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Congress on Contemporary Issues in Forest and Wildland Management

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Introduction

Forests and wildlands in the U.S. are under unprecedented pressures from climate change, budget constraints, and human development. These challenging conditions are changing the way that citizens, land-management professionals and policymakers think about forest and wildland management practices. Unprecedented ecological uncertainty and the difficulties of translating ecosystem monitoring data into actionable management plans are just two of the significant challenges. Wildfires are increasingly numerous and destructive. They are causing damage to property and ecosystems on a massive scale, and creating unprecedented financial challenges to federal, state, and local governments. Strong collaboration and trust-building among stakeholders and managers has been shown to be crucial to creating effective and lasting management responses.

Directors of the Renewable Natural Resources Foundation recognized the need for a critical examination of these and other key issues and called a Congress on Contemporary Issues in Forest and Wildland Management. The congress brought together a select group of professionals from RNRF member organizations and leaders from government, industry, academia, and nonprofit organizations. Delegates met on December 13, 2017, at the National Union Building in Washington, D.C.

Congress speakers outlined the challenges confronting federal agencies as they strive to increase stakeholder engagement and cross-jurisdictional collaboration. RNRF congress delegates discussed the conceptual difficulties of managing for climate change, and strategies to increase resilience in forests and wildlands. The congress featured discussions on how to "meet people where they are" to promote conservation and protection of natural resources. It concluded with a discussion of popular misconceptions of the local communities close to forests, called the wildland-urban interface, and the practical measures that can be taken to mitigate fire risk.

This report is a synthesis of information and professional judgments presented over the course of the congress. Presentations are supplemented by insights offered by delegates during each subsequent question-and-answer session.

Executive Summary

Funding Continuity for Conservation Programs and the USDA Forest Service

Tony Tooke, chief of the USDA Forest Service, provided an overview of the Forest Service's role in managing forests, wildlands and rangelands. The values of forests and wildlands are linked to drinking water, wood production, wildlife, recreation, sacred sites, economic prosperity and environmental security. Forest and wildland ecosystems are being adversely affected by the increasing number of floods, invasive species, fires, and droughts, brought on by a changing climate. The Forest Service's static funding during prolonged fire seasons has limited the agency's fire prevention programs. Additionally, non-fire services such as watershed management, recreation, trail maintenance and wildlife habitat protection, are also constrained as greater portions of the Forest Service budget are dedicated to containing fires. Tooke affirmed that the Forest Service is building a foundation for management decisions based on collaboration and partnerships among agencies, the private sector, non-governmental organizations, and the public.

Adapting Forest and Wildland Management in Response to a Changing Climate

V. Alaric Sample, senior fellow and president emeritus at the Pinchot Institute for Conservation, discussed the long-term impacts of climate change on forest and wildland ecosystems. Flexible institutional and governmental frameworks, transparency, and a positive attitude towards change are key to successfully managing forests and wildlands. Sample maintains that the scientific expertise and knowledge needed to make decisions are already available and must be organized, shared among stakeholders, and applied to new management practices.

Expanding the Use of Multimedia to Foster Support for Natural Environments and Resources

Amy Gibson-Grant, vice president of campaign development at the Ad Council, explained how multimedia can be used as a tool to reach the public and advance conservation values. Crafting messages that resonate with the public is key to building widespread social and political support. Gibson-Grant emphasized that technology, business practice, and human values should form the nexus of a message's marketing and distribution plan, using a media mix of multiple platforms. Gibson-Grant shared the successes of the Ad Council's prominent project, Smokey Bear Wildfire Prevention Campaign, and its more recent Discover the Forest campaign, to explain how conservation messages should incorporate research and target the audience to promote the conservation of natural landscapes.

Managing Ecosystems for Tomorrow with the Science that You Have Today

Molly Cross, climate change adaptation coordinator at the Wildlife Conservation Society, discussed practical solutions and management techniques that are being developed for use by forest managers across the U.S. Managers must proactively prepare for, respond to, and cope with the effects of climate change on forests and wildlands. Updated techniques for forest and wildland management rest upon sound science and management decisions. Successful adaptation projects from Minnesota's Northwoods, southern Utah, and southwest Montana were showcased to illustrate how adaptive and anticipatory action can be taken today to protect ecosystems into the future using available science and data.

Reconciling Energy Development with Multiple Uses

Sarah Greenberger, vice president of conservation policy at National Audubon Society, highlighted her experiences within the Department of the Interior as part of the team working to establish a standard of management for greater sage-grouse habitat among 14 states and multiple state and federal agencies. The planning effort, which covered over 67 million acres of land, was intended to assure the sage-grouse's future while obviating the need for a listing under the Endangered Species Act. She described the challenge of fostering cooperation between states and management agencies with varied needs, approaches, and geographies in order to promote buy-in and support a standard of management that would protect the species and its habitat. This extraordinary collaborative endeavor, culminating in 2015, resulted in an approach that afforded protection while allowing states to retain some measure of land-use flexibility. It is the

best recent example of how to reconcile energy development with multiple uses.

Evolving Land-Use Planning Approaches

Cecilia Romero Seesholtz, acting director for ecosystem management coordination at the USDA Forest Service, and **Jamie Barbour** assistant director of adaptive management for ecosystem management coordination at the USDA Forest Service explained the 2012 Planning Rule and its impact on land management plans across the National Forest System. The rule was developed to address contemporary planning issues like sustainable recreation, climate change adaptation, ecosystem monitoring, and social inclusiveness. It encourages and integrates public engagement early in the planning process through collaboration with tribes, states, and local governments to ensure forests and wildlands are meeting the basic needs of forest users. Planning on the El Yunque, Inyo, and Chagach national forests served as case studies of successful use of the rule.

Barbour described the goal of ecological sustainability within the rule. It fosters management decisions to maintain or restore ecological integrity of terrestrial and aquatic ecosystems and watersheds.

Reconsidering Wildland-Urban Interface Narratives

Sarah McCaffrey, research forester at Rocky Mountain Research Station–USDA Forest Service, discussed common misconceptions about communities located within the Wildland-Urban Interface (WUI). She highlighted studies that reveal that the vast majority of WUI residents across basic demographic characteristics have an excellent understanding of the risks that come with residing within a fire-prone area. Furthermore, most WUI residents have taken steps to mitigate those risks. She emphasized the need to examine the social aspect of fire mitigation, rather than focusing exclusively on ecological and physical factors influencing the risk of fire. McCaffrey proposed that a balance among these three factors will lead to increased instances of fire-risk mitigation actions within the WUI.

Observations and Recommendations

The congress yielded many constructive observations and recommendations. These can be found throughout this report. A brief list of principal observations follows:

1) It is imperative that the U.S. Congress amend the funding process for the USDA Forest Service. The agency is currently required to pay a significant portion of firefighting costs with funds appropriated for non-fire programs. These funds are supposed to be restored by supplemental congressional appropriations. Mostly, it doesn't happen. This process results in crippling cuts in funding for recreation, watershed management, wildlife management, community programs, and the vegetative management necessary to reduce the risk of future catastrophic fires. A legislative fix is long overdue.

2) Forest ecosystems are facing new threats and uncertain futures. Land management agencies will be forced to grapple with institutional reorganizations that are more adaptable to environmental uncertainties. Increasing scientific knowledge about climate-change effects and the efficacy of adaptation actions will improve resource managers' confidence about taking actions that may represent significant departures from past practice. Also, mechanisms that encourage transparency, such as environmental reviews under the National Environmental Policy Act, should be retained as they both improve public confidence in management processes and allow for a more thorough review and discussion of environmental adaptation options.

3) Public support for forest and wildland conservation can be mobilized to bolster political resolve to protect natural resources. Multimedia is a tool to reach the public and advance conservation values on a broad scale. Multimedia and online social networks can lead people to connect with nature and with others offline, further solidifying private and public eco-conscious behavior. As the competition for federal and private funds increases, advocates of conservation programs and values must master and use multimedia effectively.

4) Land managers and scientists must manage ecosystems today using the best available science, conditioned by recognition that ecosystems are changing quickly and knowledge about future conditions is imperfect. The present challenge is to translate general climate-change adaptation strategies into practical on-the-ground techniques for use by creative and adaptive forest and wildland managers.

5) Landscape scale land-use planning is complicated and difficult. Reconciling energy development with multiple uses within the context of a land-use plan is more so. In the case of the greater sage-grouse plan for multiple states and multiple agencies, the planning exercise was nearly impossible. A serviceable plan was developed because: 1) there was a law (Endangered Species Act); 2) a determined and

interested federal judge; 3) leadership and support by a national administration (president and cabinet secretaries); 4) an abundance of credible science; and 5) multiple-party participation and buy-in. That hardly ever happens—a celestial alignment? National leadership changed in January of 2017 and the plan is now being subjected to reevaluation. Leadership is a necessary ingredient for a successful planning process.

6) State-of-the-art land-use planning today requires consideration of contemporary issues like climate change, ecosystem monitoring, sustainable recreation and social inclusiveness. The newest planning approaches also encourage and integrate public engagement early in the process. Ecological sustainability will join the list of considerations when scientists figure out how it can be evaluated. The mechanism for considering of all of these issues is still being tested in special planning exercises by the Forest Service. The agency is exploring the frontiers of modern natural resources planning.

Summary of Presentations

Funding Continuity for Conservation Programs and the USDA Forest Service

The USDA Forest Service was established in 1905. Today it protects America's 193 million acres of national forests and grasslands. Those lands are threatened by a multitude of challenges that impact their ecological integrity, sustainability, and preservation. USDA Forest Service Chief **Tony Tooke** spoke about the many goods, services and values provided by forests and wildlands, and identified his top priorities to address future needs.

National Forests Provide Drinking Water for Millions

Forest Service lands encompass important rivers and aquifer systems. As the largest source of municipal water supply in the nation, more than 60 million Americans receive their drinking water from sources protected by national forests and grasslands. On the continental U.S., 53% of surface water and runoff comes from forested watersheds. Over 3,000 communities in rural and urban areas in 33 states directly rely on this water. Many cities that may seem distant from forests, such as Los Angeles, Portland, Denver, and Atlanta, receive a significant portion of their water supply from national forests. Water from Forest Service lands has an estimated annual value of $7.2 billion.

Wood and Wood Products

The U.S. uses more wood and wood products than any other nation, consuming three times the per-capita global average. The U.S. is a leader in wood production as well. The Forest Service alone currently sells three billion board of timber feet annually, a figure Tooke would like to see increase to four billion in the near future in order to improve the condition of the forests, protect watersheds, address fire, insect and disease, provide jobs, and help rural economies.

Tooke explained that Forest Service timber sales are conducted using sound science, good data and collaborative approaches. Studies have shown that forest management treatments reduce catastrophic fire impacts 90% of the time. He stated that the primary impediment to improving systemic efficiency is a lack of resources to do the work, which partnering with others through stewardship is helping to mitigate.

The agency is working to improve collaboration, strengthen partnerships, use all available tools and authorities, improve environmental analysis and decision-making, and modernize forest products delivery to help increase forest management and restoration on the National Forests.

Increasing tree mortality caused by insect infestations and drought has underlined the need for both sustainable harvesting and further research and development in wood product innovations —particularly for low-value wood products derived from blighted trees. One such innovation is cross-laminated wood (CLT) products—breakthrough low value building materials that can be used to construct buildings as tall as 12 stories. Not only could innovations like CLT spur a market that promotes healthier national forests but as a building material, wood also uses less energy and emits less CO_2 than steel.

Other Forest Values

Tooke mentioned other important forest values including soil formation, wildlife habitat, outdoor recreation, and carbon sequestration. Additionally, forests directly add to the nation's economy by providing jobs. In rural areas, sometimes forests are the only source of income to the surrounding community. Tooke observed that the Forest Service provides 36,000 jobs and contributes more than $30 billion to the national GDP.

Forests Under Threat

The Forest Service's role as the preeminent land management agency for sustaining the health, diversity, and productivity of the nation's forests and grasslands for present and future generations is more important than ever before.

Increasing floods, invasive species, fires, droughts, and tree mortality pose unprecedented threats to today's forests and wildlands. The southern pine beetle epidemic is one the worst seen in Missis-

sippi in decades. Even states as far north as New York have started having problems with this invasive insect. Additionally, Tooke cited that a historic 129 million trees on 8.9 million acres have died due to drought and bark beetles in California alone, posing a significant risk to people, infrastructure and the landscapes. The effects of a changing climate have led to longer fire seasons, which are 78 days longer than a couple of decades ago. These issues will continue to intensify into the future as conditions are projected to worsen.

The Forest Service Budget

Though the budget trend has remained relatively flat, Tooke quipped that in terms of funding for conservation "flat isn't bad." However, the rising cost of fire suppression against this flat budget has generated significant challenges for the Forest Service. Currently well over one-half of the agency's budget goes to fire suppression.

Fire suppression is budgeted using a 10-year rolling average. Over the last few decades, fires seasons have grown longer and the frequency, size, and severity of wildfires have increased, giving rise to the 10-year average cost of fire suppression. Current trends project that two-thirds of the agency's budget will be used for fire suppression by 2021.

The Forest Service spent over $2.4 billion dollars this past year on firefighting operations. This has negative impacts across the agency on other Forest Service work such as wildlife management, trail maintenance, recreation, soils, archeology, law enforcement, and research. The agency has had to increase fire-fighting staff from 6,000 to 12,000 persons while non-fire staff dropped from 19,000 to 11,000. Thus, non-fire programs are being disproportionately affected. These trends are tremendously disruptive to forest management and affect activities that mitigate the risk of fires in the first place.

The 2017 season was unprecedented. A very severe fire season hit several regions across the U.S—the southern Appalachian Mountains, the Southwest, California, the Northwest, and the Rockies. The highest fire preparedness levels of 4 and 5 were sustained for over 70 days. In August 2017, there were 80 large fires, defined as over 300 acres. This was at a time when there normally are 25 such fires. Structures are burning down four times more than they did 15 -20 years ago. As late as mid-December this year fires were still raging in California.

The Forest Service is challenged to successfully manage year-round fire seasons. However, the agency is adapting as best it can. Tooke stated that the agency is working hard with members of Congress and the Administration to find a funding solution for large, catastrophic fires. The agency is also dedicated to improving the condition of forests and to make them more sustainable and resilient to insect, disease, and catastrophic fire.

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Editorial Staff: Robert D. Day, editor; Attiya Sayyed, assistant editor; Amber Lee Todoroff, assistant editor.

National Priorities

Tooke identified five national priorities:

1. Employees

Forest Service employees must have the safest, most resilient, rewarding, respectful, and harassment-free work environment. Employees must be free to identify barriers to completing their work efficiently. Staff across fields should be encouraged to identify fundamental knowledge that can improve the quality of work, research direction and program outcomes. Tooke added that it is a top priority to increase capacity and resources for employees.

2. Customer Service

The Forest Service should excel in customer service by working with a vast array of partners. Every citizen, forest and grassland user, contractor, and volunteer deserves the very best service. The Forest Service must also recognize needs, values, and rights of the communities, states, tribes, and counties situated near Forest Service lands. Progress has already been made to more cooperatively manage land through the 2014 Farm Bill's Good Neighbor Authority. This allows the Forest Service to enter into agreements with states to allow them to perform watershed restoration, forest management, and other activities on National Forest System lands.

Through the Good Neighbor Authority, the Forest Service has entered into over 130 agreements in 32 states for a variety of wildlife, erosion control, forest management, and other work.

Stewardship authority is also providing the agency with a way to work with a diverse range of partners to do all hiring of work across the landscape. This work is driven by the sense of shared values.

The Forest Service must update policies, systems and approaches, and be more collaborative, flexible, and innovative to build capacity and achieve efficiencies. Tooke admitted, however, that cultural and institutional change may come slowly but will payoff in the long run.

3. Promote Partnerships

To tackle new and intensified issues with forests and grasslands, the Forest Service must include work to strengthen partnership and volunteer programs and bring diverse groups in to help with the conservation mission. Private-public collaboration is an important opportunity. Tooke gave examples such as Coca-Cola and the Centers for Disease Control and Prevention, which share common values on land and resources, and have worked together on various land management projects.

Volunteers also provide significant services to the agency. In the past year, over 100,000 volunteers donated 4.5 million hours, valued at over $100 million, to the Forest Service. Tooke stressed that serving as a volunteer should be available to anyone who is interested in participating. The Forest Service needs to make space for people from all walks of life to work as a partner or volunteer.

4. Improve Conditions of Forests and Rangelands

Eighty million acres of the National Forest System are at moderate-to-high risk of insect infestation, disease, or fire. One-third of this acreage is listed at very high risk. The Forest Service must work to protect these threatened landscapes and the values, benefits, services, and species that depend upon them.

Furthermore, a fire-funding fix is paramount. The Forest Service has enormous support from Secretary of Agriculture Sonny Perdue and from members of Congress on both sides of the aisle. A fire-funding fix is needed to address the rising 10-year average that serves as the basis for funding fire suppression and treats large, catastrophic fires like other natural disasters. The Forest Service is the only federal agency that has to fund emergency operations out of the regular budget appropriations. The Forest Service contains 98-99% of fires in initial containment efforts. However, it is the 1-2% of catastrophic mega-fires that account for 30% of annual fire suppression costs.

The Forest Service is also taking steps to control fire spending. Tooke explained that the agency is developing decision-making tools that consider risk exposure of responders and communities, probability of success, values at risk, and managing fires for resource benefits. Tooke also identified the need to increase the use of prescribed burning and managed natural wildfire ignitions.

5. Enhancing Recreation Activities

Finally, Tooke spoke of his love of land and nature. Bird watching, hiking, and camping complement traditional recreational activities, such as hunting and fishing. There are 148 million visits each year to national forests and grasslands. There are another 300 million visitors who traveled on the 138 scenic byways and other similar routes near, on, or through national forests to view the scenery. Recent surveys of private forest owners also identify recreation and intrinsic value for nature as top priorities for their forests.

The Forest Service has an obligation to communities to improve access to and sustain the infrastructure of forests so that they can be enjoyed for generations to come. Sustaining the agency infrastructure is another critical priority.

Conclusion

The Forest Service has a history rooted in conservation. Forests support urban and rural communities with water, recreational activities, wildlife values, ecosystem services, and economic opportunities. However, as the effects of a changing climate impact forests and grasslands, management has become increasingly difficult. The Forest Service must adapt its management to the changing environment. To do this suc-

cessfully, there must be broad acknowledgement of the persistent funding shortfall that prevents the Forest Service from fulfilling its mission and obligation to the nation.

The Forest Service looks to Congress to amend the current funding process that requires the agency to pay significant firefighting costs that impact non-fire programs. This means that all other forest values such recreation, watershed management, wildlife management, and the vegetative management necessary to reduce the risk of future catastrophic fires are woefully underfunded. Support for funding and shared conservation values are also needed from the scientific, NGO, and forest user communities. Partners, local communities, and volunteers can also assist the Forest Service in achieving its mission. The public must be invited to have a meaningful role in charting the future national forests by providing input on policies, programs, and practices.

Adapting Forest and Wildland Management in Response to a Changing Climate

The accelerating rate of environmental change is challenging the capacity of existing institutional and governmental frameworks to adapt to new forest and wildland management needs. Increasing uncertainty about the impacts of climate change and human development on forests makes predicting the future state of natural resources especially difficult. **Al Sample**, president emeritus of the Pinchot Institute, discussed the challenges resource managers face when developing plans for forests with "no-analog futures"—anticipated ecosystems that have no modern equivalents.

Megadisturbances and Climate Change

Sample's presentation noted that climate change and human developments are exacerbating the impacts of fire, drought, disease, and invasive species infestation in forest ecosystems. Novel interactions of these otherwise naturally occurring phenomenon have resulted in unprecedented "megadisturbances," such as the Tubbs Fire in late 2017 that burned over 36,000 acres and cost more than $1.2 billion in damages. The resulting large-scale forest devastation was unlike anything experienced in recent history and is forcing forest and wildland managers to rethink long-established management practices.

Land managers have developed a triage of methodologies for adapting forests to risks from major environmental change:

i. Resistance (preventing any significant change in the resource despite significant change in the environment),
ii. Resilience (positioning the resource to absorb the impacts of environmental change and return to stable functioning), or
iii. Realignment (accepting that significant change in the resource is inevitable, and readjusting resource management goals and objectives accordingly).

Sample noted that in many cases, resistance is not a realistic strategy—environmental change has become too pervasive and widespread. Observation were made during discussion that the USDA Forest Service's resistance-only adaptive management techniques had failed to effectively combat fire megadisturbaces in the early 2000s, despite $2 billion in funding from Congress. Realignment is also not feasible, as simply doing nothing to combat environmental change would mean tolerating unacceptable economic, social, and ecological impacts. Forest managers are relying on resilience as the primary strategy for adapting to climate change.

Political Resistance to Adaptation

Slow, deliberative governance and policy processes have made adapting management decisions to new scientific information difficult. Policies that guide forest and wildland management often reflect scientific recommendations that have evolved since their adoption. These typically highly prescriptive policies can constrain administrative and financial discretion in the field.

Much of adaptive management relies on slow, incremental, and reversible changes, and managers often have sufficient scientific data to begin making informed resource management decisions. Flexible policies that allow managers to more readily respond to new environmental science will be essential to implementing efficient resource management. Sample suggests that management policies could facilitate flexibility without sacrificing accountability by requiring public transparency and environmental reviews of management decisions, and keeping forest plans grounded in peer-reviewed science. He lamented the slew of recent bills being

introduced in Congress that would roll-back National Environmental Policy Act (NEPA) environmental impact analyses regulations and exempt more activities from review.

Bureaucratic and financial roadblocks to sound forest management are exemplified by public land reforestation. Wildfires and other major disturbances have left roughly 20 million acres of forestland in the U.S. "non-stocked," divided roughly evenly between public and private owners. Much of the reduction in tree cover on these lands could be attributed to wildfires but on private lands in particular, increased grazing has caused a significant portion of forests to become non-stocked. Most of impacted public land is managed by the USDA Forest Service.

A significant portion of these non-stocked lands may regenerate without direct intervention. Some lands will require major investments in intensive reforestation actions. Finally, other lands may never be able to support forests again because of climate change. For example, some forests in the Southwest have been undergoing a drying-trend over the past 20 years that has initiated a transition to non-forest ecosystems. One wildfire or massive insect or disease infestation would destroy these desiccated forests, which would then be replaced by grasslands. The Forest Service needs to develop methods for identifying which forestlands should receive which treatments.

The Forest Service is currently developing a proposal to increase reforestation of between 200,000 to 400,000 acres annually. The proposal would require a doubling of the agency's reforestation budget. However, more than 50 percent of the Forest Service's budget is currently being diverted to fight increasingly large and intense wildfires. With the agency's 2018 overall funding nearly $1 billion less than in 2017, its reforestation ambitions are unlikely to be realized. Furthermore, it is unclear whether the planned increase would even keep pace with the growing backlog of forests needing regeneration support.

Forest Carbon Stocks

U.S. forests have been increasing in acreage and carbon storage capacity over the past 100 years. Forests currently constitute 90 percent of the nation's terrestrial carbon sink, absorbing more than 700 million metric tons of CO_2 annually, and offsetting 14-16 percent of total U.S. carbon emissions. Although there is more forestland overall than there has been in recent history, as trees reach maturity and post-maturity, the rate at which they sequester carbon decreases. A 2010 assessment of U.S. forest resources projected that as soon as 2030, U.S. forests overall could become a net source of greenhouse gas emissions because of the slowing rate of sequestration, coupled with increasing wildfire, invasive insect and disease infestation, and the loss of trees at forest margins.

Differences in carbon profiles between management plans can influence decision-making. However, consideration of influences on carbon must be weighed against interrelated and interconnected services such as water filtration, wildlife habitat, and local temperature regulation

USDA Forest Service and Adaptive Management

Maintaining the status quo is typical in a decision-making environment characterized by uncertainty. However, given the escalating economic, social, and environmental impacts of climate change on U.S. forests, governmental and institutional regimes must rethink how they solve environmental problems and engage with new scientific data.

Scientific thinking regarding the environment has changed in recent years. In the past, scientists have been asked to consider alternative forest plans and make predictions on what managers can expect to see on the ground in 20-30 years. The no-analog nature of environmental forecasting has made future predictions based on historical data orders-of-magnitude more difficult. Extreme environmental variability has necessitated the development of a conceptual framework for resource management that emphasizes risk analyses and contingency planning.

Sample observed that the USDA Forest Service has 20-25 years of experience experimenting with adaptive management in both social and ecological science spheres. The tremendous area of land the agency manages (193 million acres in federal-owned land and 500 million acres co-managed with state agencies) has allowed for different land management approaches to be tried in a variety of ecosystems. The agency has also been able to experiment with collaborative approaches to management using an array of community, state, and national partnerships. This valuable experience must be used to develop institutional adaptability better suited to confront the threats of both sudden megadisturbances and incremental environmental change.

Private-Public and Interagency Partnerships for Adaptive Management

Federal agencies' efforts to restore forests and increase resiliency—even on federal public lands—are increasingly dependent upon interagency and private-public partnerships to bolster funds and enhance projects.

Interagency partnerships are being developed to improve adaptation decisions. The Forest Service, a research and management agency, and U.S. Geological Survey, an agency with a scientific mission, have been working together to develop new institutional mechanisms that smooth the translation of scientific

data to management practices. One of these mechanisms is "science-management partnerships," which allow field managers to shape ecological research questions in collaboration with scientists and apply the results of studies as soon as they become available. These partnerships facilitate a better understanding of research results and their prompt application, and have become an important new tool in adaptive management. Non-governmental organizations also can become involved in adaptive management and policy change through science-management partnerships. As Sample observed, however, these partnerships do not typically involve state or federal policy change. Rather, they tend to be local in nature, mostly reserved to national forests. He additionally noted that while the agencies may be resistant to proposals from outside organizations, policy changes can be enacted through congressional paths. He emphasized that a strong understanding of the "vagaries" of policy making and the legislative process would be essential to effective lobbying for resource management policies. Sample further suggested that NGOs could use local chapters to affect change through involvement in state or community environmental planning endeavors.

Conclusion

Forest ecosystems are facing new threats and uncertain futures. In the coming years, other agencies will be forced to grapple with institutional reorganizations that are more adaptable to environmental uncertainties. As the leading land management agency in the U.S., the USDA Forest Service could be an example to other institutions. Maintaining the status quo is not an acceptable option.

To accomplish these necessary institutional adaptations, there must be an agency-wide attitude shift that embraces change. Increasing scientific knowledge about climate-change effects and the effectiveness of adaptation actions will improve resource managers' confidence about taking actions that may represent significant departures from past practice. Additionally, mechanisms that encourage transparency, such as NEPA reviews, should be retained as they both improve public confidence in management processes and allow for a more thorough review and discussion of environmental adaptation possibilities.

Using Multimedia to Foster Support for Nature

Public support for forest and wildland conservation can be mobilized to bolster political resolve to protect natural resources. Multimedia is a tool to reach the public and advance values of conservation on a broad scale. Multimedia and online social networks can lead people to connect with nature and with others offline, further solidifying private and public eco-conscious behavior. The Ad Council has a history of addressing the most pressing social issues facing the United States. **Amy Gibson-Grant**, vice president of campaign development at the Ad Council, discussed how multimedia can connect positive conservation messaging to audiences across the country.

Since its inception in 1942, the Ad Council's public service announcements, such as Smokey Bear's Wildfire Prevention Campaign, have aimed to raise awareness, spur action, and foster behavior change.

The Ad Council sustains 40 active campaigns, organized by four key themes: health, safety, education, and family & community. Utilizing partnerships with leading non-profit organizations and government agencies, the Ad Council addresses a wide range of issues. The Ad Council selects campaigns through a selection committee. Campaigns must be national in scope, broadly applicable, non-partisan, non-denominational, and a topic susceptible to behavioral change through advertising.

The Ad Council integrates campaigns across a variety of media platforms, including television, social media, and billboards. Traditional, digital and new media can all be used to reach new or existing audiences.

Meet People Where They Are

The Ad Council campaigns are meant for a broad national audience. However, messages are tailored to a kind of person in mind for greater impact and efficacy. Gibson-Grant suggests that the best way to use multimedia to reach a target audience is to "meet people where they are."

She explained that the intended audience must be at the forefront of all decisions in marketing strategies tailored to "media, mindset, and message." Researching the audience's media consumption habits and current mindset on the topic is key to creating clear, strategic messages that are more likely to affect behavior change.

Big Trends in Media

The current media universe contains endless choices for today's consumers.

Increased engagement with media and content through a multiplicity of devices, channels, and social media platforms provides both opportunities and challenges to media marketers. Television is the most heavily consumed platform. However, digital devices are the preferred form of media for audiences between the ages of 18- 34.[1] New media is expanding into virtual and augmented reality, "wearables," chat-bots, and location-based media. Navigating the growing media options requires thoughtful planning. Connections can be made with an audience in more meaningful and customizable ways, however, marketers must overcome possible fragmentation across multiple channels to deliver a clear message.

Smart Planning

Humans are at the center of design innovation, a new paradigm for strategic campaign planning and implementation. Design innovation is at the nexus of technology (feasibility), business (viability), and human values (usability and desirability) (see Figure 1).

Targeted messaging can be enhanced by examining the "consumer journey": how consumers live their lives; how they are consuming media throughout the day; and how they make choices to bring weight to the things you want them to do versus what they are otherwise doing. Understanding the consumer journey helps identify when a message should be released and if there are any barriers to engagement.

Desktop research and media research are paired with primary research through the following methods in order to help marketers understand their audience:

Desktop Research
- Literature review
- Expert interviews & panels
- Landscape review
- Social listening

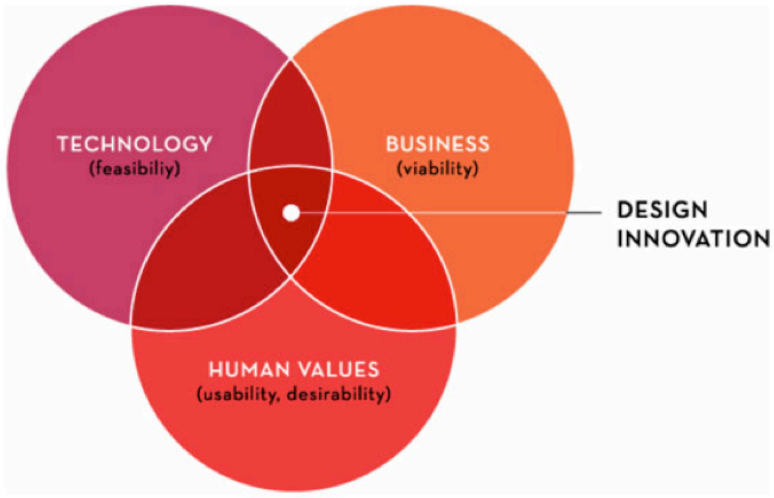

Figure 1: Design Innovation Paradigm

Media Research
- GfK MRI Survey of the American Consumer [2]
- Other industry sources

Primary Research
- In-person Intercultural Development Inventory (IDIs) & focus groups [3]
- In-home interviews/ethnographies
- Video IDIs/groups
- Journaling/filming
- Bulletin boards/online chats

Tailoring Your Message

Once the background research is complete, marketers then begin to craft the message. It is more important now than ever before to make sure messages resonate and are relevant to the intended audience.

The message should be a simple, single-minded idea that is tangible and can create actionable results. Emotion should be a campaign's focus. Gibson-Grant warned against setting campaign objects that are unrealistic. Single-minded campaigns can help support laudable goals that no one campaign can achieve.

Gibson-Grant also explained the Ad Council's Integrated Strategy Brief, which develops an overarching planning document, which different partners can work from (see Figure 2, next page). It includes points such as: what does the sponsor organization stand for, what are the campaign's overarching goals, and what do we need to offer in order to empower people to take the action we want them to take? The process should inspire creativity and strive for excellence.

Throughout the process, metrics for success should be identified and tracked. The Ad Council uses different

[1] 53% of audiences between the ages of 18-34 prefer digital devices.
[2] Gfk MRI is a survey that collects and compiles data of the adult American consumer. The database includes statistics of media usage, demographics, psychographics and consumer behavior.
[3] "IDIs assess intercultural competence – the capability to shift cultural perspective and appropriately adapt behavior to cultural differences and commonalities." https://idiinventory.com/products/

Template: Integrated Strategy Brief

Brand Promise [What does (sponsor organization) stand for?]	**Call to Action** [What is the one most important thing that we want people to do?]
Background [Why am I reading this piece of paper?]	**Support/Reasons to Believe** [Why should people believe us? In priority order of importance.]
Objectives [What are the campaign's overarching goals?]	**Solution(s)** [What do we need to offer in order to empower people take the action we want them to take?]
Target Audience [Who are we trying to reach? What do they currently think/ feel/do in relation to this issue?]	**Metrics** [How will we know if we've been successful?]
Media Considerations [Where will we reach them? Priority channels, influencers.]	**Executional Considerations/Mandatories**
Main Message	

Figure 2: Integrated Strategy Brief

metrics of success for campaigns based on four pillars: exposure, awareness, engagement, and impact. Analytics are created for questions such as: is the target audience remembering the ads; is the content "shared" and "liked"; and does the target audience commit to the action.

Work with the Community

Marketers should leverage partnerships and community groups to promote the message, give it a local face, and provide resources. Messaging should be an iterative process so that campaign managers can adjust the messaging or the medium to the audience as attitudes and mindsets shift.

A Case Study: Discover the Forest

Discover the Forest campaign raises awareness about the benefits of exploring the outdoors and encourages families to experience nature first-hand. It also aims to create the next generation of environmental stewards. The campaign is in partnership with the USDA Forest Service. The campaign goal, beginning in 2014, is to reach urban audiences to raise awareness of forested areas near them (also known as "urban forests").

The Ad Council found that children are spending less time in nature. As such, the Discover the Forest's target audience is urban parents and caregivers of tweens (ages 8-12). The baseline understanding of this target audience is that children and their parents will not want to be stewards of places that have little-to-no meaning to them. Forests are seen as something special and spontaneous rather than urban forests in their neighborhoods.

In honing in on the target audience, the Ad Council identified three demographic segments of the market audience: general, Spanish-dominant, and African American. The priority channels for messaging each segment are different. The general market priority channels are digital, followed by out-of home. The Spanish-dominant priority channels are digital, followed by TV. The African American priority channels are TV, followed by digital.

This information enabled campaign managers to tailor their targeted media campaigns to each audience. Focus groups with parents of tweens in three U.S. urban centers (Chicago, Atlanta, Sacramento) were created to discuss: parenting, activities, outdoor activities, and natural environments.

Using the findings from these discussions, the marketing team concluded that the term "forest" doesn't resonate with people. It's considered far away—a big trip that takes an effort. The campaign must reframe the way people see the nature space around them. Therefore, messaging for Discover the Forest revolved around the concept that "forests are all around us. We just call them something else."

Discover the Forest is attempting to reframe the way people see the nature spaces around them, so they understand how close a nature experience really is. Social media content, videos, and radio clips were used to spread the message. Location-based ads were also effective in connecting the target audience to their communities. All the campaign materials drive to the website, discovertheforest.org, to provide a streamlined search experience for users to find nature near them. The Discover the Forest site uses the Nature Find dataset. Nature Find's aim is to locate and promote nature spaces, including museums, where environmental concepts are also being taught. Nature Find works with local organizations to include lesser-known nature places to the dataset.

The longer-term impact will occur when the target audience notices policy change around natural spaces and is

willing and able to take action against policy that denies them their ability to access and value the nature around them.

Conclusion

Tailoring media delivery and message to an intended audience can yield a greater and more efficient impact. By communicating on platforms that consumers trust and getting the message in front of the right people at the right time, consumers will be encouraged to take action.

Managing Ecosystems for Tomorrow with the Science that We Have Today

Climate adaptation-based management means proactively preparing for, responding to, and coping with the effects of climate change. **Molly Cross**, climate change adaptation coordinator for the North America Program of the Wildlife Conservation Society (WCS) focuses on translating general climate-change adaptation strategies into practical on-the-ground techniques for forest and wildland managers. The approach is based upon using the best available science conditioned by the recognition that ecosystems are changing relatively quickly and knowledge about future conditions is imperfect.

Using Climate Data to Make Decisions

Climate change science and data are widely available. The International Panel on Climate Change, scientists supporting the U.S National Climate Assessment, NGOs and academic institutions have been collecting and examining data from around the world. However scientific data alone does not provide precise directions on how to manage or adapt landscapes to climate change. Ecosystem managers must make this knowledge actionable.

Climate-informed planning is essential for managed forests and wildlands. Cross advanced three strategies that inform decision-making:

- USDA Forest Service Climate Change Response Framework
- Climate-Smart Conservation Cycle
- Adaptation for Conservation Targets Framework

Each framework is iterative and includes several adaptive management steps (such as: define, assess, evaluate, identify, and monitor) to achieve climate-informed planning. Cross urges ecosystem managers to ask what is the goal of conservation when using the adaptive management framework. She states that there are two conflicting options: to resist change or to transform/realign an ecosystem to already occurring changes. By choosing from these paths, ecosystem managers must decide if they need to do anything new or differently and consider questions such as:

- What, where, and why changes should be made?
- How should successful planning be defined?
- How urgent is the need to either resist change or transform an ecosystem?

There are some cases where ecosystem managers will be able to prevent change, and others where they will not. Managers will need to think about how to approach changes in ecosystems. Resiliency is fundamental across the spectrum of change—strengthening key ecosystem services in some areas while also redefining the role of some services in others.

WCS Climate Adaptation Program

The program fund supports on-the-ground adaptation for wildlife and ecosystems. Over $14 million has been invested in more than 75 adaptation projects since 2011. Many Climate Adaptation Program success stories come from projects that aim at reducing threats from reduced water availability, bigger floods, bigger and hotter fires, rising seas, direct effects on species, and human responses to climate change.

Cross examined three case studies from WCS's report, *14 Solutions to Problems Climate Change Poses for Conservation*, to showcase how ecosystem managers are responding to climate change today.

Case Study 1: Negative Effects on Current Species

The Nature Conservancy, in partnership the Northern Institute of Applied Climate Science and the University of Minnesota-Duluth, implemented an adaption forestry project in Minnesota's Northwoods to plant more than 100,000 native trees on federal, state and county land in the Arrowhead Region. This area is dominated by boreal, cold-loving tree species such as white pine, jack pine and white spruce. However, climate models project warmer, drier summers that will negatively impact the growth of these species.

The program facilitated transformation of plant life in places most likely to lose boreal species that would no longer thrive under these new climate conditions. In 2015, the new planting mix consisted of yellow birch, red oak, bur oak, and white pine. Ecological models

suggested that these species would thrive under warmer, drier conditions.

This project prevents the complete loss of the ecosystem while embracing change. Cross observed that National Park Service personnel had reservations about this approach to forest management. However, for managed areas such as Northwoods, stakeholders were more open to pursuing creative strategies. This project highlighted the controversial topic of assisted migration.

Ecosystem managers must think about which species should be moved and how those species should be moved (see "Assisted Migration"). The Northwoods planting mix raised some questions about assisted migration because seeds were brought in from lower elevations across seed zones. However, the project relied on rigorous criteria and assessment to determine ecological risks and concluded that the project was safe.

Case Study 2: Less Water, Worse Droughts

In the mountainous west, snow pack is a key driver of water systems. Snow packs decline due to rising temperatures; less water and worse drought conditions are expected in the future. Ecosystem managers are working to restore the natural water storage capacity of watersheds to offset the loss of snow pack, boosting what Cross describes as the "sponge effect." The "sponge effect" works through restoring middle-elevation watersheds to improve their capacity to store wintertime precipitation in shallow aquifers. This extra aquifer storage will supplement reduced snow pack runoff in the summer when plants, animals, and people need it most.

Two projects funded by the WCS Climate Adaptation Program in eastern Washington and Montana are restoring watersheds by reintroducing beavers and their ecological benefits.

Methow Beaver Project in Washington and Utah brings together the Grand Canyon Trust and USDA Forest Service work to return beavers to land where they were once abundant. Beaver habitats can rehabilitate the hydrological function of watersheds, allowing them to trap, store, and slow down water. This is a targeted action to prevent the loss of an essential ecological function and offset snowpack losses.

However, some communities are resistant to the introduction, or reintroduction of beavers and some ecosystems within the beavers' former range are no longer suitable for beavers due to human development. For example, in Montana, WCS is working with private landowners and state and federal agency partners to mimic beavers' structures to slow water down and fill shallow aquifers. This work is unique in that it intervenes to preserve the function of the ecosystem, not by targeting the snow pack, but through the water pathways. By improving riparian habitats, when water levels rise due to the filling of the shallow aquifer, willows and shrubs can grow to develop wildlife corridors. Commentators during discussion noted that there are many instances of policy or regulatory barriers to adaptation. If those were removed, there would be greater facilitation and more adaptation projects such as beaver introduction or mimicry. As such, removing barrier and program facilitation is a necessary part of adaption.

Assisted Migration

A number of animal and plant species are at risk of displacement, extirpation, and even extinction as a result of habitat loss induced by climate change. With scientific predictions estimating significant sea-level rise and climatic changes this century, ecosystem managers are evaluating how to ensure the survival of threatened species. Assisted migration, either actively or passively moving species outside their currently occupied ecosystem, is a controversial adaption strategy to address habitat loss and species survival.

Ecosystem managers that consider assisted migration face ethical challenges that must be addressed to determine when, where, and how best to relocate species. The potential ecological risks make assisted migration a precarious solution. It also fundamentally changes ecosystem management as it challenges the conservation ethic to preserve and restore preexisting biological systems and protect them from human interference. Ecosystem managers must consider funding, public opinion, and regulatory constraints that may impede assisted migration projects. However, some species may not have other options to withstand extinction. Assisted migration has gained considerable momentum and ecosystem managers today are recommending and employing this strategy across the U.S.

For example in Florida, ecosystem managers have already identified and relocated species to new areas. The Torreya taxifolia, a conifer, no longer grows past the juvenile stage and so managers have transplanted the tree from Florida to North Carolina numerous times since 2008.

In 2017, the WCS Adaptation Program rescinded a prohibition against assisted migration projects after detailed and thoughtful conversations with funders, advisors, and within the organization. Focusing on scientific data and analysis to aid the understanding of implications on the movement of species into new areas is necessary to make sound management decisions. As such, the WCS Adaptation Program has a low-tolerance approach to assisted migration projects and will take those risks very seriously.

Case Study 3: Bigger Fires, Heavier Rains

To reduce the risk of post-fire erosion and flash flood events, the Sky Island Alliance and USDA Forest Service are installing low-tech erosion control structures in watersheds of the Sky Island region of Arizona. This project showcases the implementation of preventative measures before a big fire or heavy rain event. The combination of the two events has significant impacts on erosion. One strategy to reduce the risk of post-fire erosion is the installation of simple, low-tech erosion control structures either in areas that have recently burned or have a high risk of experiencing unusually large wildfires. These structures, such as one-rock dams, slow surface runoff and the movement of soils downstream, reducing excess sediment in rivers.

Conclusion

Cross concluded with an overview of valuable knowledge gained from the WCS Climate Adaptation Program. Climate-informed management and conservation planning explicitly has to address:

- Are we managing for resistance or transformation?
- Do we need to adjust the what, where, why, and urgency of our work to be successful?

Reconciling Energy Development with Multiple Uses

More demands are being placed on our forests and wildlands than ever before, and natural resource managers for both the Bureau of Land Management (BLM) and the USDA Forest Service are required to balance multiple uses that can include renewable and traditional energy development, recreation, and wildlife habitat protection. These uses often come in direct conflict, particularly regarding energy development, which tends to preclude any other land use. The National Audubon Society's vice president for conservation policy **Sarah Greenberger** spoke about her work reconciling multiple uses in land planning during her time as counselor and senior advisor to Interior Secretaries Ken Salazar and Sally Jewell. Greenberger primarily discussed her experiences with a years-long, landscape-level collaborative land-use planning effort made in concert with multiple Western states to prevent the listing of the threatened greater sage-grouse under the Endangered Species Act (ESA).

Landscape Level Planning

Ecological and biological ranges of species and ecosystems do not abide by state or district lines. Landscape level planning processes are becoming a more popular way to sustain environmental integrity over larger expanses of land. However, planning larger expanses requires greater coordination among more stakeholders and legal jurisdictions. Greenberger noted that both Audubon's and the federal government's recent strategies for reconciling these varied interests, avoiding costly litigation, and strengthening the durability of any given plan requires collaboration among interested parties and a strong scientific foundation.

Greenberger mentioned three major landscape-level planning efforts meant to reconcile multiple uses. Each uses ecological data to identify: (1) the most environmentally sensitive areas that should not be developed (2) less crucial areas that are suitable for energy development.

Solar PEIS (programmatic environmental impact statement), one of the first landscape-level planning efforts, looked across 12 states, identifying 22 areas that had the highest solar energy potential and the lowest potential for wildlife and cultural conflicts in 2012. Incentives were created for development in those 22 areas, and a large number of acres, classified as high conflict, were put off limits to solar development.

Second was Alaska's National Petroleum Reserve, an enormous area of public lands covering world-class wetland and other wildlife habitat along with significant oil and gas potential. In 2013, the Obama administration completed the first landscape-level full planning process, setting aside 11 million acres (of 22.8 million acres), while still allowing development access to 72% of the recoverable oil.

Third was the Desert Renewable Energy Conservation Plan, created to resolve conflict between goals to facilitate solar and wind renewable energy development, protect sensitive desert landscapes, and generate recreational income, signed into law in 2011 in California. This landscape-level plan identified 4 million acres for protection and over 300,000 acres for facilitating and speeding the deployment of renewable energy on public land.

The Sage-Grouse Protection Effort

Greenberger's presentation focused on the Obama administration's sage-grouse protection planning effort—a multi-year, multi-state, multi-agency endeavor to prevent the greater sage-grouse's listing under the Endangered Species Act (ESA). The work culminated in 2015 with 98 land-management plan amendments on public land covering 67 million acres, accompanied by 4 million acres of private-land conservation agreements, and several state-implemented conservation plans, at least three that were regulatory in nature.

Encroaching human development led to a shrinking range for the sage-grouse, and the bird's population was reduced from millions to around 200,000–500,000 individuals by the early 2000s. Recognition that the bird and its habitat were in precipitous decline sparked an aggressive conservation effort.

The sage-grouse protection effort became a critical issue due to the tremendous range of the sage-grouse, which spans several Western states and overlaps with high priority transmission routes and areas with significant potential for development in oil and gas, coal, wind energy, geothermal energy, uranium and lithium mining, and grazing. Some communities within the sage-grouse's range, particularly ranchers, have historical tensions with federal agencies. For those communities, the prospect of an ESA listing, with its attending inflexible development policies, was especially troubling. A concentrated effort was made between 2011 and 2015 for a more amicable agreement to be reached.

Timeline of the Sage-Grouse Protection Planning Effort:

2002 – The federal Fish and Wildlife Service (FWS) receives the first range-wide petition to list sage-grouse under the ESA.

2005 – FWS determines sage-grouse does not warrant listing.

2007 – Court, led by Judge B. Lynn Winmill, overturns and remands FWS decision, citing "political interference."

2008 – Wyoming developed its core area conservation strategy. Of all the states, Wyoming has the most birds and the most habitat—it also had the most conflict with energy development. State leaders decided to put together a regulatory approach to prevent bird listing, bringing together multiple state agencies and stakeholders and implementing a prairie conservation strategy that regulated where energy development and other development could occur on state lands. This plan was adopted by the BLM and subsequently implemented on its lands. This proactive and concentrated effort to pre-empt ESA listing through collaborative planning was a significant model for later federal-led planning endeavors.

2010 – FWS found the sage-grouse warranted ESA protection, but the agency did not have the resources available at that time to protect the species through listing. Other candidate species (250) were on the waiting list, and each was given a schedule for when a final decision for ESA listing would have to be decided. The final decision for the sage-grouse was to be determined in 2015.

2011 – BLM and USFS start amendments to 98 land management plans in sage-grouse habitat. Interior Secretary Ken Salazar and governors Matt Mead (Wyo.) and John Hickenlooper (Colo.) form the Sage Grouse Task Force to put together a plan to avoid listing.

2013 – Judge Winmill defers to FWS settlement agreeing to make a new finding in 2015 and list the sage-grouse if warranted. Winmill was a well-known judge in the Western states and had previous experience ruling on difficult grazing and sage-grouse decisions in the past. He was very clear that if he thought the sage-grouse protection plans were not being seriously developed or implemented he would take jurisdiction of the case.

A hard deadline of 2015, along with the credible threat of an undesired ESA listing, provided the necessary incentive to tackle the sage-grouse protection issue seriously and deliberatively. Several of the governors' previous experiences with wolves, grizzly bears, and other difficult ESA challenges informed their motivation to avoid similar issues with sage-grouse.

Science

A wealth of credible science had been built over years to understand where the most important sage-grouse habitat is, what the threats to that habitat are, what the impacts of different types of development to the bird are, and what could be done to avoid those kinds of impacts. This data was collected to demonstrate to the FWS that the bird could be saved in a credible way without ESA listing.

The Western Association of Fish and Wildlife Agencies had started the sage-grouse data collection process as early as 2006, but because of the agreement between the governors and the agencies in 2011 to work to prevent ESA listing, a team of federal and state biologists was brought together to create the Conservation Objectives Team Report. The researchers' task was to create a conservation framework so all stakeholders would know what needed to be accomplished to avoid ESA listing. This group of biologists identified the most important places to protect and some of the conservation measures that could be effective in addressing threats to the habitat. Greenberger remarked that getting state and federal biologists in agreement on what needed to be done was an important yet highly unusual move in an ESA context. She notes that the federal agencies on their own would have a hard time coming in and putting protection on acreage without buy-in from the state authorities.

Leadership

Greenberger shared a quote from a letter that Acting BLM Director Mike Pool and governors Mead and Hickenlooper sent Secretary Salazar, stating their desire to work together to create a joint effort to avoid the ESA listing:

" [T]here remains an unmet need for an action plan that prescribes near-term conservation measures, that when added to the body of past and current efforts would ensure a viable sage-grouse population in the West and preclude the listing of the species."

- Letter to Secretary Salazar from Gov. Mead, Gov. Hickenlooper, and Acting BLM Director Pool, June 29, 2012

Federal initiatives built on the principles of joint leadership demonstrated earlier in Wyoming, where multiple stakeholders and agency leaders were brought together to work on a solution. Secretaries Salazar and Jewell as well as the governors all brought their top policy experts and advisors to the table to craft a sage-grouse protection strategy, which Greenberger noted was one of the key reasons for its collaborative success.

Participation

Greenberger noted that leaders from the state and federal level made it clear that they were eager to work on an agreement to meet the 2015 deadline. There was strong interagency collaboration at the state and federal level, demonstrated by the creation of the Sage-Grouse Task Force, which included senior officials from the agencies, senior officials from the governors' offices, and FWS directors from each of the states. The task force met at least every three months to talk through the planning decisions that had to be made. Greenberger emphasized that kind of participation is important to lasting, effective decision-making, and similar groups were created on the state level in almost every state.

In Wyoming, the state sage-grouse implementation team created their Core Area strategy with representatives from stakeholders around the state. Similar groups in Idaho, Montana, Colorado, and Nevada were all developing their own plans for state adaptation and for consideration for the federal land management plan.

Greenberger reflected that it later became difficult to reconcile the various states' very different approaches to managing their sage-grouse habitat. It required difficult deliberations within the Sage-Grouse Task Force to bring cohesion to those plans. Although some differences among state sage-grouse protection plans would have been necessary to address differing economic, social, geographic, and biological variability among the states, having a clear vision of some sideboards and critical elements upfront would have minimized frustrations later on in the planning process. In the end, the regulatory certainty required to defend the plans in court lead to some of the most significant points of contention in the planning process.

The final federal land management plan was supported by the governors of Nevada, Wyoming, Colorado, Montana, and Oregon. Greenberger observed that not every state was in full agreement with the plan, particularly Utah and Idaho. However, the agreement left 90% of the high oil and gas potential outside of areas where development would be completely restricted, and over 80% outside of the somewhat restrictive areas. No areas with high potential for solar development were impacted, and accommodations were included for needed transmission. She remarked that although the plan did not avoid controversy, litigation, congressional interest, or a review by the new presidential administration, the sage-grouse protection effort was a good example of bipartisan, science-based consensus building.

Making a Plan Last

Greenberger notes that plan durability hinges on strong buy-in and participation from stakeholders and other involved parties. While the planning process is time and resource intensive, plan implementation is even more so. Greenberger remarks that plan implementation involves a significant incentive for doing hard, unprecedented work, a uniform understanding of the goals that must be collectively achieved, dedicated leadership willing to create the institutional changes necessary to facilitate the plan, and sufficient feedback channels in place to determine how successfully goals are being met. Land-management plans are high-level policy making and cover a tremendous number of details that must be coordinated across districts, agencies, and organizations.

Greenberger notes that landscape level planning and implementation requires processes and infrastructure that she does not believe the BLM has yet fully developed. For example, without a uniform organizational understanding of the new rules, and which parts of the rules were flexible and which were not, permittees received different answers at different offices about what was expected of them under the new plan. Greenberger noted that the BLM has not uniformly engaged communities or other agencies into decision making around implementation policy and guidance, and once plan implementation started it became clear that engagement on that level required an intensive time commitment and a set of facilitation skills that the BLM did not have an organization capacity to fully support, train, or reward. Upon Donald Trump's succession into the presidency, his newly-appointed Secretary of Interior Ryan Zinke ordered a review of the sage-

grouse protection plans in part citing BLM's aforementioned lack of coordination.

A strong foundation in science is also necessary to identify the places and issues that are critical to achieve desired conservation goals, so that energy development does not impact ecosystems needed for preservation. Greenberger cautions, however, that science alone cannot be the basis for planning—for a plan to be truly durable, especially around controversial, large-scale planning decisions, stakeholder engagement and the ability to build trust over time is incredibly important. The regular meetings that the Sage-Grouse Task Force conducted over three years to talk through decisions led to a shared language and a shared understanding. This resulted in state officials from less enthusiastic states such as Utah and Idaho sharing draft documents with the task force. Greenberger noted that collaboration did not always lead to agreements —Idaho and Utah filed lawsuits after the 2015 plan was released because the conservation plan didn't fully adopt the states' suggested sage-grouse protection strategies. Additionally their delegations wanted to roll back some of the agreements that had been made. In all, the durability of the ultimate agreements will hinge on the trust and engagement that was built over the three years of planning.

Conclusion

Secretary of the Interior Ryan Zinke ordered a review of the sage-grouse protection agreements in June 2017. In October 2017, the interior department opened a public comment period seeking to amend the 2015 plan. Greenberger stated that the amendment process is likely to start in early January of 2018. While she expects to see some changes to the original plan that the Sage-Grouse Task Force completed in 2015, she hopes that changes will not shake the foundation of the plan because of all of the work that has gone into consensus building among agencies and state government leaders.

Greenberger noted the need for more training within the BLM to smooth out plan implementation, which Secretary Zinke explicitly promised to review. Greenberger suspects that the review will end with the states being given greater latitude for decision-making to depart from the plan individually. She predicts that most states will ask for some changes, with some of the states with fewer acres of sage-grouse habitat taking more liberties with changes.

Leaders at the state and federal level generally agree that wholesale changes in wildlife management with every new administration are not the best way to sustain ecosystems and the vulnerable species that depend upon them. It is therefore critical to create new, collaborative land-management approaches that multiple stakeholders can embrace so that plans will endure through changes in political parties and land-management philosophies. A foundation in science, firm deadlines with real consequences, leaders who are motivated to create change, and a collaborative, trust-building relationship among stakeholders are crucial to creating lasting land-management plans.

Evolving Land-Use Planning Approaches

The 2012 Planning Rule and subsequent 2015 Final Derivatives, guide development, amendment, and revision of land management plans across the National Forest System. The rule was developed to account for contemporary planning issues like sustainable recreation and climate change. The rule modernizes the planning process by using an adaptive framework and integrating public comments into each step of the planning process.

Cecilia Romero Seesholtz, acting director of ecosystem management coordination at the USDA Forest Service, and **Jamie Barbour**, acting assistant director of adaptive management of ecosystem management coordination at the USDA Forest Service, discussed the implications of the rule and the importance of ecological sustainability in forest management.

The National Forest System History

The National Forest System Lands includes extensive tracts of both national forests and national grasslands throughout the United States. In the West, the federal government reserved land when the National Forest System was created in the late 1800. In the East, land was purchased from private landowners under the Weeks Act during the early 1900s.

All national forests and grasslands must have land management plans. The National Forest Management Act of 1976 (P.L. 94-588) is the primary statute governing the administration of national forests in the U.S. From this act, the Forest Service rule was developed in 1982 and revised in 2012.

The rule provides a framework for forest and grasslands land management plans. These plans guide project and activity decisions. Forest plans can be revised with provision efforts or amendments; however, many plans have not been significantly updated since 1982.

2012 Planning Rule Framework

The original rule did not address contemporary forest planning issues like sustainable recreation, conservation biology, and climate change. The amended rule provides flexibility to respond to social, economic, and ecological needs of the forest and the surrounding community. Seesholtz highlighted several key themes of the rule:

- Collaboration and Public Involvement
- Science
- Assessments
- Determine Need to Change
- Plan Components and Plan Content
- Diversity and Sustainability
- Objections
- Monitoring

The planning framework provides a blueprint for the land-management process. The framework is science-based and provides a structure within which land managers and partners can work together to: understand impacts on land; develop, revise, or amend plans to respond to existing and predicted conditions and needs; and monitor changing conditions and the effectiveness of management actions to provide a continuous feedback loop for adaptive management.

The planning framework has three planning processes: assess, revise, and monitor. Prior to plan development, there is an assessment of the conditions and trends that are affecting the plan area and the gaps that should be recognized in the planning process. After the assessment, the planning process begins by reviewing the existing plan and determining the changes. The planning phase is followed next by proposing changes to the plan, preparing an environmental impact statement, and requesting public comment on the proposals. After comment, a final revised or amended plan is published. After the planning phase is completed, managers begin implementing the types of projects identified in the plan and monitoring how effective the plan is in achieving desired results.

Collaboration and Public Involvement

Throughout all stages of the planning process, engaging the public is essential. Consultation with tribes on traditional ecological knowledge, land ethics, cultural issues, and sacred and culturally significant sites should be integrated into forest plan revisions. Additionally, inviting youth and minority populations, state and local governments, and other federal agencies to participate with the planning efforts can help create a shared sense of both responsibility and ownership of the various interests in the long-term success of the land management plan. Communication with these diverse groups is conducted through a variety of modern and traditional tools such as webinars, meetings, and field trips.

Forest Plan Revisions

Twenty-three plan revisions have begun since the rule passed. Francis Marion National Forest in South Carolina was the first plan to be completed.

Seesholtz shared several case studies from national forests (NF) El Yunque, Inyo, and Chugacho. On Puerto Rico's El Yunque NF, a citizen collaboration group was established and community meetings were conducted in both English and Spanish. Responding to local needs, forest managers developed small-scaled, shared stewardship projects with local forest users and communities with the direct benefits of producing jobs in small-forest products and sustainable ecotourism. On Inyo NF in California, Inyo County cooperated with the Forest Service and held meetings with congressional staff to showcase how legislators can support the plan. On Chugach NF in Alaska, forest staff and project partners facilitated interactive planning activities with youth across the national forest. Students and teachers were targeted through the lead nonprofit partner, Chugach Children's Forest, which worked with local teachers to develop a two-hour youth planning activity aimed at: sharing and learning about activities of youth in the forest; the future of activities for youth in the forest; and how youth learn and share information about the forest.

The 2012 Planning Rule and Ecological Sustainability

The rule encourages national forests to modernize plans to include concepts such as ecological sustainability, a concept largely undeveloped at the time of the original rule. Barbour explained the rule's emphasis on ecological sustainability through five key steps:

- Show how the land the Forest Service manages connects to the larger social, economic, and ecological landscape
- Provide a vision for the future of Forest Service lands
- Provide indication about future plans
- Create local ordinates to go with each project while creating standards and objectives
- Monitor projects

With this in mind, the rule incorporates sustainability in three interconnected parts: social, cultural, and economic sustainability. Barbour also explained that forest managers should take the following into account:

- Social, cultural and economic conditions
- Sustainable recreation settings, opportunities, access and scenic character
- Multiple uses (outdoor recreation, range, timber, watershed, wildlife, and fish)
- Ecosystem services
- Cultural and historic resources
- Opportunities to connect people with nature

Barbour noted several barriers that the Forest Service needs to overcome to fully embrace the rule's vision. The Forest Service has yet to conceptualize and operationalize what ecological sustainability and ecological integrity means for forests and forest managers. The agency must also significantly improve its vision for the future so that communities are cognizant of long-term goals and can contribute to those goals' success in a coherent and collaborative manner. Furthermore, Barbour elaborated on the delicate balance between social and economic sustainability. Forest Service land should complement, rather than underpin, the surrounding communities' social and economic system—determining how and how much national forests should be involved in local economies is a major challenge for forest managers.

Barbour emphasized that the Forest Service should have a more systematic monitoring program to make national forest data more comprehensible and easier to compare over time and between forests. Current monitoring techniques are different across national forests. The Forest Service should determine the fundamental pieces of information needed to understand forest ecosystems and measure forest plan goals. If no current monitoring technique lends itself to effective comparison, then a new monitoring technique should be developed.

Case Studies

Barbour also shared case studies from the Inyo NF, Francis Marion NF, and Flathead NF. On the Inyo NF, public comments noted that the draft plan lacked a coherent approach for water, watersheds, and aquatic and riparian resource conservation. Thus, the final plan identifies conservation watersheds to address conservation at scales that reflect watershed connectivity and resilience in the face of large-scale disturbance events. Additionally, stakeholders provided ideas and best available scientific information that informed this approach. On the Francis Marion NF, the assessment revealed that salt-water intrusion was likely to be a problem due to sea-level rise, the deepening of the Charleston harbor, and the diversion of fresh water for Charleston development, generation of power, and harbor transport. Forest managers worked with local stakeholders to release fresh water from dams and reengineer channelized streams. On the Flathead NF, stakeholders expressed the desire to delist the grizzly bear as endangered under the Endangered Species Act, and required assurances that the forest recovery plan would include protections for the species. Part of those protections included the provision of bear-proof canisters for park visitors' food waste. Standards and guidelines were developed to serve this purpose. Three surrounding forests adopted the measures as well to coordinate efforts.

The Future of Forest Plans

Barbour observed that the Forest Service has the opportunity to evolve past individual forests plans to develop multi-forest plans that include regional development concepts. Barbour proposed completing bioregional assessments and developing forest plans on a statewide basis. He also suggested designing and implementing forest plans across a region simultaneously. These modifications to current practices could ensure that different plans are using consistent standards and guidelines.

Adaptive Management in the Forest Service

Barbour recollected that in the 1990s he had seen ambitions for adaptive-management plans crushed by disagreements between forest managers and scientists. Scientists wanted to solve big ecological problems, conduct long-term studies but had difficulty designing small-scale projects that fit within the Forest Service budget. Without agreement over adaptive management projects, the concept mostly faded from Northwest forest plans.

Adaptive management is a requirement under the rule. However, forest managers and scientists have yet to determine how best to integrate scientific findings into management practices. Adaptive management is theoretically grounded in scientific, hypothesis-tested principles. Unfortunately, political and monetary barriers can muddle the practical application of these principles. Barbour revealed that the Tongass NF has been able to overcome these difficulties and implement an adaptive management plan.

The Tongass NF in southeast Alaska is the nation's largest national forest. Encompassing 17 million acres, Tongass contains a diverse landscape of rainforests, glaciers, and rivers. It is also prime habitat for many species including black and brown bears. Recognizing the need to manage and update the forest plan, active steps were taken to include adaptive management into plan components such as monitoring, plant restoration, and timber sales. Barbour expand-

ed upon how the timber sales' adaptive management strategy reduces timber production over the next 16 years. Old growth trees will make up the majority of the average 46 million board feet of timber harvested for the first ten years of the plan. The plan then calls for a shift to young growth trees in the final years, reducing old growth harvest to 5 million board feet for small sales and specialty products. Though there has been some objection both to the reduction of timber production by the timber industry and to the timeline by environmental organizations (which believe the transition could be faster), forest managers have reiterated the adaptive component of this plan. Barbour noted that the timeline and anticipated board feet could change over time as monitoring and evaluations occurs in the future.

Additionally, the Forest Service must determine how to translate adaptive management from theory to practice. Crucial aspects of this include standardizing the definition of adaptive management and deciding how adaptive management goals can be set and achieved. Researchers on the Rio Grande NF are hoping to do just that. Their project's methodology involves collecting data from a 15-question forest manager survey and analyzing ecological data from national forests. Because forest monitoring and evaluation is expensive, the researchers only use existing data from sources such as NGO monitoring programs, the Natural Resources Conservation Service, and the Forest Inventory and Analyses National Program. The research team designed survey questions that explicitly addressed adaptive management in order to evaluate forest managers' familiarity with the practice and determine how the concept may be effectively refined and universalized. Although these findings will be an important step towards conceptualizing and adopting adaptive management techniques, Seesholtz observed that other barriers may prevent timely and effective implementation, including a reluctance by some forest managers to change old patterns of decision-making.

Bureau of Land Management and Planning 2.0

The BLM's planning rule, Resource Management Plan, was last updated in 1983 and guides the development of 245 million acres of surface land and 700 million acres of subsurface mineral estate in the U.S. BLM modernized its planning rule in 2016 in a manner similar to the rules promulgated by the USDA Forest Service in 2012 and 2015. BLM Planning 2.0 was designed to fix key flaws in western land-use planning that resulted from the entanglement of BLM lands with private and public lands managed by other agencies. It laid out steps to better engage with the public and stakeholders as well as to adapt more advanced planning tools to improve transparency and outcomes to decide whether and where drilling, mining and logging will occur on public land.

Planning 2.0 was finalized and published on Dec. 16, 2016, at the end of the Obama administration. However, Planning 2.0 was disapproved by joint congressional resolution in March 2017 under the Congressional Review Act (CRA). This statute allows congress to adopt an expedited process—with no hearings—that prevents senators from using regular order requiring that bills be passed with 60 votes. CRA also prevents BLM from issuing any new rule that is "substantially the same" without new authorizing legislation from congress. —Eds.

Conclusion

In conclusion, the 2012 Planning Rule is an essential revitalization of the original 1982 Planning Rule. It addresses contemporary issues such as climate change while also recognizing the importance of public participation and inclusion throughout every stage of the planning process. These key elements will develop more robust, resilient national forests and strengthen the communities that rely upon them.

Reconsidering Wildland-Urban Interface Narratives

Wildfires are increasing in number, size, and intensity throughout the U.S., particularly in the West. Risk to human health and property are increasing as more people move into areas that are situated next to or within wild areas, called the Wildland-Urban Interface (WUI). Managers, researchers and policymakers are struggling to find ways to mitigate costs associated with wildfires, and have been exploring ways to encourage the public within the WUI to practice "defensible space"—maintaining and designing landscapes around structures to reduce the risk of ignition during wildfire events. USDA Forest Service forest researcher **Sarah McCaffrey** says that effective policy should start with revising unhelpful narratives that have arisen around the WUI and the people who inhabit that space.

Unfounded Biases Lead to False Narratives

McCaffrey contends that many narratives surrounding the WUI are based upon an "imagined public" that has little basis in sociological research or data. She believes there are two reasons for the inconsistency: sampling bias and confirmation bias. Sampling bias is created when a small, non-representative number of unhappy citizens complain to managers about practices that are generally acceptable to their neighbors. Managers assume that those most vocal people are representative of the whole population—an inappropriate, self-selecting sampling.

Confirmation bias has its roots in human tendencies to pay attention to information that reinforces already-held beliefs and discounting information that contradicts those beliefs. McCaffrey suggests that if managers already believe that the public does not understand what they are trying to do, or if managers believe the public is not embracing the concept of defensible space, they will only notice houses that are not taking protective actions when they visit WUI communities.

The False Narratives

The first "false narrative" that McCaffrey describes is that homeowners do not understand the fire risks of living within the WUI. The reality is that 95% of people who live in fire-prone areas know they are subject to the risks of wildfires. So the question to ask is not "do people understand their risk?" but rather, "what makes people take protective action?"

One major factor in decisions to take action is risk attitude—those who are more tolerant of risk may not engage in fire mitigation, and are more likely to stay and defend their houses instead of evacuating. Self-efficacy is another important behavior influencer—are the citizens actually capable of taking mitigation actions? Another is response efficacy—does the public understand how protective actions are effective in mitigating fires? This is an overlooked but crucial component in understanding risk-mitigation behavior in the WUI.

McCaffrey took aim at misconceived notions surrounding the Ad Council's Smokey Bear "Only You Can Prevent Forest Fires" campaign. The public service announcement has often been blamed for a negative attitude towards wildfire mitigation techniques like prescribed burns. McCaffrey says this blame is misplaced—when she speaks to homeowners about what Smokey Bear's message means to them, they generally say, "that I should be responsible when I'm in the forest." People do not think that all fires are bad, and there is very consistent evidence that the public has a sophisticated idea of fire ecology, particularly if they live in a fire-prone landscape. McCaffrey notes that around 80% of those surveyed say that prescribed fires are an acceptable management tool—30% say it should be used all the time, and 50% say it depends on where and why you are using it.

Another false narrative is that homeowners in the WUI do not take responsibility for protective actions on their land. McCaffrey noted that there is consistent evidence that people are in fact taking responsibility, and that two-thirds of homeowners have done some kind of fire mitigation, usually vegetation management. Homeowners do, however, have a strong sense of shared risk, and expect the Forest Service and other land management agencies to take good care of their lands too. McCaffrey shared one quote from a homeowner to illustrate her point: "it's not their [Forest Service] responsibility to make sure we are safe [from fire] but once they cut things down they need to follow through on that work. But we chose to be here, so we need to protect ourselves."

In addition to agency accountability, homeowners also expect detailed, localized education on fire risk. Advice should be neighborhood-specific and should aim to answer questions such as:

- Where is the fire likely to come from?
- What are the weather conditions homeowners should be on the look out for?
- Would cutting down a specific tree on a property mitigate fire risk?

Homeowners also expect agency help with larger-scale tasks, such as removing fast-growing vegetation or assisting

the elderly who may be less capable of performing mitigation practices.

Responsibilities for fighting fires and allocation of costs are usually determined among multiple agencies and jurisdictions before fires occur. McCaffrey noted that most fires in California are managed under joint command—the responsibility for a fire is not only borne by the agency that manages the area where the fire started. For example, the Thomas Fire in Ventura County that occurred during mid-December 2017 was fought and managed collaboratively by the Ventura County Fire Department, Los Padres National Forest, Cal Fire, and the City of Ventura Fire Department.

McCaffrey noted that costs are split using pre-negotiated formulas, following a general guideline that cost will be proportional to ownership of the burned land—if a fire is mostly on Cal Fire owned land, Cal Fire will pay for most of the costs. If costs are not pre-negotiated, they are divided after the fire— often a long and difficult process. Federal entities can also help with fire funding. According to McCaffrey, if a community sustains significant damage it can receive a grant covering 75% of local costs through the Federal Emergency Management Act (FEMA). Cost negotiations can become very complicated, and McCaffrey suggests a greater understanding of cost sharing is necessary if policymakers or social scientists try to evaluate financial motivations for local, defensible-space behavior change.

Demographic Narratives

McCaffrey notes that certain groups of people tend to be unjustly blamed for problems within the WUI. There is little data to suggest that any demographic category increases fire risk, with perhaps one exception: women tend to have higher risk perception than men—a consistent result in many risk studies. Education and income do not have a clear effect. One narrative suggests that poor communities will not find ways to mitigate fire risk because of the cost. Studies suggest, however, that they practice risk mitigation by pooling their resources instead of hiring outside consultants like wealthier communities.

Newcomers are often considered less informed about fire risk in their new neighborhoods. However, some data suggests that newcomers are actually more likely to mitigate fire risks, as they are more likely to seek out up-to-date information and become acquainted with the risks attending their new neighborhoods. Furthermore, 60% of moves in the U.S. are within counties, and only 20% are out-of-state, so new residents may already be familiar with a general area's fire risks.

Those who live in the WUI part-time, during weekends or for brief stays over summer, are also blamed for not being knowledgeable or active in mitigating fire risk on their properties. McCaffrey says that the data is mixed—some studies suggest that there is no difference between part-time and full-time residents. Other studies show that part-timers may mitigate less, but only because they have less time to devote to mitigation, and not because they are unfamiliar with issues regarding fire risk.

Previous experience with fire does have a consistent, if limited, effect on people's perceptions of fire risk and willingness to take protective actions. After a fire event there is a brief, 3-6 month window when people will pay more attention to fire risk. Over the course of those 3-6 months, however, fire risk will diminish in importance for those living in fire-prone areas. McCaffrey stated that fire is a low priority for most people as the chances of an individual being affected by fire, even if he or she lives in the WUI, is very low.

Regional differences also fall under false narratives. While there is a tendency to say "that's the West," or "that's the Southeast," studies prove that behavioral dynamics are consistent throughout the country. However, local contexts matter a great deal. Local agency-community relationships, local fire history, and local topography are more predicative of protective action than regional locations.

Dynamics that Work to Improve Protective Actions

While demographics have proven to be bad predictors of success in risk management, McCaffrey outlined three factors that make a real difference:

Knowledge: Better understanding of a fire mitigation practice is associated with higher acceptance levels of that practice. The more that people understand the reasoning behind prescribed fires, the more likely they will accept that activity in their communities. McCaffrey observed that while many people do not believe that wildfires will affect them individually, they do have a strong connection to their natural landscape and want to be good land stewards. People therefore tend to be persuaded by arguments emphasizing ecological benefits of prescribed burning, more so than the mitigation of fire risk.

Trust: Can those who are giving information to the communities be trusted? More importantly, can the people doing the prescribed burns be trusted? Are they competent? Do they know what they are doing, and are they able to do it safely? While ideally relationships would be built over time to foster trust, transparent and honest communication can make up for a lack of time. Knowledge and trust together lead to high acceptance levels of mitigation practices.

Messaging: How is information disseminated to the public? Simple behavioral change hinges on a single, strong, one-way message, such as Smokey Bear's "Don't start fires" directive. More complex behavior change, like the uptake of multiple fire-mitigation practices, would require interactive commu-

nication between foresters and homeowners. Interactive communication allows more public questions and a broader understanding of fire risk. Those providing the information can become more familiar with the specific issues homeowners have and familiarize themselves with what the public already knows about fires.

Measures to Mitigate Fires in the Interface

It is impossible to prevent all wildfires, and it is more helpful to approach problems in the WUI as mitigation rather than prevention—how do we mitigate fires in the WUI? How do we make fires have fewer negative impacts? There are three strategies that are often proposed for fire mitigation:

Defensible space: The homeowner manages vegetation around the home and employs practices that make the home more resistant to ignition. If homeowners build their houses and manage their vegetation to reduce risk, the odds of their homes surviving are high. Of course, extreme conditions could increase risk sufficiently to overwhelm this strategy.

Insurance: Insurance companies will not be a major influence in WUI wildfire risk reduction. Minor corporate risk exposure to fire has made the cost of insurance too low to incentivize homeowner behavior change. Between 2002 and 2011, fires accounted for 1.6% of insurance losses, and the average from 1989 to 2016 stayed at around 2%. While insurance companies are slowly getting more involved in encouraging their customers to adopt more fire-protective behavior, McCaffrey does not believe they will have a major behavioral impact.

Furthermore, McCaffrey argued that even if risk-of-loss to insurance companies resulted in exorbitant insurance rates, people would likely still build in the WUI and assume the risks on their own. Might this result in only wealthy residents who are capable of self-insurance to live in the WUI? She responded that the homeowners she has met that cannot afford insurance continue to live in the WUI anyway.

Land-use planning: Although there is some evidence that how a house is built influences its ability to survive a fire, there is no data indicating what kind of development or zoning pattern leads to better outcomes. According to McCaffrey, when discussing land-use planning, goals are not always clear. If the goal is to reduce wildfire suppression costs, then a clustered development is preferable because only one plane or fire truck would be needed to protect multiple houses. If the goal is to reduce total house loss, a clustered development would lead to more house loss due to a higher likelihood of house-to-house ignitions.

Focusing on the Social

At the end of the conversation, the question that should be asked is how do we live in fire-prone landscapes? The answer will vary by landscape and ecosystem, and development solutions should be based upon a strong understanding of both those ecosystems and nearby communities. Overall, if the social understanding of communities in fire-prone areas is broadened, managers could more effectively communicate the need for and facilitate the adoption of fire-safe practices in the WUI.

Appendix A: Congress Registrants

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Sarah Greenberger
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Appendix B: Congress Program

Wednesday, December 13, 2017

8:15 am – 8:35 am	Continental Breakfast
8:35 am – 8:45 am	Welcome and Opening Remarks **Richard Engberg** Chairman, RNRF Board of Directors North Bethesda, Maryland
8:45 am – 9:15 am	Funding Continuity for Conservation Programs and the USDA Forest Service Forests and wildlands provide recreational, spiritual, aesthetic, and economic benefits for society. However, financial support for managing public lands and resources has eroded over the past two decades. What steps can be employed to correct the long-term erosion of funding? Funding the suppression of wildfires has become a major problem because of adverse impacts on the Forest Services's non-fire programs. How can this situation be remedied? **Tony Tooke** Chief USDA Forest Service Washington, District of Columbia
9:15 am – 9:45 am	Questions and Discussion
9:45 am – 10:15 am	Adapting Forest and Wildland Management in Response to a Changing Climate Predicting the long-term impacts of climate change on forest and wildland ecosystems is difficult. How can current monitoring and data collection techniques be adapted to improve public decision-making? What institutional changes are necessary to promote climate-conscious adaptive management? **V. Alaric Sample** Senior Fellow and President Emeritus Pinchot Institute for Conservation Washington, District of Columbia
10:15 am – 10:45 am	Questions and Discussion
10:45 am – 11:00 am	Break

11:00 am – 11:30 am	Expanding the Use of Multimedia to Foster Support for Natural Environments and Resources There is a need to renew and foster appreciation for conservation, preservation and use of natural resources in the public domain. Multimedia is a tool to reach the public and advance values of conservation. How will traditional marketing, advertising and public outreach be adapted to reach new audiences? **Amy Gibson-Grant** Vice President, Campaign Development The Ad Council Washington, District of Columbia
11:30 pm – 12:00 pm	Questions and Discussion
12:00 pm – 12:30 pm	Lunch
12:30 pm – 1:15 pm	Luncheon Presentation: Climate Change Adaption Case Study & Discussion **Molly Cross** Climate Change Adaptation Coordinator Wildlife Conservation Society Bozeman, Montana
1:15 pm – 1:45 pm	Reconciling Energy Development with Multiple Uses Oil, gas, and mineral extraction and renewable energy development can cause extreme disturbances to entire ecosystems. Some federal agencies managing forests and wildlands have a mandate to promote energy development, preserve ecological integrity, and encourage multiple uses – goals that often conflict. What steps can be taken to diminish the adverse effects of energy development on renewable resources, ecosystems, and their surrounding communities? **Sarah Greenberger** Vice President, Conservation Policy National Audubon Society Washington, District of Columbia
1:45 pm – 2:15 pm	Questions and Discussion
2:15 pm – 2:45 pm	Evolving Land-Use Planning Approaches The 2012 Planning Rule, and subsequent 2015 Final Derivatives, guide development, amendment, and revision of land management plans across the National Forest System. The rule was developed to address contemporary planning issues like sustainable recreation and climate change. How are forest mangers anticipating and incorporating future impacts of climate change and community needs into revised forest plans? **Cecilia Romero Seesholtz** Forest Supervisor, Boise National Forest Acting Director, Ecosystem Management Coordination USDA Forest Service Washington, District of Columbia and

Jamie Barbour
Acting Assistant Director, Ecosystem Management Coordination
USDA Forest Service
Washington, District of Columbia

2:45 pm – 3:15 pm Questions and Discussion

3:15 pm – 3:30 pm Break

3:30 pm – 4:00 pm Reconsidering Wildland-Urban-Interface Narratives
Wildfires are becoming more devastating as more people move into the Wildland-Urban-Interface (WUI), the zone of transition between unoccupied land and human development. How can the responsibilities of firefighting and resource provision among the federal government, states and counties be delineated and clarified? What measures can be taken to reduce wildfires in the interface?

Sarah McCaffrey
Research Forester, Rocky Mountain Research Station
USDA Forest Service
Fort Collins, Colorado

4:00 pm – 4:30 pm Questions and Discussion

4:30 pm Closing

Robert Day
RNRF Executive Director
North Bethesda, Maryland

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