TESTIMONY OF NATHANIEL LAWRENCE
NATURAL RESOURCES DEFENSE COUNCIL

ON S. 2593,
THE FOREST LANDSCAPE RESTORATION ACT

SUBMITTED TO THE COMMITTEE
ON ENERGY AND NATURAL RESOURCES
OF THE UNITED STATES SENATE,
FOR ITS HEARING ON APRIL 1, 2008

Mr. Chairman and Members of the Committee:

Thank you very much for your invitation to appear today and offer the views of the Natural Resources Defense Council (NRDC) on S. 2593, the Forest Landscape Restoration Act. NRDC and its 1.2 million members and activists have a deep and abiding interest in the welfare of public lands in general and the National Forest System in particular. The degradation of those lands, which this bill aims to redress, is something we have long worked to reduce.

We applaud your initiative, Mr. Chairman, and that of your bill's co-sponsors, in developing legislation to promote restoration projects for our national forests. The bill you have introduced is replete with positive features. The bill evinces an understanding that forest restoration needs to be founded on, and evaluated in light of, the best available scientific advice. It also starts from the premise that decisions about how to use public funds on public lands should be collaboratively developed and, where possible, create local jobs. It recognizes that forest restoration is a broad, multi-faceted undertaking. It looks, as it should, to ultimately reducing the out-of-control costs of wildfire suppression. It appropriately calls for follow-up monitoring and evaluation. And critically, it preserves the set of baseline environmental protection laws that guarantee disclosure, accountability, and public participation in public lands decisionmaking and provide a safety net under resource values.

A central feature of the bill is its authorization of a limited number of projects. I would like to focus my testimony today, first and foremost, on the reason why having limits on this kind of restoration project is, for now at least, essential.

Members of this Committee are acutely aware that many of our national forestlands are significantly degraded. Despite substantial study and some demonstrable successes, however, we have only a limited understanding of how and where to try to remedy that degradation. As a result, in most regards, forest restoration remains a grand experiment. It is certainly one we need to undertake, but also one to approach with care and the knowledge that it can be done in ways that make matters worse, not better.

In particular, we have very fragmentary data about the fire ecology effects of forest restoration. In 2003, a U.S. Forest Service research publication reported that "the question of fuel treatment effectiveness has received surprisingly little scientific attention. …Thus, neither existing theory nor available empirical evidence provides much clarity on the question of fuel treatments and the conditions that influence their effectiveness when tested by wildfire."[1] This was echoed two years later by fire ecologists who noted that "replicated, empirical research on fuel reduction techniques are rare."[2] And again, in 2006, Forest Service researchers stated that "information comparing fire behavior and fire effects on treated versus untreated forest stands following wildland fire remains largely anecdotal."[3]

---

[1] Martinson, E. J. and P. N. Omi. 2003. Performance of Fuel Treatments Subjected to Wildfires, in Omi, P. N.; Joyce, L. A., technical editors. Fire, fuel treatments, and ecological restoration: Conference proceedings; 2002 16-18 April; Fort Collins, CO. Proceedings RMRS-P-29. Fort Collins, CO: U.S. Forest Service, Rocky Mountain Research Station. pp. 7-8. *See also* Carey, H. and M. Schumann. 2003. "Modifying Wildfire Behavior-The Effectiveness of Fuel Treatments." The Forest Trust. p. 16. Available at www.theforesttrust.org/images/swcenter/pdf/WorkingPaper2.pdf. p. 15 ("The proposal that commercial logging can reduce the incidence of canopy fire appears completely untested in the scientific literature").

[2] Stephens, S. L. and J. J. Moghaddas. 2005. Silvicultural and reserve impacts on potential fire behavior and forest conservation: Twenty-five years of experience from Sierra Nevada mixed conifer forests. Biological Conservation 125:369-379. p. 370.

[3] Cram, D.S., T.T. Baker, and J.C. Boren. 2006. Wildland Fire Effects in Silviculturally Treated vs. Untreated Stands of New Mexico and Arizona. Research Paper RMRS-RP-55. Fort Collins, CO. U.S. Forest Service, Rocky Mountain Research Station. p. 1.

In the absence of good empirical data on which to rely, there is still, of course, a strong intuitive basis for thinning forests to restore manageable fire regimes. Removing flammable wood should, one naturally thinks, result in smaller fires. Our experience with fireplaces, wood stoves, and campfires supports this. And computer modeling of fuel loads and flame spread corroborates the idea as well.

In practice however, the picture is much cloudier. In the first place, taking wood out of forests can actually promote hotter, faster burning fires. Aggressive thinning that removes larger trees and reduces canopy closure is a particular problem. It opens up forests to sunlight. That warms and dries the understory, making it more readily burnable. It also promotes rapid in-growth of flammable young trees and other plants, including non-native species. And all substantial thinning, even just in the understory, increases wind speeds in the forest interior. That both dries out the vegetation and leads to faster spread of wildfire and greater fireline intensity.[4]

In the second place, it is a mistake to conceive of western national forests as all overgrown thickets in need of thinning to restore prior forest structure and fire regimes. It is, of course, relatively easy to find thick stands of trees where selective logging, grazing, and fire

---

[4] Martinson and Omi, *supra* note 1. p. 7. U.S. Forest Service. 2000a. Final Environmental Impact Statement for the Roadless Area Conservation Rule ("FEIS"), volume 1. Online at: http:/www.roadless.fs.fed.us/documents/feis. p. 3-110. Collins, B.M. et al. 2007. Spatial patterns of large natural fires in Sierra Nevada wilderness areas. Landscape Ecology 22:545-557. p. 554. Whitehead, R.J. et al. 2006. Effect of a Spaced Thinning in Mature Lodgepole Pine on Within-stand Microclimate and Fine Fuel Moisture Content, in Andrews, P. L. and B.W. Butler, comps., Fuels Management-How to Measure Success: Conference Proceedings. 28-30 March 2006; Portland, OR. Proceedings RMRS-P-41. Fort Collins, CO: U.S. Forest Service, Rocky Mountain Research Station. Online at http://www.fs.fed.us/rm/pubs/rmrs_p041/rmrs_p041_523_536.pdf. p. 529. Keeley, J.E., D. Lubin, and C.J. Fotheringham. 2003. Fire and grazing impacts on plant diversity and alien plant invasions in the southern Sierra Nevada. Ecological applications 13:1355-1374. p. 1370. FEIS, *supra* this note, Fuel Management and Fire Suppression Specialist's Report. Online at: http://www.roadless.fs.fed.us/documents/feis/specrep/xfire_spec_rpt.pdf. p. 21 ("Fahnstock's (1968) study of precommercial thinning found that timber stands thinned to a 12 feet by 12 feet spacing commonly produced fuels that 'rate high in rate of spread and resistance to control for at least 5 years after cutting, so that it would burn with relatively high intensity;'" "When precommercial thinning was used in lodgepole pine stands, Alexander and Yancik (1977) reported that a fire's rate of spread increased 3.5 times and that the fire's intensity increased 3 times"); id. at 23 ("Countryman (1955) found that 'opening up' a forest through logging changed the 'fire climate so that fires start more easily, spread faster, and burn hotter").

suppression have altered western forests. And in drier sites, particularly those naturally dominated by ponderosa pine, and particularly in the Southwest and the Eastside of Oregon and Washington, fire ecologists have concluded that these stands are now prone to fire intensity and severity that is abnormal and damaging to the ecosystem.[5] Active restoration of these sites, if we can figure out how to do it successfully and without excessive collateral damage to the ecosystem, is desirable.

However, many other sites, particularly higher elevation and wetter forests, are adapted to intense, stand-replacing fires, and dense stands there represent healthy forests. For instance, "high density in lodgepole pine and spruce-fir forests is not related to fire suppression; it is simply a natural ecological feature of these subalpine forests."[6] As a result, "variation in climate rather than in fuels appears to exert the largest influence on the size, timing, and severity of fires in subalpine forests. …We conclude that large, infrequent stand-replacing fires are 'business as usual' in this forest type."[7] Other forest types, like piñon-juniper, often considered to be normally sparse also occur in dense stands naturally.[8]

In the mixed conifer systems found in much of the West, pre-settlement forest structure is hard to reconstruct with confidence. However, current fire patterns seem to be largely similar to those that pre-dated European settlement and the active management associated with most forest health problems. Researchers in southern Oregon and northern California, for instance, determined that in that region "most [recent] large wildland fires have been dominated by low-

---

[5] Christensen, N, et al. 2002. Letter to President George W. Bush. p.1. Attached to this testimony as Exhibit 1.

[6] Romme, W. et al. 2006. Recent Forest Insect Outbreaks and Fire Risk in Colorado Forests: A Brief Synthesis of Relevant Research. Colorado State University, Fort Collins, CO. Online at http://www.cfri.colostate.edu/docs/cfri_insect.pdf.

[7] Schoennagel, T., T.T. Veblen, and W.H. Romme. 2004. The interaction of fire, fuels and climate across Rocky Mountain forests. BioScience 54: 661-676. p. 666.

[8] Romme, W., et al. 2003. Ancient Piñon-Juniper Forests of Mesa Verde and the West: A Cautionary Note for Forest Restoration Programs, in Omi, P. N.; Joyce, L. A., technical editors. Fire, fuel treatments, and ecological restoration: Conference proceedings; 2002 16-18 April; Fort Collins, CO. Proceedings RMRS-P-29. Fort Collins, CO: U.S. Forest Service, Rocky Mountain Research Station.

severity fire, with variable proportions of moderate and high severity. This is consistent with historical estimates inferred from stand age structure."[9] Notably, they found that "closed-forest vegetation had significantly less high-severity fire than the burned landscape as a whole."[10] In the Sierra Nevada, scientists looking at recent fires allowed to burn in two mixed conifer wilderness areas concluded that there is little evidence that current fires burn differently from those of 100 to 300 years ago.[11] Others, looking at the Rocky Mountain region, from Wyoming through Arizona and New Mexico, concluded that fire regimes in mixed conifer forests had likely only been significantly affected at lower elevations, on dry slopes, and adjacent to grasslands.[12] Generally speaking, they concluded, "occurrence of high-severity crown fires is not outside the historical range of variability" in mixed-severity fire regimes of the region.[13]

Even in ponderosa pine, often taken as the paradigm case of a forest type in need of restoration, creating open stands with low intensity fires would match our knowledge of prior conditions in only some places. "Such historically sparse forests, subject to high-frequency [low-intensity] fires, comprise much of the ponderosa pine forest in Arizona and New Mexico but only a small fraction of the ponderosa pine forest in the central and northern Rockies."[14] More specifically, "less than 20% of the ponderosa pine zone in the northern Colorado Front Range appears to have been characterized by frequent, low-severity fires. Instead, most of the ponderosa pine zone was characterized by a variable-severity fire regime that included a significant component of high-severity fires."[15] A U.S. Forest Service publication reviewing ponderosa forests throughout the West found that "In most parts of the western United States

[9] Odion, D.C., et al. 2004. Patterns of Fire Severity and Forest Conditions in the Western Klamath Mountains, California. Conservation Biology 18:927-936. p. 933.
[10] *Ibid*. p. 932.
[11] Collins, B.M. and S. L. Stephens. 2007. Managing natural wildfires in Sierra Nevada wilderness areas. Frontiers in Ecology and the Environment 5:523-527. p. 526.
[12] Schoennagel, T., T.T. Veblen, and W.H. Romme, *supra* note 7. p. 671
[13] *Ibid*. p. 673.
[14] *Ibid*. p. 669.
[15] Romme, W., et al. *supra* note 8. p. 6.

there is also insufficient evidence to support the idea that mixed- or high-severity fires were or were not absent or rare in the pre-EuroAmerican fire regime. Thus, programs to lower the risk of mixed- or high-severity fires in ponderosa pine forests … have insufficient scientific basis if the goal is restoration."[16] Similarly, Forest Service researchers looking at dry forests in eastern Oregon and Washington found that historically there had been "mixed severity fire in all subregions and across the study area…. Instead of strong dominance of low severity fires, we saw dominance of mixed fires of highly variable severity, representing a virtual continuum of mixed surface fire and stand replacement effects."[17]

Beyond the potential of thinning to backfire, and the widespread occurrence of forests where fire does not appear to be significantly altered, a third set of factors will likely influence restoration success. Most of the impetus for landscape restoration currently focuses on forest structures and fire regimes. Members of this Committee are well aware that human management and utilization has left a broad legacy of other restoration needs as well. Accordingly, the Forest Landscape Restoration Act wisely looks beyond the narrow issue of forest structure and fire susceptibility, requiring that restoration proposals address other landscape features that may call for rehabilitation. S. 2593, sec. 4(b)(3). However, even if the only goal were to restore manageable fire, these additional restoration needs would have to be addressed too. This is because several other forms of landscape damage have important implications for how forests grow and burn.

---

[16] Baker, W.L. and D.S. Ehle. 2003. Uncertainty in Fire History and Restoration of Ponderosa Pine Forests in the Western United States, in Omi, P. N.; Joyce, L. A., technical editors. Fire, fuel treatments, and ecological restoration: Conference proceedings; 2002 16-18 April; Fort Collins, CO. Proceedings RMRS-P-29. Fort Collins, CO: U.S. Forest Service, Rocky Mountain Research Station. p. 330.

[17] Hessburg, P.F., R.B. Salter, and K.M. James. 2005. Evidence for mixed severity fires in pre-management era dry forests of the inland Northwest, USA. Association for Fire Ecology Miscellaneous Publication No., 3, 89-104. p. 101.

Roads, for instance, are associated with increased fire starts.[18] The Forest Service has found that "in areas already roaded, fire occurrence data for all causes, human and lightning, indicates that the number of large fires are dramatically higher than in inventoried roadless areas."[19] Grazing, too, can profoundly affect fire, because cows and sheep crop forest grasses that otherwise would shade out tree seedlings and carry low intensity, brush-clearing fires.[20] Non-native plant species also alter fire regimes, interacting with them in ways that are both mutually reinforcing and complex.[21]

Given these confounding factors, and the current use of thinning for fire risk reduction in many forest types, it is not surprising that the results are mixed at best. As noted above, systematically gathered and analyzed data are still scarce (though anecdotal success and failure stories are abundant). However, we are beginning to get relevant information from some careful and meaningful studies.

In a few cases, review of thinned and similarly situated unthinned stands shows success at lowering fire damage. Martinson and Omi analyzed 6 small diameter, non-commercial and pre-commercial thins from Montana to California, and two prescribed burns. They found that all reduced fire severity relative to neighboring untreated stands.[22] Treatments that removed the smallest trees appeared most effective among the thinning plots; however, lower residual stand density did not correlate with lower fire severity.[23] At the Blacks Mountain Experimental Forest,

[18] Christensen, N., et al. *supra* note 5. p. 2.

[19] U.S. Forest Service (2000a), *supra* note 4. p. 3-115.

[20] Belsky, A.J. and D. Blumenthal. 1997. Effects of Livestock Grazing on stand Dynamics and Soils in Upland Forests of the Interior West. Conservation Biology 11:315-327. Hicke, J.A. et al. 2007. Spatial patterns of forest characteristics in the western United States derived from inventories. Ecological Applications 17:2387-2402. p. 2388. U.S. Forest Service. 2000b. Protecting People and Sustaining Resources in Fire-Adapted Ecosystems: A Cohesive Strategy. Online at: http://www.fs.fed.us/publications/2000/cohesive_strategy10132000.pdf. p. 15.

[21] Zouhar, K. 2003. Bromus tectorum. In: Fire Effects Information System. U.S. Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Online at: http://www.fs.fed.us/database/feis/plants/graminoid/brotec/all.html. Keeley, J.E., D. Lubin, and C.J. Fotheringham, *supra* note 4. p. 1370.

[22] Martinson and Omi, *supra* note 1. pp. 9-10.

[23] *Ibid*, pp. 10-11. *See also* Christensen, N., et al. *supra* note X. p. 2 ("removal of small diameter material is most likely to have a net remedial effect").

both pre-commercial and commercial thinning reduced fire effects, with the largest difference found where prescribed fire was also used; lower stand density was related to lower damage.[24] No stands with only prescribed fire were analyzed for comparison, however. More recently, Forest Service researchers analyzed treatment performance in three large southwestern fires. They found that treatment reduced crown damage, particularly when accompanied by prescribed burning, though thinning did not always result in lower tree mortality.[25]

The most striking contrary results come from a study of paired sites on national forests in the Sierra Nevada. The researchers took a comprehensive approach, reviewing all areas known to have been mechanically thinning and later burned, outside of experimental forests, between 2000 and 2005. They found that in every instance the thinned stands burned more lethally, irrespective of the time since thinning.[26]

Between these two extremes is the detailed analysis conducted of the Hayman Fire in Colorado. There, the results were very mixed. The authors found that "each of the different types of fuel modification encountered by the Hayman Fire had instances of success as well as failure in terms of altering fire spread or severity," with prescribed fire showing the greatest success.[27]

The uncertainty that these studies embody is heightened by their temporal limitations. Restoration thinning will not be, on balance, successful and worth the investment, if it does not

---

[24] Skinner, C.N., M.W Ritchie, and T. Hamilton. In press. Effect of Prescribed Fire and Thinning on Wildfire Severity: the Cone Fire, Blacks Mountain Experimental Forest. Proceedings 25th Vegetation Management Conference, Jan. 2004, Redding, CA. Online at www.fs.fed.us/fire/fireuse/success/R5/ConeFire-Skinneretal.pdf. pp. 9-10.

[25] Cram, D.S., T.T. Baker, and Jon C. Boren, *supra* note 3. pp. 7, p, 13.

[26] Hanson, C.T. and D.C. Odion. 2006. Fire Severity in mechanically thinned versus unthinned forests of the Sierra Nevada, California. In: Proceedings of the 3rd International Fire Ecology and Management Congress, November 13-17, 2006, San Diego, CA. Online at: www.emmps.wsu.edu/2006firecongressproceedings/Extended%20Abstracts%20PDf%20Files/Poster/hanson.pdf.

[27] Martinson, E., P.N. Omi, and W. Shepperd. 2003. Effects of Fuel Treatments on Fire Severity, in Hayman Fire Case Study, Graham, R.T., Tech. Ed. RMRS-GTR-114. Ogden, UT. U.S. Forest Service, Rocky Mountain Research Station. p. 96.

lower the risk of abnormal fire effects over a number of years. Manipulation of forest structure could decrease fire intensity at some point, but raise it at others. The period directly after thinning, for instance, is often a period of heightened risk from activity fuels that loggers leave behind. Similarly, opening forests by heavily thinning them may lower risks at some period, but increase them during drought or after a growth spurt among small trees and understory vegetation, stimulated by increased sunlight. Thus the limited snapshot provided by a small number of studies does not assure us that reduced fire impacts under one set of circumstances will translate into landscape level success if broadly applied.

One important exception should be noted to the very substantial uncertainty that exists about where and how to thin for fire risk reduction. We know quite a lot about how to make homes and other buildings survive fires. Thinning forests away from structures is not the answer. The Cerro Grande fire in Northern New Mexico vividly illustrates this. Shortly after the fire, Forest Service researcher Jack Cohen investigated the loss of 200 homes from the fire in Los Alamos. Cohen found that the fire entered the town as a low intensity ground fire. House after house burned to the ground while nearby trees survived. The cause was neither big flames nor wooden roofs, but flammable material on, adjacent to, and near the buildings.[28]

Cohen and others have shown that, while homesites that are not fire-ready are destroyed by even low intensity burns, well-prepared ones survive even very hot wildfires. NRDC has summarized the needed measures in a report submitted with this testimony and based on a study led by former California State Fire Marshall Ron Coleman.[29] In sum, trees have to be kept thinned within a few hundred feet of homes, vegetation and other flammable material must be pulled back from around buildings, and the roofs, siding, doors, vents, eaves, and windows of

[28] Cohen, J. 2000. Examination of the Home Destruction in Los Alamos Associated with the Cerro Grande Fire, July 10, 2000. Online at: http://www.nps.gov/fire/public/pub_publications.cfm.
[29] Mall, A. and F. Matzner. 2007. Safe at Home: Making the Federal Fire Safety Budget Work for Communities. NRDC. New York, NY. Online at: www.nrdc.org/safeathome.

structures need to be designed or retrofitted to withstand heat and sparks. When these measures are taken, home survival is very high in any wildfire. Notably, thinning is needed across forest types in the homesite context. The issue is not restoration of natural fire frequencies and other ecological processes. Rather, it is reducing flame heights near structures, regardless of how fires would normally burn in the area absent human influences.

Securing lives and communities from wildfire is, of course, a very high priority in its own right. It also plays a very significant role in forest restoration. There is no debate that forest health problems are caused or exacerbated by fire suppression. The Forest Service has known since at least 1930 that putting out fires aggressively leads to bigger fires later.[30] So forest ecologists early on opposed the agency's "10 a.m." policy of putting out all fires by early the day after discovery, whenever possible.[31] But sure knowledge of long-term harm is, predictably, often outweighed by the near term threat of disaster. As long as fire crew bosses have to worry about a fire getting out of control and overwhelming some community, even a relatively remote one, we should not expect to break the cycle of suppression, threat, and suppression again that currently thwarts forest restoration, and breaks the agency's budget. In short, community fire preparedness is as critical an ecological issue as it is a human safety one.[32] And because fire suppression decisions forced by community exposure entail enormous budget outlays, it is also a key economic factor.

[30] Benedict, M.A. [Supervisor of the Sierra National Forest]. 1930. Twenty-one years of Fire Protection in the National Forests of California. Journal of Forestry 28:707-710. Weaver, H. 1943. Fire as an ecological and silvicultural factor in the ponderosa pine region of the Pacific slope. Journal of Forestry 41:7-15.

[31] Cram, D.S., T.T. Baker, and Jon C. Boren, *supra* note 3. p. 1.

[32] Odion et al., *supra* note X. p. 935 ("Treating the home-ignition zone as described by Cohen (2000) can almost eliminate the possibility of homes burning in wildfire. This would increase fire-management options and perhaps ultimately further conservation goals").

Several policy implications emerge from these studies.

1) Forest restoration needs to be approached as an experiment, with caution;

2) Thinning currently appears most appropriate in southwestern ponderosa pine forests;

3) Small tree removal is safest and most likely to restore fire regimes;

4) Failure to burn when thinning lessens success;

5) Restoration requires addressing factors other than tree density; and

6) Securing homesites and communities is a prerequisite to restoration.

As the Forest Landscape Restoration Act moves through the legislative process, NRDC hopes that you, Mr. Chairman, and your Senate colleagues will consider refining the bill, to fully incorporate these conclusions. Recognizing the very substantial care, thought, and revision that have already gone into S. 2593, we would like to take this opportunity to suggest several specific areas to look at.

First, is the issue of project size. The bill specifies a minimum of 50,000 acres for each proposal. Sec. 4(b)(1)(B)(i). No maximum is given. We need reasonable limits on how much of the forest landscape to experiment with. This is partly to limit the risk from applying a discipline in its infancy. And partly it is to ensure that as experience is gathered, plans are rethought and lessons learned are applied. Limiting project size will also be important in keeping by-product utilization scaled to support restoration decisions rather than to drive them, as a large processing facility would likely come to do over time. From these perspectives, 50,000 acres looks more appropriate as an upper limit than a lower one.

Second, without a commitment to monitoring, we should not expect to learn from experience as much or as fast as we need to. The bill appropriately calls for monitoring for at least 15 years after implementation starts. Sec. 4(g)(4). The Achilles heel of all Forest Service monitoring, however, is funding. Every national forest has monitoring plans. Few if any are fully implemented. Proposals under this bill, or funding decisions by the Secretary under sec. 4(f), should commit to paying for the full suite of monitoring and analysis activities needed to understand how experimental restoration plays out over time and how to do it better next time. Congress needs to take away the option to let monitoring slip.

Third, the bill should ensure priority for projects most likely to meet with success. Based on what we now know, such projects will be in lower ponderosa pine sites, particularly in the Southwest, limit thinning – with few exceptions – to small diameter trees, include burning as a restoration treatment, reduce road density and grazing, and include or be coordinated with a Firewise or similar preparedness program in local communities. The bill has, now, features which should tend to promote such projects. These include the requirement that strategies incorporate the best available science and that up to 12 experts advise the Secretary on "the strength of the ecological case of the proposal." Secs. 4(b)(1)(C) and 4(e)(1). The bill also mandates that collaborative processes "describe plans to" among other things use fire "where appropriate," control invasive exotic species, and maintain or decommission roads. Sec. 4(b)(3). These provisions identify important aspects of restoration. They do not, however, assure that any of the priorities listed above will guide selection of proposals for funding or reliably be implemented. Congress, if it is to expect results and use scarce funds well, should not hesitate to require these project elements, subject to periodic re-examination by the Secretary in light of monitoring results and scientific advice.

Fourth, the experimental nature of this work dictates that essentially no one has a meaningfully proven track record. The proof that a given approach works under a specific set of conditions will only emerge over time. It is, at this point in time, not really possible, in the relevant sense, for a project-proposing collaborative process to have "an established record of successful planning and implementation of ecological restoration projects on National Forest

System land," as sec. 4(b)(2)(C) now requires. We therefore suggest dropping this requirement to avoid creating a needless dispute point during the bill's implementation.

In closing, I would like to thank you Mr. Chairman, again, for the opportunity to offer this testimony. S. 2593 is a welcome move towards the start of a long and careful process of national forest landscape rehabilitation. It contains numerous provisions which will help strengthen such work as it is undertaken. In NRDC's view, I would stress, where new funding is found to address forest restoration, our top priority should be on local community Firewise programs, without which forest restoration cannot succeed. We cannot break the expensive, self-reinforcing, and damaging cycle of fire suppression until communities can survive fire.

I would be happy to answer any questions which you or Members of the Committee may have.

Exhibit 1

September 9, 2002

President George W. Bush
The White House
1600 Pennsylvania Avenue
Washington DC, 20500

Dear President Bush:

As fire researchers and ecologists, we are writing to you concerning the scientific basis for efforts to reduce risks from the kinds of forest fires that have attracted so much media and political attention in the western United States this year. As we elaborate below, responding effectively to this fire situation requires thoughtfulness and care. The fires are traceable to differing factors in different regions and forest types. Some have burned in forests where fire exclusion and land use have created unnatural accumulations of fuels while others have burned in a relatively natural manner. The most debated response to alleviating destructive fires in the future – mechanically thinning trees – has had limited study, and that has been conducted primarily in dry forest types. Thinning of overstory trees, like building new roads, can often exacerbate the situation and damage forest health. Whatever restoration measures are undertaken, preventing the re-emergence of fire problems will require a commitment to manage with fire rather than simply trying to exclude it in the future.

No single cause can explain the variety and number of fires occurring this year in western forests. In some drier forest types, such as the semi-arid ponderosa pine ecosystems, fire exclusion aided by grazing and logging has produced accumulations of highly flammable fuel well outside historical norms. However, in many western forests, including parts of the Siskiyou (mountains of the Biscuit fire), Sierra Nevada, Cascades, and Central Rockies, much of the undergrowth is primarily the product of succession from past logging and other disturbance, rather than fire exclusion alone. In other settings, like southwestern chaparral and the lodgepole pine forests of the Rockies, succession naturally produces highly flammable communities, and periodic crown killing fires are inevitable and ecologically desirable. Drought conditions such as those seen across much of the West this year can produce extensive fires even in areas where fuel loads are "normal." In all of these areas, increased human activity and habitation on fire-prone landscapes have greatly increased the chances of ignitions and the threats to people and their property when wildfires do occur.

We have no simple, proven prescription for meeting this challenge throughout the West. In semi-arid ponderosa pine forests effective restoration may result from cutting small-diameter trees in overly dense stands. However the benefits can only be realized and maintained in the long term through an aggressive post-restoration prescribed fire program that removes surface fuels. The value of thinning to address fire risks in other forest ecosystems is still poorly understood. Although a few empirically based studies have shown a systematic reduction in fire intensity subsequent to some actual thinning, others have documented increases in fire intensity and severity. Models and theories have been advanced to explain these results, but reliable data remain scarce.

In some areas the use of prescribed fire without any "thinning" would be the best restoration method. Indeed, many forests in the West do not require any treatment. These are forests that for thousands of years have burned at long intervals and only under drought conditions, and have been altered only minimally by 20th century fire suppression. These forests are still "healthy" and thinning would only disturb them, not "restore" them. In short, the variation among our forested landscapes is much too great for one treatment to be appropriate everywhere.

Where thinning is used for restoration purposes in dry forest types, removal of small diameter material is most likely to have a net remedial effect. Brush and small trees, along with fine dead fuels lying atop the forest floor, constitute the most rapidly ignited component of dry forests (young forest stands regenerating after timber harvest often burn with the greatest intensity in western wildfires). They most surely post-date management-induced alteration of dry forest fire regimes. And their removal is not so likely to increase future fire intensity, for example from increased insolation and/or the drying effects of wind.

In contrast, removal of more mature trees can increase fire intensity and severity, either immediately post-logging or after some years. These trees provide "insurance" because they often survive surface fires and can speed post-fire recovery. Even if they are diseased, dying or dead, large and old trees and snags are important to many wildlife species and ecosystem functions. Building or re-opening roads to facilitate thinning will also heighten fire risks, since roads correlate with increased numbers of human-started fires. Removing more than small trees and constructing roads will also make collateral damage to forest ecosystems more likely (e.g., through effects on water quality, fish populations, and the spread of invasive species). Therefore, where done, this kind of thinning needs particularly careful planning and implementation. The results require faithful monitoring and analysis before any effort to extrapolate the practice to other segments of the forest landscape.

Forests are dynamic biological systems and their management requires integration of approaches over time and space. Thus, whatever remediation or restoration is undertaken in dry forests, close attention must be paid to the future management of the treated forests. Because of the inevitability of fire in these systems, the goal of restoration has to be landscapes in which we can better control the fires we do not want and promote the ones we do. However, without a thoughtful post-treatment prescribed fire management program, the forest will likely return to its current highly flammable state within a decade or two, losing – among other things – the public investment made in treating it

The location of management treatments is similarly important. Strategic placement of management activities such as thinning and burning within landscapes is critical to accomplishing the most benefit with minimal ecological impact. As an important example, protecting buildings, powerlines, and water supplies will be most effectively accomplished by reducing fuels near them.

In summary, fire threats in western forests arise from many causes, and solutions will require a suite of treatments adjusted on a site-by-site basis. Enough experience exists to suggest areas such as the semi-arid ponderosa pine forests where we can, now, undertake corrective action. However, neither the magnitude of the problem nor our understanding of treatment impacts would justify proceeding in panic or without thorough environmental reviews. Moreover, whatever treatments we undertake must include provisions for long-term maintenance, integration of fire, and robust monitoring.

Very truly yours,

Norman L. Christensen, Jr.
Dean Emeritus and Professor of Ecology, Nicholas School of the Environment and Earth Sciences, Duke University

Thomas W. Swetnam
Professor of Dendrochronology & Watershed Management and Director of the Laboratory of Tree-Ring Research, University of Arizona, Tucson

Don C. Erman
Professor Emeritus, University of California-Davis

David Perry
Professor Emeritus, Ecosystem Studies and Ecosystem Management, Oregon State University; Affiliate Professor, University of Hawai'i, Hilo

Penelope Morgan
Professor of Forest Resources, University of Idaho

Scott Stephens
Assistant Professor of Fire Science. Department of Environmental Science, Policy, and Management, University of California, Berkeley

Philip N. Omi
Professor of Forest Fire Science, Colorado State University

Lisa Graumlich
Professor of Land Resources & Environmental Sciences, Montana State University

William H. Romme
Professor of Forest Sciences, Colorado State University

Paul H. Zedler
Professor of Environmental Studies, University of Wisconsin, Madison

J. Boone Kauffman
Professor of Fire Ecology, Department of Fisheries and Wildlife, Oregon State University

Dr. William L. Baker
Professor of Fire Ecology and Landscape Ecology, University of Wyoming

BIOGRAPHICAL INFORMATION

Dr. Christensen has written widely on fire ecology and management. He chaired reviews of the fire management programs in the Sierra Nevada National Parks and the Interagency Review of the Ecological Consequences of the 1988 Yellowstone Fires. He directed the recently released National Academy of Sciences study of the ecological consequences of forest management in the Pacific Northwest and is currently the chair of the National Commission on Science for Sustainable Forestry.

Dr. Swetnam has published numerous papers and book chapters on fire, climate and human land-use history of the western United States, Mexico, and Siberia, Russia. He has served on a variety of editorial boards (including the International Journal of Wildland Fire, Canadian Journal of Forest Research, and Ecological Applications), and he is co-editor of a forthcoming book titled "Fire and Climatic Change in Temperate Ecosystems of the Western Americas" (Springer-Verlag publishers). He was appointed by the President in 2000 to the Board of Trustees of the Valles Caldera National Preserve, a congressionally-chartered experiment in federal land management.

Dr. Erman was the Science Team Leader for the Sierra Nevada Ecosystem Project and Director of the University of California Centers for Water and Wildland Resources. He currently serves on a CALFED Bay-Delta Science Committee and California Tahoe Conservancy restoration science advisory team.

Dr. Perry researches forest structure in ponderosa pine forests and its implications for fire risk. He has been a member of the National Academy of Sciences Committee on the Ecological Consequences of Forest Management in the Pacific Northwest, the Scientific Societies Panel on Interim Management of East Side Forests, the Scientific Advisory Panel for the Oregon Biodiversity Project, the Scientific Advisory Panel for Weyerhaeuser Canada 20 Year Forest Management Plan, and the Marbeled Murrelet Recovery Team.

Dr. Morgan has taught, published, and done research on fire ecology and management for more than 15 years. She testified on fire management issues before the Forests and Forest Health Subcommittee of the US House Resources Committee in July, 2002. She is also a member of the Technical Advisory Committee for the Collaborative Forest Restoration Program, a United States Forest Service program in New Mexico.

Dr. Stephens' expertise is in wildland fire sciences and management. He was a founder of the National Fire and Fire Surrogate Treatments for Ecological Restoration research project, currently the largest fire science project in the nation with 13 experimental sites in 11 states. He has given testimony on fire management to the Forests and Forest Health and the National Parks, Recreation, and Public Lands subcommittees of the Committee on Resources of the United States House of Representatives.

Dr. Romme has studied fire ecology and fire effects in a variety of western ecosystems over the past 25 years. He has published over 50 scientific articles and book chapters on fire ecology, and won an award from the Ecological Society of America for an outstanding paper in ecology. He is conducting on-going, long-term studies of the fire effects and ecological responses to the 1988

Yellowstone fires, and is the lead scientist in a successful ponderosa pine restoration project in southwestern Colorado. He also is heading a team of scientists evaluating the ecological effects of the Hayman fire that burned in 2002 near Denver, Colorado.

Dr. Omi. Is Director of the Western Forest Fire Research Center, an interdisciplinary research facility based at Colorado State University. He teaches Wildland Fire Measurements, Forest Fire Management, Forest Fire Behavior, Technical Fire Management, Forest Fire Meteorology and Behavior, and Fire Science. His professional interests include forest fire management, fire behavior prediction, and fuel modeling, and his recent research focuses on the systematic assessment of the effectiveness of fire mitigation treatments, such as mechanical removal and prescribed fire.

Dr. Graumlich is the Director of the Big Sky Institute for Science and Natural History at Montana State University. She is past Director of the University of Arizona's Institute for the Study of Planet Earth, former Secretary of the Ecological Society of America, and Deputy Director of Columbia University's Biosphere 2 Center. Her research analyzes the relationship between wildfire, drought and land use in the Northern Rockies, and she works to provide scientific assessments of current natural resource issues in the Greater Yellowstone Ecosystem and other large biodiversity reserves.

Dr. Zedler has researched and published for over 35 years on fire ecology, the ecology of shrublands, forests and temporary wetlands, and the restoration and creation of habitat for endangered plant species. He has published extensively on fire effects and the life history of trees and shrubs in relation to fire, and recently chaired a panel at the 2002 Ecological Society of America annual meeting that addressed the current wildfire situation in the West.

Dr. Kauffman has been researching fire ecology in western ecosystems for over 20 years. His area of specialization is the use of fire and fire effects on ecosystems, and much of his research has focused on response of forests to burning and fire suppression, and on the use of fire as a tool in forest restoration. He has over 100 professional publications.

Dr. Baker has published extensively on fire ecology in Rocky Mountain forests, including co-editing a new book "Fire and Climatic Change in Temperate Ecosystems of the Western Americas." He has conducted fire research in Rocky Mountain National Park and in several National Forests in the Rocky Mountains. His research has been funded by the National Science Foundation, the U.S. Department of Agriculture, the U.S. Department of Energy, the U.S. Geological Survey, the Bureau of Land Management, and the National Park Service.

cc: Secretary of Interior Norton; Secretary of Agriculture Veneman