

**Mega-Fires and the Preservation Paradox:
Forest Management's Role in Re-Directing Conventional Bushfire Protection**

by

Jerry T. Williams

Senior Fellow, Program on Crisis Leadership

John F. Kennedy School of Government

Harvard University

And

Former National Director of Fire & Aviation Management

United States Forest Service, Retired

Abstract

Worldwide, governments are struggling to protect their citizens, sustain natural resources, and control costs, as wildfire threats intensify.

In the Western United States, the wildfire problem is arguably among the most serious public lands issues today. Despite a five-fold increase in protection budgets over the past two decades, at least seven of the West's eleven states have suffered their worst wildfires on record (some more than once).

Conventional wildfire protection strategies attempt to match increasing wildfire threats with greater firefighting force. Yet, as droughts deepen, wildfires are becoming more difficult to control, more dangerous and more severe. The onset of mega-fires makes clear the need for an altogether different wildfire protection model; one that more comprehensively deals with the underlying forest conditions that often set the stage for these disasters. Nowhere is the need for a more effective protection model more urgent than in the dry forest types of the arid interior West, where altered forest conditions are fueling the most serious conflagrations.

Landscape fuel build-ups and the densification of fire-prone forests have been implicated in mega-fire disasters. However, proposed hazard reduction treatments at meaningful scales are often discouraged by high upfront costs, reduced organizational capacity, the contentious nature of managing public forests, and the mechanics of a regulatory framework that holds mitigation treatments to a more rigorous environmental impact standard than the wildfire outcomes that result in their absence. The impacts that result from wildfires are largely exempt from the environmental regulations that govern forest management activities on federal lands; they go un-accounted.

This paper maintains that governments can neither take a "hands-off" approach to managing fire-prone forests, nor rely on suppression capacity alone to preserve them, without imperiling the very values they are charged to protect.

This paper offers some thoughts on establishing the basis for policy-makers to take a forest management approach in order to improve wildfire protection.

**Mega-Fires and the Preservation Paradox: Forest Management's Relevance in
Re-Directing Conventional Bushfire Protection 1/**

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Jerry T. Williams

Senior Fellow, Program on Crisis Leadership

John F. Kennedy School of Government

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Former National Director of Fire & Aviation Management

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8th Annual Joint Conference

The Institute of Foresters of Australia

and

The New Zealand Institute of Forestry

Beyond Tenure

Managing Forests Across the Landscape

Creswick, Victoria

Australia

13-15 April 2015

1/ This presentation follows the author's paper, "*Between a Rock and a Hard Place: Growing Wildfire Threats and the Urgency to Adapt Protection Strategies*," delivered at the Large Wildland Fires: Social, Political, and Ecological Effects Conference, sponsored by the International Association of Wildland Fire and the Association for Fire Ecology. University of Montana, May 2014.

The views expressed here are the author's alone and do not necessarily reflect those of the United States Forest Service, The Brookings Institution, nor the John F. Kennedy School of Government, Harvard University.

**MEGA-FIRES AND THE PRESERVATION PARADOX:
FOREST MANAGEMENT'S RELEVANCE IN RE-DIRECTING
CONVENTIONAL BUSHFIRE PROTECTION 2/**

INTRODUCTION (PP-1)



**MEGA-FIRES AND THE
PRESERVATION PARADOX:
FOREST MANAGEMENT'S
RELEVANCE IN RE-DIRECTING
CONVENTIONAL BUSHFIRE
PROTECTION**

by

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PP-1

2/ “Mega” from the Greek *me-gas*, meaning great. Mega-fires typically exceed all efforts at control until firefighters get relief in weather or a break in fuels. They often burn across large landscapes. Their shock is widespread and will reach the highest levels of government. Survivors often say that they have “never seen anything like it.” Mega-fires are usually extraordinary for their size, but it is their unprecedented costs, losses, and damages that set them apart. These incidents have long-lasting social, economic and ecological impacts. People and communities do not easily recover or move-on from them.

In this paper, the terms “wildfires” and “bushfires” are used interchangeably. In the United States, wildfires are defined as “unplanned, unwanted wildland fires, including unauthorized human-caused fires, escaped wildland fire-use events, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out.” From: National Wildfire Coordinating Group, Glossary of Terms (October 2014).

Worldwide, governments are struggling to protect their citizens, sustain natural resources, and control costs as wildfire threats intensify. This paper makes the case that the wildfire problem in the Western United States and elsewhere often traces to the condition of the forest. It holds that solutions lay, more, in how fire-prone forests are managed, than how their fires are fought.

The paper also maintains that, as climatic conditions worsen, wildfire protection strategies need to adapt, in order to be more effective under extreme burning conditions.

“Generals often prepare to fight the last war.”

Following the terrorist attacks of September 11, 2001, a Congressional commission was established to investigate the catastrophic lapse in protection. The 9/11 Commission was especially critical of leadership for:

- A “failure of imagination.” Those responsible for protection could not imagine the shocking certainty of this threat. Despite the stated intentions of a fanatical enemy, their patterns in preparation, and a surge in attacks leading up to the disaster, leadership had not adapted to a “new reality.”
- Mistakes of omission. Those responsible for protection overlooked credible threats, missed telling signals, and ignored important indicators that foretold disaster. With the “system blinking red,” political leaders and agency officials failed to act.

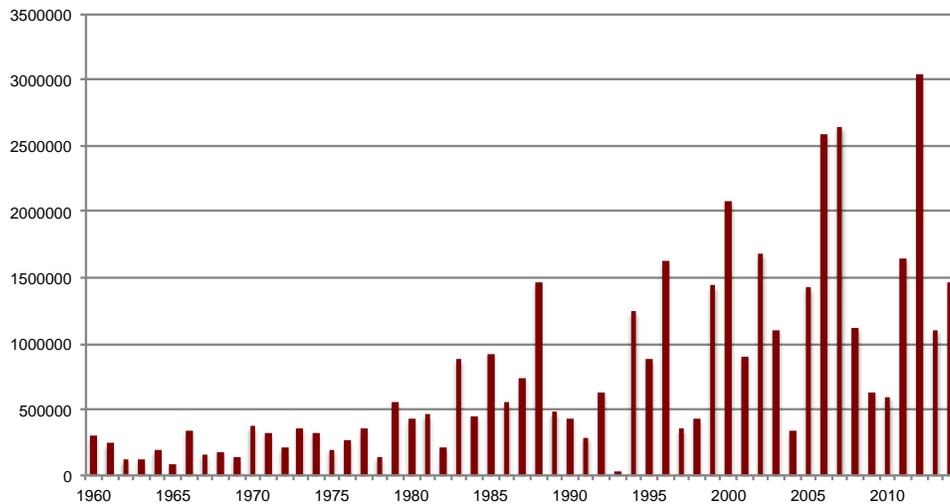
Although these findings derive from a far different kind of disaster, one cannot help but wonder if their themes apply to the way we manage protection in our forests, as the warning lights “blink red” in them.

In the western United States, wildfires are becoming more frequent and more severe. In this part of the country, the wildfire problem is arguably among the most serious public lands issues today. In the past two-decades, when firefighting budgets have never been higher, when cooperation between partners has never been better, when predictive models have never been more sophisticated, and when technological support has never been more available...at least 7 of the 11 Western states have suffered their worst wildfires on record, some more than once.

Not so long ago, it would have been incomprehensible to imagine wildfires greater than 200,000 hectares (~500,000 acres). It was only twenty years ago that our largest size-class designation (“G”) was for wildfires greater than 2,000 hectares (~5,000 acres); they were few and far-between. Back then, no one would have imagined that entire towns be virtually incinerated. Who could have imagined the shocking number of fatalities, including those among our best trained, best conditioned and most experienced firefighters? This magnitude of loss has not happened in the United States since the country first organized to deal with wildfire threats around the turn of the last century.

INSERT: Figure 1 (PP-2). Reported wildfire acres burned in the Western United States (1960-2014, in hectares) 3/

REPORTED WILDFIRE ACRES BURNED 11 WESTERN UNITED STATES (1960-2014, HECTARES)



PP-2

3/ On National Forest System lands, fewer than 3 to 5% of all wildfires account for about 95% of the total wildfire acres burned and 85% of total suppression expenditures.

Conventional wildfire protection strategies attempt to match increasing wildfire threats with greater firefighting force. However, against the backdrop of climate change and drought, fuel build-ups, and increasing values to-be-protected, the strategy is failing at the highest levels of threat, where many would argue that protection matters the most.

The situation should have policy-makers asking:

- Do we press on, continuing to re-enforce firefighting efforts with more capacity? Does more spending bring a corresponding gain in effectiveness?
- Do we try harder to “be safe” in a badly deteriorated situation or do we proactively change the situation, as the means to improve margins of safety?
- Do we continue to emphasize response, or should we consider other protection strategies that deal more directly with the causal factors involved?

If public, political and institutional reaction to a disaster fire is any measure, the need to adapt protection strategies does not seem to be registering. In the United States, there is a predictable wave of investigations, reviews, and blue ribbon commissions in the aftermath of one of these disasters. The agencies typically re-organize or change leadership. They often answer with bigger firefighting budgets, more capacity, or larger, more modern aviation assets. Recently, victims have begun to bring lawsuits against those in charge. All of these actions set out to “prevent this disaster from ever happening again.” But, the disasters keep happening.

We require our firefighters to “base all actions on current and expected fire behavior,” but it is not clear that we do the same where protection strategies are forged. The emergence of recurring uncontrollable wildfires is a clear signal that policy-makers need to take notice and adapt to this more serious wildfire threat.

A *reactive* protection strategy that depends almost solely on firefighting capacity and fast response needs to be complemented with a more *proactive* protection strategy that puts much more emphasis on reducing fuels and building resilience.

- Building firefighting capacity may work for more moderate wildfire threats, but when adverse weather, dry fuels and extreme burning conditions converge, even the most capable organizations with the most advanced equipment are overwhelmed. Efficient firefighting capabilities are an important part of any protection strategy, but they have known limits at the higher levels of threat.

The large fire problem in the Western United States is not so much a firefighting or fire operations failure, as it is a land management failure. Until policy-makers deal with it in this way, catastrophic wildfires will likely grow in number and test the boundaries of “acceptable loss.”

In the Western United States, the evidence indicates that the wildfire problem often traces to the vulnerable condition of fire-dependent ecosystems. Some will dismiss ecological considerations as little more than “eco-babble.” But we cannot bemoan the consequences of these wildfires, yet remain unknowing or indifferent to the fuel and fire behavior dynamics that predispose these forests to disaster.

THE BACK-STORY & THE PROBLEM

Reflecting on the conference theme of “creating resilient landscapes,” it seems supremely ironic that many (but, certainly not all) of the worst wildfires in the Western United States are occurring in forests that were once among the most resilient and once exhibited the most benign fire behavior, in terms of fireline intensity and resistance-to-control.

North America’s ponderosa pine example is used to illustrate fuel and fire behavior dynamics in this discussion. These dynamics often parallel those of dry forest types elsewhere, but they should not be transposed onto other forest types, where entirely different fire regimes will describe different ecologies, burning patterns, fire behavior outcomes and bushfire risk.

INSERT: Figure 2 (PP-3). Native distribution of ponderosa pine in the Western U.S.

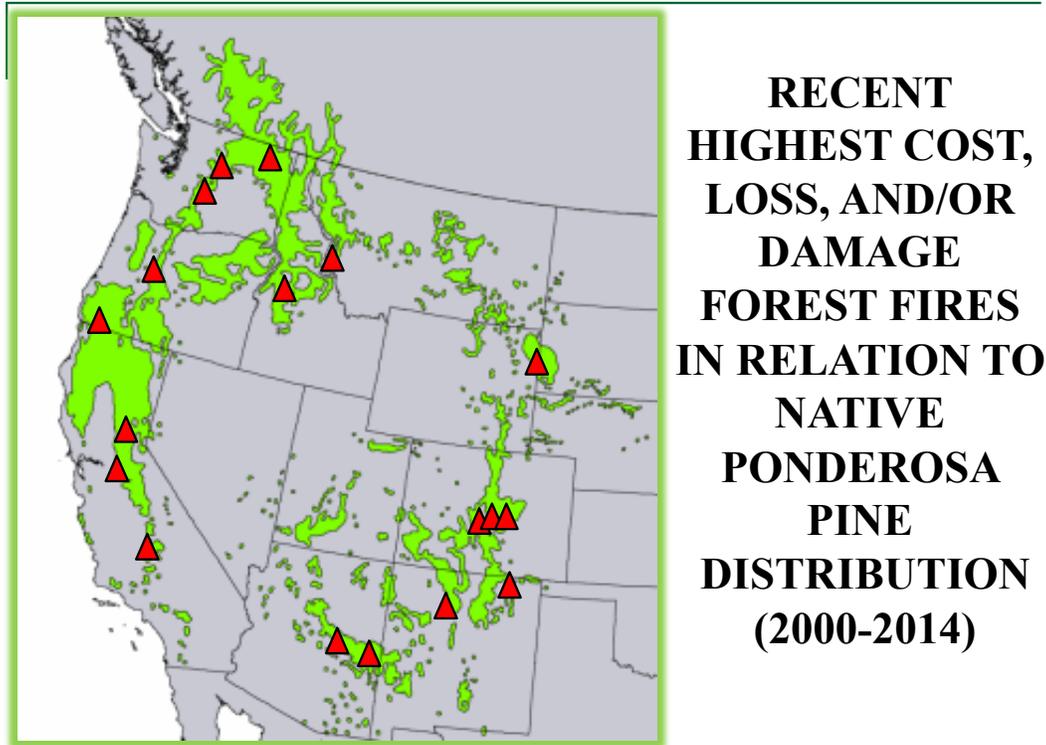


NATIVE DISTRIBUTION OF PONDEROSA PINE

Source: USGS

PP-3

INSERT: Figure 3 (PP-4). Coarse-filter representation of recent high-cost, high-consequence forest fires in relation to native range of ponderosa pine.



PP-4

Today, these forests are much altered from their historic, pre-European settlement condition. Changes in forest structure, species composition, and fuel loadings are contributing to more severe burning. Today's ponderosa pine forests are more crowded, with much more biomass and much more fuel. In many areas, fire-intolerant species have all but replaced the more fire-tolerant ponderosa pine. Arno and Fiedler estimate that, across their range, ponderosa pine dominance has diminished by about one-third to 16 million hectares (~39 million acres) ^{4/}. Of this, less than 1% is thinned or otherwise treated to reduce fuels, in an average year.

Ponderosa pine is a warm/dry-site indicator species. Although the forest's cover may change, these arid sites remain susceptible to frequent burning, owing to the warmer, drier conditions that define them. These forests also tend to occupy the valley-bottoms, where people and property are most concentrated.

^{4/} Stephen F. Arno and Carl E. Fiedler, 2015. *Giant Pines and Grassy Glades: A Saga of Ponderosa Pine, People, and Fire*. Mountain Press, Missoula Montana.

INSERT: Figure 4 (PP-5). A century of change in a ponderosa pine forest.

A CENTURY OF CHANGE IN A PONDEROSA PINE FOREST



EARLY 1900's



MID 1900's



LATE 1900's

BITTERROOT NATIONAL FOREST

PP-5

A history of high-grade logging, over-grazing and fire exclusion has changed these forests dramatically. In many places, wholesale type conversions have occurred. These changes go a long ways in explaining today's wildfire problem in the Western United States.

INSERT: Figure 5 (PP-6). Ponderosa pine forest conditions and fire behavior in the early 1900's

HISTORIC STAND MAINTENANCE BURNING PONDEROSA PINE



PP-6

One-hundred years ago, these forests were more open and much less vulnerable to the high-severity burning that we are seeing today. Frequent, low-intensity surface burning swept the forest floor of accumulating fuels, arrested encroachment of smaller trees and prevented establishment of fire-intolerant species.

INSERT: Figure 6 (PP-7). Typical ponderosa pine forest conditions and fire behavior (present).

MODERN-ERA STAND REPLACEMENT PONDEROSA PINE



PP-7

In a report now 15-years old 5/, the Government Accounting Office stated (PP-8),

“The most extensive and serious problem related to the health of national forests in the interior West is the over-accumulation of vegetation, which has caused an increasing number of large, intense, uncontrollable and catastrophically destructive wildfires.”

**U. S. Government Accounting Office
Report to Congress, April 1999**

PP-8

5/ United States Government Accounting Office, 1999. *Western National Forests: A Cohesive Strategy is Needed to Address Catastrophic Wildfire Threats*. GAO/RCED-99-65. April, 1999.

The U.S. Forest Service agreed with the findings of this report and answered with the first West-wide hazard abatement strategy. In order to optimize the protection of people, watersheds, and endangered species, and realize an eventual reduction in suppression spending, the strategy's analysis concluded that fuel reduction treatments would need to be increased to 3 million acres per year (a ten-fold jump) in the West's dry forest types for 15-years. Treatment costs were estimated at about \$600 million per year.

In the course of the analysis, another issue surfaced: the need to evaluate forest plan objectives in altered dry forest types, with respect to wildfire potential.

Although we can point to past practices for much of the West's wildfire problem, it is alarming to see how often today's expectations for the land are inadvertently contributing to an already-dangerous situation.

In leaving these forests undisturbed and unattended – by design or by default – for a wide variety of resource objectives (including wildlife habitat, watersheds, homesites, air quality, visual quality and other values), we have encouraged biomass build-ups and dense conditions that, as they dry out, are fueling our worst wildfires. Without realizing it, our attempts to manage for dense, late-successional forest conditions are imperiling the very values that we have set out to save.

This, then, is the “preservation paradox.”

From a fire behavior standpoint in the dry forest types, we have traded the logging slash from a past era of exploitation for the over-accumulated biomass in a new era of preservation. Both burn too hot to control and hotter than the forest can stand. Dry forest types with too much fuel and too much biomass are at cross purposes with our objectives to protect people, property and natural resources as droughts deepen and become more widespread.

In the West, our historically most significant wildfires brought about change. It is curious that the more recent disasters do not illicit the same outrage, spark the same debate, or bring about the wholesale change as did the “great” wildfires of a century ago. Those fires, as Stephen Pyne writes, were great because they struck a social, economic and environmental chord. They compelled a policy response 6/.

6/ Pyne, Stephen J., 2001. *Year of the Fires: The Story of the Great Fires of 1910*. Viking Press. New York, New York.

“We have become the architects of our own danger.”
-Mayor Jorge Castro, following the Valparaiso, Chile fire disaster
13 April 2014

THOUGHTS ABOUT A WAY FORWARD and the OBSTACLES BEFORE US

A protection strategy that sets out to reduce wildfire impacts throughout much of the Western United States will require restoring or re-establishing more resilient landscapes.

Not much good comes of a wildfire disaster, but some observations emerge that can help support a more proactive fire protection policy objective:

- Within the perimeter of several mega-fires, we found relatively small treated areas, where understory thinning, selective cutting and prescribed burning – all done sometime before the wildfire -- enabled the treated forest to survive largely intact. Although very few of these treated areas were large enough to influence the wildfire’s final size, they indicate that building resilience can reduce wildfire impacts. These treated areas demonstrate that selective cutting, understory thinning, and prescribed burning can be done in ways that benefit the land and the resource. Using them as examples might demonstrate that mitigation treatments can be done in ways that skeptics might come to accept.

- In stark contrast, adjacent, untreated areas suffered near complete mortality. The severity of burning in dense, dry forests describes the consequences of “no-action.”

It seems sensible that a good place to begin restoration work is in those forests where the science supports it and in those forests that were the most resilient to begin with.

Restoring or re-establishing resilient conditions at landscape scales will not be easy, nor without risk. Time is not on our side.

Many would like to believe that restoration can be accomplished by using more fire or simply by letting some wildfires burn more freely . But, throughout much of the ponderosa pine type, fuel and biomass accumulations preclude prescribed burning within acceptable limits of social, economic, and ecological risk, without, first, “stepping-down” fuel loads with mechanical thinning, selective cutting, and other fuel reduction treatments.

Some will believe that this kind of restoration work is only a surrogate for logging. It is for this reason that the primary objective for restoration needs to stay anchored on sustaining a resilient forest. Outcomes must match the intentions for a desired future condition. Harvest of merchantable material may occur as a result of restoration work, but if it is perceived as the principal motive, critics will take issue.

As if suspicions were not enough, restoration work at meaningful scales, will have other difficult obstacles to overcome. Among them:

- 1./ It is going to be contentious.
- 2./ It is going to be costly.
- 3./ The regulatory framework that managers must navigate will be time-consuming, cumbersome and strain organizational capacity.

It seems crucial that, if “creating resilient landscapes” is the goal, policy-makers will need to confront these obstacles and find ways to deal with them in a deliberate, comprehensive, and coherent way. In the time remaining, let me touch on a few thoughts that might be included in the components of a plan going forward:

- 1./ An issue is only “too contentious” when we are certain we are in a “win-lose” situation and we believe our side or our interests can win! Severe wildfires in altered dry forest types have changed this calculus. The impact of severe wildfires in these forests are adversely affecting a wide range of values, including wildlife habitat, watersheds, old-growth qualities, soil, air quality, people and other values. It has become a “lose-lose” situation.

- Recently, the Forest Service and others have been supporting collaborative planning efforts. These efforts attempt to bring competing interests together around a common goal. Many of these efforts began as a result of a nearby wildfire that raised awareness.
- The restoration projects that seem to attract the most support are those where stakeholders come to agree that the risk of catastrophic wildfires is not so remote and that their impacts are likely to be far greater than the mitigation measures that are needed to prevent them. Sometimes, these realizations are too slow to develop because,
 - Wrongly, land management decision documents do not adequately address wildfire's potential impacts early enough, in the planning phase. This omission reinforces the mis-perception that left alone, all will be well or that “no-action” equates to no effect; no consequence.
 - Likewise, our post-fire review process does little to support the need for amending forest plan objectives or accelerating restoration treatments. It rarely examines the forest conditions that predispose a bad fire. Instead, it confines itself to operational issues.
 - If we continue to frame the wildfire problem as an operational failure and overlook the forest conditions that predispose wildfire disasters, we should not be surprised that the “after-action answer” is always a bigger and better fire department. Nor should we be surprised that the wildfire problem gets worse.

2./ Something “costs too much” only when other options cost less. In terms of wildfire protection strategies, it is proving that fuel reduction does not “cost too much,” when compared to other options. In fact, those that believe restoring resilience is too costly overlook the “true costs” of taking a “hands-off” approach to land management and relying so heavily on suppression to maintain high-risk forest conditions. A few years ago, the Western Forestry Leadership Coalition found that the full costs of fire suppression-centric protection strategies are often four or five times greater than the reported firefighting costs alone. In their evaluation, the impacts from only six wildfires were found to have exceeded \$3 billion USD among those impacts that were measured.

- When we factor in private property losses, environmental damages, the public health consequences of smoke, impacts to local economies, and the long-term implications for endangered species, critical watersheds, and other irreplaceable values, as well as the need to slow rates of deforestation and “bank” carbon, the economics of restoring resilience begin to change.

- Imagine the restoration work that might be done, the grief avoided, and the suppression costs saved if decision-makers were bound to use a more complete economic analysis in comparing protection alternatives.
- Offsets are another way to reduce treatment costs. Critics point out that biomass utilization is un-economical, especially when the cost of more traditional energy sources (e.g. oil) is low. But, the advantages of offsets (or price supports) to reduce fuels can only be realized when the full range of multi-dimensional benefits (social, economic, and environmental) are included in the analysis.

3./ Our environmental regulations were enacted to preserve and sustain natural resource values and protect the human environment. When they no longer work as intended because circumstances have changed (e.g. climate change and drought), we ought to consider amending them...or at least understand the risks involved, if we stay the course and leave them unchanged.

If selective cutting, understory thinning and prescribed burning are among the tools available to create resilient landscapes, our regulatory framework in the United States does not exactly invite these actions. In fact, I believe, it discourages them at the scales needed.

- Proposed land management actions (e.g. cutting, thinning, prescribed burning) are subject to a rigorous review and evaluation of expected impacts. In a confounding way, wildfire outcomes that may become the result of “no-action” are generally free from the same scrutiny. Under the emergency provisions of our principal environmental laws, wildfires are exempt from regulatory oversight. Virtually all of these laws were enacted in a cooler, wetter climate cycle, when fire disturbance regimes were not so active as they are today and wildfires were generally less severe.
- Given the onset of warming, drying conditions and the growing potential for worsening wildfires, policy-makers must begin to wonder about a regulatory framework that holds hazard mitigation treatments to a more rigorous environmental impact standard than the more severe wildfire outcomes that result in their absence.
 - This bias in our regulatory framework is made worse because there are no mechanisms in place to evaluate the cumulative social, economic and environmental effects that seem to be compounding as wildfire impacts grow. In Arizona, for instance, one-fifth of the states’ forests have burned with near complete mortality in only the past twenty years. Yet, there is no measure of impact, in terms of the Mexican Spotted Owl, watersheds, and the other high, irreplaceable values important to the region.

- Our analysis, display and discussion of “no-action” in the planning phase is too often too superficially addressed. It is almost always the alternative receiving the least analysis, although its consequences are almost always the most severe.
- In my view, the emergency exemption provisions in many of our environmental laws should not apply to *altered* fire-dependent ecosystems. Although man's interventions may have been inadvertent, there is no doubt that they have predisposed these forests to uncharacteristically severe wildfires.
 - Excusing wildfires as “an Act of God” or “an accident of nature” makes no sense when we look back on a 100-year history of man’s influence in changing fire-prone landscapes in ways that have clearly increased wildfire risk and severity.
- Of all the natural disasters that plague us, severe and uncontrollable wildfires in altered fire-dependent forests are the least natural. This “natural disaster” has a solution that is in its ecology.

The obstacles that surround restoration work will be difficult, but not impossible to overcome. We need to do a better job in documenting the consequences of the path we are on. These consequences are the “red blinking lights” of alarm that, now, go largely un-noticed and un-accounted.

As we consider improving wildland fire protection, we might draw inspiration from the improvements in structure fire protection that have been made in our large urban areas. A century ago, our cities were haphazardly built with flammable materials. After a number of tragedies, where conflagration fires exceeded firefighting capabilities, policy-makers took notice and began to address the causal factors. Stronger building codes were adopted.

Although city fire departments have improved fire trucks, personal protective equipment, and other firefighting apparatus, those improvements have been complemented and much strengthened improvements in fire-resistant building standards. As a result, homes and commercial buildings are safer and less vulnerable to fire. Our structure fire protection strategies have continued to adapt, in order to meet protection mandates. For example, after 9/11, new construction on the World Trade Center site went forward with better fire insulation around steel components in order to withstand heat damage and prevent collapse.

A more proactive, preventative fire protection model is left begging in our wildlands.

CLOSING COMMENTS

“Politics is not the art of the possible. It consists of choosing between the disastrous and the unpalatable.”

-John Kenneth Galbraith (1908-2006), Diplomat

The onset of drought is a “changed circumstance” that should challenge convention. And, mega-fires, along with the rapid climb in wildfire costs, losses, and damages are a “new reality” that policy-makers charged with protection can no longer overlook or ignore.

In this way, the 9/11 Commission’s findings seem haunting, as we confront a serious wildfire threat that continues to incubate and grow.

This paper calls into question the notion that governments can continue to attempt matching increasing wildfire threats with greater firefighting force, as the means to protect fire-prone landscapes. The paper also argues against the feasibility of taking a “hands-off” approach to managing altered fire-dependent forests. Suspending these forests in stasis – undisturbed and unattended – is not only costly and dangerous, but promises to consume the very values that we are attempting to preserve.

I applaud you for calling this conference to address “creating resilient landscapes.”

I believe it will be up to a *unified* forestry profession to “get the wildfire problem right” and work with policy-makers to reverse the wildfire trends of the past several years. Forest managers can best help policy-makers understand the core problem, the limits of suppression, the “true costs” of wildfire impacts, and the risks of trying to preserve overgrown, fire-prone forests.

The fact that many of our worst wildfires are occurring in forests that were once among the most benign is ironic, but it also holds hope. Bushfires will always be with us, but the history and the ecology of dry forest types, especially, tell us that land managers and fire managers – working together - can reduce their severity potential. Knowing that many of our forests were adapted in ways to survive in a fire environment suggests that we might adapt our *land management strategies* to restore that resilience and, in the bargain, improve our protection capabilities to better sustain natural resources and give people safer surroundings.

It is, after all, the vulnerable condition of altered fire-dependent forests that is largely at the heart of today’s wildfire problem.