WE WILL NOT WAIT: WHY PRESCRIBED FIRE MUST BE IMPLEMENTED ON THE BOISE NATIONAL FOREST

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ABSTRACT

Understanding ecosystem dynamics is important for the successful restoration of fire-excluded ponderosa pine (*Pinus ponderosa*) stands on the Boise National Forest. It is important that such management and restoration actions be undertaken on the Boise National Forest immediately, and that such actions be based on working hypotheses. Management strategies can be modified as hypotheses are supported or refuted. Silvicultural treatments, such as thinning, prescribed burning, and reforestation, can simulate disturbance regimes that have influenced these forests for over 10,000 years. Forest managers will never have sufficient information to make fully informed management decisions. However, we currently have adequate information on criteria such as fire-return intervals and appropriate stand structure, to use as a basis for initiating restoration efforts on large areas of ponderosa pine stands that have been fire-excluded on the Boise National Forest.

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INTRODUCTION

University of Idaho professor Richard Adams told the Idaho Senate Resources and Environment Committee on February 19, 1996, that Idaho's forests will "turn over, one way or another." Major disturbances such as epidemic insect attacks, widespread disease, and large, stand-replacing fires, will "recycle" the forested landscape. People can make decisions to mimic such disturbances, through silviculture, prescribed fire or by using combinations of management and natural disturbances.

Leon Neuenschwander, University of Idaho fire ecologist, and Deirdre Dether, Boise National Forest fire ecologist, told us, "The stakes are high, time is short . . . the task is huge . . ." but that "there is still hope if [we] act now." Without management intervention, it is highly probable that, in 20 years, the remaining ponderosa pine ecosystem on the Boise National Forest may be eliminated by large-scale, stand-replacing fires. Long-term fire exclusion has shifted the fire regime from the historic one that was predominantly frequent, low-intensity understory fires, to one that in now characterized by high-intensity, stand-replacing fires.

Why are these people worried? Because during just one spectacular decade of drought and fire, Idaho's ponderosa pine ecosystem has burned at an alarming rate. More than 600,000 acres (242,817 hectares) have burned on the 2.3 million acre (930,797 hectare) Boise National Forest since 1986. Forest habitats for dozens of terrestrial and aquatic species have been eliminated as a function of high-intensity, stand-replacing fires.

THE PROBLEM—TOO MANY OF THE WRONG TREES

Many of today's tree stands on the Boise National Forest are composed of an unsustainable combination of tree species, densities, and structure. These stands are at the extreme end, or outside, their historical range of variability (HRV) (Figure 1). HRV can be defined by forest conditions that likely existed prior to 1870.

During the past 90 years, the forest has been transformed from one largely dominated by ponderosa pine, to one dominated by firs (*Abies and Pseudotsuga*) that are less resistant to insect epidemics and wildfires. The original forest was sustainable, the current forest is not. Researchers at the University of Idaho have recently completed an extensive review of forest conditions in Idaho. Ponderosa pine and western white pine are in decline, and firs are increasing (Figure 2). Continuation of current conditions and risks of increasing insect and disease epidemics and large lethal fires will almost certainly increase the likelihood of damage to these forests.

Data from the Boise Basin indicate that current conditions in the dry ponderosa pine ecosystem are significantly different from the successional and disturbance processes that occurred before European settlement. This departure from the native system has resulted from roads, extensive livestock grazing, forest management practices, changes in landscape vegetation and structure, changes in the fire regime including the end of Native American fires, and the introduction of exotic plants and diseases. These changes have decreased productivity, increased the probability of unexpected and unacceptably severe disturbance events, and resulted in habitats that differ from those in which native wildlife species evolved.

NEW INFORMATION

The cumulative impacts of land use practices such as fire exclusion, timber harvest, pest suppression, livestock use, and road construction have affected nat-

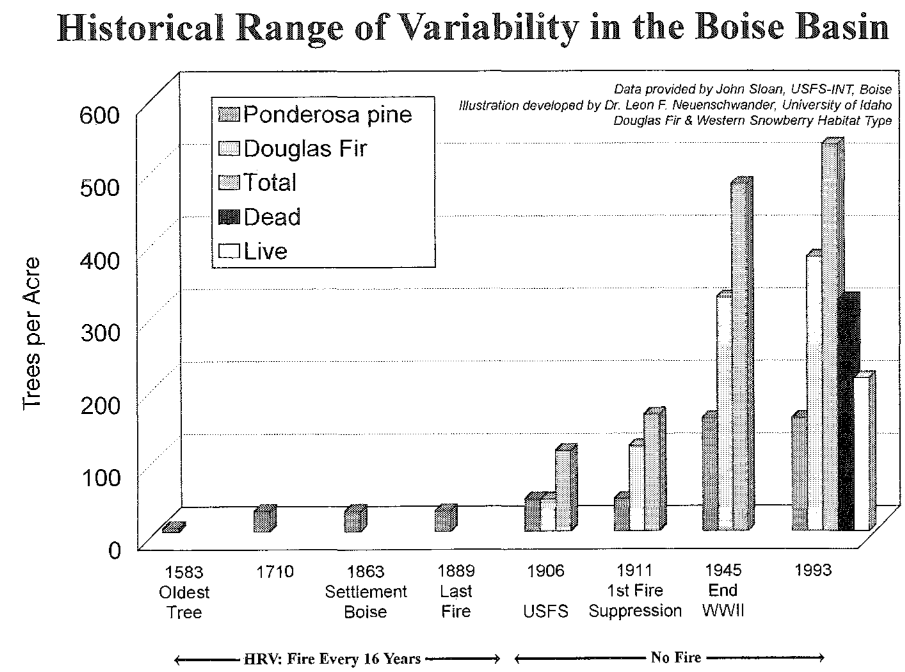

Fig. 1. Range of variation in stand structure in the Boise Basin, 1583–1993. Data provided by John Sloan.

ural resource conditions in ways that were previously not understood. While these conditions have evolved over many decades as a result of the interaction between human activity and naturally occurring events, new knowledge and understanding of their implications for long-term ecosystem health are only now coming to light.

THE STRATEGY

Starting in 1978, insect activity showed sharp increases on the Boise National Forest. The Forest Service responded by treating the symptoms (dead trees) with salvage harvesting and a minimally effective program of prescribed fire. The insect activity continued, and large crown fires replaced the expected fire regime of the past (Figure 3). The rain never came. We knew removing dead trees would not cure the problem. We knew we had to approach the problem with a strategy that made sense and could succeed.

During 1991, in the wake of over 400,000 trees killed by insects, we launched a three-part forest health strategy, focusing on: 1) salvaging dead or dying trees to recover the economic value and provide minor forest health benefits (reduce fuels, plant trees); 2) thinning green stands from below using silviculture and prescribed fire to reduce tree densities and to increase the use of prescribed fire to treat fuel accumulation; and 3) collecting and sharing information on forest health.

While we can argue that, "You can't see the forest without the trees," it is evident that forest ecosystem health is about more than just trees. The Boise National Forest staff focused on forest ecosystem health and began to aggressively pursue management strategies with a variety of partners, beginning with a policy analysis of forest health issues.

After extensive review and debate from a wide spectrum of partners we now have a forest ecosystem health strategy to restore or maintain (or make a decision not to restore) forest ecosystem health. The first part, salvaging dead or dying trees, is our short-term strategy. We are focusing our efforts on what needs to be done for a properly functioning ecosystem. Trees that are not needed to meet those goals can be removed as salvage. The second part of the strategy is to get ahead of the problem by reducing tree densities and lush undergrowth back to manageable levels. Long-term measures will be taken, such as thinning from below, and application of prescribed fire. The third part of the strategy is collecting and sharing information about how ecosystems function. Information on fire frequency, intensity, and severity demonstrated that changed fire regimes are the primary independent factors contributing to the crisis. Studies about the expected historical range of variability of ecosystem dynamics in central Idaho demonstrated that current species composition and stand density are significantly different than they were before settlement. Research information dramatically demonstrated the increase in Douglas-fir (*Pseudotsuga menziesii*) trees and subsequent mortality caused by drought in the dry Douglas-fir habitat types in the Boise Basin (Figure 1). Similarly alarming results across the West are becoming manifest in, for example, severe early season fires in the Southwest and large lethal fires in the Wenatchee, Washington area.

Our ponderosa pine stands have too many of the wrong trees growing in the understory, a condition that did not occur historically. This situation leads to wild-

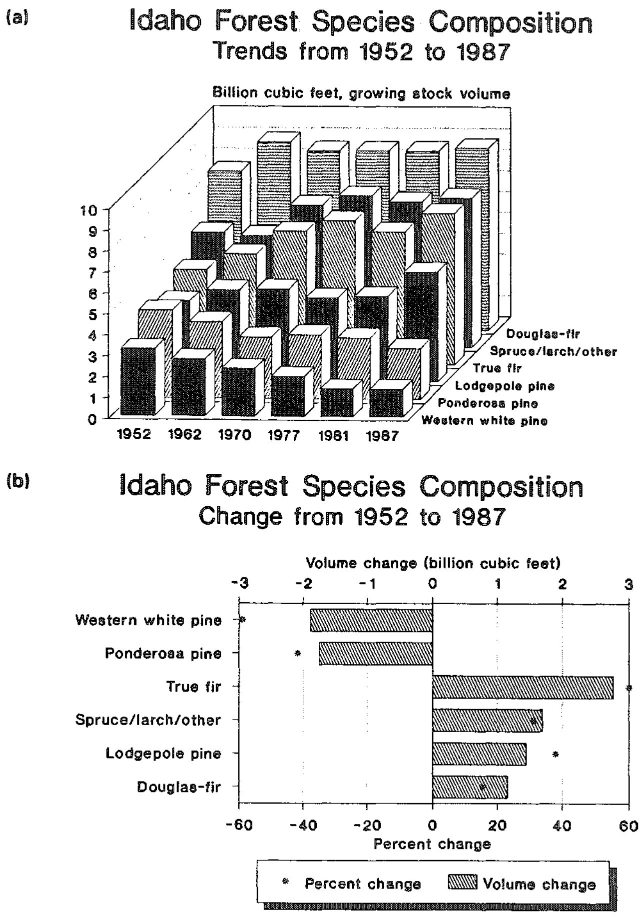

Fig. 2. Changes in Idaho forest species composition: 1952–1987. Data from USDA Forest Service.

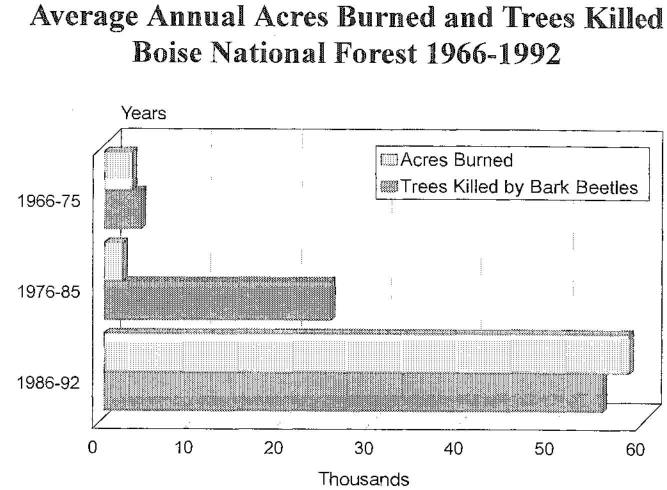

Fig. 3. Average acres burned and number of trees killed on the Boise National Forest, 1966–1992.

fires that burn hotter, more severely, and with greater intensity than fires in the past.

As land managers, we need to understand the disturbance regimes that regulate ecosystems and cycle nutrients. We must recognize that one size does not fit all, that management options in the ponderosa pine forest cover types may not be appropriate in the spruce-fir or cedar-hemlock types. Gathering and sharing information on disturbance regimes for all forest cover types will guide us toward ecosystem management at the landscape level. Direct action is needed now to maintain the ponderosa pine ecosystem.

THE TREATMENTS

Frequent, low-intensity ground fires were the historical norm in the dry ponderosa pine ecosystem. In the past ten years, our fire regime has become one of huge crown fires of unprecedented size, severity, and intensity. We know ways to reduce the risk and help sustain these ecosystems. Do we have the courage to use this knowledge now? The answer is yes. The Tiger Creek area was commercially thinned and shelterwood harvested in the late 1980's and early 1990's. A fuels-reducing prescribed burn was completed in March of 1992.

During the August 1992 Foothills fire, flames swept through the crowns of the trees, over Lava Mountain, and approached Tiger Creek. Tens of thousands of acres of mature pine and fir trees were killed in this fire storm. When the fire hit the Tiger Creek area, it changed from a crown fire to a ground fire. In the previously treated area where tree density and fuel loading were reduced by logging, thinning, and prescribed fire, the mature trees lived and firefighters were able to stop the spread of the fire on that flank. Other heavily stocked areas in the vicinity of Rattlesnake and Sheep Creek were burned so severely that few trees of any age class lived.

A prescribed fire in Cottonwood Creek burned 1,000 acres (405 hectares) in a low-intensity ground fire in April 1994. The area was previously prescribed burned in the early 1980's. The Star Gulch wildfire on August 19, 1994, just four months later, burned across the area of the prescribed fire and quickly covered 30,000 acres (12,146 hectares), some of it in untreated state, private, and federal lands next to the prescribed fire. The untreated lands were severely burned and most of the trees were killed. Incredibly, a 14 foot wide (4.27 meters) road was all that separated the prescribed fire from the wildfire on the west and northern flanks. In most instances, even directly next to the road, the trees within the prescribed burn are alive and the trees in the untreated areas are dead. The area in Cottonwood Creek has been designated for environmental education, and future study of fire effects.

Cottonwood and Tiger Creek provide evidence that managers can reduce the risk of large crown fires by using appropriate management tools. Next, we needed to know where the risks are greatest so prescribed fire and thinning can be applied in time. A mid-scale (forest level) hazard and risk assessment has provided good information to begin the tasks and take the actions that will ensure resilient, sustainable ecosystems.

THE HAZARD/RISK ASSESSMENT

The assessment is fire-based because wildfires burning outside their historical range of variability

(HRV) directly affect all other resources. The assessment estimates areas where large wildfires burning outside HRV will result in high levels of erosion, increased risk of extinction of important fish species, and elimination of late-successional habitat needed by old growth-dependent and other wildlife species.

Satellite imagery was used to determine forest cover types where ponderosa pine is, or once was, a major seral species, and to assess current vegetation densities compared to historical densities. Moderate- and high-hazard subwatersheds are those where 25% or more of the area contains forest cover types where ponderosa pine is or was a major seral species and vegetative cover is moderate or dense—greater than 30% crown closure. These are the areas where we expect continuing large lethal fire activity.

Other submodels evaluate where lightning- and human-caused fires have historically started since 1956. Subwatersheds that had more than four fires per square mile during the years 1956 through 1994 were identified as moderate- or high-hazard. Erosion potential was used to evaluate sediment yield using land types and land type associations. Subwatersheds with potential sediment yields greater than 36 tons per square mile per year were rated moderate- or high-hazard. The wildlife persistence submodel examined where large, extensive areas of late-successional forested habitat occur that are outside HRV and are susceptible to catastrophic wildfires. The fisheries condition submodel identified Chinook salmon and bull trout as those species at the greatest risk of habitat degradation and evaluated risk relative to population strength, connection to refuge habitat, and the presence of migrating fish.

The picture that emerges when all the elements are combined is a clear map of areas having a high probability of burning and enough vegetation to fuel large lethal fires. If these watersheds burn, the resulting high risks to fish and wildlife populations make them the focus for early and aggressive treatment. The hazard and risk assessment is a key tool for district personnel as they consider how to restore ecosystems.

ADAPTIVE MANAGEMENT—WE WILL NOT WAIT

Restoring forest ecosystems does not end with assessments, proposed actions, or management activities. We need to learn as we go by monitoring the effects of our actions. Our success will depend on how efficient we are at sharing the information we've gained with others. The national forests are more important than ever before as increasing human populations compete for resources. Our focus is on action and education through demonstrated performance.

During 1997 we prepared and burned more than 16,000 acres (6,478 hectares) of forested lands, a 500 % increase from three years ago. We intend to burn 30,000 acres (12,146 hectares) by 1999. We will continue to work toward the most ecologically sound and sensible actions in high risk areas. We have the tools. We know where to start. We do not fear arguing our cause before federal courts but will face them squarely, knowing we've done our homework.

We have no choice. Forest Service leaders at all levels have reached the same conclusion; if we want a diversity of uses, we must act to restore the diversity of ecosystems. We know our ideas and values will be challenged, our theories will be tested. This will lead to better knowledge and better decisions. We must move forward, armed with working hypotheses and assisted by research. We will not wait.