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Before
House Resources
Forest and Forest Health Subcommittee
Concerning
Restoring Forests After Catastrophic Events
July 15, 2004

Mr. Chairman and members of the Subcommittee, thank you for the opportunity to discuss with you the important topic of restoring forests after catastrophic events.

Background
Catastrophic events such as wildfire, hurricanes, tornados and other wind events, ice storms, insect infections and disease, and invasive species impact millions of acres of forests annually across the United States and the rest of the world. When these events occur on National Forest System lands, the need for restoration is determined by ecosystem characteristics, by economic, social, and ecological values at risk, and by land management objectives as described in the applicable Forest Plan. Forests, in the long term, are adapted to recover from such events, although recovery may take tens to hundreds of years and sometimes result in modifications to forest type. Therefore, management objectives, which address all these considerations and reflect research findings, are the critical factors in determining the amount, type, and location of restoration treatments. Many disturbed areas should be, and are, left to recover naturally, but there are times when restoration or other management activities including the commercial removal of dead and dying trees is the appropriate and responsible thing to do.

Because wildfire is a recurring and frequent force in North American forests, we will focus on restoration after fire. Wildfire is one of the most complex events that impact forests.

Ecological impacts of fire vary with forest type, stand density, fuel loading, fire intensity, slope and soil characteristics, and weather conditions. Shrubs, stimulated to sprout or germinate after fire, may prevent establishment or suppress growth of forest regeneration on some dry and mid-elevation sites. Changes in species composition and structure after fires may make these areas more susceptible to future fire and may not meet long term objectives for an area for wildlife, recreation and other resources. Severe fires may increase the susceptibility to invasion by exotic grasses and other undesirable plant species. Steep slopes and sites with water-repellant soils may lose surface soils to erosion, causing streams and reservoirs to become silted. This accelerated erosion, combined with the increased runoff typical of burned sites can cause channel erosion, loss of fish habitat, and downstream flooding or debris flows. In these situations management to restore or speed recovery would likely be appropriate.

Emergency Stabilization, Rehabilitation, and Restoration

Restoring forested ecosystems following a large scale disturbance typically involves three stages: emergency stabilization, usually completed in the year following the event to prevent threats to life, property, and further damage to watersheds; rehabilitation of key resources affected by the disturbance and unlikely to recover without human intervention; and longer term forest restoration which includes reforestation and other treatments needed to restore functioning ecosystems; and that span many years. All of these stages are completed consistent with the direction contained in individual forest plans. Research and tools developed by scientists provide important methods of evaluating what needs to be done and the effectiveness of emergency stabilization, rehabilitation, and restoration.

After a catastrophic event, our first priority is public health and safety. Our goal as land managers is to take the steps needed to stabilize and restore the resource to meet the desired condition of the resource using treatments that are based upon sound ecosystem restoration science. Emergency stabilization treatments are conducted through the Burned Area Emergency Response (BAER) program. Treatments vary based on values at risk and the probability of protecting those values. The nature of the treatment is based on severity of the fire, the slope, soils, ecotype, and post fire weather conditions. Because we fund emergency stabilization with emergency wildland fire funding, we require that treatment measures provide essential and proven protection at minimum cost in order to qualify for funding.

Over the past three years we have developed the capacity to use satellite imagery to assess burn severity on most large fires on National Forest System lands. Maps are derived and supplied to managers who must decide where to treat and how much area needs treatment. Forest Service and United States Geological Survey scientists have developed an integrated system called FIREMON for determining and implementing appropriate methods for quantifying and monitoring effects and severity of wildland fire.

For example, the bare soils of a severely burned forest may be susceptible to invasive, non-native species which compete with native species, limiting growth and productivity of desired vegetation. Treatments would be designed to prevent the establishment of invasive species based on severity of the burn, soil condition, and anticipated invasive species.

Our researchers are currently working with managers to improve a prototype computer tool that considers soils, vegetation, terrain, burn severity, and climate characteristics to estimate sedimentation that might be expected after fire, and how much erosion might be reduced by various treatments. Results are expressed in terms that allow managers to assess the uncertainty associated with future climatic events. This computer model summarizes a vast quantity of data into a form that managers can use to design effective treatment regimes.

Information developed by researchers helps manager determine appropriate treatments. For example, the 2003 Myrtle Creek Fire heavily burned the municipal watershed for the City of Bonner’s Ferry, Idaho. The steep slopes, granitic soils and typically heavy rain falls made erosion likely. To prevent heavy sedimentation of the City’s water supply, the watershed was seeded with non-persistent grasses. In comparison, the Southern California fires burned the area surrounding the Silverwood Lake, a major distribution point for the Southern California water supply. Because of the Santa Ana winds and the seasonal distribution of rains, seeding likely would not have been effective in preventing sedimentation in Silverwood Lake. Instead, mulch was placed to slow the run off and reduce erosion. The differing treatments were equally effective in preventing sedimentation.

Last year over 1.4 million acres of National Forest System land burned. Emergency stabilization treatments were carried out on 78,317 burned acres. There were also 1,474 miles of road and trail stabilization and stream rehabilitation. We also completed 2,170 projects that cannot be measured in acres or miles, such as culvert replacements, hazard warning signs and early warning systems to warn residents of impending floods.

Rehabilitation focuses on the lands unlikely to recover from fire through natural processes. The goal is to produce a more intact ecosystem that meets management objectives for fire and disease resistance, tree type, regeneration, and fish and wildlife habitat in a manner appropriate to the site and the impacts of each particular fire. These activities are carried out using the best available science to maximize benefits and minimize negative impacts of treatments.

Tools for Long Term Restoration

On many acres, natural processes may foster recovery at a pace that is entirely sufficient to satisfy land management objectives without human intervention. We conduct vegetative treatments in those locations where this is not the case, and where we can help expedite the recovery process through carefully planned and conducted activities that may also recover value from these areas through various actions, including timber salvage operations.

Longer term restoration goals are achieved through the application of prescriptions designed to achieve long term objectives for the land. I will focus on two types of prescriptions today: the removal of trees affected by the disturbance event and those designed to facilitate reforestation.

Restoration Tree Removal

We remove trees following catastrophic disturbances for both ecological and economic reasons. Prescriptions are developed following catastrophic events to achieve specific land management objectives. For example, prescriptions to achieve wildlife habitat objectives have become increasingly commonplace on the national forests, particularly for late-seral dependent wildlife species. The retention of snags, coarse woody material, and other features are beneficial to these species and to the ecosystem as a whole. Other harvest prescriptions are designed to couple the objective of leaving large tree structures in place, while removing other dead and dying trees, to expedite the establishment of a new forest.

There will be other situations where removing dead and dying trees is primarily for economic and social benefits. If we can get some of these trees out of the woods in a timely manner they still have commercial value. Timber salvage operations can provide jobs in the woods and in the mills of nearby communities. If these trees are processed before they deteriorate too much, forest products for the American economy can be the end result. Purchaser deposits generated from salvage sales may also be used to complete the renewable resource work needed to restore these project areas through reforestation treatments.

The removal of dead trees must be done promptly if economic benefits are to be derived because deterioration begins immediately after death. Steve Eubanks will share his experiences connected to the cost of delayed implementation, shortly.

In fiscal year 2003, salvage treatments were conducted on 49,000 acres following fire, insect infestations, and disease or about 22 percent of the total area where commercial harvesting was done on the national forests (224,000 acres).

Reforestation

Immediately following a disturbance event, a preliminary diagnosis is made to determine the areas that will require reforestation treatment to restore forest cover. This diagnosis is generally made by a silviculturist. Within one year of the disturbance event, a detailed prescription with specific sequence of treatments is developed. These prescriptions provide direction to restore these lands to a forested condition consistent with the land management plan.

We annually tabulate these treatment needs by national forest and include them in the Reforestation Needs report submitted to Congress as required in the Forest and Rangeland Renewable Resources Planning Act of 1974. Our most recent report compiled as of the end of Fiscal Year 2003 identifies reforestation needs of approximately 899,000 acres service-wide. Approximately two-thirds of these needs have arisen from wildfires.

Reforestation treatments may or may not involve tree planting. Natural regeneration may be entirely sufficient to achieve resource objectives. For example, in fiscal year 2003, reforestation treatments were completed on about 160,000 acres. Of this total, the Forest Service planted about 76,000 acres and seeded about 5,000 acres. The remaining 79,000 acres regenerated naturally. Each of these practices is carried out in a manner that will restore native tree species to the treatment area.

The silvicultural prescription provides direction for how many young trees must be reestablished, the proper mix of vegetation, and the target structure and composition for the reforested area. The desired future condition may be a structurally complex conifer dominated forest to provide habitat for the Northern Spotted Owl on a national forest in the Pacific Northwest, the development of cover in key winter range for black-tailed deer or myriad other possible combinations representing the spectrum of resource benefits embodied by our national forests.

One of the most useful collaborative products emerging from Forest Service research and our National Forests Systems applications group has been the Forest Vegetation Simulator and the Fire and Fuels Extension to this tool. This model enables resource managers to visualize and project through time the development of reforested areas following wildfires and treatments.

Science and Restoration

In their paper titled "Environmental Effects of Post-Fire Logging: Literature Review and Annotated Bibliography", Forest Service research scientists, McIver and Starr reviewed the existing body of scientific literature on logging following wildfire. Twentyone post fire logging studies were reviewed and interpreted. McIver and Starr concluded that while the practice of salvage logging after fires is controversial the debate is carried on without the benefit of much scientific information. They also concluded that the immediate environmental effects of post fire logging is extremely variable and dependent on a wide variety of factors such as the severity of the burn, slope, soil texture and composition, the presence or building of roads, types of logging methods, and post-fire weather conditions.

We realize that there are gaps in what we know about post-fire restoration and we are working hard to fill those gaps. Forest Service researchers, in collaboration with other scientists, are working to increase our knowledge of how ecosystems respond to fires and how management actions can affect desired outcomes. For example, there are as many as ten different research studies within the Biscuit Fire Recovery Project.

Our research program is focused on improving our ability to understand and implement restoration and rehabilitation actions. For example, research has studied the interactions of undesired, invasive species and fire, use of native plant materials in rehabilitation and restoration, and watershed responses in terms of nutrients and sediment loading.

We have established comprehensive studies to examine the variability of watershed response and treatment effectiveness. For example, we have established a network in six western states to examine variability of post-fire erosion and effectiveness of emergency rehabilitation treatments such as contour felled logs, mulches and straw wattles. Included are watersheds in the 2002 Hayman Fire in Colorado and the 2004 Cedar Fire in southern California.

Several research publications related to rehabilitation and restoration are available to all and are in general use. A series of recent publications synthesizes the science related to fire effects on flora, fauna, and air. These documents are useful in understanding how fire affects ecosystems including important post-fire plant regeneration information. The computerized Fire Effects Information System, available online, contains species and vegetation community specific summaries of what is known regarding fire effects and interactions.

In April 2003, the General Accounting Office recommended that the Forest Service and the Department of the Interior specify methods to monitor the effectiveness of emergency stabilization and rehabilitation treatments after wildfires and develop a system to disseminate monitoring results. The Wildland Fire Leadership Council chartered the National Burned Area Emergency Response Coordinators Group and assigned the group to take action on the GAO recommendations. The group has identified the major treatments and is establishing teams to identify protocols for monitoring these treatments. An additional team is being established to develop methods to disseminate the monitoring results for use in management decisions.

Tahoe Experience

During the fire season of 2001, several major fires occurred on the Tahoe National Forest including the Gap and Red Star Fires. I want to share with the committee my experience with some of the issues faced in planning and implementing restoration projects after these fires, particularly impacts of delaying the implementation of salvage and restoration activities.

First, let me provide some perspectives on what it is that we are trying to achieve as we restore forest resources to the areas impacted by the Gap and Red Star fires. In terms of our management direction, most of the fire area was in a Land Management Plan allocation (Sierra Nevada Forest Plan Amendment) that emphasizes perpetuation of mixed conifer forest conditions in support of late-seral dependent species. Our management actions would thus be directed at re-establishing these structural and compositional elements on the landscape at the soonest practicable time.

The focus of Gap and Red Star Fires' proposed restoration work was only on high intensity fire areas where mortality exceeded 75% (due to provisions of the Sierra Nevada Forest Plan Amendment). The area planned for treatment was 737 acres on the Gap Fire and 1038 acres on the Red Star Fire.

Post-fire restoration projects typically include extensive environmental analysis and documentation intended to respond to the anticipated challenges of administrative appeals and formal litigation. The Gap Fire

Restoration Environmental Assessment for the areas on the Tahoe NF was completed and a decision signed by June 2002, ten months after the fire, and operations began in October 2002 after the administrative appeal process was completed. The Red Star Restoration Project's Record of Decision was approved in November 2002, more than one year after the fire. After appeals were completed, work began in the non-roadless portion of the project in June of 2003. Most of the areas burned on private land were treated without comparable environmental analysis or public participation, by the end of November 2001.

Normally, trees 10 inches in size and larger may have commercial value. By the time operations actually began in the Gap Fire and Red Star Fire restoration work, deterioration was significant within smaller trees, and their value was no longer high enough to pay for their removal. Deterioration was less significant only on larger trees. Therefore, the minimum size of trees removed had to be increased to approximately 18 inches. As a result, many fewer trees were removed when the project was conducted. This in turn meant there was less monetary return to the Treasury from the timber sales: reductions in the returns to the taxpayer were over $1.3 million for the Gap Fire area and nearly $4 million for the Red Star Fire area.

Beyond the economic costs I have outlined, there is an ecological cost that we must also weigh. The Red Star and Gap Fire areas occur within a fire regime that experiences a frequent fire return interval (30-35 years). By delaying treating in these areas, the trees that were killed by the fire may remain standing for a decade or perhaps two, but they will eventually fall to the ground and create a very significant dead fuel component that, with subsequent wildfire events, could consume the young stand that becomes established within these areas.

Through active management in some forest types, we can accelerate by many decades the development of large tree structure and we can better protect the replacement forest. By letting nature take its course for these projects, we run the risk of delaying or not achieving these objectives.

Summary

Mr. Chairman, post-catastrophic forest restoration is a complex process which begins almost immediately following a destructive event. Forest Service research works with managers to develop tools and information that these managers need to do their jobs better. Forest Service managers strive to use the best science available in their decision making. We realize there are questions still to be answered about the effects of our restoration activities, and we are working to find these answers. We also know that we would not be responsible stewards if we waited to satisfy all uncertainties before proceeding with our work.

We appreciate your willingness to listen to us today and look forward to your support for active forest management based on the best available science. This concludes our testimony. We will be glad to answer your questions.