

Testimony of Dr. Courtney Schultz, Associate Professor at Colorado State University

U.S. House Committee on Natural Resources, Subcommittee on National Parks, Forests, and Public Lands

Hearing on: Wildfire in a Warming World: Opportunities to Improve Community Collaboration, Climate Resilience, and Workforce Capacity

April 29, 2021

Chairman Neguse, Ranking Member Fulcher, and Members of the Subcommittee:

Thank you for the opportunity to speak to you today about maintaining resilient communities and forest ecosystems in this era of increased fire and climate change. I am a professor in the Department of Forest and Rangeland Stewardship at Colorado State University, specializing in national forest policy and governance. I direct the Public Lands Policy Group, a research group studying policy developments that affect US public lands, and lead the university's Climate Adaptation Partnership, which serves to accelerate research and promote communication with policy makers to support effective and equitable approaches to climate adaptation.

Over the last decade, I have led national policy analyses of many of the primary forest restoration policies, including the Collaborative Forest Landscape Restoration Program and the Joint Chiefs Landscape Restoration Partnership. With funding from the Joint Fire Science Program, in partnership with researchers at the University of Oregon, I recently completed a four-year research project investigating the policy barriers and opportunities for prescribed fire application. I am part of a team studying the interactive effects of climate and management across all US forests with funding from the National Science Foundation. In close partnership with the Forest Service, I have also led research on national forest planning, National Environmental Policy Act processes, climate change vulnerability assessment, and science-based tools for improving fire response. In addition, I work closely with the Colorado Forest Restoration Institute and with a network of thought leaders working on forest management issues from rural and community-based forestry organizations. Based on robust social science research, I bring together findings from people and places across the country about the challenges and the opportunities they see in the field. Over the course of surveying and interviewing thousands of agency staff members, partners, including state agency employees, NGO and industry representatives, and partners representing Native American Tribes, I have built a strong understanding of the challenges and opportunities surrounding forest management for ecosystem and community resilience in light of climate change.

Forest and fire management are complex challenges that vary in every place, depending on forest and community conditions, local economic needs, and local partnerships. My research sheds light on supportive policy approaches, including legislation, budgets, and performance metrics, but ultimately it is the work of place-based partnerships that yields progress and innovative solutions. Effective collaboration, leadership, and capacity—within and among agencies partners—are the most pivotal factors that impede or promote success. There are no simple policy solutions in this context. Instead, policies that facilitate communication among stakeholders and collaboration across jurisdictions, and increase funding and capacity for the necessary work, are the most important paths forward.<sup>1</sup> As a

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<sup>1</sup> Schultz CA, Moseley C. 2019. Collaborations and capacities to transform fire management. *Science, USA* 366(6461):38-40.

corollary, actions that impede those processes or alienate key partners only lead to delay, conflict, and contested outcomes. To make meaningful progress we must seek creative approaches that bring people together around their shared goals, which in every place I have worked are the same: to protect their people and infrastructure from fire, to support local jobs and economies, and to maintain healthy forest ecosystems and watersheds into the future.

### **Forest restoration in a changing climate**

Wildfires today result from the interactive effects of climate change, land use patterns, and forest and fire management practices. Scientists predict longer and more intense fire seasons because of the warming and drought associated with climate change.<sup>2</sup> The wildland-urban interface is the fastest growing land-use type in the nation and across the West.<sup>3</sup> Forest management can both reduce and exacerbate fire hazard, depending on how, where, and when it is done.<sup>4,5</sup> In our frequent-fire forests, a century of fire suppression has led to an accumulation of small trees and fine fuels that contribute to increased fire hazard.

The effects for communities include many lives and homes lost, profound and deleterious health impacts from smoke,<sup>6</sup> and costly damage to forests and watersheds. These effects fall disproportionately on poor and marginalized populations, who are often left behind in preparedness and recovery efforts.<sup>7,8</sup> It is essential going forward to ensure the investments in forest and fire management are done in a way that increases social equity and builds collaborative capacity where it is needed.

The 2020 fire season portends the challenges to come. In my home state of Colorado, for decades we have witnessed the extremely costly consequences of fire, including the nearly \$26 million damages to water infrastructure around Denver after the 2002 Hayman Fire. That fire and others prompted a series of watershed partnerships among water utilities, other partner organizations, and the US Forest Service to fund fuels reduction in public forestlands along the Front Range.<sup>9</sup> This past summer we witnessed the largest fires in state history, including the Cameron Peak Fire, which I had to flee on the day it started just three miles from where I was hiking in the backcountry, and which two months later required me to evacuate my home outside of Fort Collins as the fire raced towards Front Range cities.

In the face of these growing threats from fire, the most cost-effective way to protect human infrastructure is to work in and around homes and communities.<sup>10</sup> Community protection, home hardening, and fuel reduction in the home ignition and community protection zones are imperative. We must adapt to living

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<sup>2</sup> Abatzoglou JT, Williams AP. 2016. Impact of anthropogenic climate change on wildfire across western US forests. *Proceedings of the National Academy of Sciences, USA* 113:11770-11775.

<sup>3</sup> Radeloff VC, et al. 2018. Rapid growth of the US wildland-urban interface raises wildfire risk. *Proceedings of the National Academy of Sciences, USA* 114:2946-2951.

<sup>4</sup> Zald HSJ, Dunn CJ. 2018. Severe fire weather and intensive forest management increase fire severity in a multi-ownership landscape. *Ecological Applications* 28: 1068–80.

<sup>5</sup> Kalies EL, Kent LL. 2016. Tamm Review: Are fuel treatments effective at achieving ecological and social objectives? A systematic review. *Forest Ecology and Management* 375:84-95.

<sup>6</sup> Ford B, et al. 2018. Future fire impacts on smoke concentrations, visibility, and health in the contiguous United States. *GeoHealth* 2:229-247.

<sup>7</sup> Davies IP, et al. 2018. The unequal vulnerability of communities of color to wildfire. *PLOS ONE* <https://doi.org/10.1371/journal.pone.0205825>

<sup>8</sup> Anderson et al. 2020. Inequality in agency responsiveness: evidence from salient wildfire events. Resources for the Future Working Paper 20-22. Available at: [https://media.rff.org/documents/WP\\_20-22.pdf](https://media.rff.org/documents/WP_20-22.pdf)

<sup>9</sup> Huber-Stearns HR et al. 2019. A multiple streams analysis of institutional innovation in forest watershed governance. *Review of Policy Research* 36:781-804.

<sup>10</sup> Calkin DE, et al. 2014. How risk management can prevent future wildfire disasters in the wildland-urban interface. *Proceedings of the National Academy of Sciences, USA* 111:1146-1151.

with fire.<sup>11</sup> Communities will need ongoing education, financial assistance, and community-based planning to reduce their risks. Because most land in the wildland-urban interface is not federal land, this will mean more work on private, municipal, and state lands to reduce fire hazard.<sup>12</sup>

Fuel reduction and restoration treatments on public lands also have value for protecting forest ecosystems, maintaining valuable services and amenities, and reducing community exposure. National forests are important for watershed protection, wildlife habitat, carbon storage, and local economic benefits, including commodity production and recreation-related benefits. Treatments should be done where there are benefits for communities or where there is a clear indication that treatments will add value for maintaining forest ecosystem integrity. Forest restoration and fire hazard reduction can serve to reduce fire intensity, stabilize carbon stores, and prevent the conversion of forests to grasslands or shrublands, which could be even more fire-prone and fail to provide key ecosystem services.<sup>13</sup> Today, we are seeing large-scale forest restoration projects in the fire-prone forests of the West and Southeast, and in other areas across the nation where there is a need for work to support climate adaptation and restoration of ecological integrity.

There is broad scientific agreement that our primary goal should be to restore natural conditions and processes, like fire, which allow forests to adjust and be more resilient to climate change. Where fire has been excluded, forest restoration can involve thinning small trees and reducing fine fuels in the forest so that we can see the return of more low-to-moderate severity fire, which historically was more frequent in our fire-prone forests. Thinning is typically most effective when followed by prescribed fire, which reduces fine fuels.<sup>14</sup> Prescribed fire can be used to maintain desirable conditions after thinning or after wildfire. Restoring fire through both prescribed and natural fire is an essential process that makes forests more adaptable to future climate stress. In the simplest terms, more “good fire” can prevent “bad fire” in our fire-adapted forest ecosystems. Native Americans used and continue to use fire as a management tool for community and forest protection and to promote desirable plant species and wildlife habitat.<sup>15</sup> Today, there is widespread agreement about the need for more natural fire, more prescribed fire, and for more cultural burning by Tribes on their ancestral lands.

Ecological restoration activities like tree thinning are not appropriate everywhere. Many of our wetter and higher-elevation forests typically saw fire every 100-300 years. Fires in these wetter and higher ecosystems are driven more by weather conditions than by fuel accumulation due to fire suppression. While managers may still want to create some fuel breaks around communities in these forests, the imperative for management in high elevation forests is much less clear. The research also indicates that in roadless and unmanaged sections of these forests, mechanical work is not a priority. Wildfires in these areas typically burn similarly to the fires they evolved with, and there is less likelihood of human ignitions, which account for many fire starts in more accessible forests.<sup>16,17</sup> By contrast, in fire-prone,

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<sup>11</sup> Schoennagel T, *et al.* 2017. Implementation of National Fire Plan treatments near the wildland–urban interface in the western United States. *Proceedings of the National Academy of Sciences, USA* 106:1076-10711.

<sup>12</sup> Schoennagel T, *et al.* 2017. Implementation of National Fire Plan treatments near the wildland–urban interface in the western United States. *Proceedings of the National Academy of Sciences, USA* 106:1076-10711.

<sup>13</sup> Coop, J, *et al.* 2020. Wildfire-driven forest conversion in western North American landscapes. *Bioscience* 70:659-673.

<sup>14</sup> Kalies EL, Kent LL. 2016. Tamm Review: Are fuel treatments effective at achieving ecological and social objectives? A systematic review. *Forest Ecology and Management* 375:84-95.

<sup>15</sup> Lake FK *et al.* 2017. Returning fire to the land: Celebrating traditional knowledge and fire. *Journal of Forestry* 115:343-353.

<sup>16</sup> Balch JK, *et al.* 2017. Human-started wildfires expand the fire niche across the United States. *Proceedings of the National Academy of Sciences, USA* 114:2946-2951.

<sup>17</sup> Bradley CM, *et al.* 2018. Does increased forest protection correspond to higher fire severity in frequent-fire forests of the western United States? *Ecosphere* 7:e01492.

lower-elevation forests, like those of northern Arizona, the lower elevations of the Sierras, and the Colorado Front Range, on average fires historically burned every 10 to 50 years. Because of fire suppression, these forests have missed natural fire cycles.<sup>18</sup> This has led to a buildup of fuels and what some scientists refer to as a “fire debt” that is now coming due. These forests are typically the highest priorities for restoration treatments.

Appropriately placed and prioritized ecological restoration and fuel reduction treatments can reduce the severity of fire, slow its progress, create more opportunities for safe engagement by fire fighters, and reduce community exposure. Most people emphasize fuel reduction near communities, in municipal watersheds, and along powerlines or rights of way as priorities, as well as the need to work at large enough scales to have a meaningful effect on fire behavior. With limited resources to implement landscape fuel treatments, fire scientists and managers are refining approaches for the strategic placement of fuel treatments using spatial analysis.<sup>19,20,21</sup> Some of these are particularly useful for informing forest planning to reintroduce fire while also planning for resource and value protection,<sup>22</sup> and for designing fuels treatments, including thinning and the reintroduction of fire, in order to maximize carbon benefits.<sup>23</sup> Studies also emphasize the value of managing naturally ignited fires for resource benefit, because natural fires, along with prescribed fire, will affect far more acres than we will treat mechanically.<sup>24</sup>

### **Policies that support partnerships, prioritization, and problem-solving**

Reintroducing fire requires maintaining a long-term perspective and can be difficult for any land manager, fire incident commander, or political representative to prioritize considering the immediate risks of fire to communities.<sup>25</sup> Different federal and state agencies working together can have policy mandates and priorities that sometimes conflict. Numerous partners recognize the incentives for agencies and industry partners to harvest in places with valuable timber, which are not typically the places with the highest fire hazard. Some members of communities may not support fuels reduction activities or the reintroduction of fire. Meanwhile, over 60% of the Forest Service’s budget now goes to fighting fire, compared to about 20% at the turn of the century, resulting in deleterious impacts to other programs, including restoration and fuels reduction, due to decreased funding and workforce capacity.<sup>26</sup> The cost of the work, along with the lack of available markets, workforce, and infrastructure are persistent challenges. Importantly, evidence indicates that the primary barriers to progress are a lack of funding and capacity, rather than burdensome regulatory or legal processes.<sup>27,28</sup> For these reasons, progress requires not only

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<sup>18</sup> North *et al.* 2021. Pyrosilviculture needed for landscape resilience of dry western U.S. forests. *Journal of Forestry* (in press).

<sup>19</sup> Kreitler J, *et al.* 2020. Cost-effective fuel treatment planning: a theoretical justification and case study. *International Journal of Wildland Fire* 29:42-56.

<sup>20</sup> Ager AA, *et al.* 2013. Restoration of fire in managed forests: A model to prioritize landscapes and analyze tradeoffs. *Ecosphere* 4:1-19.

<sup>21</sup> Gannon B, *et al.* 2019. Prioritizing fuels reduction for water supply protection. *International Journal of Wildland Fire* 28:785-803.

<sup>22</sup> Thompson *et al.* 2016. Application of wildfire risk assessment results to wildfire response planning in the Southern Sierra Nevada, California, USA. *Forests* 7:64.

<sup>23</sup> Krofcheck DJ *et al.* 2019. Optimizing Forest Management Stabilizes Carbon Under Projected Climate and Wildfires. *Journal of Geophysical Research: Biogeosciences* 124:3075–3087.

<sup>24</sup> Keeley JE, *et al.* 2021. Contrasting prescription burning and wildfires in California Sierra Nevada national parks and adjacent national forests. *International Journal of Wildland Fire*. Online at: <https://doi.org/10.1071/WF20112>

<sup>25</sup> Schultz CA *et al.* 2019. Forest Service fire management and the elusiveness of change. *Fire Ecology* 15:1-15.

<sup>26</sup> US Forest Service. 2015. The rising cost of wildfire operations: effects on the Forest Service’s non-fire work. Available at: <https://www.fs.usda.gov/sites/default/files/2015-Fire-Budget-Report.pdf>

<sup>27</sup> Policy barriers and opportunities for prescribed fire application in the Western United States. *International Journal of Wildland Fire* 28:874-884.

<sup>28</sup> Fleischman *et al.* 2019. US Forest Service implementation of the National Environmental Policy Act: fast, variable, rarely litigated, and declining. *Journal of Forestry* 118:403-418.

facilitative policy and adequate resources, but also innovative solutions and place-based partnerships to overcome these many challenges, build agreement, and leverage diverse capacities.

### *The Collaborative Forest Landscape Restoration Program and Joint Chiefs Landscape Restoration Partnership*

In 2018, I led research that took a comprehensive look at the effects of the Collaborative Forest Landscape Restoration Program (CFLRP) and the Joint Chiefs Landscape Restoration Partnership, interviewing and surveying hundreds of partners and agency staff members across all CFLRP projects and most Joint Chiefs projects.<sup>29</sup> Both programs are unique among policy tools in that they facilitate prioritization of funding based on a proposal process, allocate funding for multiple years, focus investment on specific landscapes, and require collaboration throughout the life of projects. Projects occur across the nation, throughout the West and with several projects on the frequent-fire forested landscapes of the Southeastern states. We found that these approaches support: larger-scale planning and implementation; monitoring and planning innovations; leveraging of non-federal capacity; and agreement-building in an arena that historically has been characterized by conflict over approaches to vegetation management. For instance, among the federal agency staff that we surveyed for CFLRP, over 80% said they were engaging in restoration at landscape scales more than in the past and had accelerated restoration activities. For Joint Chiefs, over 80% said they were working more at landscape scales and accomplishing more work on state and private lands compared to the past. For both programs, the majority of respondents said they were strengthening collaborative and interagency partnerships and identifying innovative ways to leverage funding from collaborative partners. Survey respondents said these programs decreased conflict and allowed them to focus on their high-priority work; 75% and 61% of agency staff members said the CFLRP led to decreased conflict and litigation, respectively. According to Forest Service reporting, the CFLRP had economic benefits that included keeping mills open, supporting an average of 5,400 jobs annually, and creating \$2 billion in local labor income; it also led to a greater proportion of accomplishments in timber volume sold and acres treated compared to the proportion of agency spending.<sup>30</sup>

Our interviewees and survey respondents said valuable program aspects included the focused, multi-year funding investment, flexible funding mechanism, the requirement to work collaboratively, and the emphasis on public-private partnerships for Joint Chiefs. Success also was facilitated by effective leadership and a history of collaborative partnerships. The biggest barrier to success inside the agencies was inadequate agency capacity for planning and implementation. The biggest challenge external to the agencies for the CFLRP was insufficient forest products industry capacity and limited markets for wood products that could offset high treatment costs. We also heard that it is important to build capacity where it does not already exist and have funding to maintain treatments.

We were able to conclude from our research that these programs, which support prioritization, partnerships, and focused investment in specific landscapes, are a successful policy model for facilitating forest restoration. Overall, these approaches lead to accelerated work, decreased conflict, and innovations in planning, monitoring, and leveraging partner capacity. Almost everyone both inside and outside the agency said that these programs should continue.

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<sup>29</sup> Schultz, CA, *et al.*. 2018. Policy design to support forest restoration: the value of focused investment and collaboration. *Forests* 9(9):512. All reports and publications for this project are available at: <https://sites.warnercnr.colostate.edu/courtneyschultz/forest-restoration-governance/>

<sup>30</sup> U.S. Forest Service. 2020. Collaborative Forest Landscape Restoration Program: 10-year report to Congress. Available at: [https://www.fs.fed.us/restoration/documents/cflrp/REF\\_Report-CollaborativeForestLandscapeRestoration-508.pdf](https://www.fs.fed.us/restoration/documents/cflrp/REF_Report-CollaborativeForestLandscapeRestoration-508.pdf)

### *Policy barriers and facilitators for prescribed fire*

Despite the gains I described above, implementing prescribed fire has been a challenge for CFLRP projects, and prescribed fire accomplishments have yet to meaningfully increase on federal lands in the West.<sup>31</sup> Implementing prescribed burns requires planning, permitting, and trained staff who are available during burn windows. It also can be controversial. We conducted a multi-year study across the West, interviewing federal and state land managers and air quality regulators to understand barriers to and facilitators of prescribed fire.<sup>32</sup> We found that the biggest barriers to progress are lack of funding and capacity, particularly because qualified fire personnel are increasingly pulled onto wildfires, but also due to seasonal employment and a general decrease in staff capacity. Resource sharing to leverage capacity across agencies and partners is essential for success. People also said incentives to plan and implement prescribed fire are weak, given the better pay on wildland fire, greater certainty of meeting agency targets by conducting mechanical treatment, and perceived risks of conducting prescribed fire, even though very few prescribed fires escape. Where prescribed fire occurs, it is because individual leaders are committed to making it happen and find creative strategies to overcome these hurdles.

Forests like the San Juan in Colorado and the northern New Mexico national forests have found success by attracting increased investments for prescribed fire, either through Regional Office funding to support their fuels reduction programs or through efforts like the Rio Grande Water Fund to leverage private funding and strengthen partnerships to protect watersheds. Staff members on these efforts work intensively on their partnerships to build capacity for public communication, smoke monitoring, planning, and burning. For instance, working with the Nature Conservancy's Prescribed Fire Training Exchange, also known as "TREX," and the Forest Stewards Guild, which has supported "all-lands, all-hands" burn teams, the Forest Service and partners have together found creative ways to staff burn teams. The northern New Mexico forests also pooled staff and targets to give themselves more flexibility to apply prescribed fire and capitalize on burn windows. The Dolores Ranger District on the San Juan National Forests undertook a novel approach to a district-wide environmental assessment to prepare for prescribed fire, which also supports using natural fire to meet ecological objectives. Staff members on the San Juan National Forest said their communication with the public and air quality regulators, along with their prescribed fire environmental assessment processes, has helped them build the communication, partnerships, and landscape strategies they need to be successful with prescribed fire.<sup>33</sup>

In addition to leveraging local capacity, state-level interagency collaboration is critical for facilitating communication, resource sharing, and problem solving because of the role of state regulatory and land management agencies. For instance, as an outgrowth of the Dinkey CFLRP on the Sierra National Forest, there is a statewide collaborative prescribed fire partnership in California that brings together: scientists; non-profit, community-based, and Tribal organizations; federal and state fire and land managers; and state air quality regulators. Partnerships like this help air and land managers work together to identify barriers to burning and possible solutions, like improved communication and monitoring to find space to burn without violating air quality standards. Similarly, the Montana-Idaho Airshed Group uses an online platform to track and prioritize burns, coordinates burners within airsheds, identifies priorities for burning based on need and availability of burn windows, and uses a liaison who works on behalf of burners to communicate with state air quality regulators.

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<sup>31</sup> Kolden CA. 2019. We're not doing enough prescribed fire in the western United States to mitigate wildfire risk. *Fire* 2:30.

<sup>32</sup> Schultz CA, *et al.* 2018. Prescribed fire policy barriers and opportunities: A diversity of challenges and strategies across the west. Public Lands Policy Group Practitioner Paper #2/Ecosystem Workforce Program Working Paper #86; Schultz CA, *et al.* 2019. Available at: <https://sites.warnercnr.colostate.edu/courtneyschultz/prescribed-fire/>

<sup>33</sup> Schultz, CA, *et al.* 2020. Strategies for increasing prescribed fire application on federal lands: lessons from case studies in the U.S. West. CSU Public Lands Policy Group Practitioner Paper #6/Ecosystem Workforce Program Working Paper #99. All reports available at: <https://sites.warnercnr.colostate.edu/courtneyschultz/prescribed-fire/>

Improved resource-sharing tools are also needed. For example, interviewees suggested establishment of a single resource-ordering system, a master agreement for resource sharing across federal agencies, and reducing barriers (e.g., cost-share requirements) to entering agreements with partner organizations. Increased funding and human resource capacity, perhaps with dedicated burn teams, also are needed, as are consistent direction, support, and incentives from Congress and agency leadership to indicate that prescribed fire is a priority.

On this topic, in our current research on fuels treatment effectiveness, fire management personnel who worked on the 200,000-acre Cameron Peak Fire in Colorado told us about the value in particular of three areas that had been treated with prescribed fire into response operations. For instance, one interaction was with a prescribed burn and nearby mechanical treatments, which fire management personnel said reduced the fire intensity and, in some places, stopped the fire from advancing, giving them more time to protect structures and more flexibility to place personnel elsewhere. Adverse wind conditions overwhelmed fuel treatments in other areas, particularly on more extreme fire weather days. While most fuels treatments never see fire, when planned in a meaningful way, they can make a difference, particularly near communities. Our interviewees recommended implementation of more strategic and connected treatments at a larger scale designed to protect the high values at risk. They also said prescribed burns for community protection should be the priority. Again, we hear that a primary constraint is a lack of financial and human capacity to implement fuel treatments and to conduct ongoing maintenance.

#### *Other opportunities to strengthen partnerships*

Continuing to strengthen partnerships with states is another important step. California is using revenue from the state's carbon market to fund cross-jurisdictional fuels reduction and increase capacity. New Mexico has appropriated funding to address fire hazard and established a prescribed fire working group. Oregon has taken similar steps through its Federal Forest Restoration Program, and Washington recently passed a bill to fund forest restoration, fire response, and community resilience. There is increased engagement at the state level in many states because of the Forest Service's Shared Stewardship Strategy. We have a five-year agreement with the Forest Service to track the effects of the Strategy's implementation over time. In our first year of research, most people said they valued increased engagement with the state to leverage capacities and identify shared priorities, often through State Forest Action Plans. Some states, including Utah, are measuring success in part through acres burned in natural ignitions and cross-boundary, pre-season fire planning. People emphasized the importance of engaging other collaborative partners as well and continuing to support place-based collaborative efforts.<sup>34</sup>

A final example is that of a relatively new, collaborative, pre-season, and cross-boundary planning approach for fire response, called Potential Operational Delineations, or "PODs."<sup>35</sup> In partnership with Forest Service research scientists, we have been researching the development of PODs through workshop processes, many of which are co-led by staff members at the Colorado Forest Restoration Institute, Oregon State University, and Forest Service scientists.<sup>36</sup> In these workshops, using principles of risk management and analytical tools that utilize scientific data to identify potential fire control locations, managers on US national forests, working with scientists, non-governmental partners, Tribes, state and local agencies, are determining fire management options in advance of ignitions. To do this, they work together to draw polygons across the landscape based on where they have the potential to hold fire—

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<sup>34</sup> Kooistra C, *et al.* 2021. Assessment of early implementation of the US Forest Service's Shared Stewardship Strategy. Public Lands Policy Group Practitioner Paper no. 10. Colorado State University, Fort Collins, Colorado. Winter 2021.

<sup>35</sup> Thompson MP, *et al.* 2018. Rethinking the wildland fire management system. *Journal of Forestry* 116:382-390.

<sup>36</sup> Caggiano MD, *et al.* 2020. Potential Operational Delineations and Northern New Mexico's 2019 fire season. Colorado Forest Restoration Institute. Available at: <https://cfri.colostate.edu/publications/>

places like ridgelines, roads, and fuels treatments. They then look at which polygons are priorities for suppression, and where they might want to allow natural fires to burn under the right conditions when fire might have benefits for valued resources. In our research, people said these activities hold promise for getting more “good” fire on the ground but also to build agreement about fire management approaches in partnership with state and local fire responders outside of the emergency management context.<sup>37</sup> Here, again, collaboration has value in the context of planning for fire response. This approach also offers a climate-smart strategy for forest management—one that recognizes the inevitability of fire, engages partners in fire response planning, and focuses on the potential to reintroduce fire as a treatment strategy where possible and contain it where necessary. Some of our interviewees said this could support fuels treatment design in the future, using treatments along pre-identified fire lines to improve fire management; on the Stanislaus National Forest, they are using this approach in current planning efforts. On the national forests in the Sierras, these efforts have informed forest plans that incorporate fire management planning and anticipate the need for reintroduced fire.<sup>38</sup>

## Recommendations

Based on my work, I offer recommendations in three areas: expanding policies to support partnerships; increasing funding and capacity; and supporting oversight and research.

### *Policies to support partnerships*

Our research demonstrates the importance of policies that support collaborative efforts to work at scale, guide priorities to places with social agreement, and leverage capacity. I would recommend expanding focused investment programs like the CFLRP. Our recent research on the new round of CFLRP proposals indicates there is substantial new demand for the program, which as currently authorized will expire in 2023. The demand outpaces the funding that is currently available, and the program would benefit from greater long-term stability. Congress might also consider whether the Joint Chiefs Partnership should be established as a congressionally authorized program and whether similar collaborative focused investment programs could be established for prescribed fire and community protection programs. Programs that build collaborative capacity are also needed to prepare partners to be competitive for these programs. Leveraging capacity and collaboration to work from the community outward presents a path forward, given the need for a community protection focus and functional partnerships to make progress.

### *Increasing funding and capacity*

More funding will be necessary to increase the ability of the Forest Service to lead forest restoration work on public lands. While the “fire funding fix” offered a mechanism to slow the drain of wildfire fighting on the agency’s budget, Forest Service funding and workforce capacity need to be restored, augmented, and accompanied with a strategy to make sure funding is used effectively and results are tracked over time. Estimates from Forest Service scientists indicate that accelerating work on a small percentage of the landscape could have outsized benefits for reducing fire hazard. This will require significantly more investment. Partners that I work with estimate that public, private, and Tribal forest lands may require an additional \$40-60 billion over the next ten years to make the necessary progress for community and forest resilience.

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<sup>37</sup> Greiner SM, *et al.* 2021. Pre-season fire management planning: the use of Potential Operational Delineations to prepare for wildland fire events. *International Journal of Wildland Fire* 30:170-178; *see also* Greiner SM, *et al.* 2020. Pre-season planning for wildland fire response: An Assessment of the US Forest Service’s Potential Operational Delineations (PODs). Public Lands Policy Group Practitioner Paper #5. Available at: <https://sites.warnercnr.colostate.edu/courtneyschultz/fire-management/>

<sup>38</sup> *Supra* notes 16 and 22.



If the Congress were to consider augmenting investments, it could require a transparent and science-based process for identifying priority work at the national-level, with forest ecosystem restoration, watershed and carbon benefits, and reduced community exposure as primary objectives. At the same time, investments will need to be targeted towards places with effective partnerships and social agreement. Therefore, investments should ultimately be allocated in accordance with priorities identified in state and local-level collaborative processes and at cross-boundary scales that are large enough to effectively influence wildfires.

Attention also must be paid to the effects of budget structures and performance measures and improving these to incentivize and account for priority work. For instance, timber targets drive work to places where there is valuable product and existing processing infrastructure, which often do not overlap with fire hazard reduction priorities, and acreage targets can incentivize staff to pursue so-called “cheap acres.” As a side note, budget modernization has made it more difficult for partners to track funding for different programs and, at least at this early stage, presents some challenges for agreements with partners and across agency deputy areas. This is a topic for ongoing attention.

As with funding, agency and partner capacity continues to be a major barrier to accomplishing work. In addition to what I have shared from our research, lack of agency capacity hinders other important efforts, including Colorado’s Forests to Faucets Partnership. Potential solutions including funding more full-time agency employees, including those who can work on prescribed fire or dedicated teams that work with prescribed fire and beneficial wildfire.

Leveraging external capacity will require more efficient resource sharing and a strong external workforce to support restoration and fuels reduction work. Efforts to increase the forest restoration workforce have great potential to support jobs, benefit rural communities adjacent to forests, and facilitate more work in the woods. I also recommend investigating how to improve resource sharing agreements and mechanisms, both with other agencies and with non-government partners.

Regarding the forest products industry, the lack of businesses able to work on restoration projects and with low-value products, limited markets, and problems with workforce availability all are barriers to progress. Congress might engage the Government Accountability Office to investigate specific challenges and policy options that would support forest products industry and other restoration businesses so that the creation of forest restoration by-products can continue to be a co-benefit of restoration work where possible. It will not be feasible, however, to rely entirely upon this strategy to fund the necessary work.

#### *Supporting oversight and research*

Ongoing oversight and problem solving relies on partner engagement, scientific research, and, of course, congressional oversight. With regard to research, problematically, the largest federal funding source for applied fire research (including my work on prescribed fire), and one which responds specifically to land management agency priorities, has been drastically cut. Congress should consider restoring full funding for the Joint Fire Science Program, by which interagency leadership sets priorities for much-needed ecological and social science research on fire management. Congress also must support the effective research that occurs within the Forest Service.

In general, more research will be needed to track ecological and organizational changes, improve current approaches, and track whether new approaches are effective. Research to monitor programs and initiatives in terms of their social, economic, and ecological outcomes is more important than ever, because of the rapidly growing extent of fire and pace of climate change. For instance, if programs are created to improve fire planning or incentivize prescribed fire, research will be needed to track their efficacy in terms of changing practice, improving partnerships, and improving outcomes on the ground. There is value in external research like ours, done collaboratively with partners, policymakers, and

agency leadership to design and evaluate our work, in tracking the impacts of policy changes like these to determine what is working and what needs ongoing attention.

In addition to the social outcomes, we also need to assess ecological outcomes over time—something that my colleagues at the Colorado Forest Restoration Institute have been doing on our Colorado projects in partnership with other scientists. And, as more forests are affected by wildfire, post-fire reforestation is becoming a greater need in priority areas, and there is a need for ongoing research and improved policy in this arena. I plan to work with the Colorado Forest Restoration Institute over the next two years to gather information on fire recovery policy needs and opportunities from the field and bring suggestions back to policymakers, including this committee, to help strengthen recovery efforts across the nation.

There also are numerous additional opportunities for continued congressional oversight to understand barriers and opportunities for change. Congress, thanks in part to members on this subcommittee, is now requiring greater information around cost drivers and decision-making in wildland fire management and the effectiveness of fuels treatments. Other challenges will also need investigation. Important questions include: how are land management agencies capitalizing on opportunities to create and maintain desired conditions in places that have burned, been treated, or where natural ignitions could be managed? What more can be clarified about challenges and opportunities related to the pace of fuels reduction work considering the substantial backlog of planned-but-untreated acres? What are the staffing and resource sharing options available to accelerate prescribed fire? And, how will greater investments be prioritized, how will this intersect with programs like CFLRP or Shared Stewardship efforts at the state level, and how might partners be involved to support transparency and accountability?

Thank you again for inviting me to testify today. I know the solutions I am offering are not quick fixes. As a researcher, I focus on systematically evaluating the efficacy of policy programs, which always take time to unfold and effect change. Addressing the challenges of forest restoration and forest fire is a problem that is centuries in the making—the result of climate change, land use change, past land management priorities, and competing social priorities. Successful change will take time, but everything I have studied indicates that it is possible with investments to build capacity, support scientific research, and facilitate place-based partnerships.