A GUIDE TO ADVOCATING FOR CLIMATE-SMART RESTORATION IN NATIONAL FOREST PLANS

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Contributors: Lead authors of the guide were Sarah Bates (National Wildlife Federation), Josh Elliott (University of Montana, College of Forestry and Conservation), and Bruce A. Stein (National Wildlife Federation), with contributions from Patty Glick (National Wildlife Federation), Kimberly R. Hall (The Nature Conservancy), and Chris Topik (The Nature Conservancy).

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Cover: Incorporating climate considerations into national forest plans will be key to ensuring the ecological and economic sustainability of these cherished public lands (Flathead National Forest, Montana). Photo: USFS.

A Guide to Advocating for Climate-Smart Restoration in National Forest Plans is available online at www.nwf.org/ClimateSmartForestPlans

National Wildlife Federation
1200 G Street, NW
Washington, DC 20005
www.nwf.org

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National forests encompass diverse landscapes—from snowy peaks and lush forests to open grasslands—and offer a wide array of ecosystem services and public benefits (Flathead National Forest, Montana). Photo: USFS Northern Region.

INTRODUCTION

The National Forest System, which includes 175 national forests and grasslands spread across 193 million acres, is a vitally important network of public lands that plays a key role in sustaining wildlife, providing water resources, offering recreational opportunities, producing timber, forage, and other products, and offering economic and social benefits to local communities. Sustaining these lands and waters, while balancing multiple use objectives and evolving societal needs and expectations, requires careful planning and continued investment in responsible stewardship. To accomplish this, the U.S. Forest Service is required to prepare a national forest plan (also known as a *land management plan*) for each forest. These plans set the overall management direction for the forest and provide guidance for the design and execution of specific management actions. As the pace, scale, and magnitude of climate change has become increasingly evident, there is a clear need for these national forest plans to explicitly address the impacts and implications of a rapidly changing climate.

Climate change, including rising temperatures, changing precipitation patterns, and more extreme storms, is having profound consequences for the nation's forests. Climate-related impacts on forests include larger and more severe disturbances (e.g., wildfires, drought, pest outbreaks), shifts in tree species ranges and forest composition, and changes in forest dynamics and regeneration capacity. However, while rapid climate change poses serious risks to natural ecosystems as well as human communities, our national forests and grasslands have a crucial role to play in slowing the pace of climate change and stabilizing our climate. Forests provide essential "natural climate solutions" by pulling carbon dioxide from the air (the primary driver of rapid climate change) and storing carbon in vegetation and soils, a process known as carbon sequestration and storage. Given the size of the National Forest System, national forests will play an increasingly important role in the nation's efforts to meet its ambitious climate protection goals. Protecting the massive amounts of carbon stored in our national forests, sustaining and increasing their

capacity to capture and store carbon, and enhancing their resilience to climate-related impacts will all be essential parts of the nation's efforts to address the growing challenges of climate change.

The effects of climate change on forest resources were generally not well understood or accounted for when the Forest Service prepared and revised national forest plans from the 1980s through the early 2000s, but scientific evidence and understanding of the impacts of climate change on forest systems has grown considerably over the past two decades. In 2012, a new forest planning rule was adopted that replaced an outdated rule crafted in 1982. The new rule is designed to help the Forest Service proactively meet current and future needs, including by improving the agency's ability to respond to the growing risks from climate change. With an emphasis on restoring and maintaining healthy and resilient ecosystems, the new rule requires consideration of both climate adaptation (i.e., efforts to address the impacts of climate change on forests) and climate mitigation (i.e., efforts slow the pace of climate change) as well as use of best available science—including climate science—throughout the planning process. Forest plan revisions are expected to consider the effects of climate change to date as well as projected future changes, and to connect those trends to observed and expected changes in forest ecosystems, aquatic systems within the forests, and the benefits these forests provide to the public. The dynamic and continuous nature of climate change also underscores the need for adaptive management in forest plans, including more agile agency responses to changing conditions, new scientific information, and experience gained through project implementation and monitoring.

The 2012 Planning Rule also provides for public involvement throughout the planning process. Revising and updating national forest plans represents a major investment of time and effort by Forest Service staff, partners, and stakeholders, and there are opportunities for public engagement during the three major phases of the planning process: assessment, plan development, and monitoring. Although a few national forests already have updated their plans under the 2012 rule, most have yet to do so. As a result, many national forests are undergoing or will soon undergo comprehensive forest plan revisions.[1] Because forest plans typically are in effect for at least 15 years—a timeframe that coincides with a critical period for addressing the global climate crisis—stakeholder engagement and input in the planning process can have an enduring impact on the future of our national forests and our planet.

1.1. HOW TO USE THIS GUIDE

The purpose of this document is to help individuals and organizations effectively engage in the forest planning process to ensure that newly revised national forest plans adequately address climate considerations and concerns. And while there are many components and outcomes of national forest plans, our particular focus is on how these plans can help increase the quality, pace, and scale of ecologically appropriate and climate-smart forest restoration.

Public involvement can and should occur throughout the planning process, but this guide focuses especially on one particularly important phase: public review and comment on draft plans. Nonetheless, we cannot overemphasize the importance of early stakeholder engagement in the forest planning process—particularly during the scoping or assessment phase—to help ensure that planning teams have access to all relevant climate-related information and fully consider

The purpose of this document is to help individuals and organizations effectively engage in the forest planning process to ensure that newly revised national forest plans adequately address climate considerations and concerns.

[1] See the Land Management Plan Revision Schedule (current as of February 26, 2021) or Land Management Revision story map.

The forest planning process is an opportunity for diverse stakeholders to provide input to the Forest Service and help shape management decisions for decades to come (Grand Mesa-Uncompahgre-Gunnison National Forests, Colorado). Photo: USFS.

the risks posed by climate change to the forest and its many services. Importantly, collaboration across jurisdictional or ownership boundaries is critical for addressing climate risks. Engaging early and often can help stakeholders, Forest Service staff, and partners better understand each other's values, and facilitate the development of plans that address potential trade-offs, have stronger support, and lead to more effective implementation.

The guide is divided into three major sections. The first (Chapters 1–5) offers background information that will be helpful to individuals and organizations seeking to review and offer comments on draft forest plans. While commenters do not need to become experts in these topics to provide impactful comments, this context should help readers understand what it means to develop a "climate-smart" forest plan. We also provide background information on opportunities for public input into the forest planning process, together with a review of the legal and regulatory framework underlying the 2012 Planning Rule.[2] We encourage commenters to incorporate specific language from these laws and regulations in their comment letters to help make their case that adequately addressing climate change in forest plans is essential for the Forest Service to meet its mission and legal mandates. The background section also provides a review of key concepts and principles supporting a shared understanding of climate-smart restoration, which can inform your review and evaluation of plan elements.

The second section of the guide (Chapters 6–7) builds from this foundation by offering specific suggestions for how to evaluate and review different resource categories and components in draft plans from a climate change perspective. This section of the guide highlights plan elements that are especially pertinent to climate-informed forest restoration, and for each offers a set of key questions intended to help readers review and evaluate the plan, and craft substantive comments that reflect important climate concerns and best practices for climate adaptation and mitigation. National forest plans vary in structure and content, and may not have the exact framework used here, but the topics here will be addressed somewhere in most plans. Chapter 6 also discusses other plan elements of potential interest to commenters, including plan appendices, environmental impact statements, and plan monitoring provisions, and we offer suggestions for how to provide input to strengthen these.

Finally, an Appendix offers a set of useful resources for crafting public comment letters. These resources highlight literature, websites, example forest plans, and statutes that provide helpful and credible information on climate change, national forests, and forest restoration.

Reviewing and commenting on a forest plan can be intimidating, given the document's size, complexity, and breadth of topics. But while forest management and restoration in a changing climate is a complicated topic, you don't need to be an expert to provide meaningful feedback. Neither should you feel the need to comment on each and every plan element. By sharing your values and concerns, and by flagging parts of the plan where you feel climate change should be given additional attention and consideration—as well as providing positive feedback where it has been well addressed—you will advance and inform a dialogue that helps support the development and implementation of more effective and climate-focused forest plans.

[2] This guide is not intended to serve as a general primer on national forest planning. For an understanding of the overall forest planning process, see *A Citizens' Guide to National Forest Planning.*

Climate change poses serious ecological and economic risks to many national forests. For example, changing climatic conditions are lengthening fire seasons and contributing to an increase in the size and severity of wildfires (Pioneer Fire, Boise National Forest, Idaho, 2016). Photo: Kari Greer/USFS.

2. WHY ADVOCATE FOR CLIMATE-SMART FOREST RESTORATION?

America's forests act as critical foundations for our daily lives, providing clean drinking water, wildlife habitat, and culturally significant resources, and supporting jobs, the economy, and our outdoor heritage. They also deliver significant carbon benefits: uptake of carbon dioxide by forests in the United States offsets about 11% of our carbon emissions annually.[3] The 193 million acres in the National Forest System provide a net carbon sink, sequestering 113 million metric tons of carbon per year—equivalent to taking more than 24 million cars off the road.

As the pace of climate change accelerates, the many ecological and economic benefits national forests provide are at serious risk. Large areas of forest are under stress due to a legacy of long-term fire suppression, intensive resource extraction and use, constrained management capacity, and encroachment from housing and other development. Impacts from drought, pests, disease, and extreme wildfires are all exacerbated by a changing climate and have further degraded forest condition in many locations. After decades of pressure from interacting management and

[3] Domke, G.M., B.F. Walters, D.J. Nowak, et al. 2019. Greenhouse Gas Emissions and Removals from Forest Land, Woodlands, and Urban Trees in the United States, 1990–2017. Resource Update FS-178. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station.

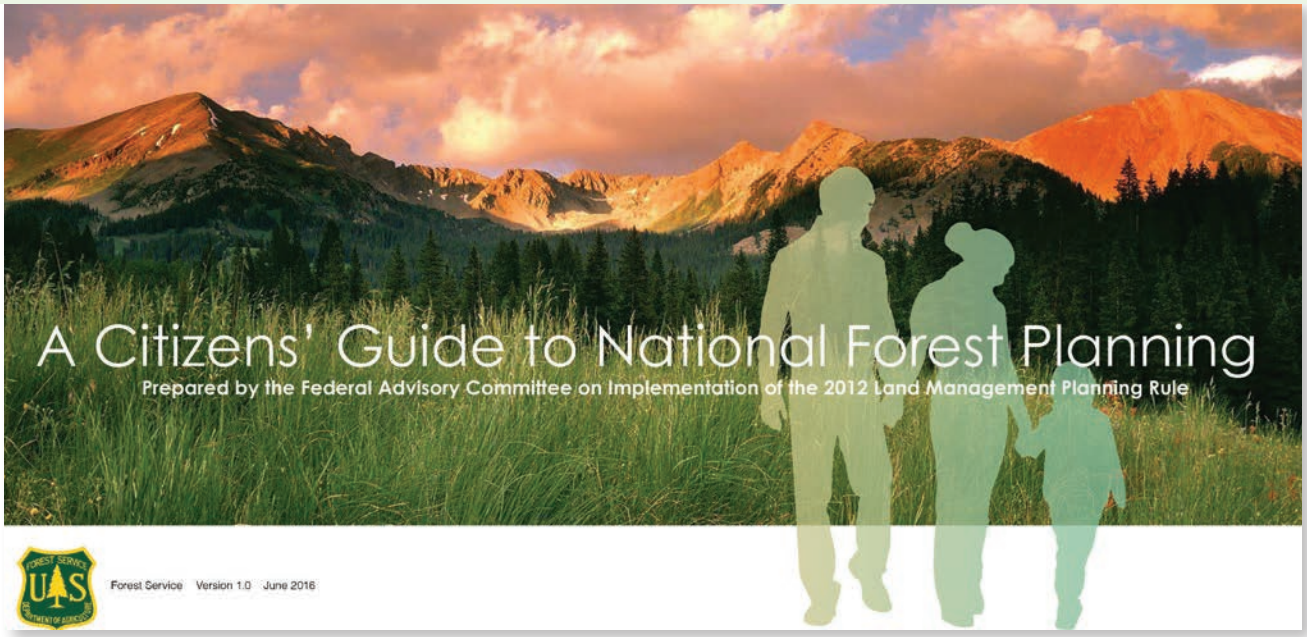
climate-related stresses, the Forest Service estimates that 65 to 82 million acres of National Forest System lands are in need of restoration.[4]

Although forest restoration activities are ongoing, there is a considerable mismatch between the current level of restoration work underway and the scale of the problem. Consequently, there is a need to dramatically increase the pace, scale, and quality of restoration on our national forests. Given the range of climate impacts, and the many values that people derive from forests, successfully restoring forest ecosystems to meet multiple objectives is a complex undertaking. Efforts to restore our national forests will be most successful if the planning process incorporates the knowledge and cooperation of the full range of partners and stakeholders, so we can tackle the challenge in a coordinated and effective way that comprehensively considers the risks and benefits of different management choices. To ensure long-term benefits and the ability to respond to continued changes in environmental and social pressures, engaged stakeholders can help ensure that forest plans fully consider and address observed and projected climate risks, and establish clear methods for learning from the results of management decisions so they can be continually adjusted and improved.

The international scientific community has warned that the next decade will be critical for taking aggressive action to reduce atmospheric greenhouse gas concentrations if we are to avoid the worst consequences of a rapidly changing climate. Scaling up the pace and scale of climate-smart restoration and reforestation on national forests offers one of the greatest opportunities for advancing large-scale nature-based carbon mitigation activities in the United States. Consequently, the next generation of national forest plans, developed under the 2012 Planning Rule, will play a key role in achieving national goals for climate mitigation and carbon management.

An estimated 65-80 million acres of national forests are in need of restoration, which can include the use of prescribed fire (above) to restore ecosystem function and reduce hazardous fuel loads (Flathead National Forest, Montana). Photo: Geneva Thompson/USFS.

[4] U.S. Forest Service. 2015. From Accelerating Restoration to Creating and Maintaining Resilient Landscapes and Communities Across the Nation: Update on Progress from 2012. Washington, DC: U.S. Department of Agriculture, Forest Service.



A Citizens' Guide to National Forest Planning (cover shown above) *provides an excellent overview of the forest planning process and opportunities for public input and engagement.*

3. PUBLIC INVOLVEMENT IN FOREST PLANNING

The 2012 Planning Rule requires opportunities for public involvement at each stage of the forest planning process. Opportunities for public involvement are well described in *A Citizens' Guide to National Forest Planning (Citizens' Guide),* a document created to "demystify" the planning process and provide interested stakeholders with helpful context and resources.[5] In addition to providing an excellent overview of the public involvement process, the *Citizens' Guide* reviews the goals of national forest planning efforts, discusses basic plan structure, and provides topical sections with key discussion points to consider. The *Citizens' Guide* also details how the forest planning process aligns with the National Environmental Policy Act process.[6] We strongly encourage you to review that guide and engage early and often in national forest planning efforts.

The forest planning process begins with an assessment phase, followed by plan development, a public comment period, revision and publication of the final plan, and then ongoing plan monitoring. Although there are opportunities for engagement throughout the planning process, our climate-focused guidance is oriented toward the plan development phase, with the intent of helping members of the public—both individuals and organizations—to provide substantive comments on draft forest plans. Such comments can play an important role in improving forest plans and ensuring that they reflect stakeholder expectations and values. While public involvement can, and ideally should, begin much earlier in the process, the public comment period can be a more accessible or feasible first level of engagement for many interested parties. Although this guide focuses on the review and comment phase, the information and principles presented here are also relevant to engagement in other aspects of the planning process.

[5] Federal Advisory Committee on Implementation of the 2012 Land Management Planning Rule. 2016. A Citizens' Guide to National Forest Planning. Washington, DC: U.S. Department of Agriculture, Forest Service.

[6] See figure on p 25 of the *Citizens' Guide.*

3.1. ASSESSMENT

Engagement and input during the assessment phase can help forest planners identify sources of relevant climate-related information (i.e., climate projections, vulnerability assessments, and existing adaptation plans) and connect with partners with relevant expertise in climate science, adaptation, and mitigation. Effective involvement during the assessment phase can help identify important management trade-offs, equity issues, and complexities that will require additional time, and perhaps additional expertise, to address. This engagement and relationship building can promote improved understanding among all participants and has the potential to lead to stronger draft plans that proactively address stakeholder concerns and interests. To meet the specific challenges of restoring the diversity and function of forest ecosystems, the assessment should take into account past and ongoing monitoring and integrate the contributions of previous management and fire suppression with key factors that influence climate vulnerability, such as observed and projected climate changes, and the presence of climate-sensitive species and systems. Perhaps the most important role for public input in this phase is to ensure that the Forest Service is considering the best available scientific information, including projections of future climatic conditions and ecological change. Once brought to the agency's attention, they must take this information into account in the planning process. A robust climate vulnerability assessment is especially important to inform the assessment phase and serve as the basis for development of a climate-smart plan.[7]

To ensure your expertise and interests are given full consideration, we recommend seeking opportunities to provide input throughout the plan assessment and development phases.

3.2. PLAN DEVELOPMENT

Early in the plan development phase, the Forest Service must identify a "need for change" statement, which explains what parts of the existing plan should be revised, linking those changes to conditions and trends described in the assessment, and the desired future conditions for the national forest. As described in the *Citizens' Guide* referenced above, "the need for change is a tool for focusing the planning phase on issues and resources that may need different direction than what is in the current plan." For most—if not all—forests in the National Forest System, the need to thoroughly address climate risks and interactions between climate change and other stressors will emerge as a driving force behind the need for change. It is also important that the plan update emphasize the forest's specific restoration needs in the framing of key shifts in management approaches. With climate change and restoration concepts firmly embedded in the "need for change," plan components are more likely to incorporate relevant climate considerations. The Forest Service must share a draft "need for change" statement for public comment prior to its finalization. This provides an important opportunity for the public input to ensure this foundational plan element adequately recognizes and incorporates key climate and restoration considerations.

To ensure that your expertise and interests are given full consideration, we recommend seeking opportunities to provide input throughout the plan development phase, which can take many forms, such as sharing key resources, engaging in field trips and discussions, and offering specific suggestions and recommendations. A simple phone call or note early on to the forest planning team leader can ensure you are on the contact list developed by the agency to share plan-related activities as they occur. From a procedural and legal perspective, however, submitting formal comments in response to the draft plan is key

[7] See the Forest Service's Climate Change Vulnerability Assessments Across the Nation webpage for links to available assessments. USDA Climate Hubs and U.S. Geological Survey Climate Adaptation Science Centers are other key sources for relevant information and expertise on climate projections and vulnerability.

since such comments require a formal response by the Forest Service. After the Forest Service addresses all comments received on the draft plan and submits a revised plan and draft "record of decision," there is an opportunity to object (if necessary) before the plan is finalized. Importantly, only those who submitted substantive comments on the draft plan may object at this stage of the process, and those objections must relate to substantive comments previously submitted, unless the objections pertain to newly available information that was not part of the draft plan.

3.3. MONITORING

Once the plan is finalized and approved, the plan monitoring phase begins. The 2012 Planning Rule requires that plan revisions include both a "plan monitoring program" and a "broader-scale monitoring strategy." The plan monitoring program is intended to test assumptions made during the forest plan development process, and to assess progress in reaching the desired conditions described in the plan. To do so, forest plans are expected to pose monitoring questions that address eight required elements, which include such things as the status of watershed conditions, the status of focal and at-risk species, as well as "measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area."[8] The broader-scale monitoring strategy is intended to answer questions best addressed at larger geographic scales (broader than a single forest plan area), and typically are developed by the regional forester with input from the individual forests. Over the life of the forest plan, the Forest Service must collect data to evaluate and report on the plan's effectiveness and the need for possible plan amendments or adjustments. Required biennial monitoring is a key component of the adaptive management cycle and is expected to indicate whether changes may be warranted to the management actions, the monitoring program, or the plan itself. The monitoring reports also provide an important opportunity for ongoing public input and engagement during the plan implementation phase.

The importance of addressing climate-related impacts and risks should inform the "need for change" statement that is required in forest plan revisions (Uinta-Wasatch-Cache National Forest, Utah). Photo: E. Greenwood/USFS.

[8] See Box 2 (page 35) for a list of all eight required elements for the plan monitoring program.

The National Forest Management Act provides the overarching legal framework for national forest planning and management and mandates an interdisciplinary consideration of the full range of forest resources and uses, including wilderness protection and recreation (Inyo National Forest, California). Photo: USFS.

4. LEGAL AND REGULATORY FRAMEWORK

Effectively commenting on national forest plan revisions requires at least a basic understanding of the legal and regulatory framework underpinning the development, revision, and use of these plans. Our intent here is not to provide an exhaustive review of the laws and regulations of national forest planning, but rather to highlight specific language from the National Forest Management Act (NFMA) and the 2012 Planning Rule that may be useful in advocating for climate-smart forest restoration during the plan revision process. Directly citing supporting language from NFMA and the 2012 Planning Rule strengthens public comments and provides a clear and direct legal basis for the Forest Service to address the values and concerns that you identify.

4.1. NATIONAL FOREST MANAGEMENT ACT

The NFMA of 1976 is the primary law governing administration and management of national forest lands and requires the development of forest plans. As a result, the Forest Service must abide by the foundational forest planning objectives described in this statute when developing or revising forest plans (16 U.S.C. § 1604(a)). In developing forest plans, the Forest Service is mandated to use a "systematic interdisciplinary approach to achieve integrated consideration of physical, biological, economic, and other sciences" (16 U.S.C. § 1604(b)). The Forest

Service "shall provide for public participation in the development, review, and revision of land management plans" (16 U.S.C. § 1604(d)(1)) and revise plans "at least every fifteen years" (16 U.S.C. § 1604(f)(5)). The NFMA's consistency provision (16 U.S.C. § 1604(i)) requires that actions and projects undertaken by a forest be consistent with that forest's plan, highlighting the importance of clear, substantive plan language pertaining to climate change in forest restoration. The Forest Service implements these requirements according to administrative regulations, the most recent being the 2012 Planning Rule (36 CFR Part 219).

4.2. 2012 FOREST PLANNING RULE

Rules for implementing the planning requirements under NFMA were first formalized in 1982, with an update and revision finally adopted in 2012. Commonly referred to as the *2012 Planning Rule,* the agency's current regulations for implementing NFMA's planning requirements are found under 36 CFR Part 219. The planning rule was formalized during a period of heightened attention and interest in climate change within the agency, and among the explicit intentions of the rule is to allow "the Forest Service to adapt to changing conditions, including climate change" (36 CFR § 219.5(a)). The regulations contain several references that relate to and support the incorporation of climate considerations in forest restoration, summarized below.

- The regulation's preamble lists eight "purposes and needs," the first among these being to "emphasize restoration of natural resources to make our [National Forest System] lands more resilient to climate change, protect water resources, and improve forest health" (77 FR 21162, 21164).

- The purpose statement explains that "plans will guide management of [National Forest System] lands so that they are ecologically sustainable and contribute to social and economic sustainability; consist of ecosystems and watersheds with ecological integrity and diverse plant and animal communities; and have the capacity to provide people and communities with ecosystem services and multiple uses that provide a range of social, economic, and ecological benefits for the present and into the future" (36 CFR § 219.1(c)).

The 2012 Forest Planning Rule includes mandates for maintaining or restoring the ecological integrity of terrestrial and aquatic ecosystems, and for sustaining at-risk species like this climate-vulnerable bull trout (Lolo National Forest, Montana). Photo: Aubree Benson/USFS.

- The rule requires planners to "use the best available scientific information to inform the planning process" (36 CFR § 219.3).

- Assessments "shall identify and evaluate existing information relevant to…(3) System drivers, including dominant ecological processes, disturbance regimes, and stressors, such as natural succession, wildland fire, invasive species, and climate change; and the ability of terrestrial and aquatic ecosystems in the plan area to adapt to change…(4) Baseline assessments of carbon stocks…(7) Benefits people obtain from the [National Forest System] planning area (ecosystem services)…[and] (10) Renewable and nonrenewable energy and mineral resources" (36 CFR § 219.6(b)).

- The rule provides mandates for both sustainability of ecosystems and the diversity of plant and animal species in the forest (36 CFR § 219.8 & 219.9). Accordingly, each plan must include components to maintain and restore ecosystem integrity and to maintain and restore the diversity of ecosystems and habitat throughout the plan area (36 CFR § 219.8).

Enhancing the resilience of forest ecosystems to the impacts of climate change directly supports the 2012 Planning Rule's sustainability and diversity requirements (Beaverhead-Deerlodge National Forest, Montana). Photo: Sarah Bates/NWF.

- Section 219.8 requires that plans "provide for social, economic, and ecological sustainability" and include components that "maintain or restore the ecological integrity of terrestrial and aquatic ecosystems… including plan components to maintain or restore structure, function, composition, and connectivity, taking into account…(IV) system drivers…and stressors, such as natural succession, wildland fire, invasive species, and climate change; and the ability of terrestrial and aquatic ecosystems in the plan area to adapt to change…(V) Wildland fire and opportunities to restore fire adapted ecosystems…(VI) Opportunities for landscape scale restoration" (36 CFR § 219.8(a)).

- Section 219.9 mandates that plans "include plan components, including standards or guidelines, to maintain or restore the diversity of ecosystems and habitat types throughout the plan area" (36 CFR § 219.9(a)(2)).

Planning that supports climate adaptation and enhances forest resilience is directly related to meeting the rule's ecosystem sustainability and species diversity requirements (36 CFR § 219.8 & 219.9). Climate-smart forest restoration can therefore be viewed as a means for the Forest Service to meet its regulatory requirements to achieve ecological integrity and increase resilience to climate change, as well as other management goals.

Several other statutes, regulations, and executive orders relate to and expand on the NFMA and 2012 Planning Rule, including the *Forest Service Manual,* Chapter 1920 (FSM 1920) and *Forest Service Handbook,* Section 1909.12 (FSH 1909.12).[9] However, language contained in the NFMA and 2012 Planning Rule is generally sufficient to support comments advocating for climate-smart forest restoration.

[9] See Appendix for a list of relevant statutes, regulations, and formal guidance.

Warmer temperatures, more severe droughts, and worsening pest outbreaks are among the climate-related factors contributing to widespread tree mortality events (Sequoia National Park, California, 2015). Photo: Nathan Stephenson, USGS.

5. UNDERSTANDING CLIMATE-SMART FOREST RESTORATION

Rapid climate change poses increasing risks to national forests and must now be taken fully into account in forest planning and restoration. Reviewing the voluminous literature on climate change and forests is beyond the scope of this document, but a basic understanding of what constitutes climate-smart restoration is crucial to effectively reviewing forest plans from a climate perspective. This includes an understanding of *climate adaptation*—which focuses on addressing the impacts of climate change on natural and human systems—and *climate mitigation*—which focuses on reducing atmospheric greenhouse gas concentrations as a means of slowing the pace of climate change.

Climatic conditions already have shifted significantly across the United States. Nationally, average air temperatures are now more than 1.8°F warmer than the historical record, with Alaska warming at about twice the rate of the lower 48 states.[10] Warming trends are continuing unabated, with the most recent decade (2011–2020) the warmest on record and each of the

[10] U.S. Global Change Research Program. 2017. Climate Science Special Report: Fourth National Climate Assessment, vol. I. (D.J. Wuebbles et al., eds.) Washington, DC: U.S. Global Change Research Program.

five hottest years on record occurring between 2015 and 2020. A rise in average air temperatures, however, is just one of many climate-related changes affecting forest ecosystems, with many of the most serious impacts related to an increase in the frequency and severity of extreme weather events. Among the climate-related impacts on forests are:

- More severe drought, which can weaken trees and contribute to increased mortality
- Worsening outbreaks of both native and nonnative pests and pathogens
- Larger wildfires and a longer wildfire season
- Altered growth rates and changes in phenology (i.e., timing of leaf-out, flowering, etc.)
- Shifts in species ranges and changes in ecosystem composition and structure
- More severe disturbance from extreme precipitation events, flooding, and storms
- Encroachment on coastal forests from rising sea levels and higher storm surges
- Changes in ecosystem functions and processes, such as hydrology and carbon cycling

Both current and projected impacts of climate change on forest ecosystems vary considerably among different forest types and across regions. While the specifics vary, the rapid pace of ongoing climatic changes, along with interactions with past management and existing non-climate stressors, are expected to undermine the sustainability and ecological integrity of many national forests and may affect their natural regeneration capacity as well as ability to provide historical levels of products and ecosystem services. Accelerating climate change will also increase climate risks to surrounding communities, including from wildfires and water scarcity, and may lead to shifts in stakeholder needs and values and impacts on regional economies and culture.

5.1. CLIMATE ADAPTATION AND VULNERABILITY ASSESSMENT

As noted above, climate adaptation focuses on addressing the impacts of a changing climate. Climate adaptation can be defined as adjustments in natural

Whitebark pine is a high-elevation tree that is a key source of food for wildlife, including Clark's nutcracker. The species is highly vulnerable to climate-related threats and due to widespread declines is now a candidate for Endangered Species Act protection (Lassen National Park, California). Photo: Frank D. Lospalluto/Flickr.

or human systems in response to current or expected climatic changes. In practice, adaptation generally focuses on reducing key climate vulnerabilities and risks, making a sound understanding of a forest's climate vulnerabilities foundational to designing climate-based restoration and management approaches. Indeed, climate adaptation is considered a form of iterative risk management.[11]

The Forest Service has developed extensive scientific expertise and capacity in vulnerability assessment and adaptation planning to support regional-scale and forest-wide planning as well as project-level design. Several adaptation planning processes are in wide use, but most follow a similar sequence, such as the steps described in the Forest Service's online Adaptation Workbook.

- **Define** goals and objectives
- **Assess** climate impacts and vulnerabilities
- **Evaluate** objectives considering climate impacts
- **Identify** adaptation approaches and tactics for implementation
- **Monitor** effectiveness of implemented actions

Because understanding vulnerability to climate change is central to adaptation planning, and to ensuring that forest plans are climate-smart, it is worth briefly describing the scientific basis for that concept. Climate vulnerability typically is defined as having three discrete elements: exposure, sensitivity, and adaptive capacity. *Exposure* refers to the type and degree of change a species or system is expected to experience, for instance a 3°F increase in average winter temperature, or a 30% reduction in soil moisture during the growing season. *Sensitivity* refers to the susceptibility of a given species or system to a particular climate-related change. *Adaptive capacity* refers to the ability of species or system to cope with or accommodate changing conditions. Adaptive capacity depends on both intrinsic factors, such as temperature tolerances, critical moisture thresholds, and dispersal traits, as well as extrinsic factors, such as the condition of the landscape (i.e., intact or fragmented) to support species dispersal and movement or continued existence of key ecological processes. Climate vulnerability assessments have been completed for nearly the entire National Forest System, using a variety of approaches and for a wide range of forest types, geographies, spatial scales and resolutions, and time frames.[12]

In the past decade, the term *resilience* has come to dominate many discussions of managing forests (and other systems) in the face of climate change, and often is used as a synonym for climate adaptation. The concept of resilience is also embedded in the 2012 Planning Rule. Resilience is most often used to refer to the ability of a system to recover from a disturbance or event and return to its prior state. Although usage of this term is highly variable, the Forest Service often employs a broader concept of resilience, which includes multiple attributes: the ability of a social or ecological system to absorb disturbances while retaining its basic structure and functioning; the capacity of a system for self-organization; and/or the capacity to adapt to stresses and change. This broader definition of resilience more closely reflects the concept of *climate adaptation,* which encompasses a wide range of possible climate-oriented outcomes and approaches, ranging from managing for the persistence of current conditions to accommodating or even facilitating changes and system transformations.

Climate adaptation generally focuses on reducing key climate vulnerabilities and risks...indeed, climate adaptation is a form of iterative risk management.

[11] U.S. Global Change Research Program. 2018. Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, vol. II. (D.R. Reidmiller et al., eds.) Washington, DC: U.S. Global Change Research Program.

[12] The Forest Service's Climate Change Vulnerability Assessments Across the Nation webpage provides access to many of these assessments.

Given the pace and scale of climatic changes, managing change on the national forests is not an option but an inevitability. The primary challenge is to determine when and over what time period to manage for the persistence of current conditions and when to accommodate or even facilitate transitions in system condition and composition. The Forest Service has referred to managing along this continuum in various ways, including through "resistance," "resilience," "response," and "realignment."[13] A more recent framework, developed by an interagency and cross-organizational collaboration, emphasizes the range of decision options available to managers, from "resisting" change to "accepting" or even "directing" system transformations (and therefore known as the *RAD framework*).[14,15]

Natural range of variability (NRV) is another concept that is central to understanding climate adaptation in the context of Forest Service planning and management. Recognizing and planning around the natural dynamics and fluctuations in an ecological system (as opposed to relying on a single "benchmark") was a key element of the agency's adoption of "ecosystem management" approaches in the 1990s as an alternative to more resource extraction–oriented management approaches. The 2012 Planning Rule further formalizes this concept in agency use by requiring a determination of NRV for a suite of ecological characteristics as a basis for measuring "ecological integrity." In practice, however, NRV is typically based on patterns observed in the historical record, resulting in what is often referred to as *historical range of variability* (HRV). Indeed, the term *restoration* itself generally implies and refers to a return to historical conditions. As climate change proceeds, many climatic and ecological variables are expected to exceed the bounds of what have been regarded as the NRV or HRV, and attempting to return ecological systems to their historical state will be increasingly challenging or even impossible. Although learning from the past and recognizing fluctuations and variability in ecosystem dynamics are still essential, application of NRV in forest planning and management will need to be done in a forward-looking way that considers the likely future, rather than just historical, range of variation in ecosystem composition, structure, and function and associated climatic and ecological variables.[16] Indeed, in the RAD framework described above, "resisting" change can be viewed as an attempt to remain within the HRV while "accepting" or "directing" change will likely exceed those historical bounds.

5.2. CLIMATE MITIGATION AND NATURAL CLIMATE SOLUTIONS

The accumulating concentration of greenhouse gases in the atmosphere—principally carbon dioxide—is the underlying driver of rapid climate change. *Climate mitigation* refers to efforts to reduce and ultimately reverse the rate of global warming through reductions

National forests store massive amounts of carbon, sequestering 113 million metric tons of carbon each year. The Tongass National Forest alone accounts for at least 8% of the carbon stored in all U.S. forests (Tongass National Forest, Alaska). Photo: John Hyde/Alaska Stock RF.

[13] Peterson, D.L., C.I. Millar, L.A. Joyce, et al. 2011. Responding to Climate Change in National Forests: A Guidebook for Developing Adaptation Actions. General Technical Report PNW-GTR-855. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

[14] Schuurman, G.W., C.H. Hoffman, C.H. Cole, et al. 2020. Resist-Accept-Direct (RAD)—A Framework for the 21st-century Natural Resource Manager. Natural Resource Report NPS/NRSS/CCRP/NRR-2020/2213. Fort Collins, CO: National Park Service.

[15] Thompson, L.M., A.J. Lynch, E.A. Beever, et al. 2021. Responding to ecosystem transformation: Resist, accept, or direct? Fisheries 46: 8–21.

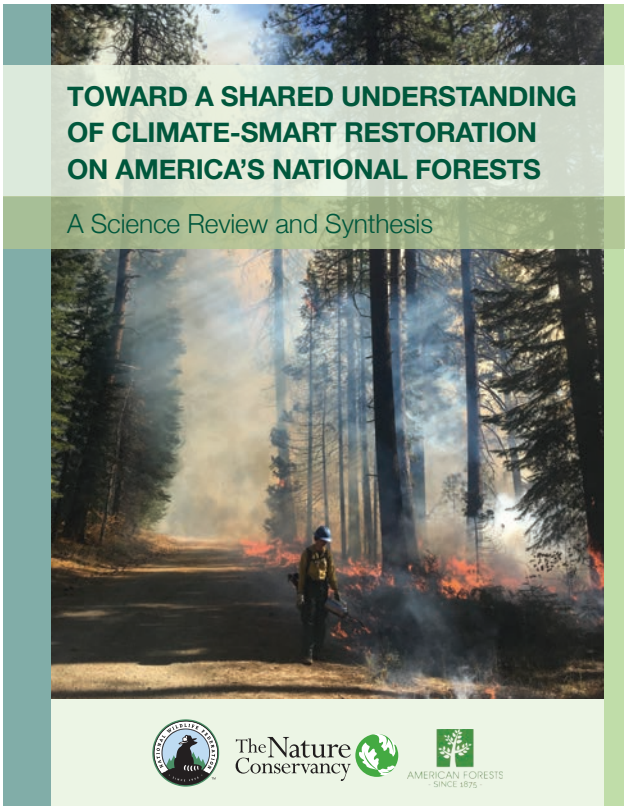
[16] Millar, C.I. 2014. Historic variability: Informing restoration strategies, not prescribing targets. Journal of Sustainable Forestry 33: S28–S42.

in greenhouse gas emissions as well as increases in carbon capture and storage. National forests represent both sources and sinks for carbon, and therefore climate mitigation and carbon management are becoming an increasingly important factor in forest planning, management, and restoration. Of particular interest is the role that forests can play as "natural climate solutions," which can be defined as conservation, restoration, and improved land management actions that increase carbon storage or avoid greenhouse gas emissions in natural landscapes.

Understanding the current carbon stocks on national forests is key to informed carbon management.[17] In general, about 60% of carbon in mature forests is stored in live and dead tree matter, with the other 40% in soil and forest litter.[18] Carbon gains and losses in forest systems fluctuate, with gains in carbon (i.e., sequestration) occurring largely through vegetative growth, and losses occurring through respiration, disturbances (e.g., fires and insect outbreaks), and harvest. Whether a forest is a net carbon sink (i.e., gains more carbon than it loses) or source (i.e., loses more than it gains) depends on the balance among each of these factors. How much net carbon dioxide enters the atmosphere over time depends on factors such as rate and extent of forest regrowth, how quickly forest matter combusts or decomposes, and how much harvested wood is stored in durable wood products.

5.3. PRINCIPLES FOR CLIMATE-SMART FOREST RESTORATION

A companion document to this guide provides an in-depth review and synthesis of the scientific literature relevant to climate change and forest restoration.[19] In an effort to promote a shared understanding of climate-smart forest restoration, that paper distills several high-level principles that should be useful to those



A companion publication offers a review and synthesis of the science underlying climate-smart forest restoration, including a more thorough discussion of the principles presented here.

reviewing and offering comments on national forest plans. These principles apply to the range of climate-related management concerns of the Forest Service and its partners in the state, tribal, nonprofit, and private sectors, from scientific assessment of climate impacts to the development and implementation of climate adaptation and mitigation strategies.

Look to the future while learning from the past. Forest planners and their partners should develop forward-looking goals for management that build on an understanding of the historical range of variability and past responses to disturbance, but account for and anticipate future climate-related changes.

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[17] Information on forest carbon stocks can be found on the Forest Service Forest Inventory and Analysis website.

[18] Ryan, M.G., M.E. Harmon, R.A. Birdsey, et al. 2010. A Synthesis of the Science on Forests and Carbon for U.S. Forests. Issues in Ecology 13. Washington, DC: Ecological Society of America.

[19] Glick, P., B.A. Stein, and K. Hall. 2021. Toward a Shared Understanding of Climate-Smart Restoration on America's National Forests: A Science Review and Synthesis. Washington, DC: National Wildlife Federation.

Embrace functional restoration of ecological integrity. As climatic conditions continue to change, it will become increasingly difficult to restore the ecological integrity of forest systems based on historical species compositions and structures. Rather, goals for ecological integrity should emphasize the capacity of forest systems to adapt and adjust, including through enhancing functional diversity and habitat complexity.

Restore and manage forests in the context of larger landscapes and longer time frames. Climate change necessitates that planners and managers consider larger spatial scales (e.g., watersheds, landscapes, and regions) and longer time frames to ensure that localized and near-term actions do not compromise the capacity of forests to accommodate and adjust to changing conditions.

Adopt agile planning and management approaches that accommodate and address uncertainty. Restoring and managing forests in the face of continuous climatic change necessarily requires decision-making under uncertainty, underscoring the importance of adaptive planning and management, including the consideration of multiple plausible scenarios of future conditions.

Managing for ecological change, including shifts from one system type to another, will be an increasingly important part of climate-smart forest restoration (ghost forest, coastal South Carolina). Photo: William Conner/Clemson University.

Address climate risks by linking adaptation strategies to key climate-related impacts. Understanding climate vulnerabilities and risks to priority forest resources and values serves as the basis for developing and implementing adaptation strategies that are capable of reducing risks and sustaining the ecological, social, and economic systems associated with national forests.

Manage for change, not just persistence. As climatic conditions exceed historical ranges of variability, national forest planners will need to consider how to reconcile "desired" future conditions with climatically achievable future conditions. Planners and managers increasingly will need to determine when and where it may be possible to manage for the persistence of current/historical forest conditions, and when it may be necessary to manage for change by accepting or even facilitating ecological transitions.

Optimize, rather than maximize, carbon sequestration opportunities. National forests will play an increasingly important role in achieving the nation's climate mitigation goals. Attempting to maximize carbon sequestration and storage, however, can undermine other important ecosystem services and national forest values. Managers should instead seek to optimize sequestration opportunities by balancing carbon goals with other important forest restoration, management, and resilience outcomes.

Enhance collaboration to identify shared values, navigate trade-offs, and maximize synergies in the context of changing conditions. Managing forests for multiple, sustained ecosystem services will necessarily entail trade-offs, particularly given the challenges and uncertainties associated with changing climatic conditions. Engaging local communities and diverse constituencies as early as possible in the forest planning process helps gain buy-in and identify opportunities to minimize trade-offs and maximize synergies, including acknowledgment and discussion of the potential for fundamental changes in national forest conditions.

Although some forest restoration activities emit carbon, such near-term releases should be balanced against their ecological benefits and longer-term carbon sequestration and storage outcomes (Oconee National Forest, Georgia). Photo: Tim Kolnick/USFS.

5.4. RECOGNIZING TRADE-OFFS IN MANAGEMENT AND RESTORATION

Managing national forests is a complex balancing act given the Forest Service's multiple use mandate and responsibility to provide for social, economic, and ecological sustainability. It is not surprising, then, that forest planning often reflects trade-offs among various social and stakeholder values and ecological outcomes. Additionally, some trade-offs reflect the difference between near- and longer-term outcomes and impacts. Trade-offs are also inherent in applying the above-described principles for climate-smart restoration. For example, forest restoration actions (e.g., prescribed burns, thinning) may help protect carbon stocks from catastrophic loss from large, severe wildfires but reduce carbon storage in the near term. Similarly, a focus on enhancing carbon sequestration and storage could conflict with sustaining biodiversity and other ecological values depending on how this is carried out. Managing forests for carbon can also conflict with water resource and aquatic biodiversity goals if an increase in forest cover and associated water use (via evapotranspiration) reduces available streamflow. On the other hand, greater riparian forest canopy can provide needed shade for warming waters. Resolving such trade-offs in goals and objectives can be informed by climate and ecological science but will generally rely on balancing among social, legal, economic, and ecological concerns in the planning process.

Climate-focused reviews should consider how draft plans address both climate adaptation and resilience as well as climate mitigation and carbon management (Bridger-Teton National Forest, Idaho). Photo: Pattiz Brothers/USFS.

6. REVIEWING FOREST PLANS FROM A CLIMATE CHANGE PERSPECTIVE

The following provides guidance for reviewing and commenting on draft forest plans from a climate change perspective. Specifically, we focus on elements of the plans that are key to advancing the pace and scale of climate-smart forest restoration and achieving climate adaptation and mitigation outcomes.

Forest planning documents have several required components, which together guide future projects, activities, and monitoring in the plan area. Plan components guide what future site-specific projects and activities may take place, where they can occur, and under what conditions. Required components include desired conditions, objectives, standards, and guidelines (see Box 1). The structure of plans can vary considerably from region to region and forest to forest. Plans generally offer *forest-wide* direction, describing desired conditions and management direction that applies to the entire plan area. Such forest-wide directions are complemented by plan components that apply to specific *geographic areas* and/or *management areas.*[20]

Plan components are typically provided for specific resources found within the specified areas. Forest plan organization varies, but resources are typically divided into two main categories: ecological sustainability and diversity, and social and economic sustainability. Subcategories of ecological sustainability that

[20] *Geographic areas* are spatially contiguous areas within the planning area. *Management areas* are defined based on shared issues, management needs, and plan components (e.g., riparian habitats), but are not necessarily contiguous. A management area may occur in a single geographic area or across multiple geographic areas.

Box 1. Required Forest Plan Components

Desired Condition. Description of specific social, economic, or ecological characteristics toward which management of the land and resources should be directed. A vision for what the forest should look like as a result of plan implementation.

Objectives. Concise, measurable, and time-specific statements of a desired rate of progress toward achieving desired conditions.

Standards. Mandatory constraints on project and activity decision-making, established to help achieve or maintain the desired conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

Guidelines. Mandatory constraints on project and activity decision-making that provide flexibility for different situations as long as the purpose of the guideline is met.

Goals. Optional broad statements of intent, other than desired conditions, that are usually related to process or interaction with the public.

Suitability of Land. Identification of land areas as suitable or not suitable for specific uses (such as timber or range production), based on the applicable desired conditions. Identification of suitability is not required for every resource or activity or for every acre of the plan area.

Source: Adapted from ***A Citizens' Guide to National Forest Planning*** (2016).

are particularly relevant to climate-smart forest restoration, and discussed later in this section, include terrestrial ecosystems, at-risk species, watersheds, fire, and invasive species. Highlighted subcategories under social and economic sustainability include timber management and partnerships/stewardship. In addition to reviewing and critiquing what is written in the proposed plan, we also encourage reviewers to consider important, substantive topics or categories that might be missing from the plan.

To help in your review of plans from a climate change perspective, we first offer several high-level questions to ask of the overall plan. We then offer suggestions for evaluating how the plan addresses a number of resource categories relevant to advancing climate-smart forest restoration. Although the categories in any given forest plan may not exactly match those presented here, this framework should provide an overview of key topics and practices to consider in developing your comments.

Again, we emphasize that commenters do not need to be experts in these topics to provide impactful comments. The context and principles provided above, and the specific guiding questions in the sections below should help readers understand what it means to take climate change into consideration in forest planning and help them craft substantive comments that reflect their particular values and concerns.

To help in your plan review, we offer a series of climate-related questions to ask of relevant plan elements and resource categories.

6.1. ASSESSING CLIMATE CHANGE IN THE OVERALL FOREST PLAN

Before diving into a review and evaluation of individual resource areas and plan components, it is worth considering how the plan overall sought to address climate change. Below, we offer several high-level questions designed to help explore the degree to which the draft plan adequately and appropriately incorporates key climate considerations. These questions reflect emerging best practices in climate adaptation planning and climate mitigation. They are designed to start broadly, for instance to ensure that foundational information about climate projections, impacts, and vulnerabilities is being used to guide the overall plan, with sub-questions focusing on how climate has been addressed as part of the required forest plan elements and components.

Overall Plan

- Does the plan reference and incorporate best available climate science, including climate projections, climate vulnerability assessments, and relevant local, state, or regional climate adaptation plans?
- Does the plan adequately characterize current climate and identify plausible and science-based scenarios of future climatic conditions (e.g., high and low scenarios of change)?
- Does the plan clearly identify key climate-related vulnerabilities and risks, including impacts to forest resources and ecological features, ecosystem services, changes in fire risk, and stakeholder values?
  - Are these vulnerabilities and risks adequately reflected in the plan's "need to change" assessment?
  - Are the "desired conditions" and "objectives" described in the plan likely to be achievable given projected climatic changes and vulnerabilities?
- Does the plan identify areas projected to experience high rates of climatic and/or ecological change as well as potential climate refugia (areas projected to experience lower rates of change)?
  - Do management objectives for various subregions of the forest take into account these differences in climate exposure, as well as climate refugia and habitat connectivity?
- Does the plan adequately integrate climate adaptation and ecological resilience considerations?
  - Are the desired future conditions, objectives, standards, and guidelines described in the plan consistent with the concepts of reducing key climate-related risks, enhancing the adaptive capacity of species and their habitats, and sustaining the functional integrity of forest systems under changing climatic conditions?
- Does the plan adequately address climate mitigation and carbon management, taking into account how changing conditions may alter forest carbon stocks and flows?
  - Is carbon sequestration and storage considered over near- and longer-term time horizons, and are the desired future conditions and objectives consistent with optimizing long-term carbon management?

Describing current climatic conditions as well as scenarios of future change are cornerstones of a climate-informed forest plan (rain gauge installation on the Gila National Forest, Arizona). Photo: USFS.

6.2. PLAN INTRODUCTION

The first chapter of most forest plans typically introduces the forest by describing the plan area, including climatic, geographic, and social factors, and the various resources that the forest contains. Forest management challenges associated with climate change should be incorporated into this introductory chapter. Per the 2012 Planning Rule, the plan must "[d]escribe the plan area's distinctive roles and contributions within the broader landscape" (36 CFR § 219.7(f)(1)(ii)). Some of the best forest plan revisions we've seen from the perspective of integrating climate and restoration have a thorough discussion of climate change within this section.[21] This discussion should summarize pertinent climate-related information obtained during the assessment phase.

Ideally, the introductory chapter will acknowledge key uncertainties associated with future changes in climate, likely effects of those changes on forest resources, and appropriate management responses, as well as how key uncertainties will be addressed in adaptive management and adaptation planning on the forest. Given that forest plans have a relatively short (15-year) time horizon, the introductory chapter is a good place to describe how near-term management decisions and practices are expected to align with and support longer-term trends in climate impacts and ecosystem responses.

Introductory Chapter

- What climatic changes and ecosystem responses have been observed in recent decades, and what is the range of projections for future (i.e., 50 to 100 years) climatic changes in the plan area?
- Does the plan's "need for change" adequately address risks to the ecological and social values of forest from observed and potential future climatic changes?
- Are there zones on the forest where ecosystem types may be unsustainable under future projections of change, potentially leading to transformation to different ecosystem types? If so, what is the general management approach for addressing these transitions?
- Are there species on the forest for which suitable climatic or habitat conditions may disappear or expand due to climate change? If so, what is the general management approach for addressing these potential range contractions, expansions, or population extirpations?
- Does the chapter adequately describe how climate change may affect key stakeholder values and forest uses, such as water supply, timber resources, fire safety, or outdoor recreation?

[21] See, for example, the Management Approach to Change and Uncertainty section of the *Draft Revised Forest Plan for the Gila National Forest* (beginning on p 27), and of the *Wallowa-Whitman National Forest Land Management Plan* (p 19–23).

Ecological sustainability is at the heart of the 2012 Planning Rule, and the terrestrial ecosystems sections of the plan will be particularly relevant to a climate-focused review (Daniel Boone National Forest, Kentucky). Photo: JimVallee/iStock.

The introduction should also include a discussion of carbon storage and carbon sequestration potential on the forest, including how that may be affected by changing climatic conditions. Comments on the introductory chapter of the plan can be a good place to highlight relevant information from available Forest Service climate change resources (see Appendix), including affirmative language that forest managers will use the agency's own climate-related information sources to guide decisions. A strong introduction that recognizes the importance of climate change throughout the planning process sets the stage for providing specific, substantive plan components that support climate-based forest restoration and management.

6.3. ECOLOGICAL SUSTAINABILITY AND DIVERSITY

Ecological sustainability is at the heart of the 2012 Planning Rule, which includes a strong emphasis on maintaining ecological integrity and supporting the diversity of plant and animal communities. Below, we offer suggestions for how ecological sustainability plan elements relate to climate-smart forest restoration. Your specific forest plan may contain different and/or additional categories, but most plans should include at least one location where these considerations apply. Some plans may contain a separate section on climate change, but even in those instances, climate considerations should be integrated throughout the plan. Plan organization varies, but you will likely find general (forest-wide) plan components followed by plan components specific to ecological types, resources, or areas.

6.3.1. Terrestrial Ecosystems

The section(s) of the plan on terrestrial ecosystems will often be the most relevant and specific to forest restoration concerns. If your time is limited, this is a good place to focus your attention.

Even when plans contain a separate section on climate change, climate considerations should be integrated throughout the plan.

Desired Condition of Terrestrial Ecosystems

- Does the plan apply the *natural range of variation* concept in a forward-looking rather than retrospective/historical manner? Does the plan offer a science-based model of how the natural range of variation might shift under plausible scenarios of climate change?
- Does the plan offer a relative ranking of climate vulnerabilities for species or forest types, and use those in the formulation of desired conditions?
- Does the plan consider when and where different change–management approaches (i.e., resist, accept, direct) should be applied to forest resources in the formulation of desired conditions?
- Based on projected climatic conditions and impacts, can the desired conditions described in the plan be characterized as "achievable"?
- Does the plan describe a pathway toward maintaining or increasing habitat heterogeneity and managing for the fullest array possible—given projected climatic changes—of ecological types and habitats on the forest?
- Does the plan suggest any changes in the land "suitability" designations based on consideration of climate vulnerability and/or need for restoration?
- If the plan includes efforts to resist climate impacts through management actions, is there a time frame and clear rationale (e.g., "buying time" for a rare species for which other habitats may not be available) for the strategy?

Desired conditions. A key topic to look for is how the plan describes the process used to determine desired conditions for terrestrial ecosystems. This should reflect an understanding of the natural range of variation (NRV) in different forest types with consideration of projected climate scenarios and associated shifts in specific drivers such as drought stress, fire regime, and increased storm intensities (a key driver of flooding and erosion). Considering the NRV recognizes the key role of natural disturbance factors like fire, windthrow, and flooding in sustaining forest biological and structural diversity, and the need to consider the heterogeneity in factors such as forest age classes when evaluating ecological integrity. Of particular interest, however, is whether the plan defines desired condition mainly from a retrospective perspective, emphasizing historical conditions (and range of variability) or takes a more forward-looking approach to identifying desired condition that may be achievable given projected climatic changes.[22]

Desired condition statements should consider how climatic trends may affect current forest types, such as these southernmost boreal conifer forests, and take into account what may be achievable future conditions. *(Superior National Forest, Minnesota).George Ostertag/Alamy.*

[22] Golladay, S.W., K.L. Martin, J.M. Vose, et al. 2016. Achievable future conditions as a framework for guiding forest conservation and management. Forest Ecology and Management 360: 80–96.

Ecological transitions. The plan should clearly indicate the extent to which changes in species composition and structure have been observed or are expected, where ecological type conversions (whether from one forest type to another, or from forest to non-forest types) are anticipated, and under what conditions management or restoration activities would be designed to address such transitions.

Ecological Transitions

- Does the plan identify ecological systems with a high expectation of type conversion (e.g., conifer forest to hardwood forest, forest to non-forest) linked to climate impacts?
- Does the plan address what management and restoration approaches would be employed in the face of such ecological transitions (e.g., whether to resist, accept, or direct)?
- Have ecological thresholds for the deployment and implementation of specific adaptation strategies and actions (whether resistance or transition-oriented) been estimated, or identified as a target for research and/or monitoring?

At-risk species. The 2012 Planning Rule assumes that maintaining or restoring the integrity and sustainability of ecosystems will support the persistence of the majority of plant and animal species on a forest. *At-risk species* that are not adequately addressed by ecosystem-focused components of the plan, however, must be addressed through additional, species-

American pika typically live in talus slopes on Western mountains and are highly sensitive to increasing temperatures. Populations declines in the Great Basin, Utah, and California have led some national forests to include pika as species of conservation concern in their forest plan revisions (Wallowa-Whitman National Forest). Photo: Mark Penninger/USFS.

targeted plan components. Within the context of the 2012 Planning Rule, at-risk species include plants and animals listed under the federal Endangered Species Act (including proposed and candidate species) as well as *species of conservation concern* (SCC), defined as non–federally listed species for which the Regional Forester has determined that there is "substantial concern about the species' capability to persist over the long-term in the plan area" (36 CFR § 219.9), and these concerns can include climate-related threats.[23]

The approach to at-risk species in the 2012 Planning Rule is a significant departure from previous processes, which included a broader suite of *sensitive species.* As a result, the determination of which species should qualify as an SCC is consequential and a subject of debate.[24] Based on current Forest Service guidance, if a species is known to be at risk across its range but

[23] Malcolm, K.D., M.M. Rowland, C.H. Flather, et al. 2016. Applying the 2012 Planning Rule to Conserve Species: A Summarized Practitioner's Reference. Unpublished paper. Washington, DC: U.S. Department of Agriculture, Forest Service.

[24] Haber, J. and P. Nelson. 2015. Planning for Diversity: A Guide to National Forest Planning to Conserve America's Wildlife. Washington, DC: Defenders of Wildlife.

At-risk Species

- Have changing climatic conditions been used in the identification and assessment of potential "species of conservation concern"?
- Does the plan adequately assess the climate vulnerability of all at-risk species, including federally listed and "species of conservation concern"?
- Does the plan identify the "distinctive roles and contributions" of the plan area for climate-vulnerable species, including those not regarded by the Forest Service as "species of conservation concern"?
- Does the plan identify management actions that could reduce climate exposures or enhance the adaptive capacity of at-risk species and consider whether management actions to meet other plan objectives could exacerbate climate risks to these species?
- Does the plan identify areas that may serve as important climate refugia for at-risk species, as well as habitat corridors and linkages needed to support species' movements and climate-driven range shifts?
- Are there climate-vulnerable species identified in the plan that are unlikely to persist in the plan area under likely future climatic conditions? If so, are management options considered (e.g., "assisted migration") that could assure their persistence in the broader regional landscape?

considered secure within the plan area it may not qualify as an SCC. Such a determination, however, would need to consider extrinsic threats to the species' viability, including from current and future climate change, and be based on best available scientific information. Additionally, the Forest Service is required to evaluate the plan area's "distinctive roles and contributions" within the broader landscape (36 CFR § 219.7(f)). Given this, the agency may have discretion to include components to protect the ecological conditions necessary to support the species, even if it does not meet the requirements for SCC designation. This may be particularly important for achieving climate adaptation outcomes. For instance, if there are locations within the plan area where ecological and climatic conditions are expected to provide long-term climate refugia for species vulnerable to climate change elsewhere across its range, the plan should recognize and include strategies intended to maintain those conditions.

The Mt. Rainier white-tailed ptarmigan has recently been proposed for federal listing as a threatened species primarily due to habitat degradation resulting from climate change (Mt. Baker-Snoqualmie National Forest, Washington). Photo: Lee Rentz/Alamy.

Forest Carbon

- Is there an up-to-date carbon stock assessment for the forest plan area, and are the pathways for carbon sequestration and storage (e.g., tree growth, soil development, storage in durable wood products) as well as carbon release (e.g., wildfire, mortality from drought, insects, or pathogens, soil disturbance) well understood and described?
- Does the plan consider the carbon implications of different management and restoration approaches (including timber harvest) from both near- and long-term perspectives, and seek to optimize long-term sequestration and storage?
- Do plan elements related to fire management and fuels treatment consider the implications for forest carbon over near-term and longer time frames?
- Are carbon strongholds (i.e., naturally carbon-rich systems and sites) identified and/or designated as areas to be managed with particular emphasis on carbon retention?
- Does the plan identify adaptation opportunities or options specifically designed to reduce climate-related risks to important carbon stocks?
- Does the plan identify reforestation opportunities for enhancing carbon storage, particularly through focusing on previously forested areas with compromised natural regeneration potential?

National forest watersheds are the single largest source of drinking water in America, serving more than 60 million people (Lolo National Forest, Montana). Photo: Sarah Bates/NWF.

Forest carbon. The 2012 Planning Rule requires a "baseline assessment of carbon stocks" (36 CFR 219.6(b)(4)) during the assessment phase but does not stipulate what to do with that assessment. The USDA has formally acknowledged maintaining carbon sequestration on national forests as a land-use objective in its 2014–2018 Strategic Plan. The department elaborated on this in 2016 in *USDA Building Blocks for Climate Smart Agriculture and Forestry,* including carbon storage as one of three primary goals. Moreover, the 2012 Planning Rule requires assessment of how people benefit from the planning area, including ecosystem services, which may be read to include the benefits of carbon sequestration.

Given the increasing focus on the role of forests in providing natural climate solutions and contributing to national goals for climate mitigation and carbon reduction, it will be increasingly important during the forest planning process to identify systems and areas that are naturally rich carbon repositories. Assessing forest carbon should also take into consideration the concept of *irrecoverable carbon,* which refers to systems where carbon once lost would not be recoverable on "timescales relevant to avoiding the most dangerous

climate impacts."[25] Areas that are particularly rich in carbon at natural forest densities are sometimes referred to as *carbon strongholds* or *carbon reserves* (e.g., old-growth forests, peatlands), and should be managed with carbon retention as a primary objective.

With limited regulatory guidance in a rapidly evolving scientific field, plan components should explicitly require partnering and collaboration with researchers to help identify and implement measures that optimize long-term carbon sequestration and storage. Strategies identified in the literature for increasing carbon storage include avoiding conversion of forests to other land uses, increasing reforestation and afforestation, managing forests to enhance growth, lengthening harvest rotation cycles, and increasing markets for long-term wood products.[26]

6.3.2. Watersheds and Aquatic Resources

National forests provide essential water, much of which originates as snowpack and flows downstream to serve municipal, agricultural, and other human needs. Fish and wildlife depend on water directly for survival, and on the riparian habitat supported by water flowing through forest streams and stored underground. These important values are addressed in forest plan sections on watersheds and aquatic resources, both of which address the impacts of land management practices on water.

Watersheds are spatial units within landscapes that are defined by hydrology (how the various bodies of groundwater and surface water connect). The Forest

Watershed and Aquatic Resources

- Does the plan reference an up-to-date Watershed Condition Assessment and incorporate priority watershed restoration goals?
- Does the plan consider the implications of future changes in precipitation and water availability patterns on watershed condition and water production, including drought, extreme precipitation events, changes in snowpack or timing of snowmelt, and increased evapotranspiration?
- Does the plan consider how climate-driven changes in streamflow (including quantity, temperature, and timing) may impact aquatic and riparian species, and identify adaptation options for managing or reducing those risks?
- Does the plan adequately identify management areas and ecological features that provide important watershed functions and ecosystem services (e.g., riparian habitats, wetlands) and consider potential nature-based solutions (e.g., beaver restoration) to maintain or restore them?
- Does the plan adequately address watershed and aquatic connectivity, including through considering the implications of changing climatic conditions and soil erosion on the forest road network, identifying vulnerable roads as candidates for closure and rehabilitation, and through the repair or retrofit of culverts to ensure functionality and aquatic connectivity during low- as well as high-flow periods?

[25] Goldstein, A., W.R. Turner, S.A. Spawn, et al. 2020. Protecting irrecoverable carbon in Earth's ecosystems Nature Climate Change 10: 287–295.

[26] Glick, P., B.A. Stein, and K. Hall. 2021. Toward a Shared Understanding of Climate-Smart Restoration on America's National Forests: A Science Review and Synthesis. Washington, DC: National Wildlife Federation.

Service has completed a baseline assessment of watershed conditions and has prioritized management actions to improve those conditions through a system called the Watershed Condition Framework. This information should appear in the forest plan Watershed section, with analysis of how to achieve desired conditions that will achieve identified watershed restoration priorities.

Climate change impacts should be a key consideration in evaluating and designating priority watersheds and how to restore those watershed systems. Factors like connection to groundwater, the current condition and use of aquatic resources, and topographic factors can drive variation in risks to aquatic systems and species within the same national forest. Investing in improved watershed integrity—which may include work to minimize the risk of erosion after management actions or fire, or improving infrastructure such as road–stream crossings and culverts—can help make ecosystems more resilient to stressors, including climate change. Watershed restoration is integrally related to other forest restoration activities and goals.

When looking at the forest plan sections related to aquatic resources, consider whether the planning document considers the potential impacts of drought, and increased evaporative demand in the terrestrial parts of the watershed, on water supply and water quality, and links these stressors to forest management and restoration opportunities and needs. Plans should also address anticipated streamflow changes resulting from climate change, for example through changes in snow accumulation and snowmelt timing, and acknowledge the ways that forests benefit stream conditions (i.e., by shading streams and reducing erosion). In arid environments, increasing forest stand density can reduce water available to streams under drought conditions, a relationship that should be considered where appropriate in the siting and choice of forest management actions. Similarly, plans should identify the important water-related ecosystem services that forests provide, such as clean water and reducing flood risks by slowing and absorbing surface waters, and articulate how climate change might impact the forest's ability to continue providing those services.

Water quality and watershed condition are both impacted by the way surface runoff (during snowmelt or rain events) moves over and under forest roads. This is of particular importance since in most regions, the intensity of peak rainfall events has shown consistent increases over the last several decades, which are likely to continue. Thus, watch for plan language related to culverts and road decommissioning (possibly appearing in a section focused on infrastructure) to ensure goals aimed at adequately sized and placed culverts, attention to removing or mitigating sediment-laden flow from forest roads to vulnerable streams, and other measures to ameliorate the impacts of runoff.

6.3.3. Fire

Fire is a necessary and natural component of most forest ecosystems. However, historical fire suppression practices, climate change, and the increasing number of homes and structures in the wildland–urban interface have dramatically increased the risks posed by wildfire, both to humans and ecological integrity. Periodic fire is essential for maintaining the health of many forests, although natural fire regimes vary considerably by region and across forest types. Climate change is among the factors that is significantly altering fire regimes on many national forests, often contributing to larger and more severe fires, including at times of the year outside of historical fire seasons.

This section of the plan should describe the natural fire regime(s) that apply to the plan area, the degree to which current vegetation conditions depart from what would be expected under those regimes, and observed changes in fire frequency, extent, and severity. The plan should consider how future climatic changes may be expected to alter fire risk and identify management approaches for restoring a more natural fire regime to the area as well as reducing fire risk to surrounding communities and valued resources. In particular, based on wildfire hazard risk assessments, it should address how, when, and under what conditions natural fires are suppressed or allowed to burn, as well as how prescribed fire may be used as a management tool. Section 23.11c of the *Forest Service Handbook*

clarifies what plan components are required relating to fire and fuels management and restoring fire-adapted ecosystems.

In addition to posing considerable risks to human communities, large and severe fires have the potential to permanently transform forest ecosystems that are not adapted to high-intensity fire regimes, particularly as climatic changes compromise the forest's natural regeneration capacity. Extreme wildfires can also compromise three critical functions that forests serve for climate mitigation: fire can reduce carbon storage in trees and soils; fire can harm the ability of forests to continue to sequester carbon through healthy growth; and carbon emissions from large wildfires can be huge, singular emission events that can equal or exceed carbon emissions from human causes.

The fire component may be found under the social and economic elements of the plan as the ecologic and social dimensions of fire and fire management are intimately intertwined. Consequently, the plan should include components designed to increase public understanding of the need for proactive vegetation and fire management to avoid larger, more catastrophic fires.

Fire

- Does the plan describe the natural fire regime of the plan area and surrounding landscape, and document departures from the pattern of vegetation types (age and structural classes) that would be expected under the natural fire regime?
- Does the plan describe observed and projected changes in fire frequency and severity based on past and current management actions and on changing climatic conditions?
- Does the plan include or reference a fire risk assessment that characterizes wildfire likelihood and intensity, effects, and the relative importance of valued resources and assets that could be impacted by wildfire?
- Has the risk assessment been used to identify wildfire hazard zones as a means of determining management areas where fuel treatments may be needed, where immediate fire suppression actions are appropriate, and where natural fires could more safely be allowed to burn?
- Does the plan discuss how changing climatic conditions may affect the timing and use of prescribed fire as a management and restoration tool?
- Are near- and longer-term interactions between fire patterns and carbon storage described, and trade-offs clearly articulated?

Natural fire regimes vary dramatically across forest types and regions. Lodgepole pine (shown) are adapted for infrequent, stand-replacing fires for regeneration. Other forest types, including ponderosa and longleaf pine, are maintained by more frequent, low-intensity ground fires (Alder Fire, Yellowstone National Park, 2013). Photo: Mike Lewelling/NPS.

6.3.4. Invasive Species and Pests

Climate change is expected to affect invasive species and pest concerns in a variety of ways. Changing climatic conditions can allow new pests to colonize an area as conditions become more suitable. The damaging effects of some invasive species (as well as native pests and pathogens) may become more pronounced under climate change through several mechanisms. For example, the lengthening of the growing season allows more generations of insects to emerge in the same year and can contribute to higher rates of population growth. Similarly, aquatic invasive species will typically grow faster in warmer water, which may further increase negative impacts on native species. Climate-related changes in disturbances, such as uncharacteristically severe fires, drought, or increased flooding and erosion, may enable invasive species to gain a foothold in disturbed areas. Finally, climate-related stress (e.g., from drought, heat waves) can also make trees more vulnerable to pest outbreaks and can affect the ability of tree species to regenerate, changing the trajectory of forest recovery following pest-related tree mortality events. Forest plan revisions should acknowledge these concerns, describe which are the most relevant to the particular forest (or portions thereof), and describe how invasive species and forest pest issues will be addressed within the context of changing climatic conditions.

Plan components should consider that many types of invasive plants and animals, as well as native and nonnative pests and pathogens, may be favored by and thrive in altered climatic conditions. Accordingly, plans should describe how the Forest Service will monitor and manage for these increasing risks and challenges. For example, creation of a climate-informed "watch list" can offer an opportunity to proactively target early detection and rapid response efforts toward harmful species that may find the plan area newly suitable under future climatic conditions. The plan should also consider how to treat native species not currently found in the plan area but that might become established under future climatic conditions. Although such species (sometimes referred to as "neo-natives") may not be part of the plan area's historical or current species assemblage, such range-shifting native species may become desirable elements of the future landscape, particularly as other climate-vulnerable species shift out of the area. Such "neo-natives" should therefore not automatically be regarded as undesirable invaders and targeted for control and eradication, but rather assessed from the perspective of the potential benefits and risks their establishment poses to other elements of the forest's biodiversity and ecosystem services. Plans should also describe the connections among management history, climate change, the magnitude of the invasive/pest/pathogen impact, and wildfire risk (e.g., cheat grass driving altered fire regimes in some ecosystems).

Invasive Species

- Does the plan identify how climate-related changes may affect the distribution, spread, and ecological/economic impact of existing invasive species and pests/pathogens?
- Does the plan identify potential new invasives or pests that may colonize and spread on the forest under projected future conditions?
- Does the plan call for development and deployment of climate-informed early detection and rapid response protocols to address potential new invasions of harmful species?
- Does the plan describe what management approach (e.g., acceptance, eradication) would be employed to address the movement of "neo-natives" (i.e., native species experiencing climate-driven range shifts) into the forest plan area?
- Do other plan elements (e.g., fire, timber management) address the increasing risk from climate-fueled invasive spread onto disturbed sites?

Timber harvest levels should account for how climate change may affect tree productivity, mortality, and regeneration (Kaibab National Forest, Arizona). Photo: Lance Cheung/USDA.

The role of nonnative species and the development of so-called novel ecosystems is challenging, and will become more so as climate change alters the composition and functioning of many biological communities. The plan should describe a clear process for assessing risks and impacts from current and potential future invasives to set priorities for invasive species control and management efforts, prioritizing those capable of undermining key ecological processes and system resilience, or threatening at-risk and other native species. Ultimately, however, it may be necessary to acknowledge that certain invasives are or may become permanent components of the ecosystem, reflecting and/or contributing to broader patterns of ecosystem transformation.

6.4. SOCIAL AND ECONOMIC SUSTAINABILITY

A wide range of topics may be covered in the social and economic sustainability portion of forest plans, ranging from energy and infrastructure to outdoor recreation and grazing. Given the restoration focus of this guide, we address two in particular: timber harvest and the role of partnerships.

6.4.1. Timber Harvest

Wood production was a core rationale for the creation of the National Forest System and has long been a dominant land use on the national forests. Over time, however, the role of timber harvest on national forests has come under intense scrutiny, particularly given the widespread ecological changes that have resulted from past logging practices. As a result, the timber harvest element of a forest plan, including the designation of "suitable" lands for harvest and forecasts of sustainable harvest levels, is often one of the most hotly debated portions of the plan.

Timber harvest is important as a commercial activity on many forests, supporting local and regional economies and providing jobs and tax revenue for surrounding communities and counties. Timber harvest is also used to achieve other forest management objectives, including ecological restoration, wildfire risk reduction, and water supply protection. The impacts of climate change can have a direct impact on timber resources, both through affecting the extent and severity of disturbances (e.g., drought, fire, pests) and tree mortality, as well as the growth rate, productivity, and regeneration capacity of the forest system. Notably, the ability of seedlings to become established post-harvest

may be a particularly climate-sensitive process. Forest plans are expected to identify which lands are "suitable" for regularly scheduled timber harvests, but harvest may also occur on other lands if they are designed to meet other plan goals, including restoration and resilience. Plans are also expected to identify sustainable levels of timber harvest, and specifically the sustained yield limit (SYL), which is the amount of timber, that "can be removed from a forest annually in perpetuity on a *sustained-yield basis*" (16 U.S.C. § 1611; 36 CFR § 219.11(d)(6)). Notably, SYL is intended not as a target, but rather an upper limit on harvest. The plans are also expected to identify projected timber harvest levels, however, as well as describe likely methods of vegetation management practices to be used and areas where they are anticipated.

Understanding the potential changes in productivity, mortality, and regeneration of various tree species is key to assessing what timber harvest levels may be sustainable under scenarios of future climatic conditions.[27] Climate change may also affect the

Timber Harvest

- Does the plan clearly articulate the anticipated role of timber harvest (sawtimber and small diameter) for economic purposes versus ecological sustainability/restoration purposes, and relate this to achieving climate-informed desired conditions on the forest?
- Does the plan assess how scenarios of future climate change may affect disturbance factors (e.g., drought, wildfire, pest outbreaks) and tree mortality for harvested species as well as affect growth rates, productivity, and regeneration potential?
- Does the plan consider how the differential effects of climate change on tree species, and related shifts in forest composition, may alter the target of timber harvest over time (e.g., softwood to hardwood, one softwood species to another)?
- Does the plan consider climate change considerations in identifying projected areas "suitable" for timber harvest, including issues related to climate adaptation/resilience (e.g., climate refugia, habitat connectivity, erosion potential) or climate mitigation (e.g., carbon strongholds)?
- Does the plan offer guidelines for on-the-ground practices in timber harvest, post-harvest management, and regeneration that take changing climatic conditions into account, including use of future climate-adapted species in replanting?
- In northern regions, does the plan consider how changes in climatic conditions, especially changes in freeze– thaw cycles, may influence soil damage risks associated with harvest and other management actions?
- Do the timber production figures (including "sustained yield limit") included in the plan take into account scenarios of future climate change on productivity, mortality, and regeneration potential of harvested species?

[27] For a relevant example of how scenarios of future change can be used to assess timber harvest levels, see: Graham, R.T., M.A. Battaglia, and T.B. Jain. 2021. A Scenario-based Assessment to Inform Sustainable Ponderosa Pine Timber Harvest on the Black Hills National Forest. General Technical Report RMRS-GTR-422. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

environmental impacts of different harvest techniques and logging infrastructure. Heavier precipitation events, for example, may exacerbate the erosion potential of different soil types and slopes, increasing sedimentation in aquatic systems, damaging logging access roads, and exceeding the capacity of road culverts.

Timber harvest decisions also have wide-ranging impacts on other forest values and condition measures, such as wildlife habitat, fire risk, and impacts on water quality and quantity. Key components of the planning rule that address timber-related decisions note the need to maintain or enhance ecosystem integrity (36 CFR § 219.8(a)(1)) while also stating that the plan "shall take into account multiple uses [including timber] that contribute to local, regional, and national economies in a sustainable manner" (36 CFR § 219.8(b)(3)).

6.4.2. Partnerships and Stewardship

Successful forest restoration and management depends on strong partnerships along with shared vision and commitment. A great plan without public support and the capacity to carry it out is unlikely to be effective. The success of collaborative processes often hinges on the strength of key relationships and the level of trust that has been developed over time. You can do your part to help foster these relationships by participating early and often in the planning process.

Many national forest staff are realizing the potential for nonprofit groups, community partners, and volunteers to help compensate for insufficient budgets. Forest plans should include policy that encourages and streamlines the process of utilizing this outside capacity, particularly as it relates to ecological restoration work, public education, and scientific expertise. This includes not only the capacity to perform work on the ground, but also the expertise that can be obtained through partnerships with universities, nonprofit organizations, and corporate entities to ensure that the best available science continues to guide forest management decisions. This aligns well with the USDA and Forest Service core values of participation and collaboration. Additionally, the 2012 Planning Rule requires opportunities for public participation and encourages collaboration throughout the assessment, planning, and monitoring phases.

Climate change and the movement toward landscape-scale management will make partnerships even more important as we attempt to tackle issues that transcend political boundaries (e.g., fire management, invasive species, watershed restoration). Plans should emphasize the importance of connectivity beyond the forest boundary, the role of cooperation/collaboration, and describe how key relationships will be fostered.

Successfully implementing forest restoration over large landscapes depends on broad stakeholder engagement and collaborative partnerships (Lolo National Forest, Montana). Photo: Skip Kowalski.

6.5. OTHER PLAN ELEMENTS OF INTEREST

6.5.1. Plan Monitoring Program

One of the major changes in the 2012 Planning Rule is the emphasis on adaptive planning and adaptive management. This process recognizes that uncertainty abounds in natural resource management, particularly when attempting to manage at the ecosystem level, and this is particularly important in an era of climate change. The 2012 Planning Rule requires a plan monitoring program that, at a minimum, addresses eight required elements (see Box 2). Of particular note is the requirement to document measurable changes to the forest and its resources related to climate change and other stressors, recognizing that the monitoring approach must be "within the financial and technical capability" of the Forest Service.

An adaptive process is not only vital to sound forest management, but also underlies the process for climate adaptation. Indeed, adaptation planning is an iterative process that mirrors in many ways the adaptive management cycle. For this reason, comments on the monitoring section should recommend that the plan be periodically reviewed (including desired future conditions) to ensure that management goals and objectives are still feasible and have not been compromised by changing conditions. Because management approaches and strategies can be expected to evolve over time (particularly where ecological transformations are expected), an important element of the monitoring framework is the identification of thresholds for documenting system change and determining when a shift in strategy or policy may be warranted. These can either be ecological thresholds (i.e., a point where there is an abrupt change in system quality or property), decision/management thresholds (i.e., where a change in management practice is triggered), or a combination of the two.

Box 2. Required Elements for the Plan Monitoring Program

Forest plans are expected to contain one or more monitoring questions that address the following topics.

- The status of watershed conditions
- The status of ecological conditions, including key characteristics of terrestrial and aquatic ecosystems
- The status of focal species
- The status of the ecological conditions necessary to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern
- The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives
- Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area
- Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities and social, economic, and cultural conditions
- The effects of management activities to determine that they do not substantially and permanently impair the productivity of the land

In reviewing the plan monitoring program, you should consider whether the questions posed are likely to produce informative and management-relevant information, and whether they are sufficiently ambitious, and whether the approach for conducting the monitoring fully engages appropriate partners in other agencies, academia, and the private sector. And while there is a specific "climate change" topic on this list, changing climatic conditions will influence virtually all of the other issue areas, so you should consider whether the monitoring approach in those instances adequately incorporates climate considerations.

6.5.2. Plan Appendices

In addition to the areas listed above, it is important to review forest plan appendices for additional areas where language supporting climate-smart forest restoration can be encouraged, particularly appendices related to management approaches, possible actions, and vegetation management practices. Verify that relevant information in the appendices aligns with and does not contradict the main body of the plan. Importantly, language in the appendices does not carry the same weight as language in the actual planning document. As such, we advise advocating for language supportive of climate-smart forest restoration to be moved from the appendix into the actual planning document, if it is not already there. Such a statement in an actual comment letter might look similar to the following:

> *While the [specific directive] in Appendix X contains positive language, we do not believe that the appendices are an appropriate place for such commendable language that promotes climate-smart forest restoration. As such, we suggest that this directive be moved into the [specific section or sections] of the Draft Forest Plan.*

6.5.3. Environmental Impact Statements

Where issues related to climate-smart forest restoration are mentioned in the Draft Forest Plan, ensure that they are also mentioned in the accompanying environmental review document (Environmental Impact Statement, or EIS). If they are not, it could indicate that there is no actual intent to take the actions/approaches indicated in the plan. For example, when the desired condition is defined based on a goal of optimizing carbon stocks forest-wide, one should find corresponding language in the EIS that discusses management actions intended to increase the long-term carbon storage capacity throughout the plan area. In preparing your comments, take the time to ensure that the EIS contains language that is consistent with, complements, and reinforces forest plan components.

Like the appendices, strong and substantive language included in the EIS will carry more weight if it is also included in the plan. As such, we advise advocating for language supportive of climate-smart forest restoration and management to be included in the actual planning document as well as the EIS.

6.6. HOW TO FORMAT COMMENT LETTERS

Be assured that there is no right or wrong way to format comment letters. Although the planning process has formal requirements for the agency to follow, all timely comments received through the proper channels are taken into account. Nonetheless, with thousands of comment letters arriving for review, submitting a clear, well-supported letter is strategic and helpful. The Forest Service is required to base planning decisions on the best available science, so clear, consistent citations (ideally accompanied by easily copy–pasted URLs) are helpful and influential.

Climate change poses increasing risks to our national forests, but climate-smart approaches to restoration can help ensure the sustainability and resilience of these vital lands and waters (Lolo National Forest, Montana). Photo: Dave Gardner Creative/National Forest Foundation.

7.CONCLUSION

This guide provides resources for offering public input and comments on national forest plan revisions, with a specific focus on climate-smart forest restoration. While the document focuses on commenting on prepared plans, the effect and influence of public involvement can be amplified by getting involved as early as possible in the planning process, well before the plan is written. This guide is by no means comprehensive, and it is important to note that each plan will be different. However, in general, most plans will likely include similar categories and opportunities to advocate for climate-smart forest restoration and management on national forest lands for the long-term benefit of forest health. We encourage you to peruse the suggested resources in the Appendix.

Effective participation in the forest plan revision process can seem daunting, but it is a timely and valuable opportunity to make a difference. Although the National Forest Management Act requires that forest plans be revised at least every 15 years, this virtually never happens, and many plans remain in effect for decades. Thus, by engaging in the plan revision process when it does happen, and expressing your values and concerns to the Forest Service, your input will help shape management and conservation actions for many years into the future.

This document is intended to help you better understand the planning process as it relates to climate-smart forest restoration and turn your interests into strong, substantive comments. We caution you not to let the scale of this task nor the desire for perfection prevent you from getting involved with the process. And, after you contribute to the forest plan revision, we hope you will be motivated to stay involved as the plan is implemented, becoming part of a collaborative process for learning and adaptation. As climate change continues affecting our national forests, your involvement in the forest planning process can truly make a difference in sustaining these vitally important lands now and into the future.

Forest plans are in need of revision on many national forests, including the Bridger-Teton where the plan was last updated in 1990 (Bridger-Teton National Forest, Idaho). Photo Nate Lowe/USFS.

APPENDIX: SUGGESTED RESOURCES

STATUTES, REGULATIONS, AND GUIDANCE

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