Testimony of George Geissler, Washington State Forester
On Behalf of the National Association of State Foresters
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Good morning, Chairwoman Johnson, Ranking Member Lucas, and Members of the Committee. My name is George Geissler, State Forester and Deputy, Wildland Fire and Forest Health/Resiliency, Washington Department of Natural Resources, Past President of the National Association of State Foresters (NASF), Chair of the NASF Wildland Fire Committee, and member of the Wildland Fire Leadership Council (WFLC). I appreciate the opportunity to speak with you today and submit written testimony as the Committee examines research and development related to wildfire operations.

NASF represents the directors of the state forestry agencies in all 50 states, eight U.S. territories, and the District of Columbia. State Foresters deliver technical and financial assistance to private land owners, along with protection of forest health, water and wildfire for more than two-thirds of the nation's forests, as well as partner with federal agencies through authorities like Good Neighbor Authority in managing and protecting the nation's federal forests. While the duties of state agencies vary from state to state, all share common forest management and protection missions and most have statutory responsibilities to provide wildland fire protection on all lands, public and private.

State Contribution

State forestry agencies contribute a significant portion of the overall wildland fire suppression effort nationally in terms of resources, personnel, capacity, and funds. Collectively, States reported spending $1.9 billion on fire suppression, prevention, and mitigation in 2018, with $1.4 billion spent on suppression alone. The overall federal cost of fire suppression for 2018 was $3.1 billion. In 2018, there were 8,080 State personnel (including overhead and crews) mobilized through the National Interagency Coordination Center. Of those State personnel, 6,026, or nearly 75%, were mobilized to federal wildfires.[1] State forestry agencies also provide local governments and volunteer fire departments with access to fire and emergency response resources, which in 2018, included 93,656 firefighters, 91,940 fire engines, 2,851 dozers, and 620 aircraft. In 2019, 50,477 wildland fires burned nearly 4.7 million acres.[2] State and local agencies respond to the majority – 79% – of these wildfires across all jurisdictions.[2]

State Foresters work closely with Conservation Districts, Mayors, local and County Governments, Tribal and Federal partners across the US to deliver forestry programs and wildfire protection on a National scale. NASF is a key partner in the development and implementation of the National

[1] Statistics posted above were gathered from the Interagency Fire and Aviation Management Web Applications (FAMWEB) system, which includes the Situation Report and Incident Status Summary (ICS-209) programs. The statistics presented here are intended to provide a national perspective of annual fire activity but may not reflect official figures for a specific agency.

[2] National Interagency Fire Center, Historical Wildland Fire Summaries, pg. 8. Last accessed March 4, 2020 at https://www.predictiveservices.nifc.gov/intelligence/2019_statssumm/intro_summary19.pdf.

Cohesive Wildland Fire Management Strategy (Cohesive Strategy), which provides the roadmap for interagency wildland fire management across the country and allows diverse stakeholders to work collaboratively using the best science to achieve resilient landscapes, fire-adapted communities, and effective wildfire response. NASF is also a key partner and member of the WFLC, an intergovernmental committee of Federal, State, Tribal, county, and municipal government officials convened by the Secretaries of the Interior, Agriculture, Defense, and Homeland Security dedicated to consistent implementation of wildland fire policies, goals, and management activities. The Council provides strategic recommendations to help ensure policy coordination, accountability and effective implementation of Federal wildland fire management policy and related long-term strategies through collaboration.

Our Nation's Forests and Wildfire

Fire is a natural phenomenon for nearly every forest ecosystem in this country. Fire has shaped the occurrence and distribution of different ecosystems for centuries, simultaneously impacting the human and natural communities that live in and around those forests. Over the past century, a culture of fire suppression has unfortunately removed the natural role of fire from many fire-dependent landscapes. This culture, combined with less active forest management in many areas, has led to the build-up of hazardous fuels to historic levels. In our attempts to manage wildfires away, we've inadvertently made our forests more prone to catastrophic wildfire.

Federal, State, and local fire managers have learned the critical role of hazardous fuels management in mitigating wildfire impacts. Solely focusing on wildfire suppression and ignoring proactive forest management does not lead to fewer wildfires in the long run; the fuel continues to build up to the point where eventually wildfires become unmanageable. The task for wildfire managers is to manage the risk to communities and ecosystems in both the short- and long-terms by implementing a coordinated and science-based program of fuels reduction, fire suppression, and community planning.

Hazardous fuels reduction has two main components: prescribed fire and silvicultural treatments, such as "thinning." Both activities have a beneficial impact on mitigating wildfire emissions by reducing combustible material in the woods and allowing fire to play its natural role in the ecosystem. In many parts of the country, especially on federal lands which have not seen regular management, forest stands are too dense to conduct prescribed fire and thus forest thinning is a crucial first step in managing hazardous fuels. Following a harvest treatment, prescribed fire can be an important tool to maintaining the investment of a more healthy and resilient forest and minimizing the risk of catastrophic wildfire.

Wildland fire response is one of the most challenging facets of our jobs. As State Foresters, we believe we need to be doing significantly more hazardous fuels reduction across all ownerships – public and private and across this country. We are committed to continue working towards this goal. Such treatments allow us to put fire on the landscape at times and under conditions that minimize impacts, including smoke emissions. These treatments reduce fuel loading in the forests, so that when wildfires inevitably occur, they burn with less intensity, reduced spread, and fewer smoke impacts on communities and firefighters.

Where forests of different ownerships exist in close proximity to each other, it is critical that decisions about suppression and fuels treatments get made in a collaborative and cooperative way. This is especially true for federal lands on which fire management has a direct impact to adjacent state and private lands and/or communities.

The Role of Research and Development in Wildfire Mitigation and Operations

Research and Development (R&D) plays a critical role in supporting wildland fire management efforts and improving technology used to support all phases of wildland fire management. Research can produce valuable information and applications that support wildland fire management and help land managers better understand fuels and wildfire behavior. Wildfire management is inherently a partnership effort between federal, state, local, and volunteer agencies and departments. All of these entities stand to benefit from coordinated R&D efforts that support the science and technology needs of Federal, State, tribal, and local governments, and also private land owners, by delivering applied research that better informs efforts to mitigate wildfire risk and foster resilient, adaptive ecosystems to mitigate the impacts of climate change.

Forest Service R&D has played a vital role in U.S. wildland fire management and response programs since the early 1900s and continues to develop new knowledge and products that support evolving fire management and response needs in the context of the growing complexity of fires in the United States. Forest Service R&D contributions that have changed the way fire managers in the United States and other countries manage and respond to wildland fires have been numerous. Here are three examples of how investments in wildfire R&D efforts provide support to all phases of wildfire management.

The Incident Command System (ICS) provides the common management structure that all wildland firefighters and support personnel work under when they come together and respond to an unwanted wildland fire or other incidents. The ICS was developed as part of the Riverside FireScope Research, Development, and Applications (RD&A) program in the 1970s and has been used since its inception in Federal fire response. Over time, the system has been adopted by emergency responders around the world and, in 2001, as a result of the important role it played in the 9/11 response, ICS became the management structure used to manage all natural and human-caused disasters in the United States.

The National Fire Danger Rating System (NFDRS) is used by wildland fire managers to assess seasonal progression of fire danger, allocate firefighting assets, determine use restrictions, and communicate fire risk with the public.

Fire behavior prediction systems that use the Rothermel (1972) model are used by Federal agencies and others to predict fire behavior on wildland fires. This model is employed as the core of many fire behavior and decision-support applications that rely on fire spread prediction.

The Joint Fire Science Program

The Joint Fire Science Program (JFSP) was established by Congress in 1998 as an interagency research, development, and science application partnership between the U.S. Department of the Interior (DOI) and the Forest Service. Program oversight is provided by a governing board, which includes representatives from five DOI agencies and the Forest Service with diverse backgrounds in R&D, fire management, and land management. JFSP supports research, tool development, and science application related to the following specific emphasis areas defined by Congress: fuel inventory and mapping; fuel treatment scheduling and risk assessment; fire effects and behavior; monitoring and evaluation; restoration of fire-adapted ecosystems; postfire stabilization, rehabilitation, and restoration; remote sensing; and developing and integrating research information for local land managers.

The JFSP is a program many state forestry agencies find tremendously valuable, providing the data we need to rate fire danger, make seasonal wildfire forecasts, and cost effectively reduce the risk of wildfire through fuels management and prescribed fire. In addition to helping state forestry agencies prepare for wildfire events, the JFS program also generates scientific data used to manage smoke from wildfires and develop remote sensing tools for wildfire management.

The 15 regional Fire Science Exchanges funded by the JFS program provide trusted, science- based information to land managers and owners throughout the country, that in turn, enables sound policy and on-the-ground decision-making related to wildfire, ecosystems, and hazard risk reduction. The Fire Science Exchange Network distinguishes itself from other federally supported wildfire research programs in its emphasis on direct application. Members of the network convene workshops, field tours, webinars, and conferences, and in many states, work directly with wildfire managers to ensure management needs and questions are met and answered with scientific research.

As this Committee examines opportunities to improve research and coordination around Wildland Fire Science, we point to the JFSP as model for federal agencies to engage in coordinated efforts that deliver applied research to land managers.

Research Informing Fuel Treatments and Active Management

America's federally managed forestlands face serious threats. Entire landscapes are experiencing deteriorating health and uncharacteristic ecological change as a result of insects and disease, catastrophic wildfire, and other forest health stressors. Forest health threats know no boundaries and there is an urgent need for more active management on these landscapes in order to protect both public and privately-owned forests and the communities that depend upon them. State Foresters are responsible for protecting the health and socio-economic benefits of forest resources within their jurisdictions; what happens on federal forests has a direct bearing on their ability to fulfill those responsibilities.

Intentional management is necessary to improve the resilience of federal forest lands. In regions with a mixture of ownerships, the prerequisite for success is landscape-level coordination, which includes the full participation of federal partners.

A great example of this interagency cooperation leading to on-the-ground decision-making related to wildfire, ecosystems, and hazard risk reduction—informed by research and develop— is the Nenana Ridge Experimental Fuels Treatment Research Project, funded by the Joint Fire Science Program. This project was designed to quantify the effects of fuels reduction treatments on fire behavior and post-fire vegetation dynamics in Alaska black spruce forests. Mechanical (e.g., shearblading) and manual (e.g., thinning) fuel treatments are commonly used by Alaska fire managers and agencies for mitigating fire risk. However, prior to this experiment, there was little documentation of the actual effect of different fuel treatments on fire behavior. The Nenana Ridge project began in 2006 with preparation of eight 1-acre treatment blocks with two controls, and a prescribed burn was conducted on five blocks in June of 2009. The primary objective of the project was to characterize the effectiveness of the treatments in reducing fire intensity. Fire-proof digital sensors and video cameras were used to document the burn, in addition to measurements of vegetation, fuel beds, and fuel moistures, which allowed scientists to compare fire behavior between control plots and fuel treatment plots. All treatments that burned resulted in significant reductions in fire intensity and spread.

This study was the first of its kind testing the effect of four fuel treatments on fire intensity in the boreal forests of Alaska. The anecdotal (n = 1) evidence suggests that all treatments significantly reduced fire intensity. The thinning treatment modified fire behavior while maintaining an aesthetic that closely matched the original forest stand; it also led to the lowest peak heating rates and was the most effective in stopping fire spread. The shear-blade treatments produced the lowest air temperatures with some indication that grass loads that could develop in years subsequent to the treatment could facilitate fire spread across the entire treatment area.

Subsequent fuels treatments in Alaska were tested by wildfire during the Eagle Trail (2010), Funny River (2014), Card Street (2015), and Nenana Ridge (2015) fires. In all documented cases the Alaskan fuel breaks changed fire behavior as the fire moved through untreated wildland fuels as an active crown fire and dropped to a surface fire in the treatment areas.[5]

I would like to highlight an example of an Alaska fuel break project which resulted in a successful burn out operation on the Shovel Creek fire near Fairbanks in the summer of 2019. The fuel break was created using shear blade by dozers and a windrow/burn treatment. The shear-blade work was done in the winter of 2007. Burning of the windrowed piles was accomplished in late fall 2009 after curing for a few years. The curing of the fuels was a smoke management technique to lessen smoke impacts during the burning as the cured fuels combust more completely and quickly. The line is over 22 miles in length and runs along a ridge between the outskirts of Fairbanks and open country to the north of town.

This operation secured the north flank of the Shovel Creek Fire, which was a Type I incident, and protected over $187.5 million in private property. This is a conservative estimate as it only includes parcels in the Level III and II evacuation areas. The costs were covered by a combination of State Fire Assistance Wildland Urban Interface (WUI) grants, which are awarded through a competitive process with emphasis on hazard fuel reduction, information and education, and

[5] Final Report: Evaluating the Effectiveness of Fuel Treatments in Alaska JFSP Project 14-5-01-27
https://www.frames.gov/documents/alaska/docs/little_et_al_2018_EvaluatingEffectivenessFuelTreatmentsAlaska_jfsp-14-5-01-27.pdf

community and homeowner action, American Recovery and Reinvestment Act (ARRA) stimulus funding and other funds, following the large 2004 and 2005 fire seasons.

And every state has ongoing efforts to improve the resiliency of our forests and provide opportunities for our firefighters by implementing and evaluating effectiveness. In a recently published research paper, scientists evaluating fuel treatments across all lands found that not only was burn severity significantly lower within the footprint of past fuel treatments than in untreated forest but in Washington:[6]

- Fuel reduction treatments that combined mechanical thinning from below with post-harvest broadcast burns were particularly effective.
- Placement of fuel reduction treatments mattered. Burn severity was significantly lower in fuel treatments positioned on leeward slopes (sheltered from wind, and typically drier and warmer than windward slopes).

With each fuel treatment and with each fire, we learn, and we get better.

Opportunities for Improving Wildland Fire Research and Development

We appreciate the work of this committee to address research and development needs related to wildfire. Accordingly, we offer the following recommendations for improving research and development efforts focused on supporting wildland fire management:

- There is a need for improved wildland fire behavior modeling, including for the wildland urban interface (WUI) that can provide wildland fire response efforts with real-time wildfire modeling and be made accessible to the general public. We have good predictive services but there is a clear need for active, real-time wildfire modeling that can be used at the operational level to inform response efforts. As an example, the National Hurricane Center (NHC) uses many models as guidance in the preparation of official track and intensity forecasts for hurricanes. Forecast models vary tremendously in structure and complexity. Similar tools that would combine a collection (or "ensemble") of wildfire models in real-time would provide an advantage for wildfire operations and better inform public orders for evacuations.

- Federal, state, tribal and local agencies should collaborate to improve fire-modeling and communications by providing real-time and realistic fire behavior information to resources engaged in wildfire suppression operations.

- We need support in the development of fire simulation models that can incorporate the built environment as a fuel. Currently, wildfire models encompass the wildlands and stop at the built environment, our communities. We need models that include the build environment in these models to better determine future threats to communities in the WUI.

[6] Prichard, Susan J., Nicholas A. Povak, Maureen C. Kennedy, and David W. Peterson. 2020. Fuel treatment effectiveness in the context of landform, vegetation, and large, wind-driven wildfires. Ecological Applications 00(00):e02104. 10.1002/eap.2104

- We need to be able to remotely track the location of active wildland fire resources and display the location of each fire resource on real-time maps. Wildfire management and suppression operations utilize a patchwork of communication to track resources. We need real-time dissemination of information.
    - The Android Team Awareness Kit (ATAK) provides an example that should considered for broader use to support the complex communication and coordination needs of the multi-jurisdictional responders. https://www.dhs.gov/science-and technology/news/2017/11/17/snapshot-atak-increases-situational-awareness-communication

- We need to improve our capabilities for early detection and assessment of wildfires, particularly in rural areas. Often times, wildfires can go undetected for days. More access to satellite technology and high-performance infrared cameras would improve our abilities for early detection and assessment. Attacking wildfires when they are small is the key to reducing fatalities, injuries, loss of homes, and cutting federal fire-fighting costs.

- We need technical assessments from qualified entities to ensure that states have adequate baseline systems necessary to capture and analyze data. This assessment should include identifying any state deficiencies in necessary equipment and provide solutions for improving state data collection systems.

- We need to prioritize the development of smoke modeling and decision support tools for local and regional public health officials. We also need operational smoke models that can be used in real time by fire managers. There are opportunities to leverage the Environmental Protection Agency and Center for Disease Control to better understand the public health impacts of smoke, and also the impacts to our wildland Firefighters. With many wildfires occurring in the WUI, there are more materials and chemicals in homes and in the streets that burn and produce a toxic environment.

- We need to provide research opportunities that will help inform the development and implementation of the next generation of national codes and standards designed to address issues in the modern WUI and impacts from catastrophic wildfire utilizing the best available science and review of past wildfire losses.

- We need to develop a standardized warning scale for wildfires that conveys the magnitude or potential magnitude of the current, developing, or projected wildfire event.
    - This scale, much like the Saffir-Simpson scale for hurricanes or the Richter scale for earthquakes, would help convey the magnitude of the impending threat to the public. This could be used included as part of the evacuation process.

Conclusion

Thank you for the opportunity to appear before the Committee today on behalf of the Washington Department of Natural Resources and the National Association of State Foresters. Wildland fire

response is one of the most challenging facets of our jobs. We appreciate the work of this committee to address research and development opportunities related to wildfire operations today and for its continued support on this important issue. Improvements in applied R&D and technologies that support wildfire operations will enhance our collective ability to safely respond to wildfire and better protect our communities and treasured natural resources. NASF and I stand ready to assist the Committee in finding ways to address the challenges we all face as the wildland fire problem continues to grow and consume larger and larger portions of our state and federal budgets. The scale of wildfires and their community impacts far outpace current efforts to prevent them and mitigate the damage they cause. Substantial increases in active forest management and fuel treatments across all landscapes and ownership boundaries are needed in the areas at greatest risk for unwanted wildfire. Without an increase in coordinated forest management, wildfires will continue to pose a threat to the nation's forests, destroy our cherished communities, and irrevocably alter American landscapes.