

**Testimony of Dr. Jack E. Williams
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**U.S. House of Representatives Committee on Natural Resources
Subcommittee on National Parks, Forests, and Public Lands
Washington, D.C.**

**Hearing on The Role of Federal Land in Combating Climate Change
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Chairman Grijalva and members of the Subcommittee, I appreciate the opportunity to appear before you today to provide my views as Senior Scientist for Trout Unlimited on “The Role of Federal Lands in Combating Climate Change.” Federal lands provide habitat for fish and wildlife species that are of substantial economic, ecological, and spiritual value, and these lands can play a key role in preparing for the impacts of climate change. I appreciate your concern in addressing this issue in a timely manner.

Trout Unlimited (TU) is the nation’s largest coldwater fisheries conservation group dedicated to the protection and restoration of our nation’s trout and salmon resources and the watersheds that sustain them. TU has more than 150,000 members in 400 chapters across the United States. Our members generally are trout and salmon anglers who give back to the waters they love by contributing substantial amounts of their personal time and resources to fisheries habitat protection and restoration. The average TU chapter donates 1,000 hours of volunteer time on an annual basis.

My name is Jack Williams and I serve as Senior Scientist for Trout Unlimited. Prior to working for TU, I was privileged to serve in a number of research and management positions in the federal government, including Endangered Species Specialist for the U.S. Fish and Wildlife Service, National Fisheries Program Manager for the Bureau of Land Management (BLM), Science Advisor to the Director of the BLM, Deputy Forest Supervisor on the Boise National Forest, and Forest Supervisor on the Rogue River and Siskiyou National Forests. I also have served as a Professor at Southern Oregon University and retain the title of Adjunct Professor at that institution.

In my testimony today, I would like to focus on three major points.

First, I will briefly describe how climate change is likely to impact our National Forests and public lands. These impacts already are being felt across the country and will become more pronounced and severe in coming years.

Second, I will describe how these impacts are likely to affect natural resources and the people and nearby communities that use these resources. It is important to recognize that

a broad spectrum of user groups will be impacted and that the risks are not just restricted to fish, wildlife, rivers, and forests.

Third, I will describe how these problems can be solved – if we act now and utilize the best available science. I will provide specific examples of what needs to be done and how to do it. If we fail to act, costs will be considerable and our National Forests and public lands will be irreparably harmed.

At the end of this document, I will provide a short annotated list of recent science articles in support of my testimony.

Impacts of Climate Change on National Forests and Public Lands

Climate change is likely to alter weather patterns and storm events across the United States dramatically with significant negative consequences for National Forests and public lands. A general warming pattern will result in increased evaporation rates and drying of forest and grassland vegetation. These effects will increase wildfire intensity and frequency, especially at mid-elevations. In turn, these changes will spark surges in forest pest species and invasive weeds, triggering a cascade of further alterations in natural ecosystems.

River flows and hydrologic regimes also will be altered, with consequences not only to fisheries but also to water supplies in general. More winter precipitation will fall in the form of rain than snow, especially at lower and mid-elevations. This will reduce snowpack and increase the probability of rain-on-snow events, likely resulting in increased winter flooding. With more rain during winter and reduced snowpack, peak stream flows will occur earlier in the spring and low or base flows during summer and autumn will be reduced. Stream flows will be less consistent from year to year.

Overall, storm intensities will be greater. Floods, drought, and wildfires are all likely to increase. The increased variability and longer duration of wet cycles and dry cycles will cause considerable additional stress to natural ecosystems.

In all cases, impacts of climate change on federal lands must be viewed within the existing management context and conditions of natural systems. Watersheds, riparian systems, and streams that are in better condition will be more resistant to disturbance and more likely to rebound quickly. On the other hand, habitats that are degraded and fragmented will be less able to adapt to climate change risks. The effects of rapid climate change will be compounded with, and magnify, existing stressors. In poor-condition lands without adequate protective vegetation along streams, floods will be more severe with greater erosion and floodplain damage. If wetlands are drained or filled and watercourses are channelized, floodplains that normally slow water flow and soak up winter precipitation to help recharge groundwater aquifers, instead will speed stream discharge, encourage summer drying, and deepen droughts.

Natural Resources, User Groups, and Communities will be Substantially Impacted

Trout Unlimited and our members are especially concerned about the impacts of climate change on coldwater fishes and the habitats that support them. We also are concerned about impacts to the recreational pursuits, such as fishing, hunting, camping, and nature watching, for which National Forests and public lands are well known. However, we also realize that the impacts from climate change will be felt far more broadly.

The affects of climate change on federal lands is likely to negatively impact many natural resources, user groups, and communities, creating problems for:

- Drinking water supplies – both quantity and quality
- Fisheries
- Wildlife
- Overall biological diversity
- Outdoor recreational opportunities
- Livestock grazing, timber harvest, and other resource extraction
- The safety and economic well-being of nearby communities

In short, a very broad range of species, people, and communities will be under increasing risk unless we take immediate proactive management actions to prepare. The costs of failing to adequately plan and prepare will be high, and will be measured in substantial economic costs to fight large wildfires, deal with multi-year droughts, and repair damage from broadscale floods, and possibly in increased injury and loss of life.

It is important to realize that we cannot prevent these climate-driven disturbances to our national forests and public lands. Emissions already concentrated in the atmosphere will produce significant changes in the global climate now and throughout the next century, and ongoing emissions are likely to increase the severity of change we must endure. Recently the head of the Intergovernmental Panel on Climate Change indicated that there is little time for mitigation efforts aimed at reducing greenhouse gas emissions; the Earth has about six more years at current rates of carbon-dioxide pollution before it is locked into a future of severe global warming. We know that change already is happening, and that we will be subjected to climate change driven risks. But it equally is important to realize that we can moderate the impacts of these changes and reduce stress on our natural resources and adjacent human communities.

Specific Threats and Appropriate Responses

In this section of my testimony, I identify specific resources on National Forests, National Grasslands, and public lands that will be threatened by climate change and provide scientifically sound and proven strategies for resource protection.

Water resources and water quantity. To help protect water supplies and maintain stream flows, the Forest Service and BLM should restore high elevation wet meadows, wetlands, riparian areas, and floodplains. These habitats act as natural hydrologic sponges that slow water discharge and recharge groundwater aquifers, which in turn increases late-season stream flows. The proper function condition of these habitats will be increasingly important as snowpacks diminish.

Water quality. To protect water quality, agencies should designate adequately sized streamside – riparian – zones and adopt management standards that emphasize aquatic system protection. These riparian zones should be large enough not only to provide shade to streams, but also to buffer from upslope erosion and poor management activities. Agencies also should protect landslide prone areas. Inadequate protection of these areas will increase siltation and erosion, which will degrade stream systems, water supplies, and fisheries.

Increasing floods. To help guard against flood damage, agencies should reconnect rivers to their floodplains. That is, rivers should not be confined into narrow channels but rather allowed access to broader floodplains. We also should seek to restore floodplains and streamside vegetation. These measures transfer flood energies into well-vegetated floodplain zones while dissipating flows and protecting soils from erosion. In addition federal agencies should improve culverts and other stream/road crossings, and decommission poorly maintained or poorly designed roads. Inadequately sized or designed culverts and poorly maintained road/stream crossings act like time bombs that will plug up then blow out during intense storms causing massive landslides and debris flows. Severe flooding has substantial consequences not only to fisheries and wildlife, but also to downstream communities and recreational facilities.



Example of a re-engineered stream crossing consisting of an oversize bottomless culvert. This structure provides for free movement of stream substrates and aquatic species while also providing adequate flood capacity and roadway safety.

Invasive species. Weedy and invasive species are more likely to flourish in degraded habitats and to be favored during highly fluctuating environmental conditions. Some invasive species will spread more quickly during warming trends and will cause greater harm and be more expensive to control if left untreated. To better manage invasive species, we should become more aggressive in programs to detect new species invasions and in programs to control established exotic species – both terrestrial invasive weeds and aquatic non-native species.

Biodiversity loss. To deal with potential loss of plant and animal diversity, lands and waters should be managed to provide adequate habitat to support viable populations of native species. Agencies should manage to protect genetic diversity, including weak stocks and peripheral populations. High levels of genetic, life history, and ecological diversity will be necessary for species to adapt to rapid environmental change.

Increasing wildfire. Wildfires are increasing in western forests because of reduced snowpack and earlier vegetative drying during summer. To deal with more frequent and

intense wildfires, agencies should selectively thin forests, primarily in wildland-urban interface zones and plantations. To prepare aquatic systems, we also should improve road networks and stream crossings, restore up- and downstream connectivity, and recover degraded riparian areas. Finally, we should adopt strong post-fire logging standards that protect soils and stream systems while providing for adequate recruitment of large wood to streams. These actions will result in less wildfire damage and decreased erosion and stream sedimentation. Riparian habitats, old growth and mature forests, and unroaded areas should be protected as well because these are the most fire resistant habitats.

Health of the land. In general, agencies should strive to improve the overall health of the land, seeking to restore conditions that allow the land to help us withstand and recover from anticipated climate change driven disturbances. This can best be done by protecting the best remaining habitats, reconnecting stream and riparian systems, and restoring degraded areas (see graphic). Watersheds that are in better condition are more able to withstand disturbances, or if disturbed, are more resilient to damage from the disturbances. Areas that may be especially important to protect include roadless areas, unroaded lands, habitat currently acting as native population strongholds, and areas of watersheds that produce high quality supplies of cold water. It is important to reconnect stream systems by removing barriers to fish movements. These barriers may include small dams whose water diversion service can be replaced by pumps or other means, inadequate or poorly-designed road culverts that create conditions that fish cannot navigate, or dewatered stream segments created by direct water diversion or by land management practices that cause the stream to go subsurface (e.g., overgrazing). Overall, it is important to reduce existing stressors, such as dense road networks or too intense or inappropriately timed livestock use. These existing stressors are within our ability to influence, whereas the added stress of climate change is beyond our ability to eliminate from the next 50 to 100 years, no matter how successful global mitigation efforts prove to be.

How might this be implemented? For the past four years, BLM, TU, National Fish and Wildlife Foundation and other partners have been reconnecting and restoring habitat for Lahontan cutthroat trout in the Maggie Creek drainage in northern Nevada. Reconnection work consisted of replacing three major culverts that blocked fish passage and removing one irrigation structure that also blocked fish movement. Livestock grazing was improved by exclusion fencing along sensitive riparian areas. Restoration efforts focused on 1,982 acres of riparian habitat, which included replanting native species and irrigation improvements. In all, 82 stream miles of Maggie Creek and its tributaries were reconnected and restored. Total cost was approximately \$600,000 during this four year period. These efforts not only benefited the threatened trout but also improved conditions for livestock use and provided increased flood capacity for the road system.



This approach to improving overall land health via watershed management can be summarized by the model of Protect-Reconnect-Restore-Sustain. Healthier lands are more resistant to climate change impacts and more resilient when disturbed by floods, drought, and wildfire.

Dealing with the Uncertainty of Climate Change

Monitoring and adaptive management will be important. Although many ramifications of climate change are relatively well understood, researchers uncover new surprises almost daily regarding the pace and intensity of change. There is substantial uncertainty and rapid environmental change ahead. National Forest and public land managers need to be better prepared to identify and track these changes and better equipped to understand their consequences.

Our ability to adapt is limited by two things: our ability to detect change and our capacity to understand its consequences. Forest Service and BLM monitoring programs are not adequate for these tasks. To address this shortcoming, the federal government needs a new science initiative among USGS-Biological Resources Division, Forest Service Research, and academic and non-profit organizational scientists to help federal land managers design and interpret the results of an integrated monitoring program across multiple jurisdictions.

Conclusion

The necessary actions described herein have a considerable price, but they also have broad benefits not only to maintaining biological diversity, but to sustaining the ecological services critical to meeting the needs of recreationists, ranchers, and other user groups, and to ensuring the well-being of nearby communities. The actions I have described are very low risk steps that have a very high likelihood of substantial benefit to multiple parties. Many actions create jobs as well.

National Forests and public lands provide substantial ecological services that include clean water, clean air, and buffering from drastic flood and drought. Without adequate effort to sustain these critical ecosystem services, private property owners, local governments and the human communities they make up will be excessively burdened.

In the end it is important that we ask ourselves: What is the cost of inaction? What will it cost to repair damage to our National Forests and public lands? What will it cost in private property loss and public safety? I would argue that it is less costly and more beneficial to address these concerns in the near-term than it would be to wait until increased climate change driven disasters befall our lands and nearby communities. The time to act is now. Our National Forests, National Grasslands, and BLM public lands are national treasures that are irreplaceable in our lifetimes.

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