent of which was protected in Wilderness or administratively withdrawn areas. Less than one-half of the areas designated as "dedicated old-growth" contained more than 70 percent OG, and nearly one-third contained none (Henjum et al. 1994). Logging all unprotected OG in the eastern regions of the two states would reduce that remaining to approximately 5 percent of the original.

III. VALUES OF OG: HABITAT

There is little question that "(m)uch of the biological diversity of the Pacific Northwest is associated with (mature) and old-growth forests" (NRC 2000). From the standpoint of conservation ecology there are at least six reasons for protecting all remaining OG:

- The science is clear: when habitats have been sharply reduced the probability of maintaining viable populations of organisms that depend on those habitats increases directly with the amount of remaining habitat protected. The amount of OG currently protected in Oregon and Washington is far below the minimum amounts of habitat that conservation biologists believe is necessary to maintain species viability (Noss and Cooperrider 1994). Protecting all remaining OG (as detected by remote imagery) would raise levels into the low range of that considered adequate.¹ Moreover, saving all would provide an important buffer against future losses. Natural disturbances are likely to destroy some of the remaining OG and mature habitat before younger forests have aged sufficiently to provide suitable replacement habitat, a risk significantly increased by the combined effects of changing climate and the increased vulnerability of older forests when embedded within a matrix of fire-prone young forests. On the east slopes of the Cascades, 14.5% of NSO habitat was lost between 1994 and 2003 (Spies et al. 2006), and approximately 80,000 acres of NSO habitat was lost in the Biscuit fire. The more saved now, the greater the buffering against such losses.
- Many species that occupy stable habitats—of which old forests are a prime example—have poor dispersal capabilities, hence risk isolation, genetic deterioration, and ultimate extinction when suitable habitat is spread too widely (Kareiva and Wennergren 1995). Studies suggest that many OG associates in the PNW may be limited more by dispersal than by the abundance of habitat per se, including species of lichens, bryophytes, mollusks, fungi, and invertebrates. This implies that every remaining piece of suitable habitat becomes an important focus for eventual colonization of the surrounding landscape. Potential problems with dispersal are exacerbated in the Pacific Northwest because young forests presently dominating the matrix do not have the structural complexity and legacies characteristic of naturally disturbed forests (e.g. Tappeiner et al 1997), resulting in a much starker contrast between old and young forests than occurred historically.
- Species, species assemblages, and the genetic structure of populations may vary at relatively fine scales for small organisms (which account for by far the largest share of diversity), raising the possibility that each remaining older forest is to some degree unique in its biological structure. For instance, many mollusk species are restricted to one region, or even one river drainage (Frest and Johannes 1993).

¹"Adequate" may vary widely depending on specific circumstances and must be determined on a case-by-case basis. For example, the amount of area needed in strictly protected status depends on what is done in the matrix.

- Even small fragments of older forest may be significant biological reservoirs. Amaranthus et al. (1994) found that 3.5-ha fragments of mature forest harbored 13 species of truffle-forming mycorrhizal fungi not found in surrounding plantations.

IV. OTHER VALUES OF OG

OG forests store large amounts of carbon that may take to several hundred years to recoup following logging. Some OG stands, especially those with infrequent fire regimes, accumulate large stores of carbon in the soil compared with mid-aged forests.

OG has a strong influence on stream flows relative to younger stands. In an experiment comparing logged and unlogged basins in the Cascades, logged basins have had elevated stream flows for 40 years compared to their OG controls (Jones and Post 2004). Stream flows during the snowmelt season have been particularly slow in recovering to OG conditions. Another experiment that compared logged with 100 year-old forest rather than OG has shown a similar pattern.

Considerable evidence over the past two decades shows that OG is more resistant to crown fire than younger forests, and hence helps buffer the landscape against the possibility of mega-fires. Modeling shows that western Oregon is likely to become drier with climate warming, which means more fire and therefore an increased value of relatively resistant components on the landscape.

The situation with fire is complicated in the dry forest types, where various factors have allowed understory fire ladders to develop in OG forests, increasing their susceptibility to crown fires. Appropriate levels of fuels reduction are badly needed in many these dry forests, however at least three strict guidelines should be followed. First, large, fire resistant trees should be retained. Second, habitats for closed forest species should be protected, which means taking a landscape approach to thinning. Third, all caution should be taken to protect soils and streams.

V. MATURE FORESTS

As recognized by FEMAT, a conservation strategy for the Pacific Northwest must consider mature forests as well as OG. Forests are considered to enter maturity when their mean annual increment culminates, following which time they begin developing the characteristics that ultimately produce OG. Mature forests serve various important ecologic functions. They serve as future replacements for old-growth, help protect existing OG by reducing the starkness of age-class boundaries, and provide landscape connectivity and transitional habitat that compensate to some degree for the low levels of OG. Moreover, they are almost certainly more resistant to crown fires than younger forests, and hence contribute to buffering the landscape.

According to FEMAT, mature and old-growth forests together compose approximately 51% of federal forest lands within the range of the NSO in Oregon and Washington. Protecting all of these would have clear benefits from the standpoint of conservation and landscape ecology. A majority of the landscape dominated by large trees within forests that have or are developing complex structure provides habitat connectivity for late-successional species and lowers the risk of mega-wildfires. Complete hands-off is not necessary, and in the case of dry forests, management will be required to reduce fire hazard. In mesic forests there is unlikely to be any ecological justification for thinning in OG and older mature forests, however thinning may be both appropriate and beneficial in some younger mature stands. Such evaluations must be made on a case-by-case basis and involve both silvicultural and habitat considerations.

In summary, OG forests are centers of biological diversity, perform unique functions with regard to carbon storage and hydrologic regulation, and serve as relatively stable components of the landscape. Mature forests share many of the OG values. The area of OG has been sharply reduced compared to historic conditions, and amounts currently protected are well below scientifically accepted minimum habitat levels required to maintain species viability. Saving all remaining OG forests greatly enhances the probability of late-successional-dependent species persisting through this period of extreme habitat bottleneck, reduces the chance of flooding, and lowers the risk of mega-fires. Saving mature forests that are effectively emergent OG contributes significantly to these goals in the short run, and will be essential in the long run.

Senator WYDEN. Thank you very much.
Dr. Tappeiner, welcome.

**STATEMENT OF JOHN TAPPEINER, PROFESSOR EMERITUS,
COLLEGE OF FORESTRY, OREGON STATE UNIVERSITY, COR-
VALLIS, OR**

Mr. TAPPEINER. Thank you for the opportunity to testify before your committee.

I agree with most of the testimony that's been presented, and certainly the descriptions we've had about old-growth forests, on wet and dry sites, and there being threatened by fire and insects—especially on the drier sites—and the variability in the old-growth forest throughout the Pacific Northwest. You know, I simply agree, so I'm going to avoid—avoid, I'm not going to present that part of my testimony.

I would just like to move right on to some ideas about managing old forests, managing to maintain or enhance old forests.

I think that it's—we would agree that thinning is a way to grow young forests, to have old-growth forest characteristics. We've found that—in our work, we've found that the, that the big trees in old-growth forests grew at low densities, and that their ages and sizes when they were 200 years old could be predicted by how fast these trees were going when they were 50 years old.

So, by managing young stands, we can increase the size of the trees, it seems to be that these old trees grew at low densities. We can also grow trees quickly with large stems, deep bark characteristics, things that resemble old-growth trees.

We know also that when you thin young stands, you develop a diverse under story, which is part of an old-growth characteristic. Also, you get an under story of shrubs growing, and they become good habitat for birds long before they really achieve characteristics that resemble old growth. So, those are some additional values for thinning these young stands, especially on the moist sites, to get old-growth characteristics, growing them more rapidly.

In the dry forests if you have young stands you can thin them for the same purposes, but of course, like Dr. Perry and others have said, we need to reduce the density of the fuels, especially the ladder fuels in the old forests, fuels that carry fire from near the ground up into the crowns of these old forests.

Also, there—thinning, commercial thinning, prescribed fire and cutting small trees by hand or tractors are all ways of reducing fuels and achieving these characteristics. I've seen this applied on a sister's district, for example, and I'm impressed by how well these work. I've also worked with the BLM in establishing studies in young stands to produce these old-growth characteristics, and I'm really impressed with how well that agency was able to implement these prescriptions, simply by—with their own people.

So, I think the potential is there for lots of good management, and they simply need to have the opportunity to do it.

Another thing we've found that I think that might be useful to know is that these old-growth trees respond positively to removal of trees from around them. When we went back and looked at old stands that have had trees removed from around them about 20 or 30 years previously, we found that the old trees that were remaining in those stands, actually increased their growth rates, which indicate that they were under stress, and that possibly it indicates, also, that they could develop resistance to insects, and so forth.

That they were growing in dense stands, because the density of the stand appeared to be suppressing their growth.

So, I think there's a good biological reason—other than fire—to remove some of these trees from old stands, just to reduce the stand density.

I'm impressed about how important it is to have local definitions of old forest, other people have talked about this. The definitions that we have that we think about, use to think about old forest, I think, are primarily developed from the moist sites in the Cascades and the coastal forests. In the mixed conifer forest, or Ponderosa Pine forests, on the drier sites, we need quite different definitions. I think we need to take into account the fire in defining those definitions, too, in coming up with those definitions. How many, in 100-acre stand, how much of it needs to be treated? Do we want it all to be treated, or do we need to leave parts of it untreated, and so forth? I don't think we've really addressed those questions.

Finally, I had a picture that I hope is before you. It's a small one—

Senator WYDEN. Let's see.

Oh, yes, I've seen this—let me just show our colleagues on the committee, Doctor, yes. A very important picture.

Mr. TAPPEINER. Thank you, sorry. That's it. Sorry I didn't get a big one like the Forest Service had.

Senator WYDEN. It only counts around here if you have charts or big pictures.

Mr. TAPPEINER. OK.

Senator WYDEN. You have got it in front of the Senators.

Mr. TAPPEINER. That picture, I believe, illustrates an example for the need for flexibility in managing these forests. Now, that's a big Sugar Pine tree in that picture, it's taken on the road from Medford up to Crater Lake. That tree is probably well over 100 years old, but in order to save that tree from fire, to reduce the ladder fuels, you probably want to cut trees around it that are 30 or 40 inches in diameter, because they're the ladder fuel in some of these old forests. You know, that doesn't mean you do that always, all the time, everywhere, but it may be important—it may be important in certain cases to remove some pretty big trees, in order to save even larger ones.

In the case of the Sugar Pine, it's even more important, because Sugar Pine is threatened by White Pine blister rust, and that's a disease that was introduced from Asia in the 1930s, and it threatens the Sugar Pine.

So, if you can find Sugar Pine trees that are healthy and free from rust—even though they're small trees—they may not be old-growth trees, it would be important to save those trees, it might be important to cut some bigger trees, in order to save the small, rust-resistant Sugar Pine.

Also, by cutting around resistant trees, you might want to be able to reproduce new, hopefully rust-resistant Sugar Pine, and try to get that resistance into the population.

So, this is just an example of why flexibility is needed in dealing with this issue of old-growth forests, and especially when the managers come to apply prescriptions to conserve or enhance them.

So, those are our proposals, my remarks, thank you for having me testify.

[The prepared statement of Mr. Tappeiner follows:]

PREPARED STATEMENT OF JOHN TAPPEINER, PROFESSOR EMERITUS, COLLEGE OF FORESTRY, OREGON STATE UNIVERSITY, CORVALLIS, OR

Good morning, Chairman Wyden and members of the subcommittee, my name is Dr. John Tappeiner and I appreciate this opportunity to testify before the committee. My remarks today will focus on managing forests on public lands to maintain and achieve old-growth forest characteristics.

1. Old Growth forests (OG) are an important part of western forests. They provide habitat for a wide range of organisms. They have spiritual, aesthetic, and historical value; they contain valuable commercial wood.

2. Each of us has our own image of an OG forest—usually large, majestic trees in undisturbed forests. Typically OG has few very large overstory trees, multiple layers of intermediate size and smaller trees, herbs and shrubs in the understory and large standing and fallen dead trees (7,9). It is this varied structure that makes OG unique. These characteristics vary widely even within a stand, and especially throughout the forests of Washington, Oregon, and northern California from moist coastal forests east to the Cascades, to the drier ponderosa pine and lodgepole pine forests east of the Cascades and the mixed conifer of southwestern Oregon and northern California. OG may be fragmented and occur in small patches (<5-10 acres) with few trees. The effects of land ownership, fire, logging, windstorms, etc. cause fragmentation. Stands that are classified as young stands may contain some OG trees.

3. Fire and other disturbances like wind and insects have had and continue to have major effects on the OG forests in the Pacific Northwest—especially on drier sites in mixed conifer, ponderosa pine and lodgepole pine forests (1, 8). Before about 1900 relatively frequent, low severity fire in the ponderosa pine and mixed conifer forests reduced fuel levels by burning small trees and shrubs, and these fires killed few large trees. Since the beginning of fire control in the early 1900's, fuels have accumulated in OG forests especially on dry sites. Consequently today's fires are much more severe, killing trees over 1000's of acres. Insects can kill young and OG trees in dense stands during drought periods in ponderosa pine and mixed conifer forests and especially in lodgepole pine forests. These dead trees increase the fuels and potential for severe fire. On moist sites fire is much less common, but when forests become dry enough to burn, fire may kill many acres of trees. In many landscapes it is likely that fire will start in young forests and burn into adjoining OG, so effects of fire on today's OG also need to be viewed from a landscape perspective.

4. There are four different goals for thinning which need to be considered. They vary with the ecosystem in which the forest occurs: (a) perpetuating old forest conditions threatened by severe fire from high density of fuels, (b) bringing forest conditions to higher resilience to drought and insects, (c) accelerating development of structural complexity and old-growth characteristics in young forests, and (d) growing trees for wood. (A) and (b) apply to dry forests, (c) mainly to young moist forests. The goals can overlap, for example: (a) and (b) on dry sites, (c) and (d) in productive moist forests, also in some dry forest stands. In both moist and dry forests, reduction in stand density favors rapid growth of large trees with full crowns and large branches and furrowed bark (OG tree characteristics) (11). We found that in western (6,10) and southwestern (8) Oregon, large, old trees grew rapidly when they were young. Tree size (diameter) at 200+ yr was strongly related to growth rate when trees were young (50 yr) (6). In addition OG trees grew much more rapidly than the fastest growing trees in nearby plantations, because of the high density of the plantation. In addition to growing large trees, commercial thinning also initiated the beginning of a multi-layer of trees, the establishment or maintenance of shrubs and a yield of wood (2,3). In young stands, even before they develop OG characteristics, the establishment of shrubs and growing trees with large crowns provides habitat for a variety of birds (5).

Thinning stands on dry, fire-prone sites also produces the characteristics described above. In addition, it can make a stand more resistant to severe fire (11). This is done by (a) spacing overstory trees when needed to reduce the density of the forest canopy and thus the potential of a crown fire that burns from one tree to the next, (b) growing larger trees with thick bark that are more fire resistant than smaller trees and dense stands and (c) lowering the density of

small trees and shrubs in the understory which reduces “fuel 4 ladders” that can carry fire into the crowns of the large, overstory OG trees. The fire scorches and kills the needles and vegetative buds, causing mortality. These treatments may yield commercial wood.

5. Removal of trees by commercial thinning, prescribed fire, and cutting small trees by hand and tractors with cutting devices, etc. are all ways of thinning stands to grow large trees and to reduce fuels and flammability (11). When the goal is to reduce flammability, often no one treatment will suffice. Slash disposal by treatments like broadcast burning, piling and burning or chipping must follow thinning. If the slash (dead tree tops, shrubs, etc) is not treated on fire prone sites the potential for severe fire may be higher than before thinning, at least temporarily. On fire prone sites treatment may be needed (about every 15 to 20+ yr) to control ladder fuels as new trees and shrubs become established. On many sites it is difficult to use fire, because (a) smoke conflicts with air quality standards, and (b) the short periods between conditions that are too wet to burn in the winter and too dry to burn safely in the summer. In ponderosa and lodgepole pine forests insects may breed in the slash and emerge to attack nearby green trees. Prompt slash disposal and timing of thinning so that the slash dries rapidly can avoid this problem. On moist sites, slash disposal is not usually needed because it decomposes more rapidly than on dry sites and fire is less of a concern.

6. Thinning for fire resistance or to promote development of OG trees, need not result in a uniform and homogeneous stand. The main purposes of thinning are a marked reduction in ladder fuels, decrease in canopy density and space to grow large trees. Species, sizes and spacing of overstory and understory trees will vary to achieve desired results.

7. OG trees respond positively to tree removal. Surprisingly stem area growth of over 68% of large (40+ in. diameter) Douglas-fir, ponderosa and sugar pine increased by over 10% for 20+ yr after trees were removed from around them. About 30% of the trees increased their growth by more than 50% and 1.5% decreased growth. Increased growth rates suggest improved vigor that may make trees more resistant to insects and pathogens during periods of drought. It also suggests that when thinning young stands to provide OG characteristics, thinning can continue well beyond 100yr.

8. Local descriptions of OG trees and stands are needed to aid conservation and management of OG stands. As mentioned above, the species composition and tree sizes in the overstory and understory of OG stands vary throughout Pacific Northwest OG forests. Forest managers, the public and scientists need guidelines to help agree on what is OG. These guidelines are needed to set goals for managing young stands to achieve OG characteristics. Guidelines will vary with species composition, site productivity, and other factors such as the potential for fire, severe insect outbreaks and windstorms. In stands that are managed to reduce fuels and flammability, the sizes and numbers of trees will differ from those where fire is not a concern.

Age is not likely to provide a useful description of OG. It is difficult to determine the ages of OG trees (especially large trees). Large trees growing on productive sites with few trees around them can be quite young. Small trees growing on poor sites and in dense stands can be quite old. OG stands often contain large trees with a wide range of ages. Thus the average tree age does not adequately describe the stand. Localized definitions of stand structure (numbers of trees of different species and sizes per unit of land) are likely to provide the most useful guidelines.

It is important to consider spatial variability within OG stands. Over how large an area should OG characteristics occur? Within a 50 to 100 acre stand some acres may have 10 OG trees, others 30+ and still others 0. What is sufficient? In fire prone forests are OG characteristics or fire proof stands needed on every acre? What is the tradeoff (if any) between fire resistant stands and ideal OG?

Guidelines should ensure a genuine understanding and description of local OG trees and stands, including spatial variability. They should be local and practical to enable forest managers to implement treatments to protect and develop OG trees and forests.

These remarks represent my view and not those of Oregon State University.

Senator WYDEN. Very good, Doctor. I just had to ask the experts a fine point of your excellent testimony.

Mr. TAPPEINER. Thank you.

Senator WYDEN. Thank you.
Mr. Brown, welcome. Thank you for your help.

**STATEMENT OF MARVIN D. BROWN, STATE FORESTER,
OREGON DEPARTMENT OF FORESTRY, SALEM, OR**

Mr. BROWN. Thank you, Chair Wyden, members of the committee, good morning. My name is Marvin Brown, I'm the Oregon State Forester. I also serve as Forest Policy Advisor for our Governor, Ted Kulongoski. It's a pleasure to be here and speak on behalf of him this morning about this topic, old growth.

It is important to the State, the old-growth issue. Just to give you some perspective, there's about 30 million acres of forest land in Oregon, 16 million of those acres are managed by either the Forest Service or the Bureau of Land Management, and pretty much all of the old growth that exists in this State, exists on these Federal lands. So, it boils down to a Federal issue that's important to the State.

Folks have described, you know, why old growth is important. It's certainly the unique biology that is represented by these stands, is something that we want on our forested landscapes, it's important to maintain that. It's also, from a, kind of, a workman standpoint, I think scenic value is really important to the average person in Oregon, the large trees that come with preserving these lands as old growth is important.

There's kind of a reassurance value to a lot of people, just out there in general society, that we've got lands that are not being particularly disturbed by individuals. I think all those are the values that are wrapped up in old growth.

There's another one too, from our standpoint, and that's if public lands can successfully deliver these values, then it makes it that much sense for private lands to have another focus, a focus on, say, early successional habitat for wildlife or for producing, you know, intensive timber production issues. So, it is important in a State.

Kind of setting that aside for a minute, the Federal lands in general, by policy, have been directed to provide a full range of benefits, economic, environmental, and social. The policies you all are fully aware of, the western side of the State is primarily dominated by the Northwest Forest Plan. The eastern side of the State, forest policy is profoundly impacted by what's called the East Side Screens. Both of those policies have provisions that directly focus on old growth, but they are also, again, like I said, the policy direction that it says that these lands need to providing economic and social benefit.

The reality is that they're not doing a very good job of delivering those benefits for the State of Oregon. Oftentimes, I think people would agree, that the reason they're not delivering many of those benefits, is because of conflicts about what is old growth and how much of it should be existing on Federal lands. So, I think it is important that we get some new policy direction that tries to get past some of this old-growth conflict, specifically, policy direction that would clearly articulate just what is old growth, what are we talking about when we talk about old growth, and what is an appropriate amount on Federal lands.

I think it would be important for that policy to also recognize, as gentlemen have said here, that it takes sustained re-entry into these areas to maintain the kind of climax conditions that are characterized by old growth. It's not a one-time thing, manage these lands and go on. It does take sustained, indefinite work, treatment to maintain them.

There also needs to be policy direction that actually allows this work to get done, policy and funding to allow this work to get done. One of the big impediments that seems to be thrown up there and inhibiting what actually gets done on the ground, is the cost of NEPA analysis, the length of time it takes to get through NEPA analysis, to some decision, and the fact that, oftentimes, even after this very lengthy analysis, the work is still not allowed to go forward.

So, I think dealing with that particular piece of the puzzle would be really important, because in the end, all the definitions are great, but you still have to be able to get the work done on the ground.

Just, you know, one view I have, is that I've always found it interesting that forest management is viewed as a threat to environmental values, when in fact, you know, much of what we're talking about here would be forest management that would improve environmental values. I think if we can kind of get that recognition somewhere in policy, then it could be appropriate to take a little different approach in the whole NEPA analysis part of the process.

So, those are our views. I appreciate it, and obviously I'll be here for questions.

[The prepared statement of Mr. Brown follows:]

PREPARED STATEMENT OF MARVIN D. BROWN, STATE FORESTER, OREGON
DEPARTMENT OF FORESTRY, SALEM, OR

Chairman Wyden and members of the Subcommittee, thank you for the opportunity to provide testimony on the science, policy and management of old growth forests. My name is Marvin D. Brown. I am the Oregon State Forester, and also serve as forest policy advisor to Oregon Governor Ted Kulongoski. I am here today speaking on behalf of Governor Kulongoski.

Slightly less than half of Oregon is forested, about 30 million acres in total. Approximately 60 percent of this land, 16 million acres, is managed by either the U.S. Forest Service or Bureau of Land Management. These federally-owned lands are the focal point for discussions about old growth in our state.

The federal lands are capable of producing a broad range of benefits, including the unique values associated with old growth forests. These values include types of biological diversity found only in old growth forests, the inspirational beauty of large trees, and a simple reassurance that some places in nature are being left generally undisturbed by people. Such values are important to the people of Oregon, and federal lands play the dominant role in providing them. These are values that Governor Kulongoski assigns to old growth forests. Shaped by those values, the Governor firmly believes that we must resolve to shift the debate about management of federal forest lands from whether or not harvest should occur in old growth forests to agreeing that such forests should be off limits to commercial harvest so we can turn our attention to properly managing the rest of national forest lands for multiple benefits.

As a practicing forester, however, I have yet to find a straightforward, easily agreed-upon definition of old growth, or a formula for determining how much old growth we need. Ultimately, questions about defining old growth—and about managing our federal forests in general—come down to policy decisions informed by science, but based on a shared vision about the purpose and range of benefits we seek from these lands.

It's important to acknowledge that disturbances, in addition to natural events such as fires or floods, also include removal of trees as part of a management strat-

egy. Mechanical removal of some trees can be more practical, more economical than, and just as effective as, allowing natural disturbances that perpetuate a climax condition.

A management regime that leads to sustained re-entry for thinning, general improvement of forest health, and for creating an appropriate distribution of size classes can successfully achieve and maintain old growth benefits.

Assuming a workable definition for old growth can be developed, the next challenge is being able to implement policy. The Northwest Forest Plan, approved in 1994, represents current policy for federal lands in western Oregon. Developed in response to the listing of the northern spotted owl as a threatened species, it designates large areas as late successional reserves (LSR), where forests would grow to old growth conditions. Notably, the Forest Plan also committed to restoring a predictable, sustainable federal timber supply for rural communities, although at lower levels than those of previous years. While most of that supply was intended to be derived from lands classified as 'matrix' lands under the plan, the plan also recognized the management of lands classified as late successional reserves would also produce merchantable timber by thinning such stands to accelerate their progression to an old growth forest ecosystem.

Almost 15 years after the Plan's adoption, little of its vision has been realized for Oregon and its communities. Instead, controversy has stymied needed management—from thinning of LSRs to harvest in matrix lands, the plan is not being implemented as intended. This is of great economic and social consequence to Oregon. The loss of a predictable and sustainable supply of timber from federal lands has resulted in the loss of jobs, community vitality and forest industry infrastructure. Worse, it has severely reduced revenues to counties in Oregon which were promised a reasonable stream of funding from federal land harvests, creating uncertainty and hardship for local schools, law enforcement and other county services. In this light, resolving the issue of what constitutes old growth would be most welcome if it facilitates successful implementation of the Northwest Forest Plan.

In adopting a definition of old growth, it must be recognized that desired old growth conditions vary depending on several factors to include annual precipitation, elevation and tree species. For example, in eastern Oregon, old growth values on federal lands are presently addressed through what are called the "Eastside Screens." Among other things, this provision significantly inhibits the harvest of any tree over 21 inches in diameter at breast height. From a forest management perspective, this is a very coarse filter that does not meet the critical management need on these lands, which is to keep stand density low enough and size distribution varied enough to promote acceptable forest health.

As a consequence, eastside federal forest lands are overcrowded with diseased, insectinfested, dead or dying trees—the result of years of suppression of the fires that once were a natural part of the ecosystem, and of climate change. What we see now are unusually hot, large fires that damage the resource, threatening even those reserve areas intended to grow into older forests. About three-quarters of the federal forested acres in Oregon are now considered vulnerable to unusually severe fires, and fire is a genuine threat to older forests and the habitat they provide.

This is why a definition of old growth must not only consider the length of time trees have been growing, it must also consider the overall forest health and other conditions that provide the ecosystem benefits desired of old growth forests.

Improving the definition of old growth in these instances will help, but in order to implement policy, there are also improvements needed in application of the National Environmental Policy Act (NEPA) and in concepts for funding federal land management.

Costs, appeals, and litigation associated with NEPA analysis have severely limited the number of forest management projects that actually make it to implementation. If federal policy were to recognize that such projects enhance environmental benefits (as opposed to the current presumption that they threaten environmental values) then there would be justification for significantly less analytical cost. The key would be to identify the circumstances under which management projects are accepted as environmental enhancements. And taking controversial projects that target cutting of old growth off the table would also do a great deal in reducing controversy, litigation and the need for extensive NEPA analysis.

Regarding funding, investment in federal lands has clearly declined at the same time that timber harvests on federal lands have been reduced to a small fraction of historical highs. This disinvestment has resulted not only in a failure to manage designated forest lands towards an old growth condition, it has also resulted in a loss of recreation facilities as well as significant threats to water quality and fish habitat because of seriously backlogged road maintenance.

Rural counties in Oregon are in jeopardy of losing roughly \$280 million in safety net payments under the Secure Rural Schools Act. No one expects timber revenues to ever again approach their historic levels.

But achieving a harvest level that offers these counties some financial relief, and that provides economic sustenance for forest-dependent communities should also be part of creating the right balance. Harvest levels and revenue to counties could be largely achieved if we simply implemented the Northwest Forest Plan. However, the failure to agree on a definition of old growth and how we will manage areas to an old growth condition curtails our ability to produce intended benefits on other federal forest lands. Just like the problem we face with fire severity, the loss of a predictable and sustainable supply of timber from federal lands for the benefit of communities speaks to the need to resolve the question of old growth.

Whether you focus on social, environmental or economic values, the federal forests clearly are not contributing benefits in proportion to the extent to which these lands dominate Oregon's landscape. Given that dominance, we cannot expect to have a sustainable forest resource in Oregon if federal lands are not well managed.

If we are successful at achieving some improvements, we think that a host of important forest related benefits, including those related to old growth forests, can be more fully realized. Those improvements should include the following: a commitment to eliminate harvest in old growth forests except when managing to accelerate or protect old growth conditions; the creation of a legally-recognized definition of old growth would benefit management of Northwest forests, a recognition that harvesting trees for management to a desired condition or to produce multiple benefits that include timber may both produce revenue, but that such harvests are for entirely different objectives and both should be allowed; and that funding federal land management in the future requires an analysis of return on investment to include the values of minimizing fire risk and associated losses as well as the role of forests in producing biofuels and sequestering carbon dioxide.

Mr. Chairman and Subcommittee members, this concludes my remarks.

Senator WYDEN. We'll have questions in a moment.

Mr. Beck, welcome, long journey for you.

STATEMENT OF PAUL H. BECK, TIMBER MANAGER, HERBERT LUMBER COMPANY, RIDDLE, OR

Mr. BECK. Thank you. Chairman Wyden, Senator Craig, Senator Smith, I really appreciate being here, it's an honor for me. I'm Paul Beck, I'm Timber Manager of Herbert Lumber Company in Riddle, Oregon. We cut big trees.

This room is an amazing room. It's beautiful wood. If this wood was Douglas Fir, it may have come out of our mill. This is the type of thing that we make. The difference between this room and the wood in it, and the product we make, is our product is certified as sustainable by the Forest Stewardship Council, either that or it's controlled by the Forest Stewardship Council. We submit our entire log procurement program to SmartWood, a division of the Rain Forest Alliance, for scrutiny.

Historically, our log sourcing area was the Tiller Ranger District of the Umpqua National Forest. Today, that sourcing area runs from Humboldt County, California to the tip, northern tip of Vancouver Island. The Umpqua National Forest grows upwards of a half a billion board-feet per year, and will do so forever. We're barging wood from Canada to fill our needs.

One of the questions that we hear constantly, is our dependence on foreign oil, something here is wrong. If you walk through a house you'll see a lot of different types—if it's under construction—you'll see a lot of different types of wood. You'll see a lot of two by fours, but you'll see a lot of bigger pieces of wood in there too. You can not build a house out of a single type of wood or a dimension of wood, you need a lot of other things to go into that house, also.

You can not build an industry that builds—that makes one type of wood. You need to have mills that produce all these other things that society needs. I would hope we would produce them here, where we have the environmental laws that we have, rather than buying them offshore somewhere.

While some segments of our industry, right now, are going through one of the worst economic busts ever, of all time, some segments are doing pretty well. The appearance-grade market, markets that we cut into, are actually pretty good. Not all products follow the same cycles. The dimension market has very big highs and lows. Our markets don't have the highs and lows and they're not in the same phase. So you've got a community like ours, with lots of different types of mills, you get a balance. Somebody's having bad economic times, at least you've got somebody in the community that's still employing people.

Our company has existed for 62 years, we've never had a single lay-off in that entire time. That's a real stability for our area. Our ability to operate depends on the ability to procure a quality of log. We're fond of saying that we don't make it any better, we just make it a different shape.

In the Fourth Congressional District of Oregon, we have the highest concentration of saw mills and veneer plants, plywood plants, in the United States, and probably the world. There's 34 mills in that area, 17 of those mills are designed to cut a large diameter log. There isn't just one or two of us left, there's a whole bunch of us.

Of the small log mills, there's two of those that cut species that aren't readily available on small diameter thinnings that come off of the Forest Service land at this time.

I find no need to define old growth. We're never going to agree on a definition. What we have a critical need to define is protection. You can't draw a line on a map or through an age class or through a size class, and pretend or try and fool people into thinking that that's magically protected. It doesn't work that way. We had lines drawn on the map, we had a line drawn around Biscuit, it's call the Kalmiopsis Wilderness Area, didn't protect it. We had a line drawn on the map on the Umpqua, around Boulder Creek. Seventy-five percent of that wilderness area burnt up. We had a line on the map that was called the Last/Slick Creek Roadless Area, didn't protect it, it burned up. Lines on maps protect—protect nothing.

We need to empower the agencies to go out and actively manage the very stands that we want to protect. We need to reduce fuel loads to protect these big trees that we're talking about. These lands have been managed for 10,000 years. When the first settlers of this continent came across the land-bridge or in boats from Asia, they brought the management tool of fire, and they burnt this land often. To think that this land, when the European settlers got here, was a wilderness area, is wrong. It had been managed.

The fuel loads that we see out there today, they're not natural. The fires that we see today are not natural. To think that we could draw a line on a map and let nature take its course, is foolish. We need to roll up our sleeves and protect these lands.

Thank you.

[The prepared statement of Mr. Beck follows:]

PREPARED STATEMENT OF PAUL H. BECK, TIMBER MANAGER, HERBERT LUMBER COMPANY, RIDDLE, OR

Chairman Wyden, Senator Smith, members of the committee, good afternoon and thank you for inviting me here today; my name is Paul Beck and I am the Timber Manager for Herbert Lumber Company in Riddle Oregon. I am a fourth generation sawmill worker. The Forests of the Umpqua and the Rogue have not only been my office of thirty years, they have been my home and my recreation for over fifty three. I am here today representing Herbert Lumber, Douglas Timber Operators (DTO) and American Forest Resource Council (AFRC). My goal here today is to help you better understand our company, our industry, our community, our forests, and the true history of those forests. There are many myths surrounding all of these things. My desire is to dispel those myths.

Herbert Lumber Company was founded in 1947 by Milton Herbert near Lowell Oregon. The following year the company moved to Canyonville and continued there until operations were consolidated with our planing mill in Riddle. We have operated continuously since 1947. We employ 62 people directly. Our employees have full benefits including medical, dental, and a retirement plan. At last calculation our average employee had been with the company for just over eleven years.

Our entire product line is either certified as sustainable by the Forest Stewardship Council (FSC) or is FSC controlled. We submit our entire log procurement program to rigorous third party scrutiny and audit by Smartwood an affiliate of the Rainforest Alliance.

We manufacture larger diameter trees into a wide variety of products ranging from door and window parts, appearance grade timbers, to industrial grade structural items. These products are in wide demand here domestically and on every inhabited continent on earth. Manufacturing these products in the United States ensures the highest environmental and labor standards are met, not mention keeping family-wage jobs in the U.S., something that is often discussed on the campaign trail and in Congress. Moreover, it's environmentally responsible to produce these products in the U.S. where we can ensure our high standards are met, rather than depending on products from developing nations with few standards and little enforcement.

Historically our log sourcing area was the Tiller Ranger District of the Umpqua National Forest. This area is within thirty miles of our mill. Today that sourcing area has grown to include the entire Douglas Fir region, which could be describe as the West slope of the Cascade Range to the Pacific Ocean, from Humboldt County in Northern California to the far northern tip of Vancouver Island. We travel this entire three state and two country sourcing area to procure the twenty million board feet of timber that we need to supply our mill. Senator Wyden and Senator Smith: our state of Oregon is the Nation's wood basket, and our mill is situated in the heart of timber country. Our neighbor, the Umpqua National Forest is growing a half a billion board feet per year and will do so in perpetuity. Yet we're barging logs from Canada to feed our mill. Senators, when one of the major environmental and political challenges of our time is a dependence on foreign oil, something here is wrong.

The timber wars of the last twenty years in Oregon are full of villains and heroes, which vary by storyteller. But as policymakers, I urge my senators from Oregon and other Members of Congress to separate reality from mythology.

MYTH 1

If manufacturers would convert to only small log operations then we could thin young stands to provide all the material necessary to supply society's needs for wood products.

Just as you cannot build a house out of one dimension of lumber, say 2x4's, you cannot build an industry that produces nothing but one type of wood. If you walk through a house under constructions you certainly will find a lot of 2x4's. This is a primary framing component. But if you look closer you will see a vast number of various other grades and dimensions. The timber industry of the Northwest has evolved to fill the needs of this market.

Primary manufacturers in the Pacific Northwest can be divided into four basic categories; Dimension Sawmills, Grade Cutting Mills, Veneer Mills, and Chipping Facilities.

Dimension Mills cut a set of specific dimensions of lumber such as 2x4, 2x6, and 4x4 in varying lengths. A stud mill is a type of dimension mill.

Veneer mills turn a log on a lathe and produce the components for plywood and laminated veneer lumber.

Chip mills simply chip the whole log. These chips are used for manufacturing paper and can be used in the generation of electricity.

Grade Cutting mills do not concentrate on a specific dimension of lumber but rather seek to capture the highest grade of wood products from a log. These mills make products that are used in the manufacture of doors, window parts, paneling, industrial products, and appearance and/or structural grade framing material. One example of large log consumer products is the headers above doors and windows that need to bare a structural load. Thinning young stands alone will not supply the raw materials needed to produce these higher grades and structural types of wood products. Thinning only young trees will also not provide the long-term sustainable supply needed for existing mills in many areas, nor will it truly maintain forest health. In order to meet consumer demand for renewable and sustainable wood products, we need to manage our forests to provide a variety of tree species, sizes and quantities. This type of management will also lead to improvements in forest health.

MYTH 2

There is one Timber Industry and all economic cycles affect the "industry" the same way.

While the dimension portion of the industry and to a lesser degree some segments of the veneer sector, is suffering through one of the worst "busts" ever, the chipping markets are red hot, and cutting markets are decent. It is important to note that the portion of the veneer market that is doing well is the high end or the appearance grade product.

The ability of cutting mills and veneer plants to manufacture appearance grade products is completely dependent on our ability to procure quality logs. As Milton Herbert, the founder of our company is fond of saying, "We cannot make the wood any better. We simply make it a different shape."

While all portions of the timber industry experience market cycles those cycles are not in sync and they do not have the same variations. Dimension lumber markets fluctuate dramatically. Cutting markets do not have the same extremes, which is reflected in the fact our company has operated continuously for nearly 62 years. In those 62 years there has never been a layoff. Part of that is due to the stability of our markets. It is also due in large part to the philosophy of the Herbert Family. That is, when the market is bad that is when the community needs these jobs the most. I can think of no other mill that can make this same claim, but in general cutting mills provide stability to the local economy. They do not have the highs and lows of the other types of mills and their cycles are often "out of phase" with other segments of the industry.

Just as it would be unwise for our government to encourage the agriculture sector to solely produce one agriculture commodity, say soy beans, it is equally unwise to adopt a policy that does not recognize the diverse demands and influences on wood products markets. Just as you would diversify your own economic portfolio, so too should rural timber economies be diversified. If federal forest policy forces every mill to create the same, low-grade product-then downturns in the housing market such as we see today will have even more dire effects in Oregon and elsewhere in the West.

MYTH 3

Only those mills that manufacture small logs are state of the art.

It is often said that our industry needs to upgrade or modernize its facilities to manufacture small logs. The truth of the matter is that the entire industry, across all mill types, has modernized to remain competitive in the world marketplace, to more efficiently produce what consumers demand and to be good stewards of the land. The log supply in the last decade has been so critically short there is no room for inefficient mills anywhere, which is obvious if you look at the long list of sawmill closures.

The Herbert Family has invested millions of dollars in continually upgrading our facility to more efficiently produce our products. Our mill is still housed in a building that was erected in 1962 but the equipment inside more resembles the set of Star Wars than the original machinery used in 1947. This investment allows us to conserve and fully utilize the forest resource for the benefit of the forest, our community, and society.

MYTH 4

There are only a small number of mills that need or can even process large diameter logs.

The 4th congressional district of Oregon is the area that I am most familiar with. This district has the highest concentration of lumber and plywood manufacturing facilities in the United States. In this district there are approximately 34 manufacturing facilities. This is over half the mill capacity of Oregon. Of those 34 mills a full 17 are designed for and need large diameter logs for their operations. There are also companies that rely on mills to manufacture larger logs into a quality of veneer that is then utilized at other manufacturing facilities. So, while some companies may rely primarily on small diameter logs at most manufacturing locations, they may also need the quality of material that comes out of these larger trees to produce products such as plywood.

It should be further noted that of the 17 small log facilities, 2 have announced permanent closure and 2 only operate when they have accumulated a volume of the species required to run their mill. One is a small pine mill and the other uses cedar. These species are not typically found in merchantable size from Forest Service small diameter thinnings. Oregon's wood products industry needs a diverse mix of species and diameters to produce the products society demands. Since the Federal government manages over 50 percent of Oregon's forest, it has an important role to play in helping to meet these needs. Ignoring this reality has both economic and environmental consequences.

MYTH 5

In order to protect and ensure that we have biological diversity in our National Forest we need to define "Old Growth".

There are many definitions of "Old Growth". I find none of them accurate and none of them useful. I have tried to eliminate the term from my vocabulary, and I see no benefit in coming up with what could only be an arbitrary standard for its definition. What we have a critical need for is a definition for Protection. All of our forests are at risk of catastrophic and historically unprecedented wildfire as well as the effects of climate change and we need to devise a way to protect them from this. Active management will be required to help forests adapt to climate change—no management will only result in losing the very forests we're seeking to protect. Surely by now we know with certainty that we cannot arbitrarily draw a line on a map, through an age class, or through a diameter class and fool ourselves or the public that it is somehow magically protected. Unnatural stocking and fuel levels are threatening all forest of all ages in the Pacific Northwest. It wasn't logging that destroyed 25% of the Spotted Owl habitat in one year on the Rogue-Siskiyou National Forest in 2002. It wasn't logging that destroyed the "Last/Slick Creek Roadless Area" of the Umpqua National Forest that same year. It wasn't harvest that consumed over seventy-five percent of the Boulder Creek Wilderness on the North Umpqua. It wasn't logging that consumed over ten percent of the Umpqua National Forest in one summer. These lands had arbitrary lines drawn around them and were called "protected". Surely we understand that these lines are just that, lines on a map and do nothing to protect anything. If we are to truly protect something, then we must take action toward that end and empower the agencies to implement fuel reduction projects in the very stands of older forests we seek to protect. This will take trust and it will take courage on your part. But my children, the inheritors of your decisions, deserve both.

MYTH 6

These Catastrophic Fires are a historical part of the forest landscape.

When the first (first means first) settlers came to North America across the land bridge or in boats across the Pacific they brought with them forest management. The management tool of choice was fire. By most accounts they burnt often and once a fire was set they had no way of putting it out and depended on winter rains to do the job for them. These fires were frequent to a point that there was often little fuel accumulation and thus a low heat/intensity. Studies do tell us they also created clearings of various sizes, some huge, especially in the Coast Range. These set fires, and not natural fires, were the single largest contributor to shaping the forests that European settlers and explorers found in the New World. When the question was posed; "How often did areas burn before European settlement?" Charles Kay who has done extensive research on the subject gave the following answer.

As often as native people wanted. There is little doubt that Native Americans fully understood the benefits they could receive by firing their environment (Anderson2005). To suggest otherwise is to assume aboriginal people were ecologically incompetent, a supposition that is not supported by any reading of the historical or ethnographic record (Mann 2005). Thus, the idea that the Americas were a pristine wilderness, untouched by the hand of man (Vale 2002) is a statement of belief, not a fact supported by science (Kay 2002, Pyne 2003).

He further states that:

Nevertheless, even with the simplifying assumptions that were employed, aboriginal use of fire most likely overwhelmed lightning ignitions as Stewart (1956,1963,2002), Anderson (2005) and others contend.

With the introduction of European diseases of which Native Populations had no defense there was a massive die off of indigenous people. It is estimated that as much as 90% of the population vanished before European settlers arrived. With this decreased population came a decrease in native burning. Forests are not static. Existing trees grow. New tree trees sprout and grow. When they grow fuel loads increased and fires became less frequent but more intense with a much greater mortality of older trees. Compounding this growth, European settlers started putting out naturally igniting fires.

While human-caused fire was very much a part of shaping the forest we inherited, the fires we are currently facing are very different and threaten the very forest we want to protect. If we are to save these forests we need to redefine the concept of protection and focus on removing ladder fuels that are threatening older forests and reduce fuel loads to actually change condition class.

MYTH 7

If we only thin overstocked stands of planted trees our forests will be healthy and protected.

Second growth plantation forests only represent a small fraction of our National Forests. Limiting management to only these stands will not address the threats that exist to forest health on all stands, planted and natural. Moreover, given the historic role of indigenous and natural fire and the decision 100 years ago to suppress fires as means to protect communities, the reality we face today is more stems per acre now than previously. Trees grow in all forest types not just in young managed stands. To assume otherwise defies all logic. If we assume that because we have over-harvested and underthinned in young planted stands that we need to correct this by human intervention, then we also need to recognize that because we have excluded fire/harvest from other naturally regenerated stands we need to also correct this through human manipulation. We have stands of all ages of trees that are overstocked when compared to historic levels. These stands are fuel loaded to the point that any attempt to reintroduce fire would be a catastrophe.

The forested landscape we inherited, and that species that adapted to it, were greatly influenced by both natural fire and by man using the tool of fire over a period of some ten thousand years. These fires were not like fires we see today which do great damage to entire ecosystems. For many reasons, including development and the need to protect and life and property, fire is not likely to play the role it once did. We can and have, however, achieved similar results in a more predictable way using modern harvest techniques. We need to redefine protection of our National Forests to promote a more extensive and less intensive program of removal of trees. Just when we are perfection those methods it would be counterproductive to limit them by implementing arbitrary prohibitions.

MYTH 8

Clear Cutting is the only tool available for the Forest Service to manage and regenerate older forest types.

On private timber lands in Oregon the goal is to maximize growth and thus profit. On these lands clear cutting helps create optimal growing conditions. These lands are some of the most productive in the world. The growth on our National Forests, however, far exceeds current or foreseeable levels of extraction. As a result, maximizing growth is not necessarily a desired goal.

There are many things that we do require of our National Forests. We expect clean water, recreation, wildlife habitat, solitude, and some contribution to our local and national economies. These expectations often require different management approaches and won't be accomplished through a one-size-fits all forest management

prescription. For example, populations of elk and deer are suffering in many areas due to a lack of forest openings for grazing habitat and thinning won't address this problem. What should be the goal is an approach to management that meets the needs of all of the important objectives listed above. I am here to tell you that if we earnestly work to achieve this goal the byproduct will be the production of a quality material from our National Forests.

For the first eighty years of managing our National Forests in western Oregon we tried to mimic nature by excluding fire and creating manmade disasters called clear cuts. These did regenerate fir well but to the possible detriment of some tree species. They obviously offended some segments of society. For the last twenty years we have tried to exclude both fire and any meaningful amount of harvest. Forests and fuel loads continue to grow and we are seeing fires that, while they are a natural consequence they are not a socially or environmentally acceptable result if our National Forests are to provide us all the things we require of them.

Given that conservative estimates tell us that burning at any scale by indigenous people ended some 150 years ago and other reasonable estimates tell us that large scale burning probably ended 100 years before that, it is safe to assume that there are trees that are at least 150 to 250 years old that would not be on the landscape given the pre-European management regime and the more recent suppression of fire. As a result, any Forest Service management approach should recognize the need to selectively harvest larger trees to manage and protect older forest types. I believe any approach that fails to do this will fall short of producing the many objectives, including healthy older forests, we all desire.

In summary, it would be simple and politically expedient to define "Old Growth" as an age, size, or draw a line on a map. This will do nothing to protect it for future generations and in fact would doom the entire forest to risk of catastrophic, unnatural, and historically unprecedented wildfire. We need to concern ourselves with the entire forested landscape. We need to not make simple decisions that will rob our children of their rightful inheritance.

There are those on both sides of this issue that have made a living off this conflict. There are those extremes that will choose to not agree. There are also reasonable people on both sides that can agree that humans have a natural role in helping to shape, manage, and protect landscape again and are poised to work together toward that end. I would hope that you wouldn't prematurely hamstring those efforts. This is not a case of jobs versus the environment. We have the opportunity to benefit both.

I can show you examples on the Umpqua and the Rogue that were not appealed or litigated that successfully met this challenge and harvested 130 to 250 year old timber. I have come here today to your office here in the Senate. Senators Wyden and Smith I have had both of your staffs spend time with me and I challenge both of you with your history of working across the aisle to come to my office, the Umpqua and Rogue, so I can show you my vision of what forest management should look like in the century ahead. I am here to tell you that Herbert Lumber, DTO, and AFRC are ready to work with you.

Thank you.

Senator WYDEN. Mr. Beck, thank you very much. It's a long trek from Riddle, and we really appreciate your coming, and there's a lot of economic hurt out there, and we're trying to respond to it and also address the old-growth protection. So, we thank you for coming.

Ms. Spivak, welcome. You've worked with the subcommittee often.

**STATEMENT OF RANDI SPIVAK, EXECUTIVE DIRECTOR,
AMERICAN LANDS ALLIANCE**

Ms. SPIVAK. Good morning, thank you, Senator Wyden.

Thank you. Good morning, Senator Wyden and Senator Smith. Thank you very much for inviting me to testify today to talk about the importance of old-growth forests in the Pacific Northwest.

We've heard today about the standing value of timber of old-growth forests, but I think it's really important to underscore that the value of these forests goes way beyond the timber value, a little has been talked about, but just underscore. These forests clean the

air we breathe, they produce oxygen, they produce abundant supplies of clean water, they're critical for the last, best salmon runs. The bigger trees are, in fact, more fire resistant, and the older forest protect from flood protection, which is a pretty big issue in the Pacific Northwest.

From a social value, these are places that Americans and Pacific Northwesterners go to play, hike, bike, camp, relax, these are the spiritual retreats for millions of Americans. In short, they're the natural forest legacy of the Pacific Northwest. From an economic standpoint, there's been a tremendous recreation boom, and those activities all contribute to local economies.

Mr. Perry touched a little bit on the carbon sequestration benefits of old forests, but I do want to underscore, because as climate change becomes more and more in the front view and we have to think about policies, sequestering carbon is critically important.

There's a very unique situation in the Pacific Northwest, especially the west side, because those forests are more carbon per acre than any other forest, including rain forests, on earth. Just to underscore how important they are, West Oregon, Washington, and Northwestern California forests are about 19 percent of the forest area in the U.S., but they account for 39 percent of the U.S. forest carbon storage. When you log old-growth forests and the carbon is released, this can't be recovered, even for centuries.

There's also been talk about, well how much old growth is appropriate? That question, in a way, is premature because there's an extreme deficit of old growth across the landscape. It used to be, in the Pacific Northwest, about two-thirds of the land were covered with older forests. Now, about 18 percent, that's a precipitous drop. The majority of this 83 percent is, in fact, on public lands.

So, our first order of business needs to bring the landscape back into balance, which is very much now dominated by younger trees. We need to bring it—shift it back into the balance dominated by older forests.

I would urge, in any legislation and policy, that there is a definition of old growth and mature trees, because without such clear direction to the agencies, we'll continue to see the pressure to log old-growth forests. An example is the BLM Whopper Plan revision, which proposes to increase old-growth forest logging by 700 percent.

The mature forest or the emerging old growth that Dr. Perry talked about, we need to protect the old growth, but the emerging class is critically important because there is such a severe deficit across the landscape, and this is the recruitment class for future old growth. As older trees do die, fire is part of the natural cycle, we need to make sure that there's more old growth coming online.

There's tremendous public support for protecting old growth. Poll after poll shows Americans want these trees protected, 1992 polls show that 75 percent of Oregon and Washington voters wanted old growth protected, including in timber-dependent towns.

For the most part, the Pacific Northwest timber industry has transitioned away from logging old-growth timber, and only a handful of mills remain dependent. No wood product made from old forests is worth the destruction of these forests. Substitute mate-

rials can be found for these products, and engineered wood products that are equally structurally sound.

It was once thought that only ivory from elephant tusks would do for piano keys and billiard balls or whale oil for lighting, but killing whales and elephants to make products out of old-growth wood that could be made from substitute materials is no longer socially acceptable. It's morally wrong. The same is true for logging old-growth and mature forests.

It's time to resolve the controversy over this and move on to more productive ground and focus on restoring the—our natural forests. These are the economic engines for local communities and while Congress did not create late successional forests, only Congress can protect them for this and future generations.

Thank you.

[The prepared statement of Ms. Spivak follows:]

PREPARED STATEMENT OF RANDI SPIVAK, EXECUTIVE DIRECTOR, AMERICAN LANDS ALLIANCE

My name is Randi Spivak and I am the executive director of American Lands Alliance. I want to thank the subcommittee for holding this hearing and for inviting me to talk about the importance of the Pacific Northwest's mature and old-growth forests. American Lands was created at the height of the Pacific Northwest ancient forest wars to give local citizens a voice in how their public forests are managed. My organization has worked on forest policy issues and specifically for the protection of old-growth forests since our inception 16 years ago.

When I speak of "late-successional" forests, I am referring to both mature and old-growth forests as defined in the Northwest Forest Plan (NWFP). Both kinds are extraordinarily valuable—not just ecologically, but socially and economically as well. Without question, they are some of the most beautiful forests in this country, maybe even in the world. These magnificent forests cleanse the air we breathe and filter and produce clean drinking water. They are home for countless rare animals and plants and they shelter the rivers that produce some of the last best runs of wild salmon. Late-successional forests are more resistant to fire and can also reduce damages from flooding. These older forests are the playground and spiritual retreat for millions of Americans who go there to hike, hunt, fish, camp, and bike. These activities also generate significant revenues to local economies. In short, late-successional forests are the natural legacy of the Pacific Northwest.

PACIFIC NORTHWEST FORESTS, CARBON SEQUESTRATION, AND CLIMATE MITIGATION

A mere 0.017% of the earth's land surface, old-growth forest conversion [in western Oregon and western Washington] appears to account for a noteworthy 2% of the total [Carbon] released [into the atmosphere] because of land use changes in the last 100 years. (Harmon, Ferrell and Franklin 1990)

Another crucial role that these late-successional forests play is helping to mitigate climate change by absorbing and storing substantial amounts of carbon from the atmosphere. More carbon is stored per acre in the moist "Westside" portions of the Pacific Northwest than any other forests in the world (Smithwick et al. 2002, Franklin and Waring 1980). Though the forests in Washington, Oregon, and California comprise only 19% of the forested area of the United States (USDA ERS 2002), they contain 39% of the United States' total forest carbon (Birdsey 1992). Logging late-successional forests releases this carbon into the atmosphere. And these carbon emissions will not be absorbed by younger managed stands for centuries to come (Janisch 2001).

HISTORIC AND CURRENT EXTENT OF LATE-SUCCESSIONAL FORESTS

Late-successional forests once blanketed the Pacific Northwest. Before European settlement they covered approximately two-thirds of the landscape. But today, after decades of logging, they cover less than one-fifth. The majority of the remaining old growth, about 83%, is on public land in Washington, Oregon, and in Northern California. (See Appendix A)

DEFINING "OLD GROWTH"

In order to develop sound and effective policies that protect mature and old-growth forests, we must be able to identify late-successional stands and trees. So a central question is, how do you define "old growth?"

While there are several definitions of old-growth forests, there is not a lot of variation among these definitions. According to the Forest Ecosystem Management Assessment Team (FEMAT), which laid the ecological foundation for the Northwest Forest Plan:

Old-growth stands are usually at least 180 to 220 years old with moderate-to-high canopy closure; a multi-layered, multi-species canopy dominated by large overstory trees; high incidence of large trees, some with broken tops and other indications of old and decaying wood (decadence); numerous large snags; and heavy accumulations of wood, including large logs on the ground (FEMAT 1993).

From an ecological perspective, a key component of protecting old growth is to also protect mature forests. Mature forest characteristics generally begin to appear at 80 to 100 years of age depending on site conditions. Like old growth, the mature age class is also ecologically valuable, but the most important role these forests serve is as the recruitment class for future old growth. As mature trees transition to old growth, they replace old growth lost to disturbance, ensuring that viable amounts of old growth will remain across the landscape.

Mature forests are those that have reached the culmination of mean annual increment (CMAI). CMAI is a time-tested method of foresters that identifies where the maximum rate of tree growth has peaked. CMAI also serves to generally define the beginning of the transition of a stand of trees to the mature stage.

Mature forests continue to grow—both upward and outward. An important transition between the mature and old-growth conditions is that while old-growth trees continue to grow, they do so mostly in diameter rather than height.

Besides scientific definitions, there is a social definition of "old growth." How does the public define old growth? Approximately three-quarters of Oregon and Washington voters say that trees are old growth when they are 100 years old. (Davis and Hibbitts 2002)

Given the tremendous ecological deficit of late-successional forests across the landscape, any policy must protect both the mature and old growth age classes. CMAI can serve as a workable demarcation point that will provide enough specificity to accurately identify mature trees and enough flexibility to distinguish between species and local site conditions.

If we are serious about restoring ecological integrity and resilience to our publicly owned forests, late-successional forests must also be restored across the landscape over time, allowing these forests to return to historic levels.

PUBLIC SUPPORT FOR PROTECTION

There is very strong public support for such a policy. Poll after poll has shown that Pacific Northwesters and Americans in general want to protect old-growth forests. In a 2002 poll of Oregon and Washington residents, 75% wanted to protect old growth. (See Appendix B)

PROTECTION AND RESTORATION OF LATE-SUCCESSIONAL FORESTS

Legislative protection for late-successional forests is essential to permanently resolve this resource conflict and provide clear direction to land management agencies concerning management priorities. Without it, we will continue to see efforts to eliminate and weaken existing protections, more litigation, and public controversy. The NWFP leaves over 1 million acres of mature and old growth open to logging. The Bush administration seeks to eviscerate what protections exist for water quality, salmon, rare species, the northern spotted owl, and the marbled murrelet in order to pave the way for even more logging of mature and old-growth forests than is already allowed by the NWFP.

The Bush administration proposes to significantly increase the logging of mature and old-growth forests. On BLM lands in western Oregon, they are proposing a 700% increase in old growth logging. There is a better path. That path is restoration of degraded public forests.

Past logging, grazing, and fire suppression has transformed many northwest forests creating a need for ecologically-based thinning that can both help restore the landscape and produce non-controversial timber volume. In the moist forests on the westside of the Cascade Crest, there are hundreds of thousands of acres of

monoculture plantations that would benefit from variable density thinning to accelerate the re-establishment of late-successional forests. On dry forests east of the Cascade Crest, thinning small-diameter trees from below reduces fuels and therefore helps restore natural fire regimes which in turn, protects and restores the original structure of old-growth forests. Many conservation groups, community-based forestry organizations, mill owners, and loggers have found common ground focusing on small-diameter thinning. Such projects are moving forward without controversy or litigation (examples include the Siuslaw, Gifford Pinchot and Rogue-Siskiyou National Forests).

For the most part, the Pacific Northwest timber industry has already made the transition away from logging old-growth timber. Only a handful of mills still rely on old-growth logs. Today, no wood products are worth the further loss of mature and old-growth forests as every acre counts. Substitute materials are readily available to replace products made from old-growth trees.

These last few old-growth mills are like the last whaling stations. It was once thought that only ivory from elephant tusks would do for piano keys and billiard balls or whale oil for lighting. Killing whales or elephants to make products that can be made from other materials is no longer socially acceptable; it is morally wrong. The same is true for logging mature and old-growth forests. Consider the recent public outrage over the Bureau of Land Management's Western Oregon Plan Revision to increase old-growth logging by over 700% in western Oregon. It is being opposed even in counties that would benefit greatly from increased logging revenues. The public will not stand for it.

CONCLUSION

It is time to resolve the controversy and get on with the business of protecting mature and old growth logging and restoring our national forests. Only clear direction from Congress to the federal forest management agencies can do this.

Unlogged mature and old-growth forests are more valuable to society than logged for short term economic gain. Late-successional forests are economic engines for commercial and sports fisheries, recreation, and tourism, as well as for the ecosystem services, carbon sequestration and social benefits they provide. There is significant wood volume and related jobs that can come from ecologically-based thinning of plantations and fire-suppressed stands. Logging the last of the mature and old-growth forests would simply be morally wrong.

In addition to a focused program of forest restoration, a comparable program of aquatic restoration is urgently needed. When we speak of forests we also mean watersheds. As degraded forests are restored to health, so too must degraded watersheds. One cannot separate the trees in a watershed from the watershed itself. There are countless miles of old and unnecessary roads that neither the public can afford to maintain nor the fish can afford to tolerate.

Please see that the Pacific Northwest protects and restores one of its most important natural legacies. While Congress did not create late-successional forests, only Congress can protect the last of the old-growth forests and restore them for this and future generations.

APPENDIX A.—THE NEED FOR PROTECTING BOTH MATURE AND OLD-GROWTH FORESTS IN THE PACIFIC NORTHWEST

Mature and old-growth forests of the Pacific Northwest are irreplaceable reservoirs for plants and wildlife, provide clean air and pure water, and mitigate climate change by storing vast amounts of carbon. Yet these magnificent forests are in great danger of being lost unless they are preserved on public lands. Old-growth forests used to comprise roughly two-thirds of the forestlands in Washington, Oregon, and Northern California, but today cover less than one-fifth. Mature forests, which become old growth as they age, have also been greatly diminished. The vast majority of remaining old growth is on public lands and there is little likelihood that mature growth on private lands will be allowed to transition to old growth. Therefore, in order to maintain current levels, and to promote the gradual return of old growth across the forest landscape, all mature and old-growth forests on public lands need to be protected.

Why older forests are important: Older forests and the structure provided by their large, live trees, standing dead trees (snags), and downed trees (often called logs) are essential to many ecological functions that make forests healthy. Specifically, older forests:

- Provide habitat for numerous fish (such as various Pacific salmon stocks) and wildlife species, including rare species and others threatened with extinction. Many wildlife species also depend on large blocks of dense older forests whose

canopy¹ layers are closed for shelter and nesting (e.g. northern spotted owl, Pacific fisher, American martin, and deer).

- Provide invaluable ecosystem services including clean drinking water, filtering the air we breathe, and cycling nutrients, which are essential for soil development.
- Are less susceptible to pest outbreaks and large-scale disturbances, like fire, than younger forests (NRC 2000). Diversity of tree and plant species, and the abundance of spiders and other invertebrates limit pest outbreaks in older forests that could otherwise over-run densely packed monocultures (Schowalter 1995). The thick bark of older trees allows them to withstand more heat, and their great height allows them to escape many surface fires. The heterogeneous structure, higher humidity, and litter moisture of many older forests also inhibit fire (NRC 2000).
- May be more resilient to climate change than younger forests because of the diverse plant and animal species they sustain (NRC 2000; Elmqvist et al. 2003; Hooper et al. 2005; Tilman et al. 2006). Some of these plants may contain invaluable medicines. For example, the Pacific yew tree, long considered a “trash tree” by lumber companies, contains taxol, an anticancer chemical.
- Store more carbon than any other terrestrial ecosystem on earth (including tropical rainforests) and therefore play a pivotal role in long-term carbon sequestration and climate change mitigation. Carbon storage in western Pacific Northwest forests is higher per acre than other forests in the United States (Smith et al. 2006; EPA 2007; Woodbury et al. 2007) and is in fact the highest in the world (Smithwick et al. 2002, Franklin and Waring 1980) because:
 - Favorable climate conditions promote growth during all seasons, not just during the normal summer growing season.
 - The dominant tree species of the region grow in diameter and height throughout their lives and produce large amounts of decay-resistant litter.
 - Infrequent natural disturbances such as wildfires and windstorms allow trees to grow very old (Wayburn et al. 2000).

Birdsey (1992) found that forests in Washington, Oregon, and California contain 39% of the United States’ total forest carbon. Smithwick et al. (2002) estimated that if allowed to return to historical old-growth status across the landscape, Pacific Northwest forests could store two to three times more carbon than they currently store. Considering that the U.S. net forest carbon sink offsets over 10% of all annual U.S. CO₂ emissions (EPA 2007), allowing forests in the Pacific Northwest to return to old-growth conditions would play a significant role in helping to mitigate climate change.

The Westside and Eastside forests are generally separated by the Cascade mountain range, which extends through Washington and Oregon to Northern California. Westside forests, which include ~24 million acres of federal forests, have very high rainfall and moderate seasonal temperature variability. Eastside forests, which include ~15 million acres of federal forests, generally grow in less productive soils than the Westside, in a climate that is hotter and drier in summer, and colder in the winter. Historically, the Westside forests have been most associated with Douglas-fir, while the Eastside forests have been most associated with ponderosa pine.

HOW MUCH OLD GROWTH WAS THERE AND HOW MUCH IS THERE NOW?

Estimates of how much old growth existed in the Pacific Northwest prior to Euro-American settlement in the early 1800s generally rely on the first forest surveys. Those surveys (Andrews and Cowlin 1942; Cowlin et al. 1940), conducted in the mid-1930s for both the Douglas-fir (Westside) forests and ponderosa pine (Eastside) forests, revealed that despite extensive logging and related fires like the Tillamook Burn that had already occurred, the forests were still primarily old growth. The National Research Council (2000), relying heavily on the 1930s forest surveys, concluded that roughly two-thirds of western Oregon and Washington forests were old growth when Euro-Americans arrived in the area, and that similar old-growth coverage had existed in the Eastside forests. This is in line with a more recent study by Strittholt et al. (2006) that found that 64% of the entire land area of western Washington, Oregon, and Northern California was covered in old growth (which it defined as 150 years or older) before settlement, as well as the Forest Service’s estimate (Moaur et al. 2005) that 60 to 70% of the Northwest Forest Plan area had been late-successional (older than 80 years) before settlement.

¹The forest canopy describes the area above the forest floor where the tree crowns meet to form an interactive web of life.

Since the 1930s, other studies have sought to measure the extent of current old growth in the Pacific Northwest. Despite the differing parameters of each study, including the definitions used for old growth, time frames, geographic areas (e.g. Westside forests, Eastside forests, individual states), ownerships (various federal jurisdictions, state, and private), and land uses (forests only, or forests combined with other land cover), every study has shown that there has been a substantial decrease of old-growth forests caused by logging. The estimates of current old growth have generally ranged from 13% of forests in western Washington and Oregon (Morrison 1991) to 18% (Bolsinger and Waddell 1993) of forests in the entire states of Washington, Oregon, and Northern California. Strittholt et al. (2006) employed satellite imagery from 2000 to examine the over 60 million acre area of the western Pacific Northwest, regardless of ownership or land cover, and found that 18% of the land is currently covered in old growth. A Forest Service survey (Bolsinger and Waddell 1993) examined 56.5 million acres of forest inventories from virtually all public and private forests in Oregon, Washington, and Northern California, and found that 18% of forests were old growth (based on varying old-growth definitions for different states and ownerships). Therefore, based on the various studies:

- There has been more than a 70% decline in the amount of old growth in the states of Washington, Oregon, and in Northern California.

Another key finding, by the Bolsinger and Waddell survey (1993) is:

- The majority of remaining old growth (~83%) in the states of Washington, Oregon, and in Northern California is on public land.

WESTSIDE OLDER FORESTS

The Northwest Forest Plan (NWFP), implemented in 1994, covers ~24 million acres of U.S. Forest Service, Bureau of Land Management, and National Park Service lands in the Westside forests of Oregon, Washington, and California, and a small portion of Eastside federal forests in Oregon and Washington near the Cascade crest. The NWFP largely shifted federal lands management from resource extraction to an ecosystem management focus within the range of the northern spotted owl, which was listed as threatened under the Endangered Species Act in 1990. This dramatically reduced the amount of logging on federal lands by ~80% (Strittholt et al. 2006). The NWFP is based on the ecological framework of protecting “late-successional” forests, which includes both “old-growth” and “mature” stands.² According to the NWFP, old-growth stands are:

Usually at least 180 to 220 years old with moderate-to-high canopy closure; a multi-layered, multi-species canopy dominated by large overstory trees; high incidence of large trees, some with broken tops and other indications of old and decaying wood (decadence); numerous large snags; and heavy accumulations of wood, including large logs on the ground (FEMAT 1993).

Old-growth stands generally contain trees with a larger average diameter, more age class variation, and more structural complexity than mature-growth stands of the same forest type. Mature stands are generally greater than 80 to 100 years and less than 180 to 200 years old. Mature forests are those that have reached the culmination of mean annual increment (CMAI), or where the maximum rate of tree growth has peaked. Mature forests continue to grow rapidly, both upward and outward. An important transition between the mature and old-growth states is that old-growth stands continue to grow, but less so in the height of trees and more so in the diameter, and not as rapidly. Like old growth, the mature age class also plays an important ecological role, but perhaps most importantly, mature trees are the recruitment trees for future old growth. As mature trees transition to old growth, they replace old growth that has been lost to disturbance, ensuring that viable amounts of old growth will remain across the landscape.

Strittholt et al. (2006), in addition to determining that large substantial losses of old growth have occurred in western Pacific Northwest (see chart below), also deter-

² A classic definition of “late-successional” forest was a state “in which shade-tolerant tree species, such as western hemlock and grand fir, begin to attain dominance” and such “conditions in the Pacific Northwest forests occurred rarely, only after many years in the old-growth condition and in the absence of significant disturbances that maintained dominance of less shade-tolerant species (most commonly Douglas-fir or ponderosa pine).” (NRC 2000 citing Spurr and Barnes 1973). With the publication of FEMAT (1993) and the Northwest Forest Plan Record of Decision (1994), “late-successional” has generally come to mean forests that have attained the culmination of mean annual increment and includes both “mature” and “old-growth” forests.

mined that there is very little mature growth (which it defined as 50 to 150 years or older) left in western Pacific Northwest:

- There are ~11.76 million acres of existing mature growth compared with ~11.53 million acres of old growth.
- There is significantly less mature growth (~5.9 million acres) on public lands than there is old growth (~9 million acres) on public lands.

EASTSIDE OLDER FORESTS

Like the Westside forests, every study measuring the Eastside forests of Oregon and Washington (“Eastside” forests do not generally include any forests in California, though a portion of the Modoc National Forest is, in fact “Eastside” in character), have shown that significant old-growth logging has taken place (Lehmkuhl 1994, Bolsinger and Waddell 1993). The Eastside Forests Scientific Panel (Henjum 1994) concluded that late-successional/old-growth forests, which it defined as forests with trees at least 150 years old or greater than 21 inches in diameter in the overstory (dominant or upper part of the forest as seen from above), make up between one-quarter and one-third of Eastside national forests. When other public and private land is considered, the amount drops to below one-fifth. This is well below historical levels; the first extensive survey of Eastside forests in Oregon and Washington (but excluding northeastern Washington) conducted in 1936, showed that 73% of all commercial forest was old growth (Cowlin et al. 1942).

The 1936 survey also found that nearly two-thirds of Eastside forestlands were dominated by ponderosa pine, with typical stands containing trees up to 60 to 70 inches in diameter at breast height (dbh) with most of the stand volume in trees of 20 to 44 inches dbh. Based on the 1936 survey, Henjum et al. (1994) concluded that:

- Less than 15% of the original ponderosa pine of Eastside forests remains.
- Only 3 to 5% of the pre-settlement ponderosa pine old growth remains in Deschutes National Forest, and only 2 to 8% remains in Fremont National Forest.

CONCLUSION

There is a severe deficit of mature and old-growth forests across the Pacific Northwest. Like old-growth forests, mature forests are ecologically important as habitat for species that depend on closed-canopies and as replacements for older forests in a dynamic landscape. Protecting and restoring mature and old-growth forests are critical to restoring ecologically robust forests. To have fully functioning forests that are resilient to natural disturbances, able to support abundant levels of plants and wildlife, capable of maximum carbon storage over time, all mature and old-growth forests need to be protected. To do so will require not only protecting what is left, but also restoring older forests across the landscape and over time.

APPENDIX B.—NEW POLL SHOWS 75 PERCENT OF OREGON AND WASHINGTON RESIDENTS SUPPORT PROTECTION OF OLD-GROWTH FORESTS FROM LOGGING ON PUBLIC LANDS

EVEN IN “LOGGING COUNTIES” A CLEAR MAJORITY NOW FAVOR NO MORE CUTTING OF OLD-GROWTH FORESTS

PORTLAND, Ore.—A new poll conducted by Davis & Hibbitts, Inc. finds an overwhelming majority of 75 percent of Oregon and Washington state residents support protecting old-growth forests from logging on public land. “The message from this poll is loud and clear: our citizens want to protect our last remaining old-growth forests from any further logging,” said Regna Merritt, executive director of the Oregon Natural Resources Council.

The most striking finding in the poll was that support for protecting old-growth forests cut across all groups and regions in both Washington and Oregon. Even in Oregon’s counties where logging and other natural resource-based activities occur (every county except Multnomah, Washington, Clackamas, Benton, Lane and Deschutes), 67 percent of respondents support protection of old-growth. Adam Davis who oversaw the poll said, “[t]hese findings demonstrate an unusually strong consensus in every subgroup tallied in favor of protecting old growth.” The 600-person poll of randomly selected registered voters has a margin of error of +/-4.0%. Davis & Hibbitts, Inc. is a highly respected, nonpartisan public research firm with a 20-year history of work on natural resource issues in the Northwest.

With only ten percent of old-growth forests still standing on our publicly owned lands, the continued logging of these majestic trees is bad economics,

bad for the environment and bad public policy," said James Johnston, director of the Cascadia Wildlands Project. "The threat to old-growth is very real with the Forest Service this year alone scheduling 114 timber sales that target 20,000 acres of national forests in the Pacific Northwest. Half of these acres could be logged as soon as this summer," Johnston added.

When the poll asked why respondents support protection of old-growth forests on public lands, the top three reasons given were 1) preserving what's left for future generations, 2) protecting the source for clean drinking water and air and 3) protection of endangered species that live in old-growth forests.

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N = 600 telephone survey of Oregon and Washington registered voters. Percentages may not add to 100% due to rounding

Would you strongly support, somewhat support, somewhat oppose, or strongly oppose protection of old-growth forest from logging on national forest?

TOTAL SAMPLE

Total Support	75%	
Strongly support	50%	
Somewhat support	25%	
Total Oppose	20%	
Somewhat oppose	10%	
Strongly oppose	10%	
Don't Know	5%	

OREGON vs. WASHINGTON

	OREGON	WA
Total Support	70%	78%
Strongly support	41%	56%
Somewhat support	30%	22%
Total Oppose	23%	18%
Somewhat oppose	11%	9%
Strongly oppose	12%	8%
Don't Know	6%	5%

NON-NATURAL RESOURCE-BASED vs. NATURAL RESOURCE-BASED COUNTIES

		<i>Natural Resource- Based</i>	<i>Non-Natural Resource-Based</i>
Total Support	67%		79%
Strongly support		43%	54%
Somewhat support		24%	25%
Total Oppose		26%	16%
Somewhat oppose		12%	9%
Strongly oppose		14%	7%
Don't Know	6%		5%

For purposes of this grouping, the non-natural resource counties are King, Pierce, Thurston, Snohomish, Whatcom, Kitsap, and Clark in Washington and Multnomah, Washington, Clackamas, Benton, Lane, and Deschutes in Oregon. All other counties are grouped as natural resource counties.

DEMOCRATS vs. REPUBLICANS vs. INDEPENDENTS

		<i>DEM.</i>	<i>REP.</i>	<i>IND.</i>
Total Support	83%	63%	78%	
Strongly support		60%	40%	52%
Somewhat support		23%	23%	26%
Total Oppose		14%	29%	17%
Somewhat oppose		7%	15%	11%
Strongly oppose		8%	14%	7%
Don't Know	3%	8%	4%	

N=600 telephone survey of Oregon and Washington registered voters.

Which do you think is the best reason to support protection of old-growth forest from logging on national forests?

	TOTAL	STATE		COUNTY		PARTY		
		OR	WA	Natural Resource-Based*	Non-Natural Resource-Based*	Dem	Rep	Ind./Other
<i>90% of the original old-growth forest has been lost to logging; the proposal would preserve what's left for future generations.</i>	35%	31%	38%	36%	34%	33%	38%	35%
<i>The proposal would provide a greater source to the regional economy by protecting a resource that is important to our supply of clean drinking water and clean air</i>	24%	27%	22%	23%	24%	27%	20%	25%
<i>The proposal would help protect endangered species that thrive in old-growth forest.</i>	13%	11%	14%	13%	12%	14%	11%	12%

All other responses 9% or less

*For purposes of this grouping, the non-natural resource counties are King, Pierce, Thurston, Snohomish, Whatcom, Kitsap, and Clark in Washington and Multnomah, Washington, Clackamas, Benton, Lanc, and Deschutes in Oregon. All other counties are grouped as natural resource counties.

Senator WYDEN. Thank you very much. I think we can all have different opinions with respect to how to resolve the controversy, but it's clear there's a lot of support for getting it done, so that's what we're going to explore now.

We're still looking at the prospect of having votes at 11, so, that may or may not happen, but what we'll do, is I'll take 5 minutes and recognize Senator Smith for 5 minutes. Then at least we'll get some questions in and see if we have some prospects then of more time.

Thank you all.

Dr. Perry, let's start with you, in terms of what you think are the important management objectives for the landscape? I mean, we want to get it all done. We want to protect all our values, water, salmon, old growth, all the things that Oregonians care about. What do you see as the appropriate long-term management objectives to get it all accomplished?

Mr. PERRY. I would say moving the—rebalancing the landscape, moving it back to a higher proportion of forests that are older, have bigger trees. I would envision in—that if we've got, say, 30 percent of it protected and we put another 30 percent or so into these—into

managed, but managed horticulturally in such a way to perpetuate a dominance of big, old trees.

Then, the remainder of the landscape managed as fast-growing plantations or whatever we might choose to do. I think that balance would give us the best combination of protection of water protection against mega-fires and the maintenance of biological diversity.

I'll emphasize that—that that's going—for two-thirds of the landscape—that's going to involve management. I'm not suggesting that we lock those away from timber harvest, but I think, you know, as Dr. Tappeiner pointed out, for those portions of the landscape, we have very powerful and effective civil-cultural tools to shape the forest toward a dominance by larger trees.

Senator WYDEN. That really leads the question I wanted to ask for Dr. Tappeiner and you, Doctor, you know, Perry. The fire season is getting longer, these, you know, enormous, you know, inferno-like fires. Both of you seem to have touched on the concept of thinning old-growth stands in order to protect old-growth trees. I think people are just starting to get their arms around what that would mean.

Dr. Tappeiner, can you kind of elaborate on that and how something like that would work?

Mr. TAPPEINER. First of all, I would say that's really important in the drier forests, not necessary for the west side forest, the hemlock, Douglas Fir forest. But in a mixed conifer, Ponderosa pine, Lodgepole, and pine forest, it's very definitely needed.

By thinning, it reduces flammability in old forests, it means removing the ladder fuels, smaller trees and the shrubs that will carry the fire into the bigger trees, OK? It also means having some space between the crowns of the bigger trees, so if you do have a severe fire, it won't burn from one big tree to the next.

Now, in order—as I mentioned earlier—in order to do this in some sites, it may be necessary to cut some fairly large trees, it may be necessary to cut some fairly old trees. Aged trees and size isn't necessarily very well correlated, so in these—especially on dry forests, some very old trees might actually be ladder fuels for larger trees that you want to save.

Senator WYDEN. OK, let me go to you, Mr. Beck, because we're going to clearly want to understand more about your business model and your needs, and some of this I may even ask you in writing. What percentage of your timber now comes from the private forests and what percentage comes from the public forests?

Mr. BECK. There is actually a couple of other groups there, and I would be guessing because I don't break it out that way. But I would guess Forest Service, BLM, probably at this point 15 percent, last year, Indian Nations, probably—probably 30 percent, 35 percent, and the remainder would be private land in one country or another.

Senator WYDEN. What is the smallest tree that you can process in your mill now?

Mr. BECK. We're totally market-driven in what we cut, and that's why we've survived, we jump around. At times we cut down to a 12-inch diameter, small end. So, that would be, probably a 18, 1-inch at breast height on a tree.

Senator WYDEN. I'll have some more questions, if we have time, otherwise we'll do it in writing. The point is, we want to learn more about your business model, and my pledge to you is to really try to walk the system through, in terms of how it works for you today and the various approaches that we might take to resolve the controversy.

Senator Smith.

Senator SMITH. Thank you, Senator Wyden.

Let me first say to Dr. Tappeiner and Dr. Perry, how honored we are to have you here.

Mr. PERRY. Thank you, we're honored to be here.

Mr. TAPPEINER. Thank you.

Senator SMITH. We respect you, we thank you for being the experts you are in a State as great as our own. I think the Chairman and I agree on that.

I think I heard you both say that old-growth trees respond positively to tree removal. Is that—are we clear on that?

Mr. PERRY. I—

Senator SMITH. In other words—

Mr. PERRY [continuing]. Dr. Tappeiner said that and—

Mr. TAPPEINER. I said that.

Mr. PERRY [continuing]. I will not dispute him on that. He knows more than I do about the old growth response to thinning.

Senator WYDEN. Is that your feeling as well?

Mr. TAPPEINER. Yes, Senator, it is.

Senator SMITH. Your testimony, Dr. Tappeiner, indicates that guidelines for understanding and describing of old growth should be local and practical, to enable forest managers to protect and develop old-growth trees and forests. Given that many forest types, climates, and diversity across the Northwest, do you think Congress should develop such guidelines, or would these be better left to professionals?

Mr. TAPPEINER. I hope that Congress would facilitate developing those guidelines. Yes, I think it has to be done forest ecologists, agriculturalists, foresters, wildlife biologists, who know their local forests. Then they have to be adaptable, they have to be flexible enough so that those guidelines can be implemented. So it takes, you know, it takes an understanding of logging equipment, it takes an understanding of fire regimes, what, you know, just the whole infrastructure of what's available locally.

Senator SMITH. Dr. Perry, do I understand that you—it's your feeling that old growth refers to a forest condition and not the size of a single tree?

Mr. PERRY. It does refer to a forest condition, and part of that condition depends on the size of individual trees. So it's both the size of individual trees and it's the forest structure, in total.

Senator SMITH. Are you familiar with the Coos Tribe proposal to assume management of a portion of Siuslaw National Forest?

Mr. PERRY. I am not.

Senator SMITH. Their plan would be a thinning-only program to accelerate old growth characteristics and wildlife habitat on about 60,000 acres. Is that something that you could support?

Mr. PERRY. Oh, yes.

Senator SMITH. Very good.

Mr. PERRY. I think it's, you know, I would have to look at it and say, on the Siuslaw, where there is no old growth, to speak of, left, then they're going to be going into younger stands. I'd just specify that I'd very much support that approach and I think it needs to be applied to the younger stands for a number of reasons.

Senator SMITH. Randi, thank you for being here, as well. I want to ask you a few questions, because I want to try to understand the differences of—that you and I may have.

Are you—were you saying in your testimony that to cut a tree and to turn it into a room like this, that it releases carbon? Or is the carbon still here?

Ms. SPIVAK. If you—there is some carbon in the stored wood, but if you take into account logging old growth and the emissions that are released by—from logging, from the tree in the soils, only about 15 percent of that carbon remains in the wood product. The life of a wood product may only be about 50 years.

Senator SMITH. It's my understanding that, as we talk about global climate change and the ability of trees to sequester carbon, that as a tree—and please tell me if I'm wrong, any of you, but I'm directing this to Randi initially—that younger trees are much better attracters of turning carbon into wood than older trees. As they die, they begin emit carbon. Is that, am I incorrect in that understanding?

Mr. PERRY. Could I respond to that?

Senator SMITH. Yes, sure.

Mr. PERRY. The evidence that's been coming in over the last few years, is that the older forests are much more productive than we once thought they were. It—the standard wisdom was they build up a lot of biomass and that respire and then throws away a lot of carbon, so their productivity drops accordingly. But in fact, what it looks like they do, is that as they get older, they use water much more efficiently than the younger forests. So, their productivity does not drop as much as we thought it did.

Senator SMITH. That, that's—I'm glad to know that. There's—I've just been confronted with lots of scientific evidence that's saying otherwise, but if that's not the case, then I'm anxious to learn that, and that's why I asked this question.

Because one of the things I do know, is when you burn up a Kalmiopsis Wilderness of old growth, you're not capturing anything, are you? It's just turned into global warming.

Mr. PERRY. When it burns?

Senator SMITH. Yes.

Mr. PERRY. You're capturing it rarely, except in small stands, do the boles burn up, so the standing boles are left there, where the bulk of the carbon is. So the carbon that's in the crowns goes up in the air, the carbon that's in the big standing boles stays onsite, depending on where it—or it gets hauled off to a mill, depending on what we choose to do about salvage.

Senator SMITH. I think my time is up, Senator.

Senator WYDEN. Senator Craig, what we're doing, given the nature—you recognize for 5 minutes, and then if we haven't gone to votes, we'll come back for another round.

Senator CRAIG. Mr. Chairman, thank you.

Panelists all, thank you. I've—I'm sorry, I had to step out, I had a meeting in the other room, but I appreciate, not only your observations, your obvious experience and knowledge of the issues at hand. I'm also pleased to hear that some believe that in old growth—some form of management, some form of activity, of the thinning, the cleaning, is appropriate, as it relates to the vitality of old growth itself.

Dr. Perry, Dr. Tappeiner was mentioning that and gave us the example of this one Sugar Pine. Do you agree with him, that the kind of active management that he talks about, about under story and the thinning and cleaning, in some respects, enhances or ensures at least the stability of an old-growth stand?

Mr. PERRY. I agree very much with the point that we need to retain some flexibility. I also agree with the point that John Tappeiner made, that this is—on the moist forest types, it's almost certainly not necessary, in terms of fire protection, to go in and do any thinning in old growth. In the dry forests types it's different. There, where you need the flexibility, that if you have—if you're trying to save a large, old, fire-resistant species like Ponderosa Pine or old-growth Douglas Fir, on these dry sites, and it happens to be surrounded by White Fir fire ladders that may be fairly large in diameter, then I think, to save that big old fire-resistant tree, we may have to log out some of those larger diameter White Fir. It's a judgment call that has to be made on the ground in those particular situations.

Senator CRAIG. But it's an active judgment call, is it not? It's not old growth as museum pieces that we put fences around and windows up to and simply observe or walk through. You're talking about an active decisionmaking process as it relates to the state of play in that old-growth stand, are you not?

Mr. PERRY. I am. Again, I'll emphasize that it's the dry forest types that this applies to, but yes, I definitely am talking about an active decisionmaking process.

Senator CRAIG. When I came back into the room you were all having a discussion about sequestration and I missed, I think, Randi, your testimony, as it relates to—or at least you were responding to a question. Ron and I—Senator Wyden and I—have spent a good deal of time and made efforts to introduce legislation over time that recognize and reflect on the value of sequestration as it relates to climate change.

In the latter years of the Clinton Administration, I spent about a 24-hour period stopping the Clinton negotiators, at a Climate Change Conference in Belgium, from giving away our sequestration values, and that's when the Russian's were in there dealing and making their play with the forests of Siberia, because I saw it as a value we could not give away nor should we negotiate away.

Last year—let me put it this way, I serve on the Environment and Public Works Committee, which has been very active in attempting to look at legislation that addresses the issue of climate change. As a result of that, I asked some of our agencies to look at last year's burn on public lands, both forest and grasslands, but, of course, dominantly forest lands, as it relates to the total acres burned and the approximate release of carbon into the atmosphere, and what it—what was it an equivalent of.

This is a guesstimation, but a reasonable guesstimation based on some pretty good minds—it was equivalent to taking 12 million passenger cars off the road, if that carbon had not been released, but had been retained inside the log, inside the tree, inside the grass blade.

Now, how do we compare that? That's like taking nearly all of the passenger cars off the highways of California. I think we're—I'm always amazed that we just pass this one by. We are rushing to judgment on climate change in other areas, trying to control man, but we're not actively engaging Mother Nature in her releases, in ways that we probably ought to. I think it is extremely important that we do that.

I'm very anxious to look at the science that says old growth does more than we thought it did, because I started looking at the science about 15 years ago, when we believed that young and active forests and their growth cycles sequestered a great deal more than older trees, and the trees that had peaked and were, if you will, just sustaining themselves.

So, those are extremely valuable pieces of information for us to have. Because, as we equate climate change and as we legislate—if we do—and if I'm still here, I'll make every effort to put a forest provision in climate change. Because I think it is a valuable factor in our overall understanding of what we might be able to effectively do.

If any of you wish to make comment to those comments, please do. If not, Mr. Chairman, I have no further questions of the panelists.

Senator WYDEN. I thank my colleague. The vote hasn't been called, so let's see if we can get another 5 minutes in on our questions. I won't even take 5 minutes.

Ms. Spivak, question for you—I'm going to be, on Sunday afternoon, in beautiful Baker County in our State on the east side, and I know that you all have been supportive of the idea of working with industry folks and environmentalists and scientists, looking at thinning on the east side, and I think that's appreciative, and certainly that's something that I'm going to hear a lot about on Sunday afternoon. We'll want to follow up with you more on your thoughts in terms of how that ought to go forward.

Tell me, if you would, just so we get a—almost a set of data points to let us build the record—what your sense is of old growth, and the amounts. How much there used to be, how much there is now, and what you think it ought to be. I realize this is a very inexact, you know, science. I think you had some numbers earlier. Again, this is in area where people have differences of opinion, but just from your standpoint and the efforts that you've made over the years—how much did there used to be, how much is there now, and what's your sense of how much there ought to be?

Ms. SPIVAK. OK, good question, thank you.

There have been a number of studies over the years to try to get a good handle on those numbers, and of course, it's not an exact science to calculate the past, but based on a series of studies, it looks like there was, across the Pacific Northwest, pre-European settlement, about two-thirds of the landscape was covered with older forest, old-growth forests.

Now, based on current data, which is accurate—fairly accurate, anyway—it looks to be there’s about 18 percent across the landscape. So, it’s about a 72 percent drop.

So, we’re in a significant deficit state of old-growth forests across the landscape. To answer the question of how much there should be, as we talked before and you heard Dr. Perry testify, the landscape is sort of out of balance now, with a lot of younger forest plantations, more fire-prone.

To restore the ecological balance, we’d like to see the landscape go back to a dominance by older forests, getting closet to the historic composition.

I just wanted to mention one other thing on thinning, if I may, and I was cutting my testimony so I didn’t—I had to cut some things out, but—I did also want to say that, you know, as tenacious and as important as conservationists are to protect the old growth, we totally recognize that in dry forests there has been a buildup of fuels because of grazing and fire suppression.

So, we’re not talking about a complete hands-off approach, just let nature take it’s way. I absolutely recognize and, you know, I learn a lot from Dr. Perry and other scientists, that it is important to go in there and reduce the ladder fuels and do some active management in these stands.

But, you know, we need to be careful—it’s talking about protecting the older trees, making sure there’s not damage to soils, to water quality, to wildlife habitat and to fish. So, you know, again, not hands-off, but careful management.

Senator WYDEN. That’s a good message for Baker County on Sunday, and I thank you for it.

Let me ask one question of you, if I could, Mr. Brown. You know, this subcommittee has tried very hard to strike a balance in natural resources—we’ve been right at the center of the two pieces of legislation in the last 15 years that actually became law—the County Payments legislation, and the Forest Health legislation. I’m going to see if I can help spur along the third effort with this thinning bill.

You’ve heard a little bit about some of the concepts, you know, today. We want to make sure, particularly in these, you know, hundreds of thousands of acres of, you know, overstocked, you know, second-growth stands, that we get some of that merchantable timber to the mills, and you know, we protect old growth—and that’s going to be the general, you know, direction.

But one of the reasons I feel so strongly about trying to make this effort is I’m now old enough to remember some of the battles, where our wonderful Senator Hatfield was holding, you know, the big Timber Summits and we would have throngs of protesters, and the timber wars with all the lawsuits were just sort of notorious for, sort of bringing everything to a halt. Instead of the win-win kind of situation—being sensitive to economics and environmental values, essentially we got, you know, a whole lose-lose.

I think my question to you is—what’s your sense about the impact of something like that in the State of Oregon? I mean, when you have something like that, essentially, total, you know, gridlock, it strikes me that the impact can just be, you know, devastating. You remember some of those old battles, and what can you tell us

about what happens when you have total impasse in a State like ours?

Mr. BROWN. Senator Wyden, it is devastating. It covers the gamut of environmental costs, as well as social and economic costs.

The social cost comes a lot from rural communities no longer being able to support family wage jobs, the education system suffers because the infusion of dollars aren't there any longer. There's a migration of people out of those communities, because they don't have the opportunity to earn a family wage job.

I've even heard folks talk about it showing up in things like higher rates of domestic violence, and people accessing, kind of the social welfare infrastructure because of the lack of economic opportunity, and the stress that goes with that.

It's interesting, on the environmental side, there's also significant issues. One of the ones that I get real concerned about with Federal lands is the road maintenance. Because Federal lands no longer have the economic infusion that allows them to maintain their roads, they're not being maintained, they represent a water quality threat, and they're not doing as well a job as, say, industrial timberlands at eliminating fish passage barriers that, you know acts, and allow salmonettes to be much more successful at spawning.

So there are environmental consequences that go with, with all of that conflict. Not to mention the millions of acres of dead, dying, and diseased trees that are on the landscape right now, and certainly the economic piece of that. We know, you know, there's only a fraction of the mills in Eastern Oregon no that there once used to be. So, it has had very significant impact.

When, you know, our landscape, our forested landscape is 60 percent under the management of Federal policy, you can expect that to also bleed over into what happens on private lands. Private lands adjacent to Federal lands are threatened by the fires that burn off of them, they're threatened by the insect and disease issues that come from Federal lands.

When those mills in Eastern Oregon go away, that private landowner that used to be able to take his logs 50 miles has to go 300 miles. It greatly impacts our ability to manage.

Senator WYDEN. Very helpful.

There are about 12 minutes in the vote, so if Senator Smith takes 5, we'll be able to make it.

Senator SMITH.

Senator SMITH. Thanks, Senator.

Paul, thank you for being here. When you cut a tree, how much carbon is released when it's harvested and processed?

Mr. BECK. You know, I've never done the science. But, the actual log, probably 99 percent of it is—

Senator SMITH. It's still carbon, right?

Mr. BECK. We do utilize log fuel, the bark, to generate electricity. There's a co-generation facility about a quarter mile from our plant.

But, I question the logic of a burnt tree—

Senator SMITH. Being better than a harvested tree?

Mr. BECK. Yes. I mean, it's decomposing. Yes, the roots decompose when we log, but so does a burnt, dead tree. It decomposes.

Senator SMITH. You indicated that, you know, where you're living, you are surrounded by some of the most productive forestlands in the world, you now go to other countries to get your logs, is that correct?

Mr. BECK. Yes, it is.

Senator SMITH. Is that Canada?

Mr. BECK. Canada.

Senator SMITH. Do they have any standards on old-growth harvest?

Mr. BECK. The private lands that we deal with on Vancouver Island, have a pretty rigorous set of forest practices law. I don't think they probably compare to ours. I think—

Senator SMITH. Are they over-cutting up there?

Mr. BECK. What's that?

Senator SMITH. Are they over-cutting their old growth up there?

Mr. BECK. I don't think so.

Senator SMITH. Ms. Spivak I think compared mills like yours to the whaling industry of a century ago. I wonder if, in fairness, you ought to have a response to that.

Mr. BECK. I think it might have been a fair response to my great-grandfather's mill, he did have a saw mill, he did log, that was 100 years ago. It's not a fair comparison to what I am proposing now. Our mill still sits in a building that was built in 1962, but the equipment inside is nothing like the mill we had in 1947—it more resembles something out of Star Wars. It's a state-of-the-art saw mill, designed specifically to cut large trees in a very efficient manner.

You know, what I would like to see is man become a native species on a landscape again. I said that the Native Americans managed this land by fire for 10,000 years, and the fuel that was removed kept those forests healthy.

What I would like to see, and what Linda's people have been doing on the Umpqua, on the Rogue, is just that—they've been removing some trees. It's no the clear-cut of my great-grandfather's. What I'm proposing is more like the Inuit whale hunting, I guess, if we want to use the whale hunting analogy, and it wasn't the Inuits that destroyed the whale populations of the world.

Senator SMITH. Thank you for being here, Paul.

Ms. Spivak, I appreciate your testimony, as well, and your perspective. I respect it, and I also want to state for the record I do value forests as a place of recreation, as a place where there is an economy.

I would just note for the record that Ron Wyden and I this week have been besieged with county Commissioners and mayors who frankly are at an absolute dead end as to how to fund things like schools and paved roads and have public protection and police and sheriff departments. While recreation is important, it does not provide these local communities with the basic building blocks for civil society, and they are landlocked by Federal timber, and the deal has been changed on them, and it has been an enormously difficult challenge for us, working in a bipartisan way, to get the rest of the country to agree to pay us not to log. That is, essentially, the deal.

The feeling around here is, we don't want trees cut, and we don't want to pay you not to cut them anymore. When recreation is a full

replacement, I'll be the first to admit it, it just simply isn't. There's a lot of people that are falling victim by a change in forest policy, and it does seem to me that the ultimate tragedy for the environment, for Spotted Owls is when it all goes up in smoke. Because then, while there may be some ecological value in fire in a forest, the extent and intensity with which they burn in these overgrown areas now, leaves the environment and the economy all the losers.

Thank you, Mr. Chairman.

Senator WYDEN. I thank you, Senator Smith.

Let me thank all of you, and particularly for the tone, the constructive tone that all of you have brought. Because for me, this completes the second of our two-part effort to look at this issue, the first hearing was devoted just to the thinning question. This was designed to look at old growth, but of course the two are intertwined, and we've seen that in both of the hearings, and then I've had a number of sessions at home, you know, in rural Oregon, you know, listening to people.

I will tell you, I think in Oregon, folks really get it. I mean, they understand that this is a critical time, both from the standpoint of the economy and the environment. They don't give people election certificates to just go out and sloganeer. They give us election certificates to do the heaving lifting, to really try to think through how to deal with these issues.

You've given us a lot of very good suggestions. They have been specific, they have been pointed, I think it's fair to say that not everybody on this panel agrees with all of the other witnesses, but you've all show an inclination to work together.

We've be able to thread the needle a couple of times on this subcommittee—particularly County Payments, and Forest Health—I see Ms. Goodman there in the second row, you know, nodding. That's what you do when you have people like yourselves who have demonstrated goodwill and a desire to reach out and get ideas and suggestions for our forests, where a lot of the good work that you all propose is actually being done today.

So, I leave today with a real sense that we can do this, again. We're going to be calling on you often, I hope to have a piece of legislation to show you, to ask you for your input and your ideas on, very shortly.

I'm sorry that the morning doesn't allow us to do more in terms of questioning, we'll probably have some additional matters we want to ask you in writing.

But thank you for your input, and particularly, thank you for the way that you have approached a very difficult issue, which is not through name-calling and rock-throwing, but through a desire to try to find some common ground, and by God, I think we can do it.

With that, the subcommittee's adjourned.

[Whereupon, at 11:25 a.m., the hearing was adjourned.]

APPENDIX
RESPONSES TO ADDITIONAL QUESTIONS

RESPONSES OF DAVID A. PERRY TO QUESTIONS FROM SENATOR BARRASSO

Question 1. If the goal is to foster and improve the old growth attributes in a stand of timber, do you think that large, catastrophic fire is a better management method than allowing thinning in old growth stands?

Answer. In dry forest types, NO. Proper fuels reduction (e.g. underthinning, retaining large trees, treating logging slash) is important to restore and protect dry old-growth. In moist forest types, thinning within OG is unlikely to help prevent a large fire and may even increase the risk.

Question 2. Do you think that management can improve old growth stands or maintain old growth characteristics or would you recommend a hands-off approach to optimizing old growth in all instances?

Answer. Proper management can improve OG characteristics in dry forest types that have experienced an influx of younger trees during the era of fire suppression and high-grade logging. Management should focus on the source of the problem—the smaller trees; large, fire resistant trees should not be removed (unless to protect an even larger adjacent tree).

In moist forest types management will detract from OG values.

Question 3. Let's say we come to an agreement on a definition or set of definitions for old growth—and we then draw a line around the existing old growth—and that old growth gets blown down or burned up. How should the Forest Service and the BLM handle that kind of situation?

Question 3a. Should salvage harvesting be allowed or should they just walk away and allow the material to rot?

Answer. Areas allowed to recover naturally from disturbance are among the rarest community types we have. From an ecological standpoint, it is crucial that some natural recovery be allowed. The LSR's and IRA's are the logical places for that. Where salvage is allowed, there are various reasons why we should take some and leave some (I've always liked 50-50). The idea that leaving wood in the forest is "waste" or hampers recovery of the system has no support in the ecological sciences. In fact, from an ecological standpoint leaving it is a plus.

Question 3b. What if the fire was not started naturally or did not originate in the old growth stand?

Answer. It's important to keep the focus on what we want on the landscape. What is perceived to be "natural" can be a useful guide, but we shouldn't become prisoners to it.

One of the witnesses today advocated for full protection of mature trees and went on to suggest that trees over 100 years in age are mature. In my state of Wyoming—and I am told in parts of both eastern Oregon and Washington—we have large stands of Lodge-pole pine and Ponderosa pine that regenerate in very thick and dense stands that have stagnated. The trees never grow large in diameter or very tall. We call them dog-hair stands.

Question 4. If Congress were to adopt either an age limit or a definition that says the land managers should stay out of mature stands of timber, what would you recommend be done in these stands that have stagnated but are mature or over 100 years in age?

Answer. I started my career as a lodgepole researcher in the northern Rockies, so I know about doghair. In all cases—whether lodgepole or some other species—we have to stay flexible with regard to the mature stands. Depending on site and stand history, some won't need thinning and some will if we want to keep them healthy. Silvicultural expertise will be crucial in making these calls.

Dr. Perry you suggested a good mix of management for old growth protection would be 30% old-growth reserves; 30% in mature forest (recruitment areas for old-growth); and 30% in production forest plantations to be managed. The most recent

data we have on land allocations in the Pacific Northwest Forest Plan is 24.5 million acres. Of that approximately 66% of the land is in old-growth and mature forest reserves; approximately 4.2 million acres (17%) in Adaptive Management Areas and Riparian Reserves where harvesting is significantly restricted and about 4 million acres (16%) in the Matrix Lands but estimates are that about only 3 million of that is really been open to management.

Question 5. Currently there are between 3 and 4 million acres in the Pacific Northwest Forest Plan that are allocated to the matrix lands which can be actively managed. What steps would you recommend the Bureau of Land Management and the Forest Service take to assure the 30% of its lands become available for active timber management as you called for in your testimony?

Answer. I'm glad to have the chance to clarify this. The 30-30-30 mix I mentioned referred to land allocations within the region, and not just federal lands (a basic principle of ecosystem management is to look across ownership boundaries and plan accordingly). Using a general target allows us to evaluate what role the federal lands should be playing in a particular subregion. In the Oregon Coast Range, for example, intensive management is well represented on private lands and federal lands have another role to play. In the southern Cascades and Siskiyou's, with less private land, some intensive management on federal lands will probably be necessary to attain the ~ 30% figure. However, even in the later case, intensively managed federal lands must be subject to riparian reserves and harvesting restrictions similar to those imposed by FEMAT. Those restrictions are subsumed within my 30% figure. I am definitely not suggesting that federal lands go back to the era of industrial-style management, or that 30% of federal lands opt out of FEMAT.

30-30-30 are not magic numbers and there will be some variation around these depending on the context (especially since they don't add up to 100%). The key concept is that in order to protect diversity and reduce the chance of very large disturbances, immature stands should exist as islands within a sea of late successional (i.e. mature plus OG) rather than vice versa.

Finally, achieving these land allocations is a long-term goal. If the objective is to produce healthy and resilient forested landscapes, timber harvest from federal lands over the next several decades should come from thinning overstocked young stands and removing fire ladders from older dry stands. Thousands of acres are in need and the agencies are not able to meet those needs with their current resources. Given the looming threat of more fire and insect activity, this situation is a powder keg. By putting young, fire-susceptible stands on the landscape, regeneration harvests exacerbate risks and should occur only under special circumstances (e.g. if there is a demonstrated shortage of early-successional habitat). Once large, fire-resistant trees dominate the regional landscape again, we can consider regeneration harvests in those areas where they are appropriate.

Thank you for the chance to address these follow-up questions. I'd be happy to continue this dialogue.

RESPONSES OF PAUL H. BECK TO QUESTIONS FROM SENATOR BARRASSO

Question 1. You talked about the fires that have occurred on the Umpqua National Forest and the old-growth that has been destroyed by those fires. Do you have any idea, on an acres basis, how much old-growth forest on the Umpqua National Forest has been harvested since 2000 vs. how many acres of old-growth has burned?

Answer. The Umpqua is 984,602 acres. Of that, well over 10% is non-forested and is water, rock, ice, or roads. In the period between 1996 and 2003 a total of 108,595 acres burned at unnaturally high mortality. Well over two thirds of this acreage was mature forest types. That is 11% of the total Umpqua and over 12% of its forest. Of critical importance to understand is that, of that burned area over 13,000 acres burned at High Severity. The Severity is measured by several criteria the most important being soil damage. An intense fire or one with high mortality is one thing, as it will often be able to support a new forest. A high severity fire has so damaged the soil itself that a new forest may be hundreds of years in the making. It may take a hundred years to grow a large tree but it may take several hundred years to recreate the soil that makes that possible. High severity fires are an indication of extreme fuel loading. This unnatural fuel loading allows the fire to burn at a heat and duration that will actually ignite and consume the soil itself. These High Severity fires occurred in mature stands.

The Umpqua regeneration harvested less than a thousand acres of older timber in that time period. Regeneration harvest is as close as the Forest Service gets to an actual clear cut. Regeneration retains as few as three trees per acre but more often as many as 20 or more trees per acre and always has green tree retention

areas, stream buffers and wildlife corridors. It is not my Grandfather's forestry. Most all of these regeneration harvested acreages were from sales that predated the North-West Forest Plan. They were planned, laid out, and auctioned prior to its implementation. For one reason or another, including litigation, they were harvested after the plan went into affect. The Umpqua has all but abandoned the use of regeneration harvest for any new sales. It is important to note that none of the soil conditions in high severity burn areas are present in regeneration harvested areas.

Question 2. Compared to 2000 do you have any idea how much old growth has been added to the Umpqua National Forests inventory of older trees?

Answer. The Forest Service estimates that 40,000 acres of the Umpqua have grown into "late-seral condition" since 1996. On the surface this would seem positive but when compare to the number of acres that have "burned out of late-seral condition" it is a large net loss. We need to do something to keep the growth from burning up.

Question 3. Before the implementation of the Northwest Forest Plan, how much of your mill's lumber supply was from the Umpqua? How much do you receive from the Umpqua now?

Answer. Prior to the implementation of the Northwest Forest Plan Herbert Lumber purchased over 90% of its wood from the Federal Government. The majority of this volume came from the Tiller Ranger District, the center of which is within 30 miles of our plant. Last year our supply from the Umpqua and adjacent BLM lands were less than 10% of our total usage. That percentage is actually up from zero the year before. The reason for this bump up is twofold. A sale that sold in 1997 finally worked its way through the courts and the purchaser was able to operate it. In that ten year period they had changed their operations to the point that this wood better fit us than them. Secondly the Umpqua had planned, laid out, sold, and operated a series of sales in older stands that were, for a lack of a better term, light touch. These were excellent projects that reduced fuel loading and greatly improved deer and elk habitat. They were esthetically pleasing and had the added benefits of being profitable and producing a much needed size and grade of wood. These sales included no regeneration harvest. To the best of my knowledge, these sales were not litigated. There are hundreds of thousands of acres on the Umpqua that would benefit from this type of management.

Question 4. How much of the 20 million board feet your mill processes each year is brought in from Canada?

Answer. Last year our Canadian suppliers accounted for approximately 40% of our needs. This was our highest import year and likely will be. Our expectation going forward is that we will rely on these sources for a third of our needs.

Question 5. Are these logs from Canada larger or of better quality than logs from Oregon or Washington or approximately the same?

Answer. The quality and size of logs that we obtain in Canada exist on the Umpqua. We manufacture products from logs that are typically 16 inches and sometimes as small as 12 inch diameter on the small end and up. Our average log size for 2007 was over 23 inches and it was 22 the year before. Where a dimension mill may only make a half dozen products, we literally make hundreds. The key to our success and to our survival is our ability to shift from one product to another as markets dictate. Our ability to do this depends on having a wide range of logs. We do not cut all of our products out of 16 inch logs. We cannot cut all of our products out of 30 inch logs. We need a full range of diameters and grades of logs. This entire range exists in the overstocked stands of the Umpqua. If the Umpqua is to survive as a green forest it needs to have some of that material removed.

Question 6. All else equal, if you could sustainably meet your board foot requirements from Oregon's forests would you still need to bring in logs from Canada?

Answer. In a perfect world it makes no sense to go to Canada to purchase wood that exist in our own back yard. Indigenous burning halted and fire suppression started over a hundred and fifty years ago. These stands of all ages, that are quite literally within view of our mill are overstocked beyond what they were historically. The wood is here, it is growing, it needs to be removed if the forest is to continue to meet all the needs that society is putting upon it; why would society want us to buy our wood anywhere else? As a pure business decision on Herbert Lumber's part it would be extremely unwise for us to trust the Federal Government to provide any raw materials. It has a dismal track record of keeping its promises over the last two decades. Our Canadian trading partners are our most dependable and consistent suppliers of quality raw material. Congress would have to make some iron-clad guarantees before we would even consider turning our backs on this relationship.

Question 7. In your mind, given the demand for wood products that Americans use, is it moral to supply our wood product demands from countries with lower environmental standards that we impose on our own federal forests?

Answer. While I do not like to pass moral judgment, the simple answer is no. I feel confident that our raw material sources are environmentally sound. As I stated in my testimony we submit our raw material purchase program to third party scrutiny to make sure that our environmental standards are met. Two things are of great concern for me though. 1) Not all companies have those standards and not all countries have the same high standards that Canada has. 2) Even given our company's high standards, our consumption of energy to get a product to mill when that same product exists within a few miles and exists in such quantity as to put a whole ecosystem at risk of unnatural and historically unprecedented high intensity fire seems ridiculous. The raw material is here in our local forests. The forests are in desperate need of stewardship if they are to continue being green ecosystems. We have the ability to remove some of this material in such a way as to insure and improve the future viability of these forests. We can remove this material in perpetuity. We have the ability to do this in a manner that would return money to the treasury. Why would the public want us to go anywhere else for our raw material needs?

Thank you for the opportunity to answer these additional questions. If any of these answers need clarification, or if they in turn foster further inquiry please do not hesitate to ask, as I would welcome the opportunity to continue this discussion.

RESPONSES OF LINDA GOODMAN TO QUESTIONS FROM SENATOR BARRASSO

Question 1a. In your written testimony you wrote: "Management Implications—The mission of the Forest Service is to sustain the health, diversity, and productivity of the nation's forests and grasslands to meet the needs of present and future generations. The National Forest Management Act (NFMA) establishes the goals of maintaining species diversity and ecological productivity on National Forest System lands."

In reviewing the National Forest Management Act, we do not see that law established that goal, rather we believe you may have been referring to Section 1604 of the Forest and Rangeland Renewable Resource Planning Act that established a goal to provide for diversity of plant and animal communities (see below).

16 USC Sec. 1604 FOREST AND RANGELAND RENEWABLE RESOURCES PLANNING(B) provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives, and within the multiple-use objectives of a land management plan adopted pursuant to this section, provide, where appropriate, to the degree practicable, for steps to be taken to preserve the diversity of tree species similar to that existing in the region controlled by the plan;

Do you agree and would you like to correct that oversight? If not could you please provide the language from the National Forest Management Act that you were referring to in your testimony.

Answer. The National Forest Management Act (NFMA) amended the Forest and Rangeland Renewable Resources Planning Act of 1974 in part to add the provision quoted above. The Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974, as amended by NFMA, is codified at 16 U.S.C. §§ 1600 et seq. Specifically, Section 6 of NFMA amends section 5 of the RPA Act. Section 6 added subsections (c) through (m), including the diversity provision (see 90 Stat. 2952, 2953). The proper, formal citation for the diversity provision is section 6(g)(3)(B) of the Forest and Rangeland Renewable Resources Planning Act of 1974 Act (16 U.S.C. 1604(g)(3)(B)). As you correctly note, we were referring to this provision in our testimony. However, because NFMA added the provision to the RPA Act, it is not incorrect to cite NFMA as the source of the diversity provision.

We agree that it requires the agency to provide for diversity of plant and animal communities.

Question 1b. The 10 year Assessment of the Pacific Northwest Forest Plan showed that between 7 and 8 million acres of older forests currently exist in Oregon and Washington. It showed that since that plan was implemented in 2000, the number of acres of old forests have increased by about 1.25 million acres. It also showed that only 17,000 acres of these stands have been harvested which is far less than the 230,000 acres the plan anticipated would be managed. Most importantly, I see that fires have impacted 102,500 acres of older forests since the plan was implemented.

My question is: given the data I have quoted above, should we be more concerned about fire or more concerned about harvest and management when it comes to protecting old growth and older stands?

Answer. Fire has a potential for much greater impact on old growth and older stands than harvest.

Concern regarding the impact of fire on older stands is warranted:

- One quarter of the Northwest Forest Plan (NWFP) older forest is in dry provinces.
- Between 1994 and 2003, about 1.3% of Late Successional Old Growth burned in wildfires. The Biscuit Fire accounted for about three quarters of the total.
- More large fires have burned since the last inventory (mapping) period, 1994-2002.
- Monitoring results indicate that at least 1.7 million acres of older forest was present in fire adapted ecosystems in dry physiographic provinces in the NWFP area at the end of the last ten-year NWFP monitoring period. A majority of this area is currently in a fire condition class where at least one and possibly more fire return intervals have been missed and there is an excessive buildup of fuels. Stands in these conditions are at elevated risk from catastrophic wildfire.

Harvest within mature and older stands in the dry provinces is an important tool to maintain older stand characteristics and habitats in the event of fire. We now have several examples of forested areas that experienced fire after management treatment that survived because the fire burned through on the ground at lower intensity.

Question 2. Can you help us understand the variety of definitions used in the forest plans in Region Six for the terms old-growth stand, old-growth, and old growth habitat and the variety of definitions used on the East-side forests versus the West-side forests?

Answer. The variety of definitions used on East-side and West-side forests is primarily related to the differences in forest types which occur among the Forests. For example:

Malheur NF (east side)

Mixed-conifer, old-growth stands are multistoried with large-diameter trees commonly older than 230 years. Understory trees are usually shade-tolerant species like white fir, uneven in size and age, and range from saplings to large sawtimber. Although density and closure of individual canopy varies considerably, the overall closure is generally high (70-80 percent) because of the layered structure.

Old-growth ponderosa stands generally have a more open, parklike appearance with overstory trees exceeding 250 years. Lodgepole pine stands are characterized by dense stands of even-aged trees with canopy closure exceeding 70 percent and trees generally 70 to 80 years old.

Mt. Hood NF (west side)

Douglas fir and Pacific Silver Fir stands below 3600 feet elevation used PNW-Research Note 447 as the guiding document to describe attributes which include at least eight live trees per acre > 32 inches in diameter, at least four 20-inch snags per acre, a minimum number of large logs, and the presence of a deep multilayered canopy. The Region 6 Interim Old Growth Definitions extended the definitions to other vegetation zones, each of which has different threshold values depending on native site productivity. For example, in the Pacific Silver Fir zone above 3600 feet, the diameter limit is between 22 and 26 inches, and the minimum number of live trees depends on site class, ranging from 1 tree per acre for site class 6 to 6 trees per acre for site classes 2&3. Likewise, snag and log density thresholds vary by site class.

References

Old-Growth Definition Task Force. 1986. Interim definitions for old-growth Douglas-fir and mixed-conifer forests in the Pacific Northwest. PNW Research Note RN-447.

USDA FS Pacific Northwest Region. June 1993. Region 6 Interim Old Growth Definitions.

<http://www.reo.gov/ecoshare/Publications/documents/FirsWesternHemlockSeries.pdf>

FOLLOW-UP QUESTIONS

Question 2a. With the release of Region 6 Interim Old Growth Definition all forests reviewed their definitions for old growth in their plans and adjusted accordingly.

In your mind is it realistic to develop one definition for old-growth, or old-growth stands and attempt to apply that definition to all forest or portions of forests in the States of Oregon and Washington?

Answer. It is not realistic to develop one definition to encompass all old growth forest types in the Pacific Northwest Region. The result would be a definition so generic that it would have little site specific, practical applicability. Old growth definitions should be fine-tuned to the patterns and dynamics of the forest landscape mosaic of an area. Many scientists believe that multiple definitions of old growth are needed to encompass the diversity of forest types within the Pacific Northwest.

Example: Old growth forests east of the Cascades and in the Klamath Province of southern Oregon historically ranged from open, patchy stands, maintained by frequent low-severity fire, to a mosaic of dense and open stands maintained by mixed severity fire at variable frequency. In these areas, old growth structure and composition were spatially diverse and were shaped by a complex disturbance regime of fire, insects, and disease. This is very different from old growth forests on the west side where forests are characterized by the presence of large (> 32-inch diameter) or old (> 200 years) Douglas-fir trees per acre, one or more shade-tolerant associates such as western hemlock, high amounts of large snags and logs, and complex canopy layering.

Question 3. I know that this hearing is focused on old-growth in the Pacific Northwest, but I also know when forest policy gets developed for the Pacific Northwest it has the tendency to strongly influence other parts of the country. I had my staff look at the terms old-growth stands, old-growth, and old-growth habitat in the National Forest plans in all regions of the country. As you can imagine there are lots of different definitions for each of the terms depending on which plan you examine. In some forests they didn't even bother to define one or more of the terms.

Do you think it wise (given the variety of forest types and specific conditions on forests across the country) to even attempt to come up with a one-size-fits-all definition of any of the terms I have been asking you about today; or would we be better off to allow these terms to continue to be defined through the forest planning process and tailored to local conditions?

Answer. A one-size-fits-all definition, at the scale of the Pacific Northwest region, is not useful. It is much more appropriate to define attributes through the forest planning process and tailor them to the stand types and local conditions of each forest.

Question 4. Are you familiar with the moratorium on harvesting in the Giant Sequoia stands in California?

Answer. Yes, we are familiar with the 1992 Presidential Proclamation, subsequent language in appropriations bills, and a judge's ruling in October 2006 regarding harvesting in giant sequoia groves.

Question 5. If so, at what risk are we putting those stands when we can't harvest some of the large White-fir than now provides potential fuel ladders that could put the Giant Sequoia at risk if there are fires in those groves?

Answer. Protection of the giant sequoia groves from "wildfires of a severity that was rarely encountered in pre-Euroamerican times" is identified in the Presidential Proclamation that formed the Giant Sequoia National Monument in California. The Proclamation also states, "Outstanding opportunities exist for studying the consequences of different approaches to mitigating these conditions and restoring natural forest resilience." It is difficult to determine the risk to these stands "when we can't harvest some of the large White-fir." The degree to which risk could be reduced by harvesting some large white-fir would need to be compared to other options, including thinning smaller trees and/or reducing surface fuels by mechanical means or by prescribed burning.

Question 6. Dr. Perry suggested a good mix of management for old growth protection would be 30% old-growth reserves: 30% in mature forest (recruitment areas for old-growth); and 30% in production forest plantations to be managed. The most recent data we have on land allocations in the Pacific Northwest Forest Plan is 24.5 million acres. Of that approximately 66% of the land is in old-growth and mature forest reserves; approximately 4.2 million acres (17%) in Adaptive Management Areas and Riparian Reserves where harvesting is significantly restricted and about 4 million acres (16%) in the Matrix Lands but estimates are that about only 3 million of that is really been open to management.

Given Dr. Perry's recommendation what would Congress have to do increase the matrix lands up to the 7.35 million acres he is calling for?

Answer. It is difficult to tell from Dr. Perry's testimony whether he was actually recommending 7.35 million acres in matrix lands. We have tried to lay out more clearly the acres meeting the older stand definition used within the NWFP, within matrix/Adaptive Management Areas and Reserves of all kinds.

Using the 10 Year Monitoring Report for the NWFP, the following information may be helpful:

Forest-Capable Area		Distribution of acres by size class in 1996						Total NWFP	
		0-10"		10-20"		20"+ (meets def'n of older forest)		Million acres	% of total
Allocation	Reserve	Million acres	%	Million acres	%	Million acres	%	Million acres	% of total
	Reserve	7.3	39	4.8	26	6.5	35	18.6	80
	Matrix/AMA	2.0	43	1.3	28	1.4	30	4.7	20
	Total	9.3		6.1		7.9		23.3	
	% of total	40		26		34		100	% of total

Land allocation in the NWFP

There are approximately 23.3 million acres of forest-capable area in the NWFP

- 18.6 million acres (80% of forest-capable area) allocated to Reserves of all types (Administratively Withdrawn, Congressionally Reserved, Late Successional Reserves, Riparian Reserves)
- 4.7 million acres (20% of forest-capable area) allocated to Matrix or AMA

Distribution by size class in 1996

In 1996 there were 7.9 million acres (34% of NWFP) of forest 20"+ (meeting the older forest definition)

- 6.5 million acres in Reserves (35% of Reserves)
- 1.4 million acres in Matrix/AMA (30% of Matrix/AMA)

In 1996 there were 6.1 million acres (26% of NWFP) of forest 10-20" ("recruitment areas")

- 4.8 million acres in Reserves (26% of Reserves)
- 1.3 million acres in Matrix/AMA (28% of Matrix/AMA)

In 1996 there were 9.3 million acres (40% of NWFP) of forest 0-10" ("plantations")

- 7.3 million acres in Reserves (39% of Reserves)
- 2.0 million acres in Matrix/AMA (43% of Matrix/AMA)

Expected ingrowth

Based on rates reported in the NWFP 10-year report, older forest is increasing at a rate of about 19% per decade. Between 1996 and 2006,

- In Reserves, older forest increased about 1.5 million acres
- In Matrix/Riparian Reserves, older forest increased about 260,000 acres
- Most recruitment occurs from the 10-20" class into the 20"+ class (older forest)

Question 7. Several of the witnesses' testimony on carbon sequestration seemed to differ.

What is the Pacific Northwest Research Stations assessment of both Dr. Perry's and Ms. Spivak's testimony related to how much carbon is stored in wood products once a forest has been harvested, as well as on the relative ability of old growth forests to capture and store carbon compared to younger forests?

Answer. Finished forest products in the PNW contain about 20-35% of the carbon that was in the stand; Old forests may be either sinks or sources of carbon, depending on the year; Carbon storage is only one of myriad functions of forests on the landscape.

Wood is approximately 50% carbon, but only parts of the above-ground portion of trees, and none of the root systems or associated soil carbon end up in most wood products. In 125 year-old rapidly growing Douglas-fir, about 70% of stand carbon is in the live tree.¹ Based on studies of old Douglas-fir at the Wind River Experi-

¹Smith, J. E., L. S. Heath, K. E. Skog, and R. A. Birdsey. 2006. Methods for calculating forest ecosystem and harvested carbon with standard estimates for forest types of the United States. Gen. Tech. Rep. NE-343. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. 216 p.

mental Forest,² about 40% of stand carbon is in heartwood and sapwood. Given these numbers, it is likely that finished forest products from the Pacific Northwest contain somewhere between 20 and 35 percent of the total carbon in the harvested forest stand, including associated soils. Other parts of trees (e.g. bark, branches and tops) may offset emissions of fossil carbon if they are used, for example, to generate energy that displaces energy produced by oil, natural gas, or coal.

When a forest stand, regardless of age, is harvested, a large amount of carbon is released through decomposition of roots, branches, and needles and through disturbance of the soil. How much depends on the type of harvest, the amount of soil disturbance, and post-harvest management. Some of that carbon will be fixed again in the short-term, but much of it will reside in the atmosphere until existing vegetation and newly establishing stands can once again fix it.

Old forests store very large amounts of carbon, however, they are about carbon neutral^{3,4} over time—that is, the rate at which carbon is taken up and removed from the atmosphere by photosynthesis is mostly offset by the rate at which carbon is released to the atmosphere through respiration and decomposition. In some years it appears that old forests in the Pacific Northwest are carbon sinks, and in some years, carbon sources;⁵ mostly, old forests store carbon fixed over the life of the stand. That carbon will eventually be released to the atmosphere when old trees die and decompose or when the stand is replaced through natural disturbance such as fire.

Younger, rapidly growing forests take up more carbon from the atmosphere than do old forests: Depending on the year, a 40-year-old Douglas-fir stand took up 2 to 7 times the amount of carbon compared to a 450 year old stand on an area basis,⁶ but younger stands have not yet developed the massive carbon storage in large boles, snags, and downed logs that is present in old forest.

Carbon uptake and storage is only one of myriad functions of forests on the landscape. A distribution of forest ages is necessary to assure multiple ecosystem functions such as water management, wildlife habitat, and biodiversity.

RESPONSES OF MARVIN BROWN TO QUESTIONS FROM SENATOR BARRASSO

Question 1. How many acres of state forests do you manage in trust for counties and schools?

Answer. 781,615 acres.

Question 2. Do you manage to provide old growth values on State trust lands?

Answer. Yes.

Question 3. How many acres of state trust lands are virgin or old growth forest?

Answer. To my knowledge there are no significant acres that have not been either harvested, or wholly regenerated after a modern-day fire. There will be scattered acreages of 100 year old, plus, trees, but I would not equate these with the virgin stands that once existed in these parts of the State. We manage our lands under a long term plan that seeks to have 25% of the land provide “older forest structure” over time, but the actual location of the structure is expected to shift around on the landscape.

Question 4. How much of that is permanently preserved?

Answer. Timber harvest is not categorically forbidden on any of these acres. Perhaps 20% of the acres are located such that harvest is unlikely, as they may be inoperable land, a riparian zone, along a scenic corridor or intensive recreation area, etc.

Question 5. What percentage of Oregon’s state forests that you administer do you manage either intensively or extensively resulting in harvests for wood products?

Answer. Nearly all, but the 20% referenced above would probably only experience a harvest if there were a defined need related to forest health, critical wildlife habitat or human safety.

²Harmon, M. E., K. Bible, M. G. Ryan, D. C. Shaw, H. Chen, J. Klopatek, and X. Li. 2004. Production, respiration, and overall carbon balance in an old-growth *Pseudotsuga-Tsuga* forest ecosystem. *Ecosystems* 7: 498-512

³Field, C.B. and J. Kaduk. 2004. The Carbon Balance of an Old-growth Forest: Building across approaches. *Ecosystems* 7: 525-533

⁴Harmon, M. E., K. Bible, M. G. Ryan, D. C. Shaw, H. Chen, J. Klopatek, and X. Li. 2004. Production, respiration, and overall carbon balance in an old-growth *Pseudotsuga-Tsuga* forest ecosystem. *Ecosystems* 7: 498-512

⁵Ibid

⁶Chen, J., K. U, S. L. Ustin, T. H. Suchanek, B. J. Bond, K. D. Brososke, and M. Falk. 2004. Net ecosystem exchanges of carbon, water, and energy in young and old-growth Douglas-fir forests. *Ecosystems* 7: 534-544

Question 6a. I assume the public also visits Oregon state forests for recreation, solitude, etc. and that these needs are met in conjunction with other needs, such as timber management and older forest values. Is this correct?

Answer. Yes.

Question 6b. So you can manage for both recreation, wildlife and fishery values while also managing for timber production and older forest values?

Answer. Yes.

Question 7. Do some of the classic “old growth dependent” species that have driven much of land management in the PNW also reside on state lands under your management? How are they doing?

Answer. Yes. Northern Spotted Owls are experiencing declines similar to that found on federal lands. Marble Murrelets appear to be holding fine.

RESPONSE OF RANDI SPIVAK TO QUESTION FROM SENATOR WYDEN

1. Ms. Spivak, there were a number of statements made at the hearing regarding the carbon sequestration abilities of old growth forests, whether or not and how much carbon is emitted in logging and wildfires and how much carbon would ultimately be sequestered in a wood product. What is your understanding of the science on these issues?

Answer.

OLD-GROWTH FORESTS REMAIN EFFECTIVE CARBON SINKS

Senator Craig said that, “An old-growth tree is quite simply a tree that has matured and is starting to die. It might take 200 years for it to get there, but it is no longer the robust, active growing tree that it once was in its youth.” He went on to state that he is “very anxious to look at the science that says old growth does more than we thought it did, because I started looking at the science about 15 years ago, when we believed that young and active forests and their growth cycles sequestered a great deal more than older trees, and trees that had peaked and were if you will, just sustaining themselves.” Similarly, Senator Smith said, “It’s my understanding, that as we talk about global climate change and the ability of a tree to sequester carbon, that, and please tell me if I’m wrong, any of you, but I’m addressing this to Randi initially, that younger trees are much better at attractors of turning carbon into wood, and that as they die, they begin to emit carbon, is that, am I incorrect in that understanding.”

As Dr. David Perry mentioned during the hearing, the conventional wisdom that old-growth forests emit carbon and are no longer carbon sinks is a claim that is contradicted by recent research. For purposes of clarification, the term carbon sink refers to a carbon dioxide reservoir (e.g. forests, oceans) that is increasing in size, which is the opposite of a carbon dioxide source. In the case of forests, a forest is a carbon sink when it sequesters more carbon than it emits through respiration. Forests withdraw carbon from the atmosphere and incorporate it into biomass through photosynthesis as well as into their soils, and release carbon to the atmosphere through both plant and microbial respiration.

The following studies demonstrate how mature and old-growth forests remain effective carbon sinks in forest ecosystems around the world, including the Pacific Northwest, where the most rigorous studies have been done: Douglas-fir-western hemlock, Washington (Janisch and Harmon 2002; Harmon et al. 2004; Paw U et al. 2004) Oregon (Van Tuyl et al. 2005); Douglas-fir, Pacific Northwest, westside (Mills and Zhou 2003); ponderosa pine, central Oregon (Law et al. 2000; Law et al. 2001; Law et al. 2003); whitebark pine-subalpine fir, northern Rocky Mountains (Carey et al. 2001); spruce, central British Columbia (Fredeen et. 2005); spruce-hemlock-fir, aspen-birch, hardwood, Maine (Hollinger et al. 1999); northern hardwoods-conifer, New York (Keeton et al. 2007); hemlock-hardwood, upper Midwest (Desai etl al. 2005); eastern hemlock, Massachusetts (Hadley and Schedlbauer 2002); beech, central Germany (Knohl et al. 2003); Scots pine, Siberia (Wirth et al. 2002); Dahurian larch, Siberia (Schulze et al. 1999); multiple forests of various European countries (Valentini et al. 2000); and multiple forest types, worldwide (Lugo and Brown 1986; Buchmann and Schulze 1999; Law et al. 2002; Pregitzer and Euskirchen 2004).

The main reason that older forests remain effective carbon sinks is that they have much lower rates of respiration than younger forests. Additionally, old-growth forests, which store more carbon in the forest floor than younger forests, also release carbon from soil and litter at a slower pace than younger forests. The exhaustive Pregitzer and Euskirchen study (2004) showed that one of the reasons that older forests are effective carbon sinks is because their heterotrophic respiration, which is the sum of respiration from the litter (course woody debris) and soil carbon pools,

levels are lower than younger forests. Specifically, they found that the rates of heterotrophic soil respiration for temperate forests (similar to those of Western Pacific Northwest) range from $9.7 \text{ MgC ha}^{-1} \text{ yr}^{-1}$ in younger forests to $2.8 \text{ MgC ha}^{-1} \text{ yr}^{-1}$ in older forests—a decrease of roughly 346%. When you consider that “fluxes from soil are clearly the largest source of ecosystem respiration,” for instance accounting for roughly 70% of total ecosystem respiration in a ponderosa pine forest in central Oregon (Law et al. 1999), it is clear that soil respiration can dictate whether or not a forest is a net sink or a net source of carbon to the atmosphere. For example, on the dry eastern face of the Cascades, where trees grow slowly, replanted clear-cuts give off more CO₂ than they absorb for as much as 20 years (Law et al. 2001).

In addition to storing more aboveground carbon in trees and other vegetation, older forests also store more carbon in the forest floor than younger forests do. Pregitzer and Euskirchen (2004) found that mean and median organic soil horizon (forest floor) pool sizes increased with age in all major forest types—boreal, temperate and tropical forests, reaching a peak in the 71 to 120 or older age classes. This finding was echoed by Zhou et al.’s (2006) study that found that carbon stored in the top 20 centimeters of soil of an undisturbed old-growth forest in China increased 68% from 1979 to 2003.

Depending on the species of tree and the climate it is in, an old-growth tree is not necessarily “starting to die” as Senator Craig put it. Trees in the Pacific Northwest continue to grow for centuries, and if left undisturbed, will often live to be well over 500 years old and sometimes live in excess of 1,000 years. Second, there is no scientific basis for Senator Craig’s statement that “young and active forests and their growth cycles sequestered a great deal more than older trees.” Senator Craig appears to be confusing the term “carbon sequestration” with the term “carbon sink.” In terms of carbon sequestration, the amount of carbon sequestered in a forest is mostly a product of how much biomass is in the forest, and how long the forest has been undisturbed.

Regarding younger forests ability to be effective carbon sinks, it is important to distinguish between trees and forests. The key variable is not the rate of sequestration by a single tree, but the total amount of carbon stored by a forest. In all of the component pools within a forest (e.g. live trees, standing dead and down, soil, litter) growth of individual trees slows as they grow older, but when all pools of carbon stored in the forest are considered, carbon storage continues to increase in old forests. Pregitzer and Euskirchen’s 2004 exhaustive study of carbon cycling and storage in forest ecosystems around the world, which utilized a database of approximately 1200 entries, taken from 120 references, found that “living biomass carbon increased through time, peaking in the 71–120-year age class in boreal forests, but increasing steadily with age in temperate and tropical forests. The older age classes contained two to 10 times as much living biomass carbon as the youngest age class.”

FOREST FIRES AND CARBON EMISSIONS

Senator Craig also cited the amount of carbon released from forest fires, “This is a guesstimation, but a reasonable guesstimation, based on some pretty good minds. It was equivalent to taking 12 million passenger cars off the road. If that carbon had not been released, but had been retained inside the log, inside the tree, inside the grassland. Uh, now how do we compare that, well that’s like taking nearly all of the passenger cars off the roads of, off the highways of California.”

Senator Craig is correct that forest fires emit carbon dioxide to the atmosphere. However, it is misleading to look at a single event in time at a single point on the landscape and draw conclusions relating to the carbon consequences. A few points should be considered. First, the carbon dioxide released in a forest fire is carbon that has been cycling back and forth between forests and the atmosphere for millennia. Fire or decay releases carbon to the atmosphere, and regrowth ties it back down. Burning fossil fuels, by comparison, takes carbon out of geological deposits and adds this paleo, non-cycling carbon to the atmosphere, thereby causing a net increase in total ecosystem carbon.

“Natural forest disturbances, including fire, kill trees but remove very little of the total organic matter. Combustion rarely consumes more than 10 to 15 percent of the organic matter, even in stand-replacing fires, and often much less. Consequently much of the forest remains in live trees, standing dead trees, and logs on the ground.” (Franklin Agee 2003).

Live trees will continue to store carbon and dead trees will decay and slowly release carbon dioxide for tens of years. Regrowth after fires fixes carbon from the atmosphere reversing the emissions caused by fire over time. About 5-10 percent of the biomass consumed by wildfire is converted to charcoal, a uniquely stable form

of carbon, which, if mixed into mineral soil or washed into water bodies, may remain there for thousands of years. (DeLuca and Aplet 2008)

CARBON EMISSIONS: LOGGING VS. WILDFIRE

News stories in late 2007 highlighted findings that burning vegetation (including agricultural burning, prescribed fires and wildfires in both forest and non-forest vegetation) in the United States during 2002-2006 released carbon dioxide equivalent to 4-6 percent of all human-caused emissions, nationally (Wiedinmyer and Neff 2007). But when emissions associated with logging and processing of wood products (see calculations below) are compared with emissions from forest fires as reported by a 2007 EPA report (Smith and Heath 2007), emissions from logging are more than twice as much as wildfires. Estimates at smaller scales, for instance the state of Oregon, (Law et al. 2004; Turner et al. 2007) or Shasta County, California (Pearson et al. 2006) also indicate that annual emissions from logging and wood products production typically exceed those from fire.

CALCULATION OF CARBON EMISSIONS FROM FOREST FIRES

Wiedinmyer and Neff (2007) estimate average annual U.S. emissions from fire (all vegetation fire: agricultural burning, prescribed fire, wildland fire in forests, grasslands, chaparral and shrub-steppe) for 2002-2006 to be 293 Tg of CO₂, which, multiplied by .2727 (because only .2727 of the mass of CO₂ is from carbon) is equivalent to 79.9 Tg of carbon.

Smith and Heath (Smith and Heath 2007) provide estimates of CO₂ emissions from fire in U.S. forests, which average to 25.5 Tg of carbon for 2001-2005 as shown in Table 7-12 below. They also provide estimates of emissions of methane and nitrous oxide (also greenhouse gases) for 2005, which, when converted to equivalents of carbon, would bring the total to 29 Tg of carbon and carbon equivalents.

Table 7-12: Estimated Carbon Released from Forest Fires for U.S. Forests

Year	C Emitted (Tg/yr)
1990	21.1
1995	11.8
2000	41.7
2001	17.8
2002	30.9
2003	24.0
2004	20.6
2005	34.5

(From Smith and Heath 2007)

CALCULATION OF CARBON EMISSIONS FROM TIMBER HARVEST

The calculation starts with 191,629 thousand metric tons, the mean annual dry weight of roundwood (logs) removed from U.S. forests (Howard 2007) between 2001 and 2005. This figure needs to be adjusted to reflect the fact that more biomass is harvested in the forest than is removed as logs. Birdsey (1996, Table 1.8) provides figures for the ratio of total harvest to harvest removed for both hardwoods and softwoods, for different regions in the U.S. Averaging across hardwoods and softwoods and across regions yields an average ratio of 1.525, which yields a total harvest of 292,234 thousand metric tons of wood. Since this biomass is approximately 50% carbon, dividing by 2 yields 146,117 thousand metric tons of carbon. Multiplying this figure by 58% [the mid-point of the one-half to two-thirds estimate of total harvested biomass that is released at or near the time of harvest (EPA 2005)] yields 84,748 thousand metric tons, or 85 Tg of carbon emitted annually as a result of timber harvest and processing, not including emissions from forest products or fossil fuel emissions associated with harvest.

Wayburn et al. (2000) explains that, "on average, forest fires release roughly 10-20% of the carbon that harvest does in an old-growth stand and 5-10% of that in a second-growth stand" as shown in the graph* below.

The below table (Table 4) from the Turner et al. study (2007) shows the disparity between the amount of carbon released to the atmosphere because of harvest and the amount of carbon released to the atmosphere because of wildfire in the entire

* Graph has been retained in subcommittee files.

state of Oregon. The ratio of emissions from harvest to emissions from fire is roughly 30 to 1.

Table 4. Carbon fluxes for Oregon. Values are state-level five-year means and standard deviations for the period 1996–2000. Units are TgC yr^{-1} .

Flux	Mean	SD
Net ecosystem production	17.0	10.6
Timber harvest	5.9	0.3
Crop harvest	4.8	0.4
Fire emissions	0.2	0.2
NBP	6.1	10.2

(From Turner et al. 2007)

RESPONSES OF RANDI SPIVAK TO QUESTIONS FROM SENATOR BARRASSO

Question 2. Are you concerned with the fact that 5 times as many acres of old growth has burned as have been harvested?

Answer. American Lands is extremely concerned that mature and old-growth forests continue to be logged. The Western Oregon Plan Revision that proposes to increase old-growth logging by over 700% is a case in point. Logging mature and old-growth forests causes significant harm to forest ecosystems and the life support services that humans and wildlife depend upon from these forests. Logging mature and old growth also releases substantial amounts of carbon and can make forests more prone to uncharacteristic wildfires. Further, tree plantations tend to burn very hot. According to research from the Klamath Siskiyou region in Northern California, tree plantations experienced twice as much severe fire as multi-age forests (Odion et al. 2004).

Regarding wildfire, I would like to make the following points:

1. Natural disturbances, especially wildfires are essential ecological processes by which forests regulate and renew themselves, especially western forests. It is impossible, and not ecologically desirable to manage fire out of forests that have evolved with fire, including characteristic stand replacing fires, as natural starts will always occur. Wildfires reset the ecological clock for forests, watersheds and aquatic systems.

2. Past and current management on public forests has in some, but not all cases, severely altered forest structure, biodiversity, natural fire regimes and related ecosystem processes. More recently, climate change and drought have caused fire seasons to be longer, and fires in some areas to burn hotter than during historic conditions. In these instances, where there is a risk of uncharacteristic wildfire,¹ American Lands supports management practices—mechanical thinning, prescribed fire and wildland fire use—that can restore ecological integrity and resilience to forests and reduce unnatural fuel loads that can contribute to uncharacteristic wildfires.

3. Restoration needs of forests differ depending on the characteristic fire regime, Plant Association Group (PAG), and degree of ecosystem degradation from past and current management. Reintroduction of fire is the most effective method to restore ecosystem processes and resilience and maintain appropriate fuel levels. If it is determined that prescribed fire alone is not appropriate because fuel loads are unnaturally high, then thinning should be done as a pre-requisite to prescribed fire where soil health can be maintained. Prescribed fire should be used following thinning to burn highly flammable slash and brush that can actually increase fire risk and cause subsequent fires to burn uncharacteristically severe if left untreated. American Lands supports variable density thinning in young managed stands and thinning certain dry forest types where fire suppression and grazing has significantly altered natural fire regimes. Thinning should focus on removing small diameter material and ladder fuels.

¹Fire events of a severity that is well outside the historic range of variability based on site-specific vegetation reconstructions of stand age structure and fire history or early historic records. Adapted from Noss et al. (2006).

Question 3. From a silvicultural standpoint, do you think that the kinds of large and severe wildfire we've seen in recent years are more beneficial to advancing old growth forest than allowing thinning and harvesting activities to take place?

Answer. As noted above, American Lands supports management activities that can reduce inappropriate fuel loads and facilitate the onset of late-successional characteristics in certain forests. Attached for the record is a document, Management Principles for Protecting and Restoring Old Growth Habitat Washington, Oregon, and Northwestern California National Forests and Bureau of Land Management Holdings, spearheaded by American Lands that sets forth management principles supported by our organization.

It is important to stress, however, that tradeoffs should not be made that may reduce the risk of uncharacteristic fire but cause harm to other important long-term aspects of the forest that are vital to its health, most especially soils. Soils are the foundation of healthy productive forests now and in the future.

Specifically, thinning must not increase fire hazard by either leaving flammable logging slash and branches on the ground or by opening up stands so widely that the ground is exposed to drying sunlight. Increased sunlight results in rapid growth of plants, which act as ladder fuels for fire and increased winds resulting in increased fire severity. In order to reduce the risk of opening forest canopies too much, thinning needs to concentrate on smaller diameter material such as ladder fuels and surface fuels. Additionally, many wildlife species require large blocks of dense forest cover therefore canopy closure needs to be maintained.

Thinning is not a panacea. There are two situations in particular, where thinning is not likely to decrease fire severity: (1) where fire behavior is determined more by local weather such as high winds, hot temperatures and climate conditions rather than fuels, which may be increasingly the case with climate change; (2) where fire behavior is governed more by steep terrain and access is limited.

Question 4. If fires continue to consume 9 or 10 million acres per year or even at a faster rate, how does that advance the protection of the wildlife, watershed and other resource values your organization advocates for?

Answer. Short of clearing all trees from the landscape, logging will not stop fires nor will logging avert the causes or impacts of climate change. Forests have burned and will continue to burn. Ecological restoration of certain forests, including restoration thinning in previously managed forests combined with prescribed fire will move forests towards a more natural and fire tolerant state. Aggressive clearing of timber and biomass around homes in communities immediately adjacent to forest landscapes also will help protect investments and lives.

Currently, the Forest Service actively suppresses more than 85 percent of fires. Fires in natural, wild landscapes far from communities should be allowed to burn for the forest's long-term health. This will save taxpayer money and allow forests to adjust to a warming, more fire-prone climate.

Question 5. Let's say we come to an agreement on a definition or set of definitions for old growth and we then draw a line around the existing old growth, and that old growth gets blown down or burned up.

How should the Forest Service and the BLM handle that kind of situation?

Answer. Naturally recovering forests following disturbance events are some of the rarest forms across the landscape. These areas need to be allowed to recover on their own. Although people see wildland fires, wind and ice storms, and insect outbreaks as "catastrophes" affecting federal and nonfederal lands, over time, such events have in fact both created and helped sustain the character of many regional ecosystems.

Question 6. Should salvage harvesting be allowed or should they just walk away from the away and allow the material to rot?

Answer. As one prominent forest ecologist has put it, "Timber salvage is most appropriately viewed as a 'tax' on ecological recovery."

In answer to this question, the following summarizes testimony of Dr. James Karr, noted ecologist and professor emeritus at the University of Washington before the Senate Agriculture Subcommittee on Rural Revitalization, Conservation, Forest and Credit on August 2, 2006.

The first point that I would like to make is that logging after natural disturbances is not an ecosystem restoration tool. Such logging damages forest landscapes by limiting populations of species crucial to the maintenance of these landscapes and by impeding the natural processes that have long sustained these ecosystems. A substantial body of evidence (some dating from the early twentieth century) demonstrates that post disturbance logging impairs the ability of forest ecosystems to recover from natural disturbances (Frothingham 1924; Isaac and Meagher 1938; Beschta et al. 1995, 2004; McIver and Starr

2001; Karr et al. 2004; Lindenmayer et al. 2004; DellaSala et al. 2006; Donato et al. 2006; Foster and Orwig 2006; Hutto 2006; Lindenmayer and Noss 2006; Lindemayer and Ough 2006; Reeves et al. 2006; Schmiegelow et al. 2006).

Specifically, post disturbance logging prevents or slows natural recovery by slowing the establishment of plant and animal populations and degrading streams. Logging after natural disturbances damages terrestrial and aquatic systems, plant and animal communities, sensitive areas, and crucial regional resources such as soils. For example, the dramatic physical changes in forest structure resulting from hurricanes and insect infestations in New England do not disrupt biogeochemical cycles or degrade water quality, but post disturbance logging increases nitrogen loss and does degrade water quality (Foster and Orwig 2006). Post disturbance logging also threatens species listed under the Endangered Species Act and places more species at risk, making future listings a near certainty.

Damage from post disturbance logging may consist of direct effects from logging, such as increased mortality of tree and other seedlings, damage to soils, or destruction of key biological legacies (that is, intact understory vegetation, snags and logs, patches of undisturbed or partially disturbed forest; Lindenmayer and Noss 2006). Equally important are the indirect effects of activities associated with logging, such as more traffic on existing roads, development of new roads, spread of invasive species, further loss of biological legacies, and damaged soils as a result of burning of slash (the leaves, twigs, branches, and other organic material left after logging).

These observations are not mere points in an abstract scientific debate; they constitute an accumulation of on-the-ground evidence that logging after disturbances harms rather than helps the regeneration of forests. As one prominent forest ecologist has put it, "Timber salvage is most appropriately viewed as a 'tax' on ecological recovery."

The second point I wish to make is that recommendations exist for how to avoid damage from post disturbance treatments and how to speed recovery of both terrestrial and aquatic systems (Karr et al. 2004; Foster and Orwig 2006; Lindenmayer and Noss 2006; Reeves et al. 2006):

- Protect and restore watersheds before disturbance occurs, because healthy ecosystems sustained by natural processes are more resilient to natural disturbances. Such protection is far less expensive than post disturbance rehabilitation, which often brings new rounds of damage.
- Allow natural recovery to occur on its own, or intervene only in ways that promote natural recovery. For example, ensure that unburned and partially burned patches within the perimeter of a disturbed area are exempt from logging or subject only to low-intensity harvesting that leaves high levels of biological material behind.
- Retain old or large trees and other biological material because they provide habitat for many species, reduce soil erosion, aid soil formation, maintain desirable microclimates, and nourish streams.
- Protect soils because soils and soil productivity are irreplaceable on human time scales.
- Protect ecologically sensitive areas such as streamside, or riparian, corridors; roadless areas; and steep slopes because of their importance in maintaining local and regional biodiversity and protection of water quality and because physical and biological instability in these places often has repercussions that spread across landscapes. For example, after a disturbance, riparian areas should receive the same protection they received before the disturbance.
- Avoid creating new roads and landing zones (for logging by helicopter) in the disturbed landscape because they damage soils, help spread noxious weeds or pests, and alter ground and surface water relationships across the affected landscape; indeed, postdisturbance logging may affect a larger area or have a greater impact on forests than the disturbance itself (Frothingham 1924 and others cited by Foster and Orwig 2006).
- Limit reseeded and replanted, especially with nonnative species, which can impede native plant regeneration, or even with varieties of native species that may not be appropriate for local ecosystems.
- Do not place structures such as weirs, riprap, or artificially placed large wood in streams because their ecological benefits rarely outweigh the physical damage or expense of installing and maintaining them.

- Continue research, monitoring, and assessment that will improve our knowledge of post disturbance ecosystems, but do this in ways that do not ignore or distort established principles of forest and river ecology.
- Educate the public so that they recognize that fires, storms, or insects on landscapes are not always catastrophes but crucial components in the evolution and maintenance of ecosystems.

More than 500 scientists—from diverse disciplines, institutions, and geographic areas—have to date acknowledged the ecological merits of the recommendations I have outlined here, including the recommendations' broader applicability in ecosystems other than national forests and affected by disturbances other than fire.

The letter referred to by Dr. Karr is attached for the record.

Finally, I would like to clarify that what may be commonly regarded as rotting wood and therefore seen as a waste of timber, is actually one of nature's most important processes whereby organic matter decomposes from the action of bacteria or fungi. Decomposing wood and associated litter plays a vital role in returning nutrients to the forest floor, provides an energy base for the detritus food web, and contributes to the formation of soils.

Question 7. What if the fire was not started naturally or did not originate in the old growth stand?

Answer. From an ecological perspective, the origin of a fire does not change the fact that post-disturbance logging is damaging.

Question 8. Have you surveyed the membership of the American Forest Alliance to understand what their collective annual use of wood is?

Answer. First, the name of our organization is American Lands Alliance. Given our focus on forests, I could see how our name can be easily confused. Regarding surveying our membership for their collective wood use, no we have not done that. We are not against wood use. We are opposed to damaging logging practices that harm water quality, destroy wildlife habitat, degrade recreational opportunities, especially on public lands.

Question 9. Has your organization considered asking your members to reduce their use of forest product to help facilitate the protection of our federal forests by reducing the overall demand for forest products in this country? If not, why not?

Answer. We engage our membership in protection and restoration efforts on publicly owned forests and watersheds. But I think that is a great idea and will send out an alert to our network with your suggestion. Thank you.

I'm glad that you brought up the important point of reducing demand for forest products. I think you may find the following information on materials such as engineered wood that provide effective substitutes for old-growth wood very informative. May I suggest that you pass this onto Paul Beck at Herbert Lumber? These approaches could provide Herbert Lumber with a more viable business model than their current one that relies almost exclusively on logging the last of the remaining mature and old-growth forests. (Livingston 2004; 2006)

The United Nations' ECE/FAO Forest Products Annual Market Review in 2000 stated that manufacture and use of the world's Engineered Wood Products (EWPs) is expanding globally, with much of the impetus coming from the global need for efficient construction techniques, growing environmental concerns, and the universal requirement for affordable shelter.

There are numerous reports and sources, including from the U.S. Forest Service such as <http://www.fpl.fs.fed.us/documnts/techline/wood-flooring-made-from-forest-restoration-materials.pdf> that discuss how composite wood products made from small-diameter Douglas fir are just as strong as products made from old-growth Douglas fir and how (Burke and Draper 2003).

For example, laminated wood beams reduce large dimension lumber use because they are made of smaller sized lumber glued together to achieve longer and thicker dimensions with superior strength and can thereby replace large beams from old growth.

In your testimony you suggested only 15% of the carbon is stored in the wood products generated from the trees harvested from federal lands. But Dr. Perry estimated that it could be as high as 30%. Other research from the forest products industry and from federal research papers suggests that approximately 50% of the wood in a tree is carbon.

Question 10. Could you provide the Committee with the research citations to support your claim that only 15% of the carbon sequestered in forests is stored in the lumber from trees cut in our forests?

Answer. First, it is true that about half of the dry weight of wood is carbon. However, I was not referring to what percent of the wood in a tree is carbon, but rather

that wood products represent only a fraction of the carbon stored in forests and that the process of converting forests into wood products releases the vast majority of the stored carbon to the atmosphere.

In my testimony I said that only 15% of the carbon stored in forests ends up stored in wood products. This small fraction of carbon storage results from cumulative carbon emissions at each step in the logging, milling, manufacturing, and transporting of wood products. The carbon losses are related to logging waste known as slash, milling and manufacturing waste such as sawdust, and transportation and process emissions. This statistic comes from Figure 8 in Ingerson 2007 which in turn cites these two studies: Gower et al 2006 and Smith et al 2006.

The difference between Ingerson's 15% and Dr. Perry's 30% is because Figure 8 (below)* accounts for "process and transport emissions" by subtracting 17% of the carbon from the 32% found in wood products at the end of the manufacturing process. It makes sense to account for the carbon consequences of using fossil fuels to process and transport wood products.

The bottom line is that logging forests, milling and transporting wood products transfers to the atmosphere the majority of the carbon once stored in the forest. It is easy to conclude that carbon is stored more securely in forests than in wood products because forests can be long lived and continue to sequester carbon for long periods, while wood products represent only a fraction of the carbon in the forests they came from and wood products have relatively short useful life spans.

RESPONSES OF JOHN TAPPEINER TO QUESTIONS FROM SENATOR BARRASSO

Question 1. One of the witnesses today is advocating for full protection of mature trees and suggests that trees over 100 years in age are mature. In my state of Wyoming—and I am told in parts of both eastern Oregon and Washington—we have large stands of Lodge-pole pine and Ponderosa pine that regenerate in very thick and dense stands that have stagnated. The trees never grow large in diameter or very tall. We call them dog-hair stands.

If Congress were to adopt either an age limit or a definition that says the land managers should stay out of mature stands of timber, what would you recommend be done in these stands that have stagnated but are mature or over 100 years in age?

Answer. I think that there are many definitions of "mature." They are based mainly on the experience, values and orientation of the person using the term. It is applied to both trees and stands in a variety of ways. Mature may mean that the growth of merchantable volume is slowing down; or it may mean that a stand is habitat for a particular species of wildlife, or that the trees are a certain size. Western conifers can grow to very old ages and a wide range of sizes. There is no reason that a tree that is 100 or 200 years old should be considered "mature", when it may live 400 years or more. It is a difficult concept to apply without criteria based on species and local conditions.

To me "dog-hair" stands are so dense with conifers, and tree growth is so slow, that no self thinning occurs. Thus these stands remain "stagnated"—with little change in tree size and stand structure.

If the rule is not to cut trees defined as mature, then I do not see what could be done within the stand. There could be an attempt to protect these stands from fire by reducing fuels in stands around them. In many places dense stands of pine are susceptible to bark beetles. Often the larger trees are killed rather than the smaller ones. Of course the forest becomes very susceptible to fire after tree mortality from bark beetles.

Question 2. You mention that old-growth trees respond positively to the removal of competing trees. You mention that these trees are larger than 40 inches in diameter. How big were the trees that were removed in the studies that showed this? How old were they?

Answer. These studies reconstructed the effects of tree removal by BLM timber sales. They were not designed studies in which the number and sizes of trees were carefully controlled. We took advantage of sites where trees were removed from around old-growth trees about 20 to 50 yr previously to see how these old trees responded to tree removal. Trees removed varied in sizes and amounts. On some sites only a few big trees were left (about 10 to 20/ac) as shelterwood trees for regeneration of a new stand. On some sites big and small trees that were judged to be likely to die were removed. We wanted to see if removal damaged the remaining trees as evidenced by a reduction in their stem growth rates. We found, however that the

* Figure retained in subcommittee files.

stem area growth rates of many trees increased, indicating a positive effect of reduction in stand density. Others found similar results: (McDowell, N., J. R. Brooks, S. A. Fitzgerald, and B. J. Bond. 2003. Carbon isotope discrimination and growth response of old *Pinus ponderosa* trees to stand density reduction. *Plant Cell and Environment* 26:631-644.).

Question 2a. Does this suggest that a national, legislated limit on diameter or age is an appropriate prescription for all the old growth stands in the Pacific Northwest?

Answer. No. Flexibility is needed. Decisions regarding what trees to leave or to remove are best made case by case. In old-growth Douglas fir stands in western Oregon, practically no tree removal is needed to conserve these stands. There may be a few exceptions in fire prone sites at low elevations. In the pine and mixed conifer forest in southern and eastern Oregon considerable removal of trees of a wide range of species, sizes and ages is needed—again depending on conditions at a specific site. The work mentioned above suggests that removing trees from around old-growth trees need not damage them.

Question 3. If you were going to map all stands of old growth in the Pacific Northwest—or anywhere, for that matter—could you write a single prescription that could uniformly be applied to all of them in order to perpetuate old-growth characteristics?

Answer. Based on my answers to the questions above, no I could not. Forest stands are fairly complex. Some would need considerable work in and around them, others would need very little and other would need no treatments. What might be needed would depend on the conditions within the old-growth stands themselves as well the conditions in the stands around them. Variables like susceptibility to fire, insects, wind, etc., as well as expectations of local communities, protection of private lands, wildlife habitat, etc. etc. could all affect prescriptions from site to site.

Question 4. A majority of the current national forest plans in the Pacific Northwest contain a definition for old-growth stands that does not specify age. Are you familiar with this definition?—Since you state in your testimony that “age is not likely to provide a useful description” of old growth, what are your concerns with the current definition?

Answer. I am not familiar with definitions other than those reported by the PNW Research Station. Those deal mainly with Douglas-fir/hemlock forests. I am not familiar with definitions for mixed conifer, lodgepole, etc. The definitions that I am familiar with do not take into account variability within a stand, nor the area over which old-growth conditions might occur. The definitions mainly describe average values per acre. Questions like what is an acceptable condition for an old-growth forest treated to reduce fire susceptibility are not addressed, to my knowledge.

[Responses to the following questions were not received at the time the hearing went to press:]

QUESTIONS FOR JAMES CASWELL FROM SENATOR WYDEN

Question 1. Mr. Caswell, your testimony states:

In 1950, the standing volume on the O&C lands was greater than 50 billion board feet (BBF). Fifty years later, after selling 45 BBF, the standing volume is now 70 BBF due to better information, in-growth and rapid reforestation of harvested lands.

You seem to be saying that in 50 years BLM removed 90% of the standing volume it started with in 1950 and still has 40% more standing volume. By this measurement, if no logging had occurred, the standing volume on the O&C lands would have more than doubled in 50 years. Can you please provide a detailed summary of your calculations for these numbers? Its my understanding that in the mid-90s the BLM changed its commercial inventory and utilization standards a number of times - trending toward a decrease in the minimum tree diameter at breast height to qualify for inventory as commercial timber and a greater allowance for defects - do your calculations account for those changes?

Question 2. Turning more specifically to old growth, can you give your agency's estimate of what the change in standing acreage of old growth has been between 1950 and today? And please indicate how you are defining old growth in coming up with these answers.

QUESTIONS FOR JAMES CASWELL FROM SENATOR BARRASSO

Question 3. I know you spent a lot of time as a forest supervisor in Idaho and I know you understand how many acres have burned in Oregon as well as in Idaho that once contained older forests. In your estimation, which is the greater threat today to old growth stands, fires or timber harvesting? And why?

In past hearings some witnesses have spoken about protecting old growth trees, some have discussed using an age or a diameter limit as the criteria for what must be protected. If I recall, the federal agency still uses a diameter limit on their lands in eastern Oregon and Washington.

Question 1. Can you tell me how that diameter limit has worked out for the Bureau of Land Management? Does it make sense to try and define individual trees as old-growth and then protect our forest on an individual tree basis?

Question 2. Would that protect old-growth stands in a way that you think is appropriate for old-growth stands or habitat?

Question 3. If Congress were to impose a no-harvest restriction on all trees within old-growth stands, wouldn't the risk of crown fires destroying old-growth stands increase?—particularly on dry sites east of the Cascade Range?—and even the south facing slopes in the west-side forests of Oregon?

Question 4. Are you familiar with the moratorium on harvesting in the Giant Sequoia stands in California? If so at what risk are we putting those stands when we can't harvest some of the large White-fir trees that now provide potential fuel ladders that could put the Giant Sequoia at risk if we do have fires in the Giant Sequoia stands?

Dr. Perry suggested a good mix of management for old growth protection would be 30% old-growth reserves: 30% in mature forest (recruitment areas for old-growth); and 30% in production forest plantations to be managed. The most recent data we have on land allocations in the Pacific Northwest Forest Plan is 24.5 million acres. Of that approximately 66% of the land is in old-growth and mature forest reserves; approximately 4.2 million acres (17%) in Adaptive Management Areas and Riparian Reserves where harvesting is significantly restricted and about 4 million acres (16%) in the Matrix Lands but estimates are that about only 3 million of that is really been open to management.

Question 4. Given Dr. Perry's recommendation what would Congress have to do increase the matrix lands up to the 7.35 million acres he is calling for?

Several of the witnesses' testimony on carbon sequestration seemed to differ.

Question 5. What is the Bureau of Land Management's assessment of both Dr. Perry's and Ms. Spivak's testimony related to how much carbon is stored in wood products once a forest has been harvested, as well as on the relative ability of old growth forests to capture and store carbon compared to younger forests?