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Chairman Markey, ranking member Sensenbrenner, and members of the Committee, I want to thank you for this opportunity to be here and testify on the matter of climate change and fire management. My name is Michael Medler, and I am an associate professor in the Environmental Studies Department at Western Washington University, the president-elect of The Association for Fire Ecology (AFE), and a member of Firefighters United for Safety, Ethics and Ecology (FUSEE).

I worked as a seasonal wildland firefighter for the U.S. Forest Service in the 1980s, and really cut my teeth as a sawyer while fighting the Yellowstone fires in 1988. Although it has been awhile since I put on my fire boots and cut fireline, several of our members in AFE and FUSEE are currently serving on the firelines in Southern California, and I wish to share with you their concerns about the changes in fire behavior resulting from global warming and climate change.

## FIRE BEHAVIOR IS CHANGING

In Yellowstone in 1988 I remember being told over and over by veteran firefighters that we would never see fire behavior like that again in our lifetimes. Now, 20 years later, most summers bring us new record-breaking wildfire incidents and record-breaking fire seasons. In Idaho, for example, the year 2000 set a record for amount of acres burned, but this record was broken last year and then broken again this year with almost 2,000,000 acres burned by wildfires. "Megafires" are now routinely occurring in many parts of the U.S. on both public and private lands.

Last year the East Amarillo Complex in Texas burned 907,000 acres of mostly privately-owned rangelands, spreading 45 miles from its points of origin in the first nine hours after ignition. This year in Alaska the 260,000 acre Anuktuvuk River Fire was the largest wildfire in recorded history north of the Brooks Range, and burned over 112,000 acres on a single day in September—unprecedented fire behavior so late in the season. On this year's 300,000 acre Cascade Complex in Idaho, the fire spread so rapidly that it entrapped and burned over an entire firefighter camp, fortunately without killing anyone. These formerly "anomalous" wildfire events are occurring with greater frequency due to climate change.

I must point out that uncharacteristic fire severity should be more our concern than fire size because wildland fire has historically shaped many landscapes and is essential for the survival of many plants and animals. Some ecosystems like southern California's chaparral country are experiencing a surplus of ignitions, but other ecosystems are experiencing a "fire deficit," and our continued attempts to indiscriminately exclude wildland fire poses significant risks, costs, and impacts to firefighters, taxpayers, and the environment. But on the firelines, it is clear that global warming is changing fire behavior, creating longer fire seasons, and causing more frequent, large-scale, high-severity wildfires. Many firefighters have commented that they are facing more extreme fire behavior than they have witnessed in their lifetimes. Among fire scientists there is broad consensus that these changes in fire size, fire frequency, and fire severity will continue to occur as the climate continues to change.

## WEATHER DRIVES LARGE WILDFIRE EVENTS

Several of our members in AFE and FUSEE serve as fire behavior analysts, but the computer models they use to predict the rate of fire spread and fireline intensity often fail to accurately predict the actual observed fire behavior faced by firefighters. This is because the models rely on historic weather data, and we are experiencing weather phenomena that is unprecedented in the historic record. Record-breaking readings of the Burning Index and Energy Release Components are weather-driven, and have all been associated with recent megafires.

Although lots of attention has been given to reducing hazardous fuel loads, the problem of large-scale high-severity wildfires is more complex than dealing with fuel loads alone. In particular, weather is a major driver of large wildfire events. Prolonged droughts, high temperatures, low relative humidities, and strong winds create tinder-dry vegetation that ignites easily and spreads fire rapidly across any kind of fuel type—it can launch flames across eight-lane freeways and loft burning embers up to a couple miles in front of a wildfire to light new fires. The precautionary principle should be applied before embarking on landscape-scale fuels reduction treatments that reduce overstory canopy structure but neglect understory surface fuel loads, and cause microclimatic conditions that exacerbate the effects of a warmer, drier climate.

Climate change is also affecting precipitation patterns so that in many places more precipitation is falling as rain instead of snow, and the snow that does accumulate melts earlier in the spring and returns later in the fall. Since 1987 the average wildfire season in the West has now lengthened an extra 78 days, and periods of high or extreme fire danger are occurring earlier in the summer. Viewed on a national scale, we are witnessing the end of the seasonality of wildfire as it becomes a year-round phenomenon that rotates around the various ecoregions. This is taxing the endurance of firefighting crews and draining the budgets of land management agencies.

## FIREFIGHTING STRATEGIES AND TACTICS ARE CHANGING

Along with the increased occurrence of extreme fire behavior, firefighters have been forced to change strategy and tactics. The traditional firefighting strategy of "perimeter control" and its tactics of "anchor, flank, and hold" proved to be largely futile in the megafires of 2006 and 2007. Firefighters in the Northern Rockies, especially Idaho, had to basically give up on aggressively fighting fires in the forest because it was extremely unsafe and almost completely ineffective. Instead, they adopted the strategy of "indirect attack" and "point protection" to make sure individual homes and communities were protected from wildfire ignition, while essentially letting the fires burn across the landscape. In many cases, firefighters were forced to light large-scale backfires that burned with high severity because they were ignited during severe fire weather conditions.

## COMMUNITIES ARE SPRAWLING INTO HIGH WILDFIRE DANGER AREAS

Sprawling suburban/exurban developments built in fire-prone areas are also affecting firefighting strategies and tactics because actions are more focused on protecting structures than on suppressing wildland fire. When severe weather conditions fuel extreme fire behavior, however, firefighters are often unable to stop fire from spreading into vulnerable communities. All the air tankers in the world cannot help defend communities if fierce winds or dense smoke make them unable to fly safely.

Development patterns including the location of communities, and the design and construction materials of homes, rarely consider wildland fire dynamics, and this is putting both homeowners and firefighters in harm's way. Firefighters are rightly becoming more unwilling to risk their lives to protect individual homes from wildfire when they are located in absurdly indefensible locations like the top of narrow "chimney" canyons, or are built with highly combustible materials like wooden "shake" roofs, or are completely surrounded by dense flammable vegetation.

## TWO KINDS OF FIRE REQUIRE TWO SETS OF FIRE POLICIES

Nowadays it seems that nearly every wildland fire threatens rural homes and communities. Yet, once a wildland fire enters a subdivision or cluster of homes, it becomes less of a wildland fire and transforms into an urban fire. Fire management policies thus need to distinguish between backcountry wildlands, many of which are comprised of fire-adapted ecosystems, and frontcountry communities or the built environment, many of which are largely unprepared for wildfire. Conflating wildland fire with urban fire has led to inappropriate forest management and ineffective community protection policies.

In wildlands that have been degraded by past land management practices including fire exclusion, ecological restoration programs should carefully reintroduce fire through prescribed burning and wildland fire use. Some of my colleagues speculate that we have perhaps a ten-year window of opportunity to reintroduce fire on a landscape-scale and have some control over fire behavior with desirable effects, but beyond that time frame we may lose this control due to climate change. The whole ecological restoration agenda is challenged, however, by the uncertainty of facing future climatic conditions that may be unlike anything experienced in the past.

In rural communities, it is past time that we address the needs for some land use zoning, revised building codes, and enforceable vegetation management ordinances on private property in order to reduce home ignitability. Climate change is going to create more wildfire-prone environments, and the cycle of new homes being rebuilt in the same places with the same materials as the homes that were destroyed by past wildfires must be broken. It is clear from experience that lightning or arsonists can strike in the same places more than once! Ideally, our goal should be to create fireproof structures able to dwell sustainably in fire-permeable landscapes.

NEED TO BE PROACTIVE, NOT REACTIVE, TO MANAGE WILDLAND FIRES IN A CHANGING CLIMATE

Our traditional strategies that focused on fire prevention and fire suppression have become increasingly ineffective and are not sustainable. Given natural lightning ignitions and those of criminal arsonists or careless recreationists, wildfires will inevitably occur. The attempt to exclude fire from the landscape has, in fact, caused great harm to those ecosystems that evolved with, adapted to, or depend upon recurring fires. It is important to understand that there are a variety of fire regimes, including some that naturally burn with high severity, that have not been significantly affected by climate change—yet.

Given the increasing frequency and duration of severe fire weather conditions, large wildfires defy human ability to "put them out" and they will inevitably burn until the weather changes. The attempt to extinguish all fires has, in fact, caused huge costs to taxpayers, significant environmental damage, and put firefighter safety at unnecessary risk. It is important to acknowledge that there are forces of Nature that cannot be humanly controlled, and perhaps megafires should be viewed as similar to hurricanes, floods, earthquakes, and volcanic eruptions—natural disturbances that humans must adapt to since we cannot prevent or stop them. This is not a pitch for fatalism, but instead, a plea for realism and a change in paradigm from reactive wildfire suppression to proactive fire management.

Historically, legislation and policy changes in wildland fire management have always followed large wildfire disasters, reacting to those events after the damage has been done. For the future's sake, we need to take *proactive* steps to mitigate the effects of uncharacteristically severe wildfires, and adapt to altered fire regimes caused by climate change and variability due to global warming.

In 2006 at the Third International Fire Ecology and Management Congress--an event attended by over 1,200 fire scientists and managers from 26 different countries across six continents--the "San Diego Declaration on Climate Change and Fire Management" was formally ratified. This historic document presents a synopsis of the best available science on the effects of climate change on fire regimes and wildland fire, and provides a list of action items for proactive fire, fuels, and ecosystem management, and fire research, education, and outreach.

The San Diego Declaration offers a "wish list" for policy reform and legislation that we recommend this Committee and Congress as a whole examine closely. Among the Declaration's many recommendations for action are the following:

- Incorporate the likelihood of more severe fire weather, lengthened wildfire seasons, and larger-sized fire when planning and allocating budgets, which traditionally are based on historical fire occurrence.

- Develop site-specific scenarios for potential weather event linked to climate change and redesign fire management strategies for rapid response to these events.
- Consider climate change and variability when developing long-range wildland fire and land management plans and strategies across all ownerships.
- Evaluate probable alternate climate scenarios when planning post-fire vegetation management, particularly when reseeding and planting.
- Prepare for extreme fire events by restoring some ecosystems and reducing uncharacteristic fuel levels through prescribed burning, mechanical treatments, and wildland fire use to meet resource objectives.
- Expand wildland fire use at the landscape scale in fire-adapted ecosystems to restore fire regimes and reduce fuel loads.

- Implement long-term monitoring programs in fire-adapted ecosystems that are expected to undergo the widest range of variability linked to climate change.
- Expand interdisciplinary research to forecast potential fire season severity and improve seasonal weather forecasts under future climate change scenarios.
- Integrate the subject of climate change and its influences on ecosystem disturbances into curricula within natural resource programs at secondary school, university, and continuing education levels.
- Disseminate information to the general public and government agencies regarding the potential impacts of changing climate on local natural resources, particularly those that interact with fire.
- Form interdisciplinary teams of researchers that include fire ecologists and climate scientists to identify and pursue emerging areas of climate and fire research.

We would like to enter the full San Diego Declaration into the record along with our testimony, and urge Congress to do whatever you can to facilitate implementation of its many recommendations.

GLOBAL WARMING IS A FIRE ISSUE

Alongside melting glaciers, rising sea levels, and stronger hurricanes, it is clear that conflagration wildfires or "megafires" are providing another dramatic signal of climate change. In our view, global warming is fundamentally a *fire* issue, for it is the *burning* of fossil fuels that is the primary anthropogenic cause of climate change.

Consequently, we must bridge the gap between the Nation's energy and climate policies, and our wildland fire management policies. The best available science and the professional experience of wildland firefighters justifies taking action now to reduce fossil fuel burning while at the same time addressing land management practices, rural development patterns, and fire management policies in order to confront both the causes and consequences of the climate crisis.

Wildland firefighters serve on the frontlines of climate change, and have high hopes that Congress will craft sound energy, land management, and urban development policies that effectively deal with the "burning issue of our time." Thank you very much.