USDA

United States Department of Agriculture

Toward Shared Stewardship Across Landscapes:

An Outcome-Based Investment Strategy

Forest Service FS-1118 August 2018

Cover photos

Fire ecologist Alicia Reiner and fire and aviation management cooperative fire assistant Mark Corson check equipment at Fire Behavior Assessment Team site on the Cedar Fire near the Sequoia National Forest, Posey, CA, in 2016. USDA Forest Service photo by Lance Cheung.

Private home near the Cedar Fire in the Sequoia National Forest near Panorama Heights, CA, in 2016. USDA Forest Service photo by Lance Cheung.

Portion of the Chattahochee-Oconee National Forest in Georgia after thinning treatment for timber sales production. USDA Forest Service photo by Cecilio Ricardo.

Firefighters conduct a prescribed burn on the Stanislaus National Forest near Sonora, CA. USDA Forest Service photo.

Public meeting on the Fossil Creek Comprehensive River Management Plan. USDA Forest Service photo by Deborah Lee Soltesz.

Forest Service employees brief U.S. Department of Agriculture Secretary Sonny Perdue and New Mexico Governor Susana Martinez on forest treatments during tour of the Santa Fe Watershed in Santa Fe, NM, in 2018. USDA Forest Service photo by Lance Cheung.

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Fields of sunflowers blanket many open meadows and fields in Coconino National Forest in Arizona. USDA Forest Service photo by Deborah Lee Soltesz.

Executive Summary

Managers and owners of forests across the Nation face urgent challenges, among them catastrophic wildfires, invasive species, drought, and epidemics of forest insects and disease. Of particular concern are longer fire seasons and the rising size and severity of wildfires, along with the expanding risk to communities, natural resources, and the safety of firefighters. Accordingly, at the U.S. Department of Agriculture, Forest Service, we are rethinking our approach to land management. We will work closely with States to set landscape-scale priorities for targeted treatments in areas with the highest payoffs.

For decades, we have worked with States, Tribes, local communities, and collaborative groups to reduce fuels and improve forest conditions. By offering a powerful vision for improving forest conditions across fire-prone landscapes, the National Cohesive Wildland Fire Management Strategy provides a foundation for building even stronger relationships.

The 2014 Farm Bill gave the Forest Service tools to get more work done on the ground, for example, providing for cross-boundary work with States through the Good Neighbor Authority (GNA). As of June 2018, we have signed 163 GNA agreements on 59 national forests in 25 States to complete a variety of restoration activities. The 2018 omnibus bill further expanded the GNA and other authorities, enabling us to do more work across boundaries.

Since the 1990s, the average annual area we have treated has steadily grown. We are protecting more communities and watersheds, producing more timber volume, and treating more acres for hazardous fuels than at any time in the past 20 years. Yet catastrophic wildfires and the corresponding loss of lives, homes, and natural resources have continued to grow, partly because our treatments have been uncoordinated and not at the right scale. Although locally successful, we have rarely succeeded at the scale needed for lasting impacts across landscapes.

A steady increase in collaboration capacity and recent breakthroughs in Forest Service science, mapping, and technology are providing new tools for planning investments to reduce fire risk and improve forest conditions. We will implement these new authorities and advances in technology by:

- Working with States to set priorities and co-manage risk across broad landscapes. The most effective approach to wildland fire management is shared stewardship of the wildland fire environment, shared ownership of the challenges it presents, and a shared commitment to meeting those challenges. As the scale of wildfires grows, the scale of coordinated planning needs to expand accordingly. We envision States taking a leading role in convening stakeholders to discuss the wildland fire environment. State forest action plans can provide guidelines for coordinating activities across jurisdictional boundaries.

- Using new tools to conduct targeted investment planning. Advances in remote sensing, information science, fire simulation tools, and mapping technologies have enabled Forest Service scientists to complete new national resource assessments. Based on the assessments, Forest Service researchers have developed tools for evaluating fire risk and making land management investments at scales where the payoffs are highest. These tools for scenario investment planning give stakeholders the science-based capacity to find opportunities for lasting improvements in forest conditions by making the corresponding targeted investments.

- Focusing our work on broad outcomes. Outputs are valuable indicators of program accomplishments, but outputs alone do not tell us whether we have achieved large-scale outcomes. We envision joining together with partners and stakeholders to identify desired outcomes and the key performance indicators for measuring them.

- Capitalizing on the authorities created by recent legislation. The 2018 omnibus bill gave us new authorities to help expedite our work, including new categorical exclusions, expanded GNA, and 20-year stewardship contracting. We will use every authority we have to get more work done on the ground.

- Improving the Forest Service's internal processes. We are reforming outdated agency processes that delay our work of reducing fire risk and improving forest conditions. For example, we are improving the efficiency of our environmental review processes under the National Environmental Policy Act, and we are realigning our policies to better meet market demand for forest products in ways that help us improve forest conditions.

- Using all active management tools. To better manage fire risk, we will need to step up the use of prescribed fire and managed wildfire in concert with mechanical treatments and timber sales. Working with partners and stakeholders, we can find opportunities in fire-adapted forests to reintroduce the right kind of fire at the right times in the right places.

- Applying a risk-based response to wildfire. As envisioned by the National Cohesive Strategy for Wildland Fire Management, learning to live with fire includes a safe, effective, risk-based response to wildfire. As part of an approach to co-managing fire risks across landscapes, we will seek dialogue with partners and stakeholders on what a risk-based response might mean.

Through shared stewardship, the Forest Service and State and other partners have unprecedented opportunities to co-manage fire risk for desired outcomes at the most appropriate scales. Our concept for an outcome-based investment strategy has three core elements:

- **Determining management needs on a State level**. We will prioritize stewardship decisions directly with the States, setting priorities together and combining our mutual skills and assets to achieve cross-boundary outcomes desired by all.

- **Doing the right work in the right places at the right scale.** We will use new mapping and decision tools to locate treatments where they can do the most good, thereby protecting communities, watersheds, and economies where the risks are greatest.

- **Using all available tools for active management.** We will use every authority and tool we have to do more work on the ground, including timber sales, mechanical treatments, and carefully managed fire, working with partners and stakeholders to choose the right tools.

The Forest Service plans to share this concept for an outcome-based investment strategy with partners and stakeholders across the Nation as a starting point for dialogue. We realize that what we envision will require experimentation, co-learning, and adaptation. Working with States and others, we envision stakeholders coming together across landscapes to co-manage risk, use new tools to better target investments, focus on outcomes at the right scale, and recalibrate our wildland fire environment for the benefit of people, both now and for generations to come.

The Beaverhead-Deerlodge National Forest in Montana. USDA Forest Service photo by Preston Keres.

Firefighters observing fire behavior on Willow Fire on the Caribou-Targhee National Forest in Idaho, 2008. USDA Forest Service photo by Martell Gibbons.

Growing Need for Reduced Fire Risk and Improved Forest Conditions

This paper presents a framework for reducing wildfire risk at its actual landscape scale. The framework is based on a scientific breakthrough: a new planning tool that gives the wildland fire community the ability to manage fire risk across broad landscapes. Working together through shared stewardship, stakeholders can make cross-boundary investments to reduce fire risk and improve forest conditions across shared landscapes in a way never done before.

The concept of an outcome-based investment strategy responds to an urgent national need. Managers and owners of forest land across the Nation face a range of growing challenges, among them catastrophic wildfires, invasive species, droughts, degraded watersheds, and epidemics of forest insects and disease. Driving factors include regional changes in temperature, precipitation patterns, and other environmental conditions, along with challenges related to normal forest growth and land use change within and adjacent to the Nation's forests and grasslands. Such challenges call for new thinking and approaches.

Of particular concern are longer fire seasons and the rising size and severity of wildfires, along with the growing risk to lives, homes, natural resources, and other values. Statistics reflect the scope and urgency of the issue (figure 1).

The United States has more than a billion burnable acres, and 2 of the last 3 years have seen the most acres burned since 1952. The impacts have been devastating to local communities and economies. For example, the number of structures destroyed by wildfires has risen from less than 900 in 2001 to more than 12,000 in 2017. After more than a century of fire exclusion, the Nation has a complex and challenging wildland fire environment, including a growing backlog of fire-adapted forests in need of active management.

The wildland fire community has made progress in meeting the challenges—but not enough. It is time to step up our game, and Congress has given the Forest Service, an agency of the U.S. Department of Agriculture, more of the means to do so through the Consolidated Appropriations Act of 2018. Following the omnibus bill's passage, the Senate Committee on Energy and Natural Resources asked the Forest Service to report on how the bill will help the agency meet the fire-related challenges facing the Nation.

In response, this paper sets forth the broad concept of an outcome-based investment strategy, describing the context and rationale for the strategy and how it can work through partnerships at larger scales than ever before. Fully developing and deploying the concept will take time; we will

need to hammer out the details together with our partners. It will be up to our partners and stakeholders, working together, to decide what the strategy looks like on the ground and what tools to use, such as timber sales, mechanical treatments, prescribed fire, and "managed wildfires.[1]" Our purpose here is to indicate an opportunity for reducing fire risk and improving forest conditions by enhancing the entire wildland fire system.

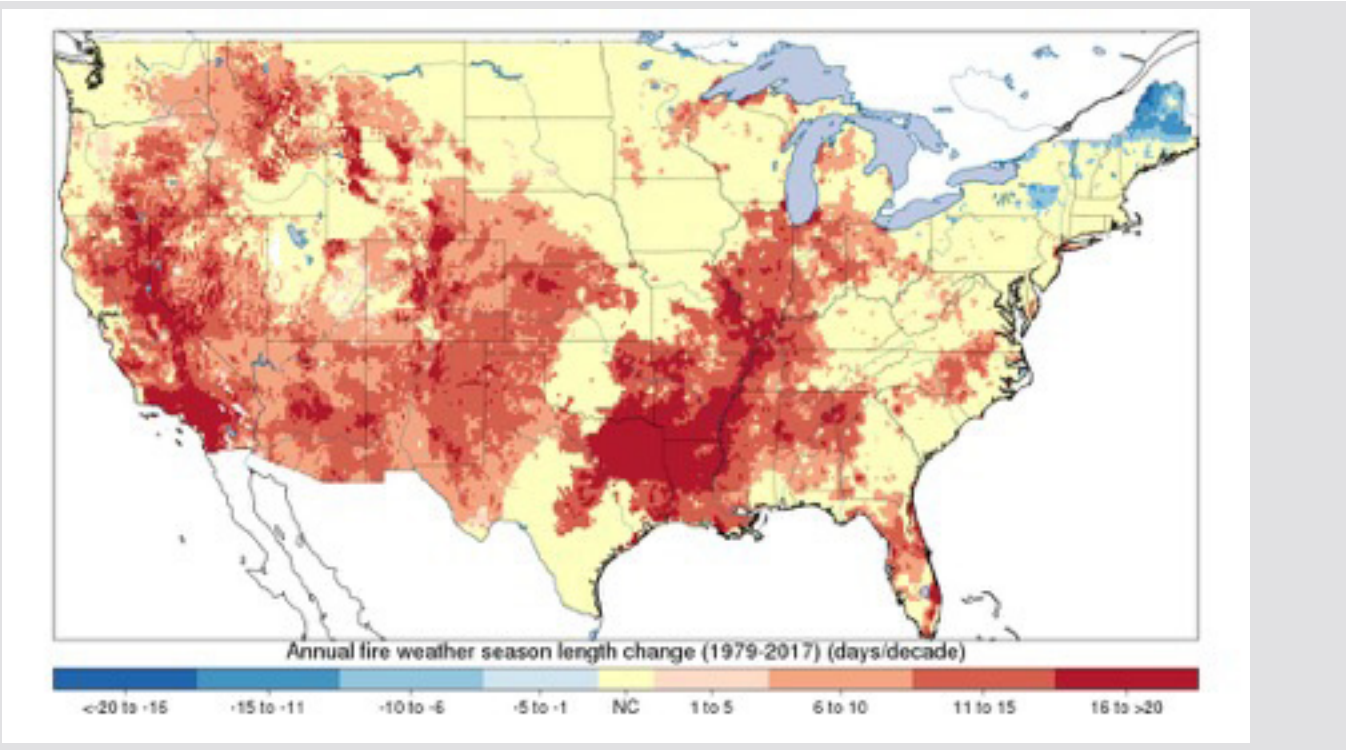

Figure 1. Changes in fire weather season length (FWSL) across the contiguous United States, 1979–2017. The FWSL is the number of days each year that wildfires are likely to burn. Across much of the United States, fire seasons have lengthened by as many as 20 days per decade over the last four decades.

[1] Prescribed fires are set and managed by professional fire managers under carefully controlled conditions. Wildfires ignited by lightning or other ignition sources are sometimes allowed to play their natural ecological role, managed and monitored by wildland fire professionals and suppressed if needed. For the purposes of this paper only, we are calling such fires "managed wildfires."

Figure 2. The wildland fire system we have today includes environmental, social, political, financial, and cultural factors that drive outcomes in the wildland fire environment. WUI = Wildland-Urban Interface.

Improving the Wildland Fire System

Wildland fire management in the 21st century is affected by a system of interconnected factors. A suite of environmental, social, political, financial, and cultural factors all drive outcomes in the wildland fire environment (figure 2). With pieces connected to responders, communities, and landscapes, our wildland fire system is extremely complex. The challenge is making the system operate through synergies that allow stakeholders to work together across broad landscapes toward outcomes desired by all. Our purpose is to improve the system.

For decades, the Forest Service has worked with States, Tribes, local communities, and collaborative groups to carry out projects to reduce hazardous fuels and improve forest conditions. We have built strong relationships and gained experience in working with collaborative groups across landscapes toward shared goals, and we have made progress in using the wildland fire system to good effect. Since the 1990s, for example, the average annual area treated has steadily grown; from 2008 to 2017 alone, we treated an area about the size of Ohio.

Yet catastrophic wildfires and the corresponding loss of lives, homes, natural resources, and other values have continued to grow. One reason is that our projects have been largely uncoordinated and not at the right scale. We have been locally successful in many cases but rarely at the scale needed to have a lasting effect across broad landscapes.

Moreover, we at the Forest Service and our partners have limited budgetary and other resources; even pooled, these resources cannot begin to treat all the landscapes in need. In an era of megafires that sweep across landscapes in multiple ownerships, no single entity can meet the challenge alone at the scale needed to reduce fire risk across broad landscapes. The belief that individual landowners and land managers can and should shoulder all responsibility for disturbance-related risks within their own jurisdictions is outdated. The risk is at scales that are simply too great.

Clearly, targeted investments are needed at the scale of shared landscapes, including partner contributions of resources. We need shared approaches at the scale of the challenges we face within the wildland fire environment, using shared resources for the right kinds of investments in the right places. We can improve the wildland fire system by joining with partners and stakeholders to make smart choices about where we work—shared decisions that are both strategic and effective—investments that can truly make a difference at an all-lands scale.

Aspen stand on Monroe Mountain following mechanical treatments and removal of conifers on the Fishlake National Forest in Utah, 2016. USDA Forest Service photo by Nicholas Mustoe.

Vision

The starting point for an outcome-based investment strategy is for us at the Forest Service to sit down together with our partners and stakeholders to formulate a broad shared vision for managing the Nation's forests and grasslands. Developed by the entire wildland fire community, the National Cohesive Wildland Fire Management Strategy offers a vision for improving forest conditions across fire-prone landscapes while helping people learn to live with wildland fire. The strategy is a powerful idea that has motivated stakeholders nationwide to work together across boundaries to achieve better fire-related outcomes.

Nevertheless, the Forest Service believes that *all* land management outcomes, not just those related to wildland fire, can benefit from taking a similar approach. Our concept of an outcome-based investment strategy is grounded on assessing risks and tradeoffs. In this case, the tradeoffs are in terms of fire risk to communities, but they could be in terms of any values at risk. For example, the same science-based approach of assessing risk and evaluating tradeoffs could be used for managing insect epidemics, restoring degraded watersheds, or conserving species at risk. We are starting with fire-related challenges as a proving ground for our concept.

Most ecosystems across the United States are adapted to periodic stressors and disturbances such as drought, fires, storms, and outbreaks of insects and diseases. Accordingly, our vision takes multiple factors into account: the natural ecological role of fire and other disturbances; the ability of people to adapt to living with fire and other disturbances; and the need to respond to fire and the effects of other disturbances to protect communities and other values at risk.

At the Forest Service, we take a holistic approach to land management based on sound science and on achieving long-term outcomes across landscapes. Our vision for the future of America's forests and grasslands is for a time when:

- Land managers are using all available tools and authorities for active management, including fire where allowable and appropriate, to reduce risk and improve forest conditions;
- Resilient communities are able to withstand the effects of wildfires and other disturbances; and
- The Nation as a whole has learned to live with fire and other disturbances.

Our vision for the investment strategy laid out in this paper is based on continuous learning as well as on shared leadership and stewardship across broad landscapes. Shared stewardship is about working together in an integrated way to make decisions and take actions on the land. Shared stewardship is one of our five national priorities at the Forest Service, and it aligns with USDA's strategic goal of fostering the productive

and sustainable use of the National Forest System, particularly USDA's strategic objective of mitigating fire risk.

In accordance with shared stewardship, we recognize, accept, and respect the differences in missions, goals, and objectives among landowners and land managers across the Nation. For example, the States have differing mandates regarding fire suppression. However, fire, insect outbreaks, and other disturbances have no landownership boundaries (figure 3). Shared stewardship can bring partners and stakeholders together across shared landscapes, capitalizing on existing tools and authorities, to set mutual goals and priorities, analyze tradeoffs, and help decide where to make the investments needed to achieve the cross-boundary outcomes desired by all.

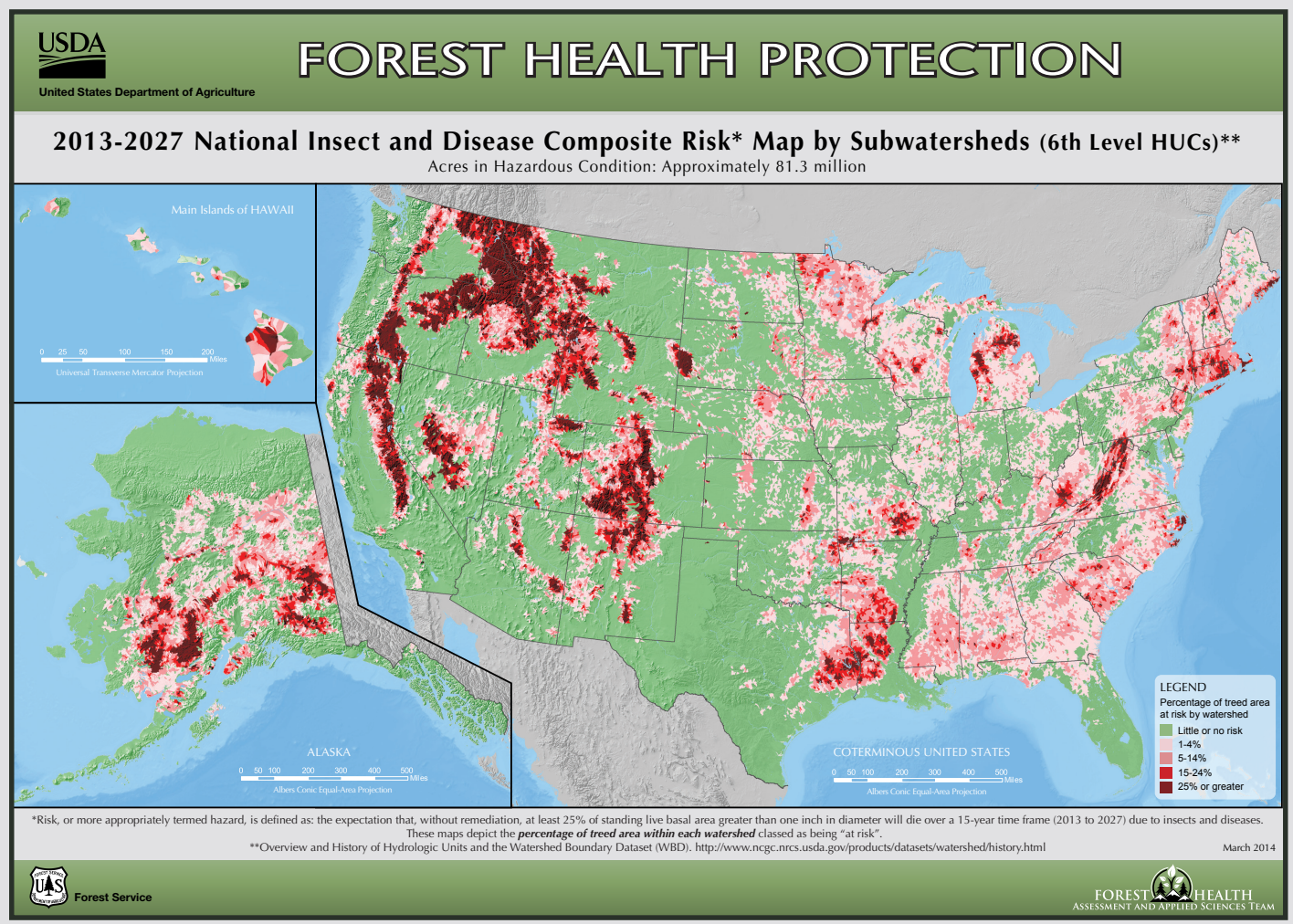

Figure 3. National insect and disease composite risk map by subwatersheds (2013-2027).

Firefighters on the Thomas Fire on the Los Padres National Forest in California, 2017. USDA Forest Service photo.

Current Situation

In recent decades, the wildland fire system in the United States has changed. The National Cohesive Strategy for Wildland Fire Management (Cohesive Strategy) in particular has given the wildland fire community common sideboards and guidelines for our collective work. Despite constraints and ongoing challenges, the Forest Service and partners have opportunities to improve the wildland fire system by building on new authorities, new community relationships, and breakthroughs in science and technology.

Fire Year Outlook for 2018

Calendar year 2017 was one of the most devastating fire years on record. Tragically, dozens of Americans were killed, including 14 wildland firefighters. Communities in the Southeast and across large parts of the West were affected, with more than 10 million acres burned—an area larger than the State of Maryland—and more than 8,000 residences destroyed. It was the most expensive year for wildfires on record: Together, Federal agencies spent $2.9 billion to suppress wildfires across the Nation.

Early predictions indicated that 2018 would likely be another challenging fire year. As of July 1, the National Interagency Fire Center noted that abnormally dry conditions along the west coast had allowed for a northward expansion of drought into Oregon and Washington in June. The southwestern monsoon, anticipated for early July, was expected to reduce fire activity across the Southwest. Continuous grass growth was predicted to lead to above-normal large fire potential in the Great Basin and westward into California. The peak of the western fire season was expected for August, with California continuing to experience significant fire activity in September and October.

As of July 29, about 4.4 million acres had burned, mostly in the South, Great Basin, Rocky Mountains, Southwest, and Alaska. The rate of burning was less than the previous year but almost about 800,000 acres higher than the 10-year average. Federal, Tribal, State, and local partners are working together through cooperative agreements for a sustained and effective response to wildfires across jurisdictions. At the Forest Service, we have about 10,000 firefighters, 900 engines, and hundreds of aircraft available to manage wildfires, and our partners have more resources in every category.

Cornerstones for Change

In recent decades, we and our partners have taken many steps across the United States to improve forest conditions across broad landscapes. That includes reducing wildfire risk for homeowners and communities across the Nation's forests and grasslands. We have made advances in research and technology,[2] including social science related to shared learning about cross-boundary stewardship. We have also treated more and larger areas to improve forest conditions, partly through initiatives with partners across jurisdictions and through landscape-scale collaborative projects. The appendix contains brief descriptions of some of our most innovative and successful all-lands initiatives and programs. The advances we have made lay the foundations for changing the way we and our partners work together to reduce fire risk and improve forest conditions.

Challenges and Constraints

Although we and our partners have made progress in using the tools of active management to protect communities and improve forest conditions, the corresponding treatments have not always been at a broad enough scale. The challenges are just too great.

One challenge has to do with the Nation's history of excluding fire from fire-adapted landscapes. Nearly every landscape in the United States has a history of fire, but the cascading effects of more than a century of fire exclusion and fuel buildups, changes in land use, extended drought, warming temperatures, and the spread of invasive species have led to widespread changes in vegetation conditions and fire frequency across the Nation. The effects of fire exclusion can be called a "fire deficit," which can vary depending on many factors. For example, a ponderosa pine woodland with a history of burning every 5 years on average might not have burned at all since the 1950s, for a tremendous fire deficit. The fire deficit is the difference between the historical rate of burning and the current rate of fire frequency (whether wildfire or prescribed fire) plus mechanical treatments.[3] Figure 4 shows the difference. On forested lands, the average annual fire deficit can range up to 60 percent—that is, up to 60 percent more of the landscape burned historically than now, especially in the West.[4]

Forest Service hot shots and Job Corps firefighters perform a prescribed burn in the Monongahela National Forest in West Virginia, 2018. USDA Forest Service photo by Cecili Ricardo.

[2] *Advances came in such areas as fire-related physical science, risk management protocols, fire weather forecasting, firefighting equipment development, ecological science, and watershed practices prefire and postfire.*

[3] *Mechanical treatments involve the use of equipment and machinery to remove vegetation, typically by thinning overly dense forest stands. Often, the treatments are followed by prescribed fire.*

[4] *In some areas, such as the chaparral in southern California, there are more fires than there were historically. In the sage steppe ecosystems of the Great Basin, for example, invasive grasses have led to a fire surplus.*

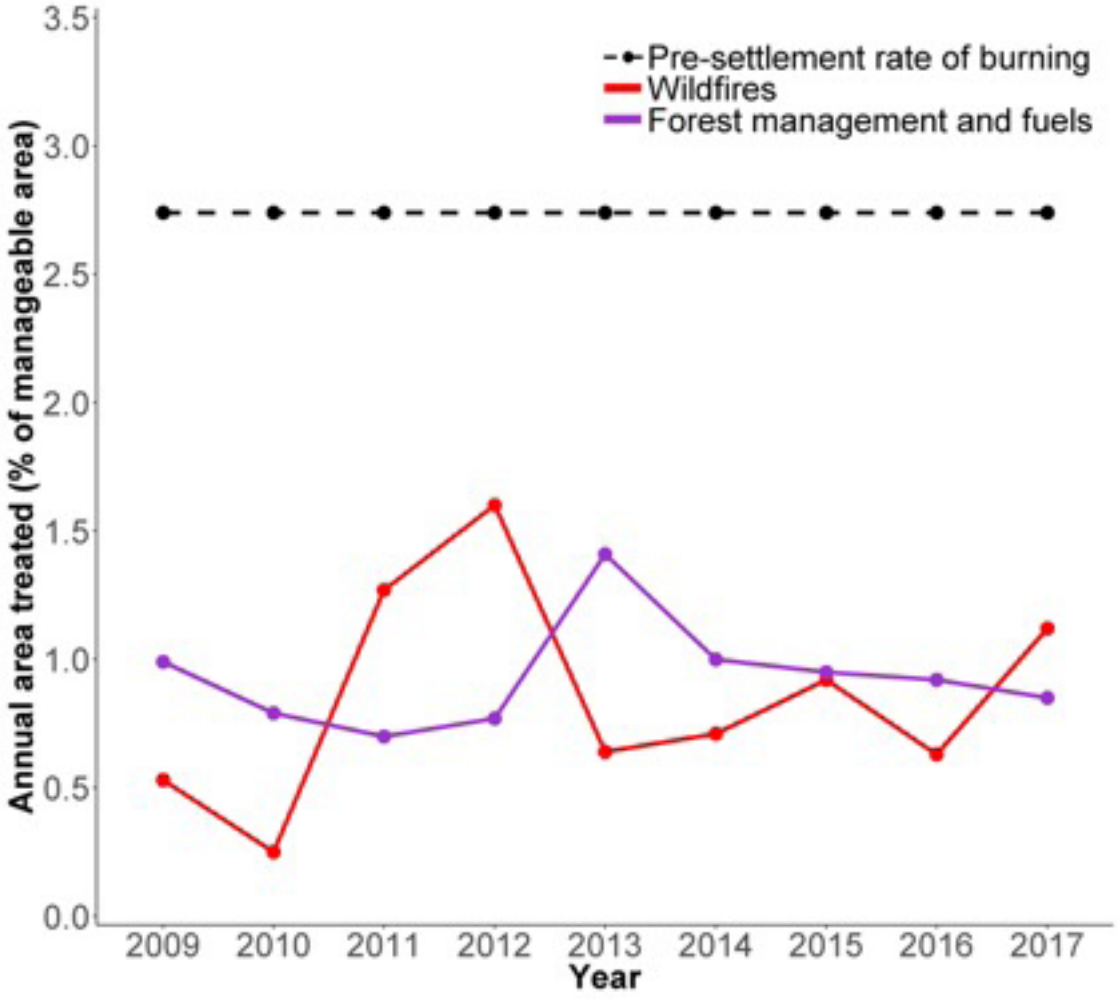

Figure 4. Area in percent of lands in the United States (excluding wilderness and roadless areas) affected by wildfire and fuels treatments from 2009 to 2017. The dotted line at the top, based on LANDFIRE fire regime data, shows the historical rate of burning.

The result has been fuel buildups and a growing number of catastrophic fires. Scientists predict that extreme fire danger across much of the West will become the new normal by the middle of the 21st century. Recent experience confirms the trend. Impelled by fire seasons lengthening into fire years, land managers might be inclined to step up fire suppression, compounding fire deficits and increasing future wildfire risk.

Compounded fire deficits would further degrade forest health on public and private lands alike nationwide. Of the lands on the National Forest System at high to very high fire risk and/or above-normal levels of insect and disease mortality, we can treat 17 million acres through traditional timber sales and 35 million acres through prescribed fire and/or another fuels treatment. Overgrown fire-adapted forests like ponderosa pine often need a mechanical treatment followed by prescribed fire (figure 5).

Figure 5. Fuels and forest health treatment, before and after, in a ponderosa pine stand. Vegetation removal reduced ladder fuels and created an open, patchy stand structure less likely to carry a crown fire and more like historical stand structures. Prescribed burning then reduced ground fuels, creating conditions for an open ponderosa pine woodland well adapted to frequent surface fires.

Active management on most of the National Forest System is therefore limited to fuels treatments, predominately by prescribed fire. For example, timber sales have typically applied to about 200,000 acres per year, whereas hazardous fuels treatments overall have covered about 1.9 million acres. And within hazardous fuels treatments from 2008 to 2017, mechanical treatments accounted for about 37 percent of the area treated, with prescribed fire accounting for most of the rest. To diminish the fire deficit and thereby mitigate fire risk, the Forest Service and partners will need to step up the use of prescribed fires and managed wildfires in concert with timber sales and mechanical treatments.

The Forest Service has learned that engaging landowners and communities well ahead of any planned activity is key. Many citizens are understandably concerned about the effects of smoke and about prescribed fires escaping to become wildfires. A typical tradeoff in fire-prone landscapes is smoke and risk from planned prescribed fires under controlled conditions or from unplanned wildfires under unpredictable conditions. Learning together with stakeholders to assess risks and evaluate tradeoffs has become a critical part of developing and carrying out successful land management programs. For cultural, historical, and biophysical reasons, the use of prescribed fire is widely accepted in large parts of the Southern United States. The lessons learned by land managers and communities in the South might be useful in helping to overcome constraints elsewhere in the United States.

A Foundation for Success

Despite such constraints, the Forest Service has built capacities in recent decades that provide unprecedented opportunities to rise to the challenge (figure 6). From forming resource advisory councils in the early 2000s to joining the entire wildland fire community in drafting the Cohesive Strategy in the 2010s, we have found new ways of building lasting relationships with partners and communities. For example, we have built new social capacity by co-convening and in some cases co-funding collaborative groups around the country.[5] We also laid the foundations for additional management capacity by adopting a new land and resource management planning rule in 2012. We are now revising forest plans to incorporate all-lands approaches, adaptive management, and a full suite of active management tools.

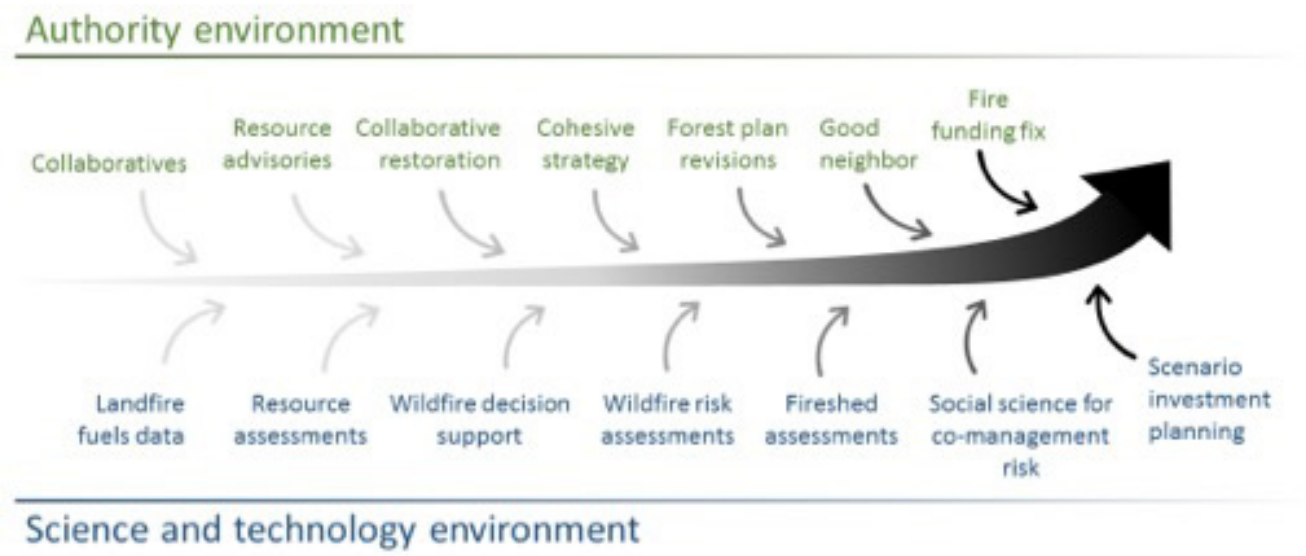

Figure 6. In recent decades, new Forest Service authorities, along with new investments in science and partnerships, have led to an accelerating rate of returns and new synergies in wildland fire management.

Our growing experience with treatments to improve forest conditions at the Forest Service has provided new analysis tools. We have also acquired more technical capabilities through new scientific breakthroughs, ranging from applied fire science to understanding how to help communities become adapted to wildfire. Advances in remote sensing, information science, fire simulation tools, and related technologies have helped us complete, in recent years, new resource assessments to better understand terrestrial conditions, watershed health, wildfire hazards, and forest health. We also have tools to assess the economic and social benefits of reducing risks to communities and watersheds. Our suite of new tools gives us a science-based capacity to find opportunities for lasting improvements in forest conditions by making the corresponding targeted investments.

One catalyst for change has come through the Consolidated Appropriations Act of 2018, which will help the Forest Service stabilize its operating environment. Beginning in fiscal year 2020, the omnibus bill will keep rising suppression costs from steadily draining budgetary resources away from our nonsuppression programs, and it will also reduce the need for transferring funds from our nonfire mission areas to cover firefighting costs. In addition, the bill expanded our authorities for using forest management tools to get more work done on the ground.

Another catalyst for change has been the Forest Service's work with partners toward mutual recognition that disturbances such as wildfires are all-lands events with cross-jurisdictional implications. Figure 6 shows the nature of fire transmissions across jurisdictions in relation to the community of Ketchum, ID. Because fire crosses back and forth across landownership boundaries, the risk is shared; accordingly, land managers cannot achieve the fire-related outcomes people want without all-lands planning—without shared stewardship of the wildland fire environment,

[5] *Social capacity, according to the 1987 Brundtland Report on sustainable development, is the ability of social systems to produce services and experiences.*

including a sense of interdependence and shared responsibility for managing the risk.

"Fire risk" comprises the likelihood of a wildfire, its intensity, and its positive or negative effects. Large fires burn across various jurisdictions, both public and private, with each contributing to the spread and intensity of the fire (figure 7). Using advanced modeling tools, we can now understand cross-boundary fire risk issues across a "fireshed"—the area of fire risk around a community or other point of value—including the contributions that individual land parcels make to community wildfire risk. We can map firesheds around communities and other values to locate hotspots of fire transmission. In the Western United States, for example, scientists have mapped the core firesheds that are responsible for some 80 percent of the potential future community exposure from wildfires ignited on the National Forest System (figure 8). Fireshed assessments can be used to identify broad areas where fuel treatments will do the most to reduce fire risk in the long term (figure 5).

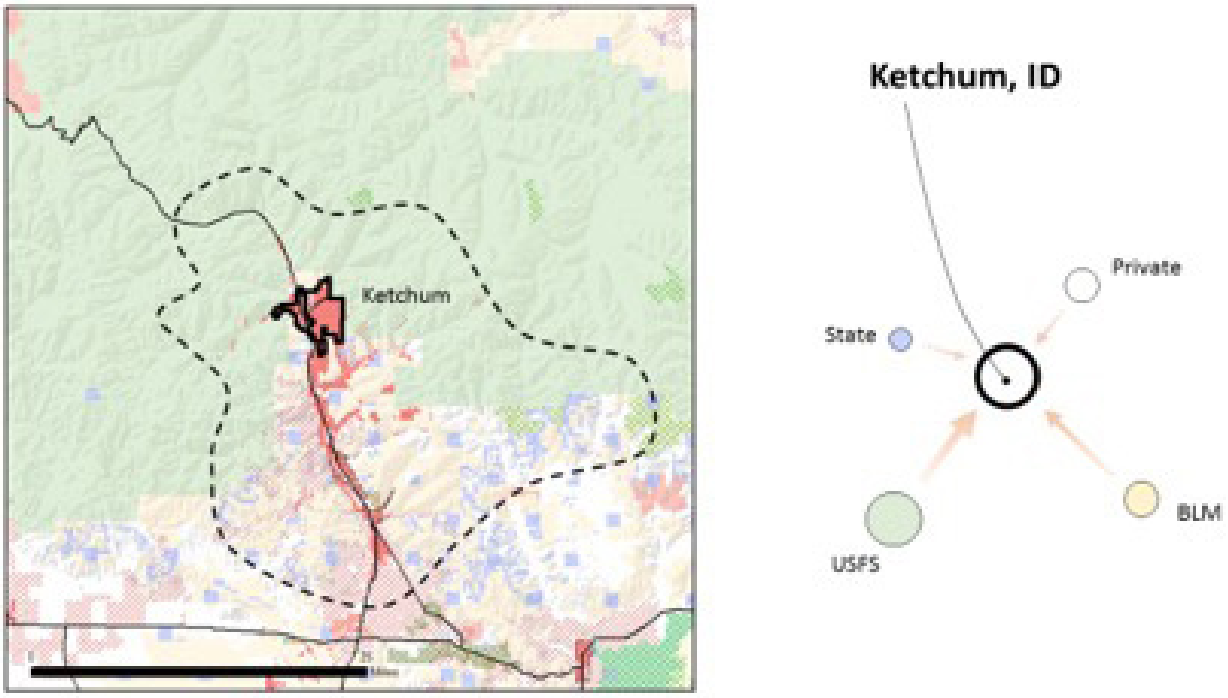

Figure 7. The fireshed for Ketchum, ID (left, dotted line), includes lands in multiple ownerships—Forest Service (USFS), Bureau of Land Management (BLM), State, and private. The arrows (right) show fire transmissions to the community within the fireshed from each type of landownership, with the size of the arrows and circles indicating the level of transmission. The risk to the community is shared across landownerships.

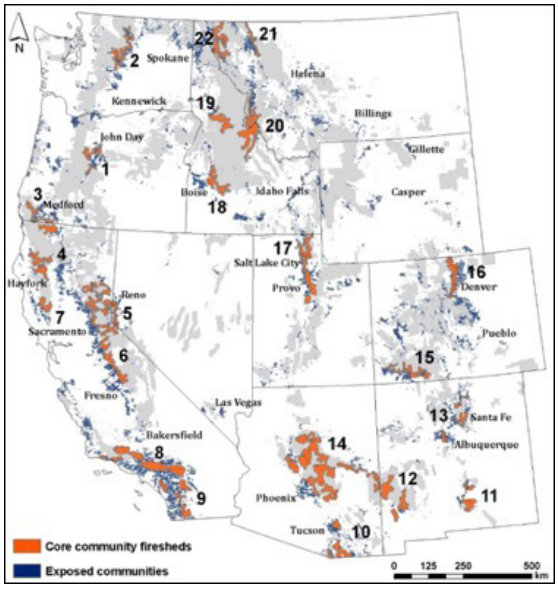

Figure 8. Core firesheds (orange) that potentially transmit fire to the exposed communities (blue) adjacent to national forests. These core firesheds account for 80 percent of the total potential fire from the National Forest System to communities in the Western United States.

USDA Forest Service personnel and partner agencies discussing decisions made and consequences of the 2015 Mormon Fire in Arizona. USDA Forest Service photo by Brady Smith.

Strategy for Shared Stewardship

Accordingly, the Forest Service has reached a turning point: we are now poised to capitalize on a unique set of synergies among new authorities, innovative community relationships, and breakthroughs in science and technology (figure 5). Our concept for an outcome-based investment strategy is predicated on seven types of activities:

1. Working with States to co-manage risk across broad landscapes;

2. Using new scenario investment planning tools for targeted investments;

3. Focusing our work on broad outcomes;

4. Capitalizing on the authorizing environment created by recent legislation;

5. Changing the Forest Service's own internal processes to get more work done on the ground;

6. Using a full suite of active management tools, including the right kind of fire at the right times in the right places; and

7. Applying a risk-based response to wildfire.

Co-managing Wildfire Risk

Landscapes in the United States are a mosaic of mixed ownerships. The National Forest System covers about 8 percent of the Nation's total land area and about 20 percent of the Nation's forests, mostly in the West; the relative proportion and influence of lands under Forest Service management vary widely across the Nation. At the Forest Service, we manage a portion of most landscapes and are directly responsible for only a portion of the response to wildfire. Typically, risk is shared among Federal, State, Tribal, local, and/or private landowners, land managers, and other stakeholders. The wildland fire community has cooperative agreements for sharing wildfire response. When we and other land managers and landowners across all lands appreciate our interdependencies and accept our shared ownership of fire risk, we have an opportunity to share responsibility for evaluating and managing it.

New science and landscape assessments have resulted in a better understanding of the scale of risk and the need to address it at the appropriate scale. For example, community firesheds are substantially larger than the boundaries of most community wildfire protection plans, resulting in mismatches between the scale of wildfires and the scale of mitigation planning. Mapping the scale of risk has led to a better understanding of how risk is shared among landowners and across jurisdictions. As the scale of wildfires continues to grow, the scale of coordinated planning needs to expand accordingly, perhaps to encompass a "stewardship landscape"—the area needed for effective cross-boundary planning.

The technical capacity is there. We have tools that stakeholders can use to make sound risk-based, land management decisions. Co-managing fire risk means learning together about firesheds and landscapes around communities, municipal watersheds, and other values and choosing the risk reduction strategies with the highest rate of return on investments. In some areas, the greatest wildfire risk reduction might come from investing in fire prevention. Elsewhere, it might come from hazardous fuels treatments around communities. In still other areas, the best strategy might be to focus on defensible space within communities. The right actions in the right places will have the most meaningful cumulative effects.

The key is to bring stakeholders together to learn about the particular fire risks they face, to examine the options for managing them, and to decide what actions to take. Convening and planning at multiple scales will be crucial. Within the framework of an outcome-based investment strategy, partners and stakeholders would take multiple scales into account, from the national scale to the individual project scale. Ideally, plans at smaller scales would tier to plans at larger scales.

In our preliminary thinking, we envision that the States offer a particularly useful scale. Given their unique authorities and responsibilities, States and territories can lead the way in convening stakeholders to facilitate dialogue about the wildland fire environment at every scale. States can smooth the way for land management planning that takes biophysical, social, and political factors into account; indeed, the State forest action plans can serve to coordinate activities across stewardship landscapes that span jurisdictional boundaries within a State.

The Forest Service is ready to help. Our cross-jurisdictional mission, science capacity, and history of working in cooperation with States, Tribes, communities, and local groups give us the ability, if needed, to act as co-conveners and co-facilitators for collaborative learning and decision making. Stakeholders could then use the Forest Service's assessment and planning tools to devise investment plans at the appropriate scale, tiered to the broader statewide plans. Through an analysis of tradeoffs, planning for desired outcomes at the appropriate scale would then let partners and stakeholders treat the highest priority areas first.

Fuel treatments conducted on the Colville National Forest in Washington. USDA Forest Service photo by Paul Haas.

Scenario Investment Planning

We envision being a partner with State leaders, working together to build coalitions of stakeholders that support investments to reduce risk and improve forest conditions within a State. One crucial area of Forest Service support will be in science and technology, based on advances in recent years. Forest Service scientists have been developing and adapting tools that can be used to collaboratively assess fire risk and make land management investments in areas where the investment payoffs are greatest. The tools will require careful use at and across the appropriate scales.

Building on recent national assessments (such as for terrestrial condition, wildfire hazard, insect and disease, forest inventories, drinking water, and watershed condition), the Forest Service has developed a science-based decision support framework to simulate specific investment strategies over the short term (3 to 5 years). The simulations can help stakeholders better prioritize activities to achieve desired outcomes on the National Forest System and adjacent lands in each State. These tools would not supplant forest plans but rather point to areas of opportunity for working across boundaries at a cross-jurisdictional fireshed or landscape scale.

This new framework can give stakeholders a way to understand trade-offs among competing land management goals and to discover the best investment strategies at the appropriate scale.

Scenario planning can also help categorize landscapes by "investment themes" in terms of risk and management opportunities (figure 9). This approach can help build a policy bridge among administrative scales in the Forest Service, for instance, by translating national budget priorities into investments in specific landscapes where they are most likely to produce desired outcomes.

We also envision scenario investment planning as a tool for cross-boundary collaboration. It can help planners identify high-priority, cross-boundary risks and achieve outcomes that meet both Forest Service and stakeholder objectives. The framework can be applied at the State scale as part of collaborative efforts to define planning areas, such as stewardship landscapes, that fit shared management visions across multiple landownerships.

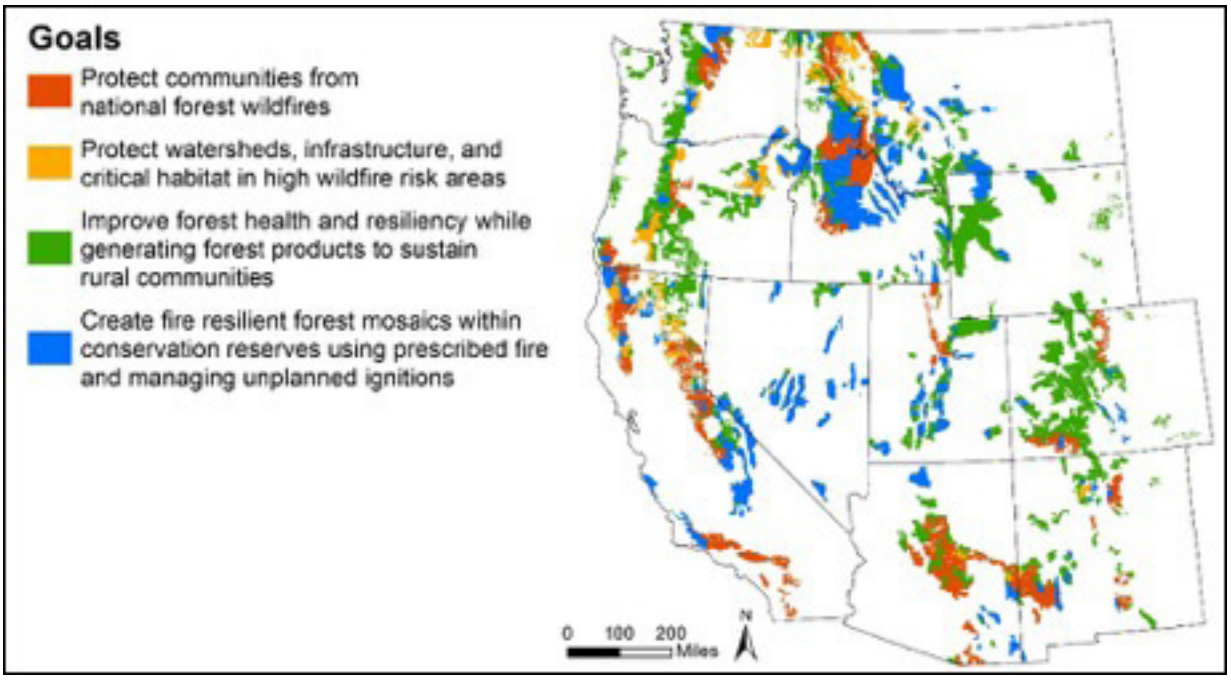

Figure 9. Conceptual map of "investment themes" derived from scenario planning showing broad potential goals. The goals are not mutually exclusive; often, several goals can be met on the same landscape.

Job Corps students participating in prescribed burn around a red-cockaded woodpecker nest tree on the Croatan National Forest in North Carolina, 2016. USDA Forest Service photo by Bill Coates.

Focusing on Outcomes

Advances in social and technological capacity within the land management community will create the most synergies if partners and stakeholders focus on outcomes at the right scale. Historically, the Forest Service has focused on outputs, such as volume of timber sold, number of fires suppressed, or acres of hazardous fuels treated. Outputs are valuable indicators of program accomplishments, but outputs alone do not tell us whether we have achieved large-scale outcomes. Collaborative projects around the country have achieved social, economic, and ecological gains, though not always at the scale needed to achieve lasting outcomes across broad landscapes. An outcome-based investment strategy requires a broadening of our planning focus.

Moreover, an all-lands approach requires valuing the social outcomes needed for shared stewardship across landscapes and firesheds. Therefore, we are developing meaningful indicators with our partners to account for the complex multidimensional outcomes we seek, such as reduced fire risk and resilient fire-adapted forests. We will use key performance measures to account for the outcomes we commit to achieving in using scenario planning to carry out an investment strategy.

In short, the Forest Service long ago learned how to account for activity targets. Now, we must become adept at accounting for meaningful outcomes as well. To do so, we envision joining together with partners and stakeholders to learn about shared risks, discuss potential common goals, agree on joint planning areas across stewardship landscapes, and jointly develop desired outcomes and how to measure them through key performance indicators.

New Authorizing Environment

In carrying out an outcome-based investment strategy, the States, Tribes, and other conveners and stakeholders can capitalize on new opportunities for cross-boundary projects on the National Forest System and adjacent lands. Together with our partners, we can build on recent successes and use new authorities and approaches to expedite work on the ground so we can achieve common goals.

Tools in the 2014 Farm Bill

The Agricultural Act of 2014, better known as the Farm Bill, provided a suite of tools that will continue to help the Forest Service get work done on the ground more quickly and collaboratively. Some authorities have helped to expedite our processes for environmental analysis and decision making, which has boosted the amount of work we can get done. For example, the Good Neighbor Authority (GNA) has created opportunities for expanding partnerships with States to work across boundaries. As of June 2018, we have signed 163 GNA agreements on 59 national forests in 33 States for a variety of restoration activities.

Another example is the tools provided for in the Farm Bill for cross-boundary work to protect forest health from insects and disease. In cooperation with State Governors, the Forest Service has designated about 56.9 million acres on the National Forest System across 100 national forests in 37 States for expedited treatment for epidemics of insects and disease. As of June 2018, 74 projects across 38 national forests and 18 States were proposing to use Farm Bill insect and disease tools. Of these, 63 projects proposed using categorical exclusions, and the rest proposed using expedited environmental analysis for timber harvests and other activities. These tools give us more of the means we need to achieve outcomes mutually decided on through scenario investment planning.

Tools in the 2018 Omnibus Bill

The omnibus bill gave the Forest Service a suite of new authorities to help expedite our work of improving forest conditions and reducing fire risk. Each Forest Service regional office is drafting a plan for applying our new authorities to our work on the ground. In addition:

- With respect to the **new categorical exclusions** for treatments to improve forest conditions, we will track the number used at the national level and work with the Forest Service regional offices to understand how to use them most effectively.

- With respect to our **new authority for road maintenance and reconstruction** in our GNA agreements with the States, we have national templates to allow existing agreements to incorporate roadwork. We will continue to monitor our agreements and work with our State partners to add components and expand the number of agreements.

- With respect to **20-year stewardship contracting**, we plan to start in a few areas where we believe we will have a high level of success in attracting investments in wood-processing infrastructure. We will ensure that we are synchronized at all levels of the Forest Service in carrying out our new authority.

At the Forest Service, we are committed to validating the trust that Congress placed in us through the omnibus bill. One way is developing and improving tools to make our wildland fire suppression activities more cost effective. We will also implement the outcome-based investment strategy outlined in this paper, supported by integrating our national wildfire hazard assessment with the other assessments we have completed or will complete.

Ponderosa pine stand immediately after the Willard Fire burned through on the Coconino National Forest in Arizona, in 2017. USDA Forest Service photo.

Internal Reforms

The new authorizing environment for the Forest Service will strengthen our ability to make more investments in areas with the highest payoffs. The change initiatives we have launched to reform outdated agency processes that delay our work on the ground will also strengthen our ability. Two of these changes initiatives are described below.

Environmental Analysis and Decision Making

Under our 2012 planning rule, we can improve the efficiency of our environmental review processes under the National Environmental Policy Act (NEPA) to accelerate the pace of our treatments to improve forest conditions. By developing collaborative projects across large landscapes, we can perform environmental analysis for larger planning areas, thereby making it easier to get work done on the ground while still delivering sound environmental analyses.

To that end, we have launched a change initiative called Environmental Analysis and Decision Making. The goal is to increase the efficiency and reduce the cost of our environmental analysis and decision-making processes. For example, we are restoring agencywide NEPA training with new courses for line officers and resource specialists. We are also reviewing and updating our NEPA regulations, and we are building on authorities in the 2014 Farm Bill to consider new categorical exclusions in such areas as infrastructure repair and special use permits. Overall, we have been working with USDA to reengineer the way we conduct environmental analysis and decision making, and we expect major improvements.

Forest Products Modernization

Many Forest Service policies and procedures related to forest products are out of date. Our Forest Products Modernization initiative is designed to align our culture, policies, and procedures with current and future needs for forest products from healthy, resilient forest ecosystems. Our goal is to become more agile, flexible, and adaptable to better meet current and future market demand for forest products in ways that help us improve forest conditions. For example, we are revising our policies and procedures to make timber sale contracts more flexible. We want to make it easier to remove lower value or noncommercial biomass, thereby reducing fire risk and improving forest conditions. We are also encouraging the use of cross-laminated timber technology to construct tall buildings from mass timber derived from small trees, which can include materials removed to reduce fuels and improve forest health.

The Right Kind of Fire

A focus on outcomes at the right scale, including resilient forests and reduced wildfire risk across firesheds, implies using a full suite of tools for active management, including timber sales, mechanical treatments, and—as envisioned in the Cohesive Strategy and in Federal interagency policy—both prescribed fires and managed wildfires. Like other land managers, the Forest Service is bound by administrative, institutional, biophysical, and other constraints that give us limited options for using fire for management purposes. However, the agency does have unique opportunities, for example, in backcountry settings, that other land managers might not have to use fire. Unlike most landowners and land managers, the Forest Service is both fire manager and land manager on the same piece of ground. That gives us the ability in many areas, working with local communities and other stakeholders, to reintroduce the right kind of fire at the right times in the right places.

On most landscapes near communities, depending on the condition of the land, mechanical treatments are needed to reduce fuels before reintroducing fire (figure 4). Many fire-adapted forests have such high fire deficits that returning fire too soon or in blocks too big could have devastating ecological effects, along with catastrophic consequences for local communities. Within administrative and other constraints,[6] mechanical treatments are often a necessary precursor to returning fire to fire-adapted forests.

In fire-adapted forests, prescribed fire is an indispensable part of treatments to reduce fuels and improve forest conditions, and it is subsequently needed to control fuels and sustain forest health. In fire-adapted forest types, there is no substitute for fire. Research has shown that mechanical treatments alone are not effective in managing risk in fire-adapted landscapes or in sustaining resilient fire-adapted forests. Moreover, fire is the only tool available for reducing fuels and improving forest conditions on many landscapes, such as in wilderness areas or in areas too steep or remote for mechanical treatments.

We envision the right kind of fire as part of an outcome-based investment strategy. Scenario investment planning would allow stakeholders within a fireshed to assess the risks and tradeoffs and plan a successful response before a fire occurs. Stakeholders would begin by using assessment tools to gain a mutual understanding of the tradeoffs between alternative scenarios. One common tradeoff is between the future risk of a catastrophic fire and its lasting smoke impacts and the lesser risks from a mechanical fuels treatment coupled with prescribed fire and its short-term smoke impacts. Effective prefire planning would then entail making the corresponding investments in the highest leverage areas. Pre-season fire planning would also involve working with State and local partners to develop common operating approaches to help us align our various missions regarding

[6] *Areas that are ineligible and/or infeasible for mechanical treatments include wilderness and roadless areas, areas too steep or remote, areas with low-value woody materials, and areas already treated or burned over by wildfire.*

suppression and initial attack. For example, a community might treat the surrounding landscape to reduce hazardous fuels, using a combination of mechanical vegetation removals and the right kind of fire in the right place at the right time. Additionally, stakeholders might work with local communities to help them take measures to reduce fire risk to homes, infrastructure, and other values. National forests and regional offices would work with State and local partners to pre-plan fire management. Our intention is to work with States to examine approaches, develop plans, and implement on-the-ground activities together, as well as jointly determine ways to use new technologies to improve the effectiveness of prevention and detection, and enhance firefighter safety

Risk-Based Response to Wildfire

An important part of prefire planning is dialogue involving States, Tribes, communities, and others about a fire suppression policy based on the principle that safety comes first. Rising rates of firefighter fatalities in recent decades are of deep concern to the Nation. When extreme fire behavior precludes successful defense of homes, the Forest Service's first priority is human safety—evacuating everyone from areas at risk and ensuring that responders use tactics that are both safe and effective.

As envisioned by the Cohesive Strategy, learning to live with fire includes a safe, effective, risk-based response to wildfire. As part of an approach to co-managing risks across firesheds, we will seek dialogue with partners and stakeholders on what a risk-based response might mean. For example, our suppression policy is based on the probability of success. We neither expect nor allow firefighters to risk their lives while attempting the improbable. What might that mean for local residents and communities? What are their corresponding options for input into fire response and for preparedness in the event of a wildfire?

Forest Service engine and line crews work in and around the Wofford Heights community in response to the Cedar Fire in California, 2016. USDA Forest Service photo by Lance Cheung.

Deschutes National Forest silviculturist leads a discussion of forest restoration techniques with Forest Service employees and members of the Deschutes Collaborative Forest Project in Oregon. USDA Forest Service photo by Beth Peer.

Envisioning a Path Ahead

All this is part of a conceptual framework for making strategic investments across landscapes for outcomes desired by all. Through shared stewardship, the Forest Service and State and other partners have unprecedented opportunities to co-manage fire risk and achieve positive outcomes at the most appropriate scales. The key is working with the States and other partners to convene stakeholders for planning at fireshed and landscape scales. The partners can use scenario investment planning as a tool for assessing risk, evaluating the tradeoffs, and managing risk through targeted investments in areas with the highest payoffs. We envision outcomes that include resilient fire-adapted landscapes, flourishing fire-adapted human communities, and fewer responder injuries and fatalities.

There is much work to do, and it must be done within the framework of our social, political, financial, and biophysical opportunities and constraints. We believe that the wildland fire community, drawing on the Cohesive Strategy, now has enough social capacity, as well as the science, technology, and authorizing environment to move toward a truly all-lands, all-hands approach. We plan to share our concept for an outcome-based investment strategy with partners and stakeholders across the Nation as a starting point for dialogue.

We contemplate a path ahead with all due humility. We know that we don't have all the answers or perhaps even the right questions. We have some ideas that seem exciting to us. We have conducted some experiments that we keep learning from, and we realize that what we envision will require continuous experimentation, co-learning, and adaptation.

We are beginning to understand that scale matters. How do ecosystems on the National Forest System interconnect on large landscapes? How do we help stakeholders across America's forests and grasslands plan across scales? How do we give stakeholders across all scales opportunities to participate in creating conservation outcomes? These questions and more will influence our thinking as we build communities of stakeholders in pursuit of collective conservation outcomes at the complex and interconnected scales that characterize our Nation's forests and grasslands.

The first phase of our work will be exploratory—joining stakeholders in learning how to interconnect in terms of relationships, goals, and priorities across scales. We envision the exploratory phase as creating a conservation network for shared stewardship of our Nation's forests and grasslands. We will need partners at the national scale to help guide the needed exploration and relationship building by carefully co-convening early explorers at many scales. We expect the exploratory phase to generate stakeholder learning as a basis for the next phase of collaborative work.

What will the next phase look like? Success will depend on taking a co-learning and co-designing approach together with partners and stakeholders. As envisioned in this paper, we hope to help partners interconnect all conservation interests into a network for sustaining the Nation's forests and grasslands into the future. We believe that the Forest Service has a role to play in helping partners and stakeholders come together to co-manage risk, use new tools to better target investments, focus on outcomes at the right scale, and recalibrate our wildland fire system so it works better for people, both now and for generations to come.

Recent Forest Service Initiatives and Programs To Build Capacity

Appendix

Accelerated Pace of Forest Management

The Forest Service, an agency of the U.S. Department of Agriculture (USDA), has increased the pace of work on the ground to reduce fire risk to communities and to improve forest conditions, partly to restore watersheds and water supplies. The area treated annually in recent years has shown steady gains: from 4.2 million acres in fiscal year (FY) 2011, to 4.6 million acres in FY 2014, to about 6 million acres per year in FY 2016–17. In the process, the Forest Service expanded partnerships to increase the scale of forest management and work strategically across landscapes. Working in broad partnerships engages local communities, maximizes efficiency, generates investments by partners, and magnifies outcomes for communities.

Collaborative Forest Landscape Restoration Program

Since FY 2010, the Collaborative Forest Landscape Restoration Program has established 23 collaborative projects across large landscapes around the Nation to reduce fire risk, improve forest conditions, and generate jobs and economic activity in rural areas. The program has shown that strategic landscape-scale partnerships work. Outcomes include:

- Attracting partner investments of more than $90 million for work on National Forest System lands and generating more than $207 million in investments on State, private, and other Federal lands;
- Creating $1.5 billion in local labor income;
- Creating or maintaining an average of 5,400 jobs each year;
- Reducing hazardous fuels on more than 2.9 million acres; and
- Selling more than 2.5 billion board feet of timber.

Perhaps, most importantly, the Forest Service has added to its store of best practices. For example, areas treated with a combination of timber sales and fuels reduction have changed the rate of fire spread and intensity, making it easier to control fires and reduce the risk to communities, private property, and natural resources. The agency plans to make the best practices part of the way it works, which will help with collaboration and community engagement.

Managing Across Landscapes for Forest Health

Although forest insects and diseases play ecological roles, they can also be serious economic and environmental threats, partly due to the effects of a changing climate. Tree mortality resulting from insects and diseases across the United States increased from about 7.9 million acres in FY 2016 to more than 8.8 million acres in FY 2017 (figure B-1), with 46 percent of the mortality due to western bark beetle. Such infestations can reduce benefits from forests, including timber, recreation, clean water, energy, wildlife habitat, and jobs.

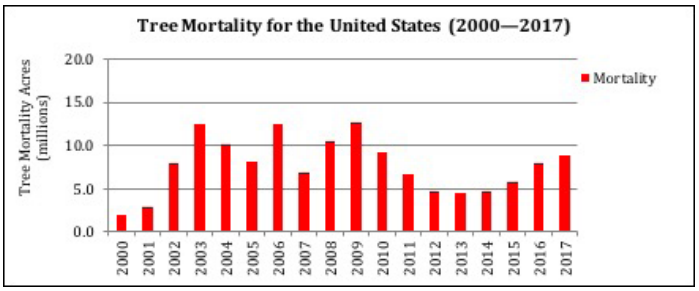

Figure B-1. Tree mortality in the United States has been trending upward since 2013, in large part due to bark beetle outbreaks in the Western States.

The Forest Service monitors, detects, and helps manage insects, diseases, and invasive plants, using its funding authorities to protect forest health across boundaries at landscape scales. Partnering with State, Tribal, and local governments, as well as other partners, to prioritize management actions, the Forest Service helps ensure that America's forests remain resilient and sustainable.

Watershed Enhancement and Infrastructure Protection Partnerships

The Forest Service has been working with municipal water providers, energy utilities, corporate partners, and others to restore healthy forests in high-priority watersheds and near critical energy infrastructure on the National Forest System. In Colorado, for example, the agency is working with Denver Water and other water providers that serve more than 3.2 million municipal customers and 900,000 acres of agricultural land. Since FY 2009, the partners in Colorado have contributed or promised a total investment of $36 million for treatments on National Forest System land. The accomplishments include more than 40,000 acres treated, 860,000 trees planted, 80 miles of trails and roads restored, and 2,700 volunteers engaged.

Cohesive Strategy Pilot Projects

The Forest Service has been carrying out the National Cohesive Strategy for Wildland Fire Management by making investments with benefits for landscapes and communities. Through Federal, State, and local partnerships,

the Forest Service has established 10 pilot projects to strategically treat forests to reduce wildfire risk to communities and to foster community engagement. The pilots are changing the conversation across all lands about the management of fire and are attracting private and corporate funding to address forest health needs.

Supplemental Fuels Program

The Supplemental Fuels Program was part of the Forest Service's program to reduce fuels and improve forest conditions under its Hazardous Fuels budget line item. The Forest Service distributed most funds for Hazardous Fuels to the regions to fund high-priority regional projects. Program staff at the national level evaluated the project proposals submitted by the regions on their ability to target areas of high wildfire risk, mitigate that risk, and achieve cross-boundary accomplishments with willing partners and neighbors. Although the regions reported project achievements, such as acres, within the total accomplishments of the Hazardous Fuels program, outcomes included building social capacity for cross-boundary collaboration in improving forest conditions.

Joint Chiefs' Landscape Restoration Partnership

Since FY 2014, the Forest Service has partnered with the USDA, Natural Resources Conservation Service in funding projects across large landscapes to reduce wildfire threats to communities and landowners, protect water quality and supply, and improve wildlife habitat for at-risk species. The 3-year projects target forest ecosystems where public and private lands meet. In fiscal years FY 2014–2017, the partners invested $176 million in 56 projects in 38 States and Puerto Rico, with State and local partners contributing another $20 million. Outcomes included:

- Treating more than 400,000 acres on the National Forest System for hazardous fuels;
- Restoring more than 29,000 acres of watersheds;
- Treating 724 miles of streams to improve aquatic habitat; and
- Supporting conservation activities by private landowners on more than 200,000 acres.

Accomplishment Trends

The graph below shows Forest Service accomplishments in treatments on the National Forest System since FY 2008 (figure B-2). For measures of active management such as timber sales, watersheds restored, and managed wildfires, the 10-year trends are slowly rising. More information on the use of managed wildfires and on acres treated to reduce hazardous fuels and restore forest health can be found at http://fsweb.wo.fs.fed.us/fire/fam/fuels/hazardous.html.

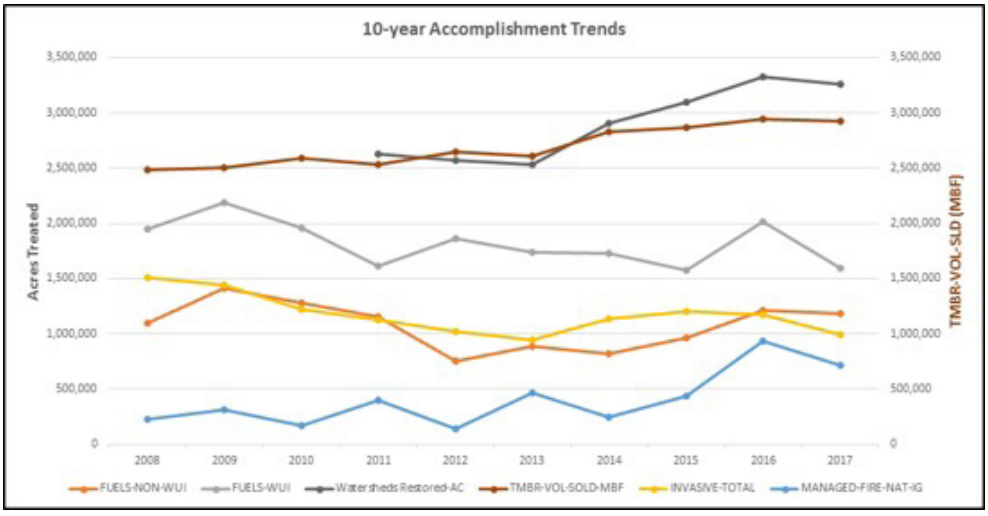

Figure B-2. Accomplishments in treatments on the National Forest System since FY 2008.