Chapter 2

Management Recommendations

Chapter 2 presents 10 key recommendations for improving land management plans to support communities and ecosystems in the BioA area. The recommendations provide a focused snapshot of the most urgent or widespread community needs and ecological issues. We recognize that the social, economic, and ecological challenges across this landscape are complex and will likely require solutions that go beyond what can be achieved by modernizing land management plans. However, these recommendations offer a step forward by identifying what can be influenced by land management planning on national forests and grassland in the BioA area.

The integrated recommendations in this chapter are based on the opportunities, challenges, and geographic considerations that you'll read about in chapters 3 through 5, as well as the contributions to communities discussed in chapter 1. This chapter weaves together key findings, while drawing out connections to people and their communities to present a cohesive, integrated set of recommendations for Forest Service land management planning across the BioA area. The recommendations intentionally don't address the details of exactly how they would be incorporated and implemented into land management plans. We'll engage with our publics and stakeholders as we move along in the planning process and then accomplish that greater level of planning detail. These recommendations don't involve all issues that might be addressed in future planning. Additional findings and recommendations that did not rise to a level of urgency or those that did not affect multiple national forests and grasslands will be considered when individual national forests and grasslands in the BioA area conduct their assessments.

Throughout the rest of this assessment, you'll notice that findings are organized under the following five broad categories. These categories represent the key social, economic, and ecological challenges facing our existing land management plans and illustrate linkages and opportunities for integration across the recommendations. We developed the categories after assessing current conditions and trends using the best available science and monitoring and implementation results as well as what we heard during the public listening sessions held in 2015 and the Forest Service meetings in 2019.

Ecological Integrity. Maintain and enhance the sustainability of our terrestrial and aquatic ecosystems so they continue to deliver important benefits.

Fire and Fuels. Manage fire and fuels for increased compatibility with natural processes, while continuing to prioritize human health and safety.

Sustainable Timber. Provide sustainable timber and forest products to local communities, while contributing to ecological restoration needs.

Habitat Management. Address habitat management to promote the recovery of federally listed species and the persistence of other species at risk.

Sustainable Recreation. Provide recreation opportunities that are sustainable considering increasing demand and the changing nature of recreation patterns.

RECOMMENDATION 1—*MAINTAIN AND RESTORE ECOSYSTEM CHARACTERISTICS AND PROCESSES BY WORKING TOWARD DESIRED CONDITIONS THAT ARE COMPATIBLE WITH THE DIVERSE LANDSCAPES ACROSS THE BIOA AREA.*

For the past few decades, conditions associated with invasive species, wildfire, and climate change have affected the sustainability of our national forests and grasslands in the BioA area, and their ability to provide the numerous benefits described in chapter 1.[17] **The water we drink, the air we breathe, the food we gather and eat, and the places where we recreate and enjoy spiritual renewal, depend on the sustainability and integrity of our national forests and grasslands.**

The ability of ecosystems to persist in the face of stress or pressure and continue providing benefits into the future depends on their ecological integrity (figure 2-1). However, ecological integrity is compromised across much of the BioA area (chapter 4, Ecological Integrity). We need to restore ecosystem processes, such as fire, and characteristics, such as the distribution and extent of major vegetation types, tree species diversity, forest structure, stream connectivity, density and size of dead wood, water quality and quantity, and habitat connectivity. Ecosystems have integrity when these characteristics are resilient to fire and climate change and function at multiple scales.

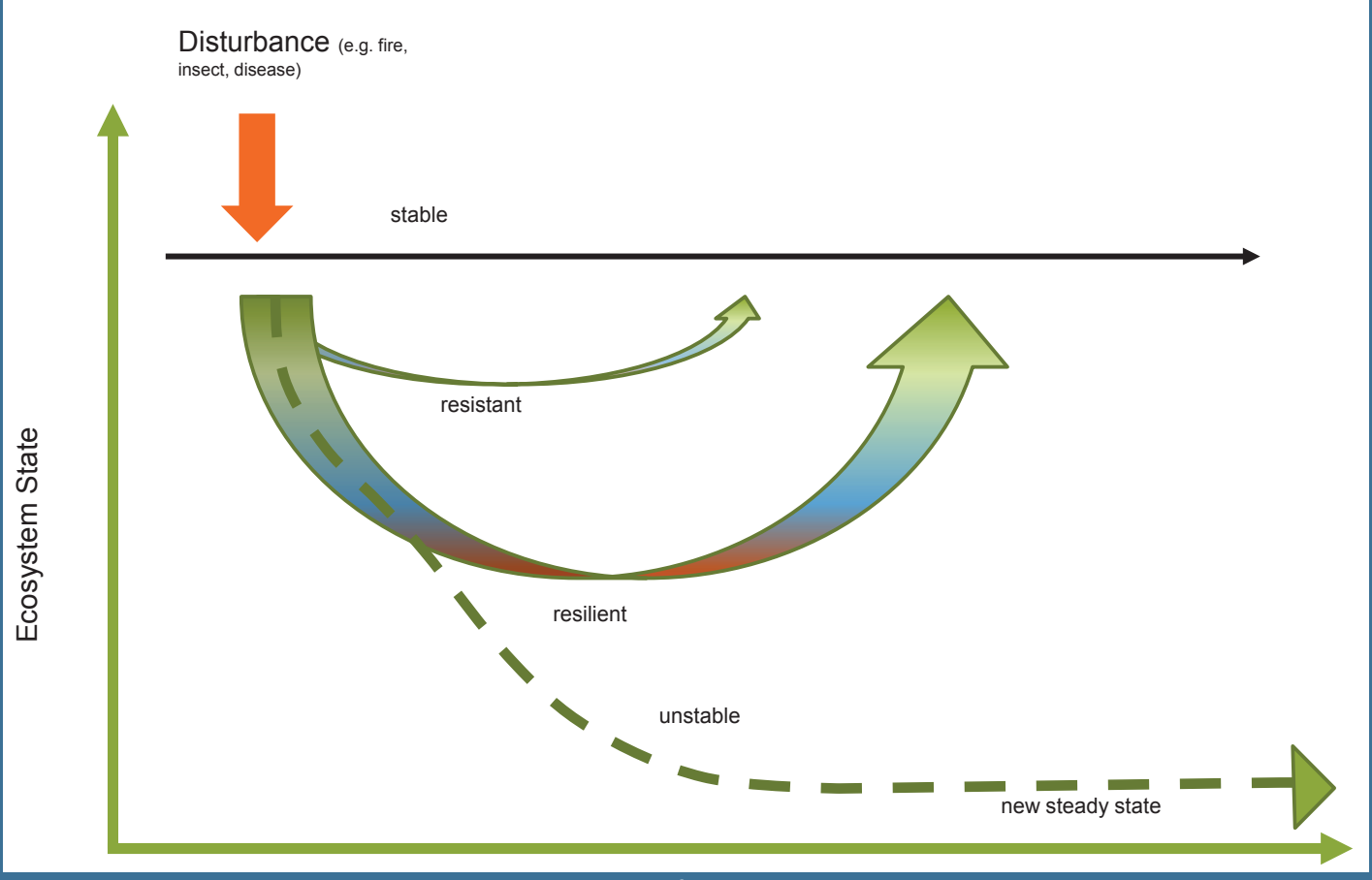


Figure 2-1—When a disturbance occurs, even a natural one like fire, drought, insects, or disease, an ecosystem responds in different ways. The ecosystem can be resistant (very little change occurs, and the system stabilizes quickly), resilient (more change occurs but the ecosystem stabilizes eventually), or unstable (ecosystem changes completely). One example of this is a frequent-fire dependent forest historically dominated by ponderosa pine that now has dense stands of white fir or grand fir. The forest could experience a low-severity ground fire and change very little (resistant), or it could experience a mixed-severity fire and take years to recover, but eventually return to a conditions resembling those before the fire. Finally, a large high-severity fire could burn a large area of forest to the ground with the ecosystem unable to regenerate ponderosa pine, instead transitioning to a fir-dominated forest or a grass or shrubland ecosystem (unstable). This figure does not incorporate climate change, changes in land use, or social factors. Adapted from Franklin and others 2018.

[17] Spies and others, 2018; Long and others, 2014; Dumroese and others, 2018.

One of the factors limiting our ability to maintain and restore ecological integrity is existing plan direction that is not always compatible with the diversity of ecosystems across the BioA area (figure 2-2) (chapter 4, Ecological Integrity and Habitat Management). For example, current direction related to tree age and size in the NWFP and the Eastside Screens[18], which promote old-growth forests, might be appropriate in some instances but can create barriers to implementing appropriate management when applied using a one size fits all approach. While existing plans have been effective at stemming the loss of dense, multi-layered old-growth habitat and providing habitat connectivity (chapter 3, Ecological Integrity and Habitat Management), it has been at the cost of ecological integrity in some areas.[19]

"The science of the NWFP did not adequately deal with substantially different ecology of forests and landscapes of the dry forest zone, which comprises almost half of the NWFP area."

Spies and others 2018

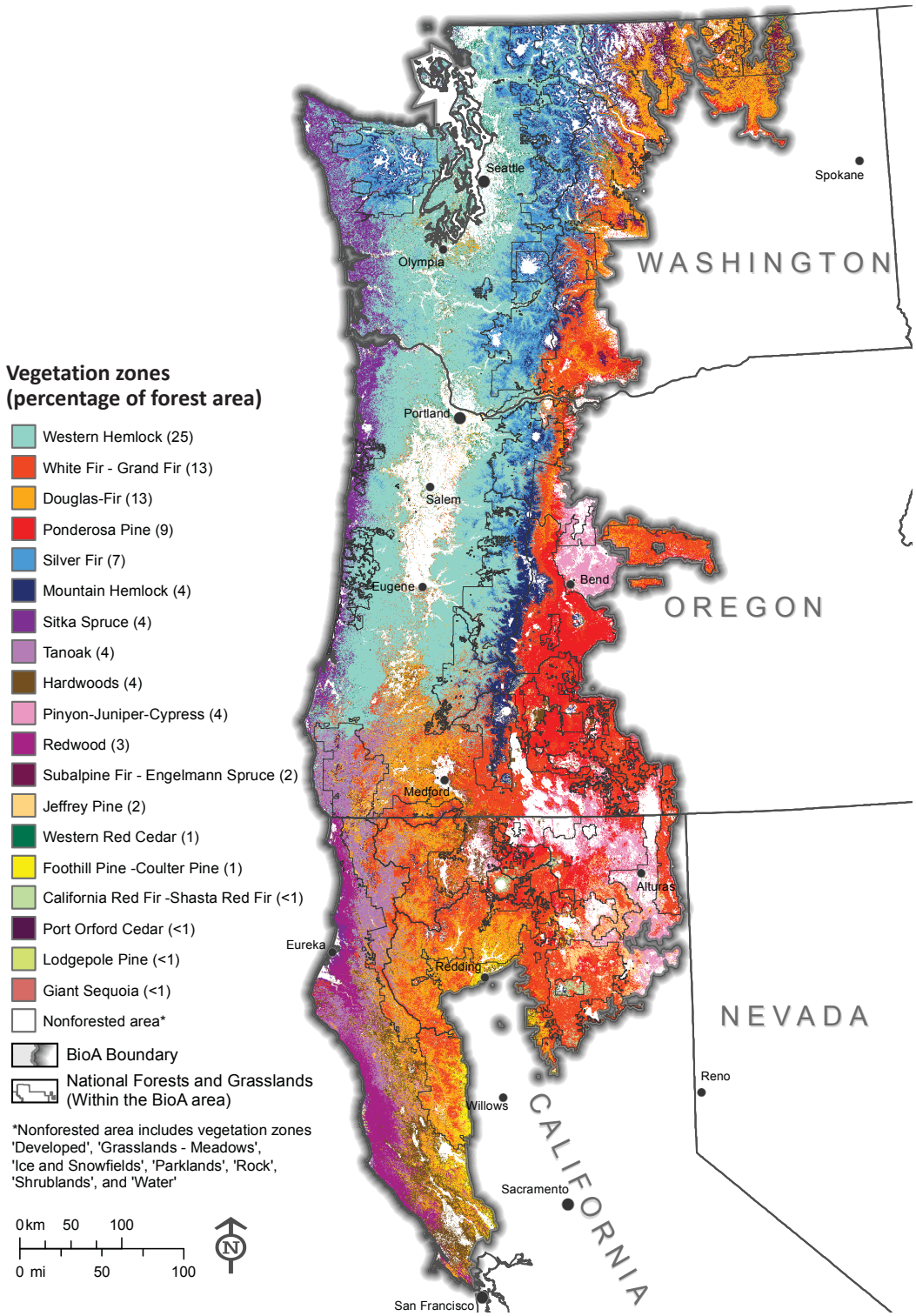


Figure 2-2—There are the broad and diverse vegetation zones within the BioA area. The zones are named for the main tree species and indicate the potential of the land to support ecosystems and produce resources. The categorization is a framework for the intersection of climatic and productivity gradients across the landscape, including disturbance—notably fire.

[18] USDA Forest Service, 1995.
[19] Spies and others, 2018a.

Some incompatibility between plan direction and our goals for achieving ecologically resilient landscapes is found across the BioA area but is particularly acute in the frequent-fire dependent ecosystems of the Klamath Mountains, Southern Coast Range (California) and on the eastern side of the Cascade Mountains (chapter 5, Ecological Integrity and Fire and Fuels). An extensive build-up of flammable vegetation, increasingly dense forests, and changes in tree type and patterns all contribute to uncharacteristic effects from wildfire and insects and disease that can impact local communities as well as important habitat and other resources.

Ecosystem-specific desired conditions that support the natural capabilities of the land will better ensure that we are managing for ecological integrity and the long-term sustainability of habitats, which includes incorporating the natural role that fire, insects, disease, and other processes play. Desired conditions should incorporate the best available scientific information for example, Pacific Southwest Research Station's report, *An Ecosystem Management Strategy for Sierran Mixed-conifer Forests*[20] about the amount, type, size, and arrangement of vegetation in forested and non-forested landscapes.

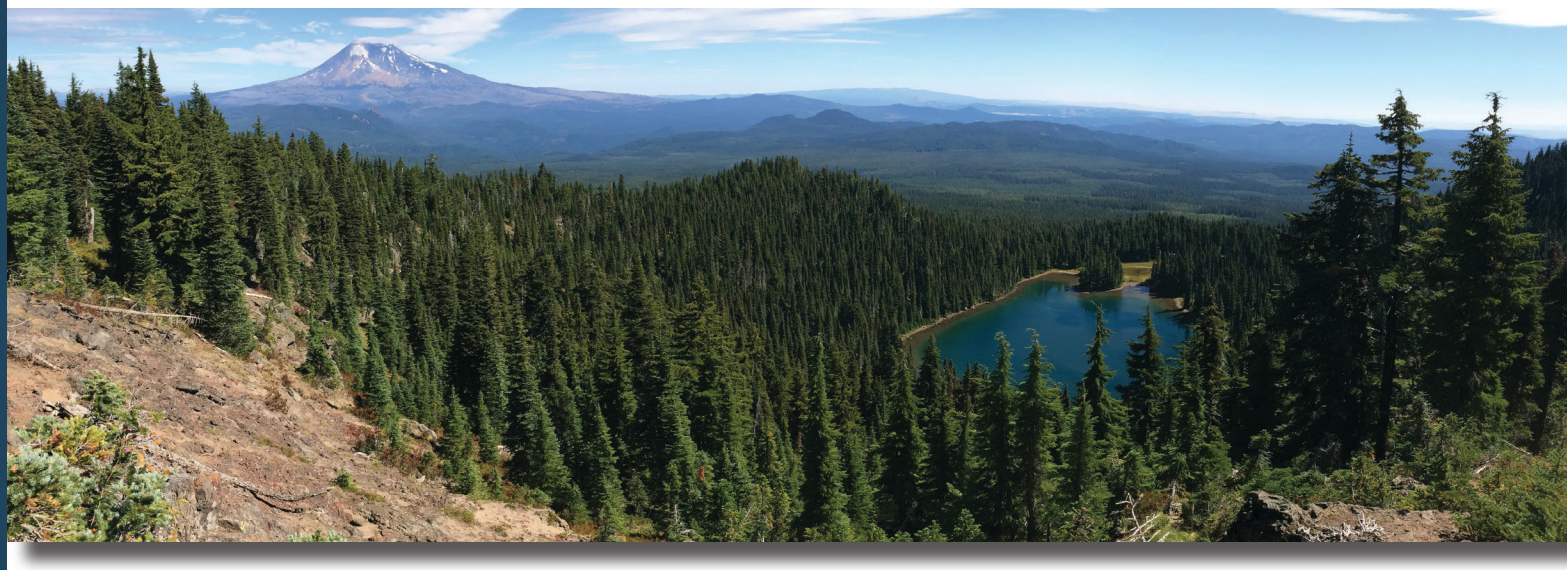
Desired conditions that address the diversity of ecosystems across the BioA area and promote the resilience of those ecosystems will be a strong foundation for land management plan direction that will guide us toward ecologically sustainable landscapes. We can then build other plan direction to support ecological integrity as well as benefits like clean air and water, recreation, forest products, carbon storage, and cultural connections.

Resilient Ecosystems and Ecological Integrity

A resilient ecosystem maintains key functions and processes in the face of stress or pressure, which is a key component of ecological integrity. Less resilient ecosystems are slower or less likely to recover from disturbances. Resilient ecosystems maintain important processes, like fire, which are sources of renewal and function across multiple scales.

One method to estimate if a landscape is resilient to disturbance is by comparing existing forest structure, species composition, and landscape patterns to reference conditions, such as a natural range of variation. Significant differences indicate a loss of resiliency. Understanding reference conditions provides critical insight to help ensure that management practices will lead to increased resiliency and flow of resources. For example, knowing reference conditions could provide percentages for how much old, mid-aged, young, and early-seral forest would be on the landscape if that landscape were resilient to natural stressors, like fire.

However, ecological resilience is not always a desired condition. In fact, ecological resilience might directly conflict with desired conditions. For example, ecologically resilient forests might host wildfire near homes and important infrastructure like telecommunication sites or powerlines. These are cases when a natural process that is part of maintaining ecological integrity is not desired. We can use concepts like ecological integrity and resilience as anchors for management and desired conditions, but they have limitations in the context of communities, changes in climate, and land use.



[20] North and others, 2009.

RECOMMENDATION 2—*ADDRESS THE DYNAMIC NATURE OF ECOSYSTEMS TO BETTER RESPOND TO FUTURE ENVIRONMENTAL UNCERTAINTIES.*

The dynamic nature of ecosystems means that goals for reserves should likely include a range of successional stages and, in some cases, adjustments to reserve boundaries. For example, the needs of some species associated with old forests that experience dynamic disturbance events are not being met by the static boundaries of late-successional reserves.[21] Managing large reserves as dynamic mosaics of vegetation conditions that meet the needs of various wildlife species as well as goals for resilience to climate change and fire might better align with current goals.

Ecosystems naturally change across time; we need plan direction that is tied to the characteristics that define these ecosystems. Such land management direction is more adaptable to the dynamic systems we steward. In addition, our growing knowledge about how to enhance and retain old-growth forest habitats tells us that land management plans must adapt to changing desired forest characteristics like tree age and size. Incorporating climate change refugia into reserve networks and aligning late-successional reserves with late-seral habitat can proactively address habitat management given future uncertainties (figure 2-3).

"In recent years, the frequency and severity of pest and wildfire events are unlike what we have experienced in the past, forcing us to reexamine our land and fire management policies and practices."

California's Forest and Rangelands: 2017 Assessment

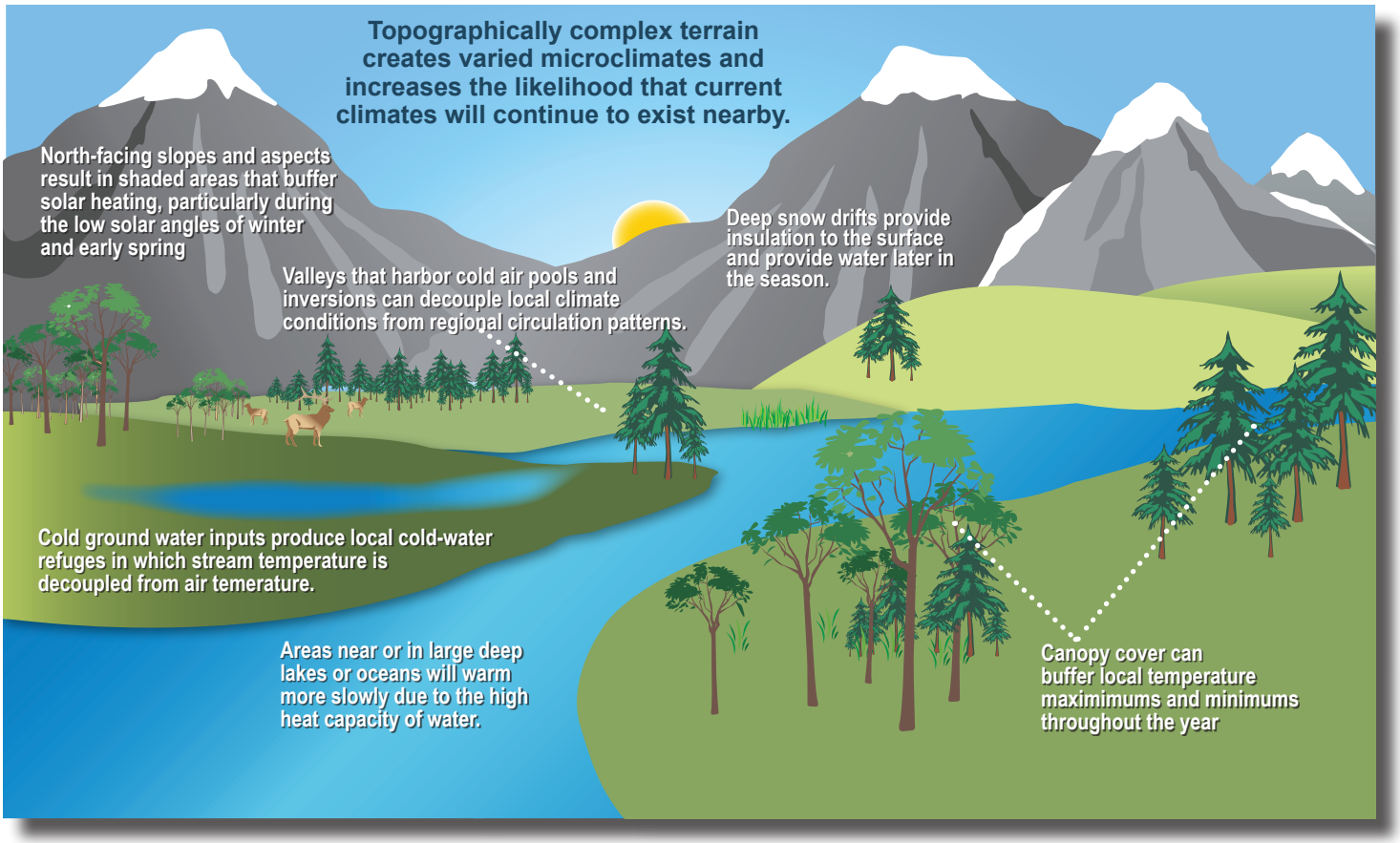


Figure 2-3—Climate change refugia principles and examples of refugia that might experience reduced rates of impact from climate change. Source: Morelli and others. (2016). After Spies and others. 2018.

[21] Marcot and others, 2018.

Climate change adaptation and mitigation strategies are not directly addressed under existing land management plans and maintaining and restoring natural processes is often difficult. A changing climate is expected to impact ecosystems, biodiversity, and the delivery of benefits to people.[22] As we work to modernize the plans, we have an opportunity to include direction[23] (chapter 3, Ecological Integrity) that enables us to meet a changing climate with ecologically resilient landscapes. Within the BioA area, the effects of climate change are anticipated to be the greatest in northern California, southern Oregon, the eastern Cascades, and high-elevation zones (chapter 5, Ecological Integrity).

While our knowledge about national forests and grasslands and the communities that we serve has grown, large uncertainties remain.[24] By improving how we integrate future uncertainty into our land management planning direction, we will be better positioned to manage ecosystems in the face of anticipated change. **Risk management, adaptive management, and monitoring are tools we can use to address complex social and ecological issues given an uncertain future.**[25] Adaptive management areas were designated in the NWFP but are rarely used, so goals associated with learning from adaptive management were not met. It will be important to incorporate and implement adaptive management processes, risk management, and monitoring into future land management plan direction.

"The response of forest and range ecosystems to a changing climate is one of the greatest challenges confronting California"

California's Forest and Rangelands: 2017 Assessment

Testing and evaluating new, highly integrated conservation strategies could help us deal with uncertainties and knowledge gaps related to fire, climate change, invasive species, tradeoffs between ecosystem and species goals, and between ecological and social components.[26] Incorporating contemporary management concepts and tools could help us manage ecosystems to move toward resilient states and reduce risks associated with uncertainty. Creating plan scenarios or processes that are triggered under various circumstances could also help. Using a variety of management approaches and courses of action will likely be the best way to minimize risk and enable future learning.[27]

[22] Reilly and others, 2018.
[23] Reilly and others, 2018.
[24] Spies and others, 2018b.
[25] Spies and others, 2018b.
[26] Spies and others, 2018b.
[27] Reilly and others, 2018.

RECOMMENDATION 3—*UPDATE AND INTEGRATE EXISTING AQUATIC DIRECTION FROM MULTIPLE AQUATIC STRATEGIES.*

Healthy, functioning watersheds and the aquatic and riparian ecosystems within them are critical to providing key benefits to people and ecosystems, as described in chapter 1. The Aquatic Conservation Strategy is working well, is functionally sound, and provides a solid foundation, with opportunity for improvements, to move into future land management planning efforts[28] (chapter 3, Ecological Integrity). National forests and grasslands in the BioA area, including those outside of the NWFP area, also have well-functioning aquatic direction that addresses the need to provide beneficial habitat and water quality.

Designation of riparian management areas—a cornerstone to the Aquatic Conservation Strategy, Sierra Nevada Framework Aquatic Management Strategy, and PACFISH and INFISH strategies—has resulted in a trend toward watershed improvement across the BioA area. Although climate change projections suggest a trend of warmer stream temperatures, which cause water to hold less oxygen, 20 years of monitoring data are showing cooler stream temperatures, which indicates improving stream conditions within the NWFP area.[29] Cooler stream temperatures might be a result of increasing tree cover along streams, which helps to buffer stream temperatures against climate change.

At the same time, managing aquatic and riparian ecosystems in the BioA area under the above strategies has created multiple process and analysis requirements that have increased Forest Service planning costs, while agency budgets and workforce have declined (chapter 4, Habitat Management). For example, in areas where both PACFISH and the NWFP apply, the consultation, reporting, and analysis requirements of both must be met. By developing one consolidated strategy for managing aquatic and riparian systems across the BioA area, we can increase efficiencies while retaining the effective qualities of the current strategies.

Active Management—direct interventions to achieve desired outcomes, which may include harvesting and planting of vegetation and the intentional use of fire, among other activities.

Spies and others 2018

Existing strategies have been successful at addressing aquatic and riparian conservation issues at the appropriate scale, as well as taking an ecological approach to managing habitat to support species viability. It will be important to bring these successful approaches forward and to consider how complementary land allocations—for example, riparian reserves, late-successional reserves, and congressionally-designated areas—work together to protect and restore aquatic habitat and watersheds.

Land management planning direction that considers natural processes and future uncertainties is vital for aquatic and riparian systems. For example, promoting fire regimes that result in fewer large, uncharacteristic wildfires can help maintain the resiliency of aquatic systems.[30] Modernizing the land management plans in the BioA area should also address impaired waters and aquatic invasive species, which have emerged as a threat and are expected to increase as a result of factors such as climate change and human activities.[31]

Riparian areas are generally managed passively using natural process and minimal intervention. However, by clearly defining the desired conditions, we can identify where active management, such as harvesting, planting vegetation, using fire, and other activities,[32] is needed. Sometimes, for example, when dealing with non-native species, passive management might even hinder the restoration of aquatic and riparian ecosystems.[33]

By bringing forward the successful components of existing strategies and plan direction, improving direction based on what we have learned, and developing one consolidated strategy across the BioA, we can ensure effective and efficient management of watersheds, and their aquatic and riparian ecosystems.

[28] Reilly and others, 2018.
[29] Miller and others, 2017.
[30] Hunsaker and others, 2014.
[31] Reeves and others, 2018.
[32] Spies and others, 2018.
[33] Reeves and others, 2018.

RECOMMENDATION 4—*REDUCE THE INTRODUCTION AND SPREAD OF EXOTIC PLANT, ANIMAL, AND OTHER INVASIVE SPECIES.*

The effects of invasive species are one of the primary concerns associated with maintaining ecological integrity across the BioA area (chapter 4, Ecological Integrity). Our understanding of the ecological and economic impacts of invasive species has greatly increased during the past few decades. Invasive species can have widespread social, economic, and ecological impacts, including negative impacts to native species, permanent ecological changes, reductions in water quality, altered fire regimes, degradation of forage quality, adverse effects on human health and well-being, and economic losses.[34]

Existing land management plans are quite limited in addressing potential impacts of invasive species; they focus primarily on invasive plants. However, the term "invasive species" includes terrestrial and aquatic insects, animals, and pathogens that have moved into habitats or areas where they previously did not exist. An example of an invasive species is the barred owl, which has invaded the range of the northern spotted owl and has become one of the major factors affecting the recovery of spotted owls (chapter 4, Habitat Management). Direct management of most animals, including the barred owl, is outside the authority of the Forest Service. However, land management plans should address the need to manage habitats to reduce opportunity for competition between native and invasive species and prevent the introduction of invasive species.

Land management plans in the BioA area should address the need for proactive invasive species management by integrating invasive species ecology and management direction with overarching desired conditions related to forest ecology. In addition, plans need to include approaches for increasing invasive species prevention and control efforts, such as early detection and rapid response, frequent inventories, and increased interagency coordination. Because invasive species are a landscape-level issue that crosses administrative boundaries, creating consistency in plan direction across the BioA area would improve efficiency and effectiveness of treatment strategies by making it easier to coordinate and share resources within the Forest Service. Managing and preventing invasive species is not something that the Forest Service can do on its own. **Having consistent invasive species management direction in the BioA area promotes shared stewardship and enhances the ability to work with other agencies and private landowners to manage invasive species across multiple jurisdictions.**

[34] Long and others, 2014.

RECOMMENDATION 5—*PRIORITIZE COMMUNITY AND FIREFIGHTER SAFETY IN FORESTED AREAS NEAR COMMUNITIES AT RISK FROM WILDFIRES.*

The population of the region continues to grow, and people are increasingly choosing to live within and adjacent to national forests and grasslands. During the past few decades communities have experienced some of the largest and most impactful fire seasons in recent memory. As the amount of wildland-urban interface has increased, so has the risk of wildfire impacts to people and communities (figure 4-5). Wildfire can have significant effects on public health and safety and community economics by impacting air and water quality, the supply of power, recreation opportunities, and travel and transportation. **Although fire plays a key ecological role in national forests and grasslands, wildfire often occurs in places and at times that are not desired.**

The cost of suppressing increasingly complex wildfires continues to climb, consuming valuable time and resources that could otherwise be used to work toward land management objectives for the benefit of local communities and the public. Of the national forests within the BioA area, 10 are in the top 40 that have the highest wildfire risk across the country,[35] and eight are in the top 25 that have the highest wildfire suppression costs.[36] Emphasizing strategic risk management, especially in places on the landscape where it is most needed and effective, might help alleviate some of the imbalance.

"Fire risk' comprises the likelihood of a wildfire, its intensity, and its positive or negative effects."

– Toward Shared Stewardship: Across Landscapes (2018)

Some current land management plan direction emphasizes ecological and wildlife habitat objectives in places where they are incompatible with effective wildfire-risk mitigation (chapter 4, Fire and Fuels Management). Although most ecological and wildlife habitat objectives are compatible with wildfire risk mitigation, incompatibilities that do exist hinder effective hazardous fuels reduction in certain circumstances, particularly in portions of some designated late-successional reserves. Plan direction for late-successional reserves includes provisions for risk reduction activities; however, the risk is narrowly defined as risk of loss for late-successional habitats. The definition of risk needs to include risks posed to communities in addition to ecosystem integrity.

Land management plans need to better address strategic wildfire -risk mitigation in and around communities and in the wildland-urban interface. We need to better align fuels and fire management objectives with land management allocations, including options for active management. This also includes ensuring land use allocations support management activities to reduce the risk around critical infrastructure, such as powerlines and telecommunication sites.

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

– Toward Shared Stewardship: Across Landscapes (2018)

Having a risk-based framework in our land management plan direction would allow for management of key ecological and wildlife characteristics, while at the same time emphasizing critical risk mitigation in the places and at the times where it is most needed. A key example of a management challenge is the apparent conflict between the objectives of addressing fire risk and maintaining habitat for northern spotted owl. Wildfire-risk assessments provide a quantitative approach to identifying and prioritizing treatments around communities and infrastructure, to restoring focus areas on the landscape, and to providing appropriate response to wildfires (chapter 5, Fire and Fuels Management).

[35] Dillon and others, 2015; Dillon, 2017; Dillon In Press.
[36] Thompson and others, 2015.

RECOMMENDATION 6—*RECOGNIZE THAT FIRE IS A NATURAL PROCESS AND PLAYS AN IMPORTANT ROLE IN REDUCING THE RISK OF UNCHARACTERISTIC FIRE AND IN PROMOTING ECOSYSTEM HEALTH.*

Dating back nearly a century, the Forest Service has suppressed most wildfires, fearing resource damage and impacts to private property and communities. During the past few decades, we better understand the vital ecological importance of natural disturbance in many of the ecosystems in the BioA area.[37] Today, we know that fire plays a particularly critical role in shaping the ecology of the forest, shrubland, and grassland ecosystems of the Pacific Northwest and northern California.[38]

"To safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a Nation, live with wildland fire."
National Cohesive Wildland Fire Management Strategy Vision

To restore ecological balance, as well as to promote community safety and resiliency and ecological integrity, **it is essential that we restore natural fire into ecosystems in the BioA area.** In practice, this might require different approaches based on and tailored to conditions within the diverse ecosystems of the broad BioA area. Existing land management plans focus on wildfire suppression and don't fully acknowledge the important ecological role of fire in fire-adapted ecosystems, nor do they adequately promote the use of unplanned ignitions to meet ecological and resource objectives (chapter 4, Fire and Fuels Management). Across the BioA area, and especially in frequent-fire dependent systems, the amount of "good" fire today is only a small fraction of what historically drove these ecosystems (figure 2-4).

- Ecosystems that experience fire frequently are **frequent-fire dependent.**
- Ecosystems that sometimes experience fire are **fire diverse (mixed-severity).**
- Ecosystems that historically haven't often experienced fire are **fire infrequent.**

For full definitions, see Chapter 4, Fire and Fuels Management.

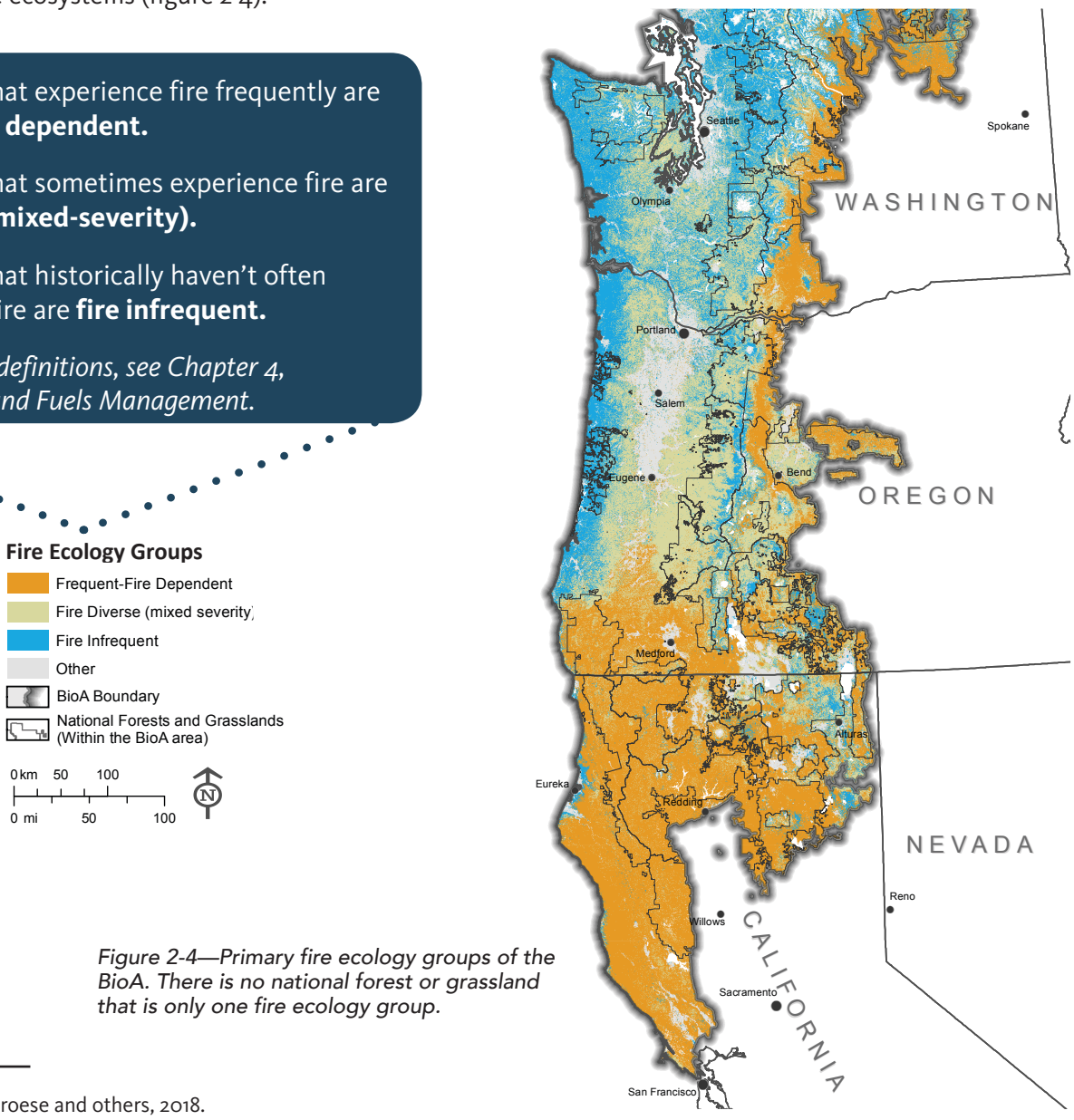


Figure 2-4—Primary fire ecology groups of the BioA. There is no national forest or grassland that is only one fire ecology group.

[37] Spies and others, 2018.
[38] Long and others, 2014; Dumroese and others, 2018.

We acknowledge that fire can pose a significant risk to communities, recreational opportunities, municipal watersheds, important wildlife habitat, private timber lands, and other social values. However, not all fire is bad, and fire is often essential to the long-term function, stability and resilience of ecosystems. These concepts are reflected in the 2014 National Cohesive Wildland Fire Management Strategy, which is the result of a collaborative effort among federal, state, local, governments, Tribes, partners, and stakeholders. The strategy, which aims to comprehensively address wildland fire management across all lands in the United States, is not reflected in existing land management plans in the BioA area.

It is not practical to use only mechanical harvest and prescribed fire to meet landscape resource objectives because of the vast geographic scope of the challenge.[39] Therefore, to help affect landscape-level change and promote broad-scale ecological sustainability, integrity, and resilience, we need to leverage fire, one of nature's own tools, to help restore ecosystems.[40] There are opportunities in our frequent-fire dependent systems to manage wildfires to reduce fuels and improve forest conditions when the fires are safe for firefighters and the public and do not threaten communities or structures. We recognize that conflict can exist between the use of fire and other objectives, like timber production, which we will need address in upcoming planning efforts.

"Use of naturally ignited wildfires to achieve resource objectives is very important because, in most areas, current amounts of prescribed fire are too little to affect a sufficient area"

– Spies and others 2018 (North and others 2012, 2015)

"In the era of megafires that sweep across landscapes in multiple ownerships, no single entity can meet the challenge alone at the scale needed to reduce fire risk across broad landscapes."

– Toward Shared Stewardship: Across Landscapes (2018)

We know that many landscapes that need restoration are so departed from resilient conditions that fires might become uncharacteristically large and of high severity so that even the most fire-resistant trees cannot survive.[41] Such fires could permanently alter forest types or damage ecosystem integrity. To support the natural role of fire in restoring our landscapes, we must ensure that land management plan direction supports the strategic placement of mechanical and prescribed fire treatments. Such treatments will be most successful if they are coordinated and appropriately scaled across all land ownerships including Tribal, state, other public, and private lands.

While the problems and solutions associated with fire vary across the BioA area, the most urgent need to restore natural disturbance and fire is primarily in the frequent-fire dependent ecosystems in the eastern Cascade Mountains, Klamath Mountains of southern Oregon and northern California, and the southern Coastal Mountains (figure 2-5) (chapter 5, Fire and Fuels Management). **Updated land management plans need to support the use of natural fire as an ecological tool and use a risk-based strategy** to identify places on the landscape where fire can safely and effectively be managed to benefit resources. To reflect the National Cohesive Wildland Fire Management Strategy, plans need to emphasize working with partners and neighbors to take an all-lands approach to fire management that supports a spectrum of management options, including prescribed fire, mechanical treatments, suppression, managed wildfires, and working with communities to increase their resilience to fire.

[39] North and others 2012, 2015.
[40] Spies and others, 2018a. p. 172
[41] Spies and others, 2018a.

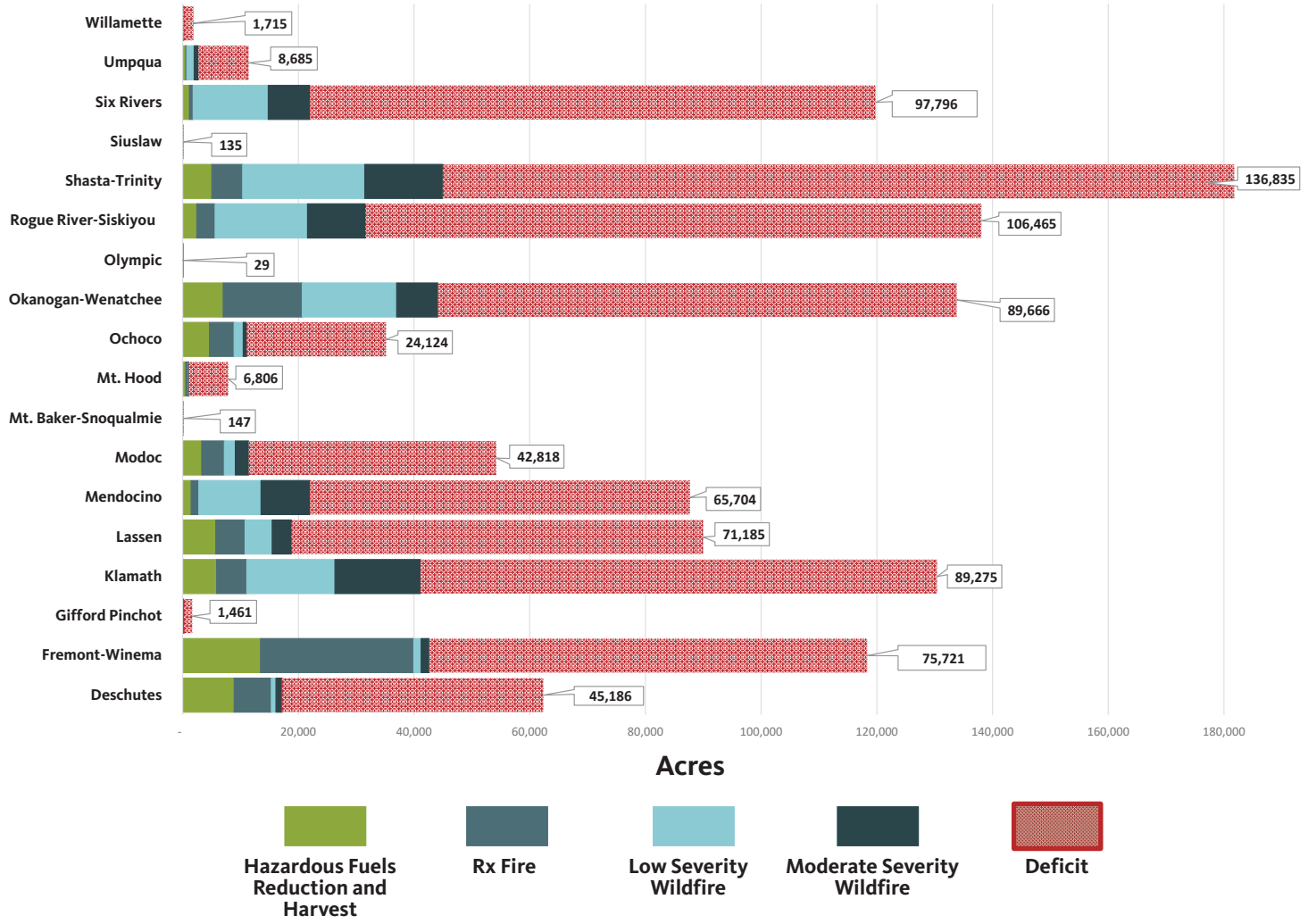


Figure 2-5—Mean annual acres of disturbance for frequent-fire dependent ecosystems on each national forest in the BioA area, in contrast to the amount of fire disturbance expected for these ecosystems. Totals are based on 2008–2018 data. The deficit bar is the difference between the amount of fire that historically, or naturally, was on the landscape and the amount of wildfire, prescribed fire, and hazardous fuels treatment currently on the landscape. Land management plan direction that provides for use of treatments that close the gap will help restore the role of fire.

RECOMMENDATION 7—*EXPAND THE USE OF TIMBER HARVEST AS A RESTORATION TOOL TO PROVIDE ECONOMIC AND SOCIAL BENEFITS TO COMMUNITIES.*

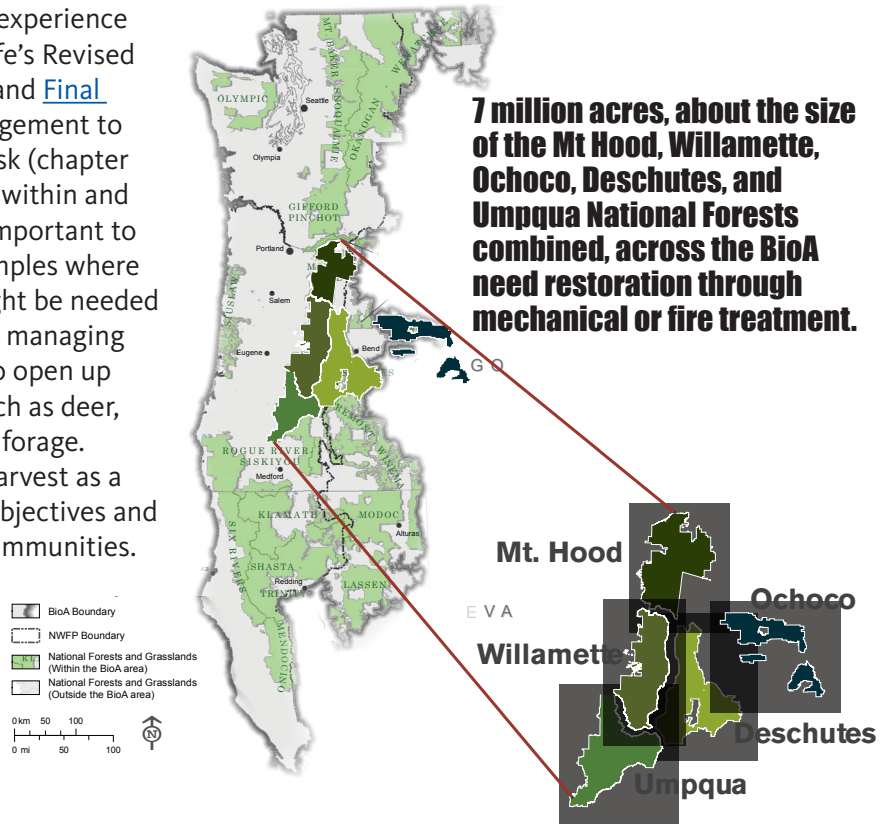
While remaining fairly stable for the past decade (chapter 3, Sustainable Timber), timber harvest levels fall short of what was anticipated under existing land management plans,[42] and they are not expected to significantly increase in the BioA area in the future under current land management direction (chapter 4, Sustainable Timber). Updating existing plans to identify and expand where timber harvest is an appropriate tool to support desired ecological conditions would help to increase the pace and scale of landscape restoration and the resulting timber harvests could support the local or regional economy. Combining an ecological forestry approach (Evolving Timber Harvest Methods; chapter 3, Sustainable Timber) with timber production would help support a more predictable and sustainable supply of timber in the BioA area, where timber processing infrastructure and workforce both play a critical role in meeting restoration needs (chapter 4, Sustainable Timber).

Modernizing land management plan direction, in partnership with Tribes in California, Oregon, and Washington, is key to working toward regional ecological integrity and community sustainability. For example, Tribal strategies, like the Plan for the Klamath Tribes,[43] and state forest assessments and action plans provide insight into areas where timber harvest offers mutual benefits to achieve cross-boundary restoration goals.

"... ecological forestry recognizes that forest are ecosystems with diverse biota, complex structure, and multiple functions, and not simply collections of trees valuable primarily for the production of wood. In doing so it seeks to maintain the fundamental capacities (integrity) of the forest ecosystems to which it is applied."
Franklin and others 2018

We estimate that about **7 million acres across the BioA area need restoration** through mechanical treatments or fire[44] (chapter 4, Ecological Integrity). In the frequent-fire-dependent ecosystems east of the Cascade Range, in the Klamath Mountains, and in the southern coastal ecoregion, restoration to increase resilience is an urgent need (chapter 5, Sustainable Timber).

Harvesting trees to meet restoration goals is often restricted by a combination of planning incompatibilities, such as direction for late-successional reserves and survey and manage standards and guidelines (chapter 4, Ecological Integrity and Sustainable Timber). However, taking a narrowly interpreted or passive approach to management to protect at-risk species and old-growth habitat is not necessarily helpful to ecosystems and habitats in the long-term, especially in dry forest types that historically experience frequent fire.[45] In fact, the U.S. Fish and Wildlife's Revised Recovery Plan for the Northern Spotted Owl and Final Critical Habitat Rule recommend active management to revitalize forest ecosystems and reduce fire risk (chapter 2, Recommendation 9).[46] Active management within and outside the reserve network of the NWFP is important to meet many of our ecological goals.[47] Two examples where active restoration through timber harvest might be needed but is limited under current plan direction are managing scenery resources where trees might be cut to open up views and managing habitat for ungulates, such as deer, where trees might need to be cut to generate forage. Updating plans to expand the use of timber harvest as a restoration tool can help us meet ecological objectives and could support socioeconomic goals in local communities.



[42] Grinspoon and others, 2016.
[43] Hatcher and others, 2017.
[44] Ringo and others, 2019.
[45] Spies and others, 2018a.
[46] Spies and others, 2018a.
[47] Spies and others, 2018a.

RECOMMENDATION 8—*EVOLVE FROM SINGLE-SPECIES FOCUS TO A COMPLEMENTARY ECOSYSTEM AND SPECIES APPROACH TO MAINTAIN DIVERSITY OF PLANT AND ANIMAL COMMUNITIES AND SPECIES PERSISTENCE.*

Maintaining or restoring ecological integrity is expected to provide for the habitat needs of species and the diversity of plant and animal communities (coarse-filter approach). A coarse-filter approach provides for a diversity of habitat types at various scales, such as complex early seral habitat, to account for the complexity of these landscapes and the species that depend on them. Sometimes this approach doesn't adequately consider unique habitat requirements, and then there is a need for species-specific management that focuses directly on one species (like the marbled murrelet) and its specific habitat needs, this is called a fine-filter approach.

The NWFP emphasized fine-filter approaches to conservation for the spotted owl, marbled murrelet, and hundreds of other species, although it recognized that both coarse-filter and fine-filter approaches were needed.[48] The reserve system has been successful in conserving and developing northern spotted owl habitat on federal lands, although the owl population is still declining due to a combination of other factors (chapters 3 and 4, Habitat Management). However, the emphasis in the NWFP on one size fits all dense, multi-layer old-growth habitat is not always ecologically appropriate, especially outside of fire-infrequent forests[49] (chapters 4 and 5, Habitat Management).

Pine Marten

The NWFP survey and manage standards and guidelines are a fine-filter approach that was designed to protect biological diversity. The standards and guidelines have increased our knowledge about species that depend on late-successional and old-forest habitat (chapter 3 Habitat Management). However, they haven't been fully implemented primarily because of the complexity and cost of individually surveying for and managing so many species—currently 298 (chapter 4 Habitat Management). Taking a coarse-filter approach can help us manage for the habitat needs of multiple species, including species that are considered imperiled or vulnerable. The Aquatic Conservation Strategy is a good example of a multi-species, coarse-filter approach that has improved conditions within aquatic and riparian ecosystems that anadromous fish and other organisms depend on.

"Conserving biodiversity is about more than protecting old-growth forests; it is also about maintaining processes, other successional stages, and forest dynamics at multiple scales."

Spies and others 2018

Ecological integrity has been compromised in more frequent-fire dependent ecosystems where loss of old forest from high-severity wildfire has been concentrated in recent years.[50] This can have negative impacts on species habitat and biological diversity. Plan direction to protect species habitat needs to be grounded in ecological principles and acknowledge the differences between ecosystem types to promote resilience to fire, climate change, and other drivers and stressors. We also need to update land allocations to be better aligned with the habitats they are trying to protect, such as critical habitat for northern spotted owl and late-successional reserves (chapter 5, Sustainable Timber).

To more successfully manage species habitat, we need to reassess how we are using ecosystem versus species-specific approaches in our land management plans, and ensure we are managing our ecosystems to be resilient in the face of change. Maintaining or restoring ecological conditions like those under which native species have evolved offers the best assurance against losses of biological diversity and maintenance of habitats for most species in an area.[51] Using a combination of management approaches is necessary to help ensure conservation of both individual species and biodiversity.[52]

[48] Stine and Spies, 2018.
[49] Spies and others, 2018.
[50] Davis and others in progress; subject to peer review, Davis and others, 2015.
[51] 36 CFR Part 219 National Forest System Land Management Planning Preamble.
[52] Marcot and others, 2018.

RECOMMENDATION 9—*PROMOTE ACTIVE MANAGEMENT IN PLANT AND ANIMAL HABITATS TO RESTORE AND ENCOURAGE ECOLOGICAL RESILIENCE.*

As highlighted in previous recommendations, we must manage for species habitat along with other management objectives to ensure our national forests and grasslands can continue to provide social, economic, and ecological benefits. Passive management—allowing nature to take its course to restore ecosystem conditions—can protect habitat and biodiversity. However, current conditions across parts of the BioA area are putting habitats, communities, and resources at risk. In some cases, active intervention is needed to restore ecological integrity and support the long-term sustainability of benefits that national forests and grasslands provide.

We have largely been successful in maintaining intact habitat for species that depend on dense, multi-layered old-growth forest, particularly within the NWFP late-successional reserve network[53] (chapter 3, Ecological Integrity). Similarly, our riparian reserve network created by the Aquatic Conservation Strategy, PACFISH, INFISH and Sierra Nevada Framework has been successful in protecting riparian habitat and water quality with distinct benefits to fish and amphibians (chapter 3, Ecological Integrity).[54] However, management of diverse wildlife habitats involves more than just protecting old-growth forests.[55] Management also requires maintaining a variety of ecological processes and all successional stages on our dynamic landscapes,[56] such as complex early-seral habitat for pollinators and early-seral dependent birds.

Under current land management plans, management direction that protects habitats and tree structural stages and size classes creates barriers to treatments that are needed to restore habitats and increase ecosystem resilience (chapter 4, Ecological Integrity). Monitoring and best available science tells us that to foster ecological integrity across a diversity of habitat components for northern spotted owl, we must allow for active habitat management within and outside of the reserve networks. For example, the Revised Recovery Plan for the Northern Spotted Owl (U.S. Fish and Wildlife Service) recommends protecting the best of the spotted owl's remaining habitat, while also revitalizing forest ecosystems through active management.[57] Active management might include "carefully applied prescriptions such as fuels treatment to reduce the threat of severe fires, thinning to help older trees grow faster, and restoration to enhance habitat and return the natural dynamics of a healthy forest landscape."[58] We know that in frequent-fire dependent ecosystems, forests are currently experiencing uncharacteristic fire. If not actively managed using mechanical treatments and prescribed fire, these forests will be increasingly susceptible to more large and high severity fires that could negatively impact ecological integrity (chapter 4, Fire and Fuels Management and Habitat Management).

"Active rather than passive human participation in the initiation and development of forest ecosystems has probably never been more appropriate than in the 21st century when human kind has altered so many of the fundamental conditions under which forest ecosystems have evolved. We believe forests in this century will often require human participation to assist them in their continued adaption to shifting environments and disturbance regimes..."

Franklin and others 2018

For example, our current reserve network was developed and located on the landscape to protect fire-infrequent forests, but the network also includes fire-diverse and frequent-fire dependent forests. Different fire groups require a variety of management techniques to maintain and restore resilience in the face of wildfire and climate change (chapter 4, Ecological Integrity and Fire and Fuels Management). Static late-successional reserves might not be able to meet the needs of all old growth-dependent species because large disturbance events, combined with changes in fire on the landscape due to climate change, reduce or isolate a reserve[59] (chapter 5, Habitat Management). As discussed in earlier recommendations, the dynamic nature and ecological capabilities of the landscape must be incorporated into the design of the reserve system to ensure that it is a connected system of habitats that meets the needs of its dependent species.

Using a system of reserves has been a critical component of conservation in the BioA area. However, updates to the current reserve system are needed to allow for active management to increase connectivity and support fire and other key natural disturbance processes[60], which is an issue in frequent-fire dependent ecosystems. Active management inside and outside NWFP reserves is needed to promote biodiversity and ecological resilience.[61]

[53] Davis and others, 2015
Davis and others in progress; subject to peer review.
[54] Reeves and others, 2018.
[55] Marcot and others, 2018.
[56] Spies and others, 2018.
[57] US Fish and Wildlife Service, 2011a.
[58] Marcot and others, 2018
[59] Marcot and others, 2018; Spies and others, 2018; Reilly and others, 2018.
[60] Spies and others, 2018b.
[61] Spies and others, 2018.

RECOMMENDATION 10—*RECOGNIZE THE SOCIAL AND ECONOMIC BENEFITS TO COMMUNITIES AND PEOPLE FROM SUSTAINABLE RECREATION OPPORTUNITIES.*

Participation in recreational activities is how most of us experience our national forests and grasslands; however, recreation was not a major focus of the land management plans for the forests and grasslands within the BioA area. In contrast to the NWFP's guidance for natural resource management, there is no overall consistency to recreation management (chapter 4, Sustainable Recreation). The lack of uniform management direction related to recreation inhibits our ability to effectively and efficiently address management concerns for resources that cross multiple administrative boundaries, such as trails and designated wilderness, and can be confusing to the public. **The increasing demands and economic significance of recreation activity as well as the impacts of excessive deferred maintenance and a changing climate was not anticipated in 1994.** These changes and lack of recreation direction undermine our ability to manage recreation resources and ensure their long-term sustainability.

Land management plans in the BioA area should support sustainable recreation by better integrating resource and recreation management objectives (chapter 4, Sustainable Recreation). For example, while the NWFP has helped preserve and improve the outstanding natural qualities that encourage visitation (chapter 3, Sustainable Recreation), options for addressing recreation issues, such as overuse and facilities maintenance, are often limited due to the need to meet species conservation objectives within late-successional reserves and riparian reserves. However, not addressing recreation issues can have negative impacts to aquatic systems, wildlife habitat, and other resources (chapter 4, Ecological Integrity). There are opportunities within land management plans to meet species conservation objectives, while also increasing recreation management options and our ability to maintain, expand, or create new sites. Moving forward we desire to appropriately design and manage recreation facilities to meet both recreation and Aquatic Conservation Strategy objectives. Taking an integrated approach to recreation management and ecological needs can help us more sustainably meet the needs of visitors and support local economies.

Land management planning efforts must continue to consider wide-ranging recreation challenges and develop tools that can be consistently applied, while understanding the unique recreation opportunities and the needs of surrounding communities on individual national forests and grasslands in the BioA area. **Evaluating recreation demands that will complement state outdoor recreation action plans and other management strategies is important to integrate cohesive recreation direction.** Land management planning offers the opportunity to work with the public to identify recreation emphasis areas that can help focus resources on priority maintenance or development needs as well as help respond to changing recreation demands, particularly for national forests and grasslands located near metropolitan areas where the greatest recreation challenges are expected. (chapter 5, Sustainable Recreation).

NWFP area visitors spend about $612 million each year on lodging, restaurants, souvenirs, and other trip-related expenses.[62]

[62] Charnley and others, 2018.

Modernization Options

The integrated recommendations presented in this chapter focus on several major issues impacting multiple national forests and grasslands across the BioA area that can be influenced by land management planning. Using these recommendations as a starting point, the Forest Service will engage the public as we develop a strategy for updating land management plans across the BioA area. We want to keep and enhance management direction that's working well, but make changes where necessary to meet today's social, economic, and ecological conditions and challenges on our dynamic landscapes. Large-scale management challenges, such as climate change, affect all the national forests and grasslands across the BioA area. Other challenges, including maintenance of spotted owl habitat and maintaining the role of wildfire in frequent-fire dependent ecosystems, are unique to or more urgent on individual or several national forests and grasslands. To increase efficiency in land management, it's important for modernization efforts to create consistent direction for universal challenges, but also to develop direction that recognizes and is compatible with diverse ecosystems and communities.

Potential Strategies for Land Management Modernization

Simultaneous Plan Revision

Pros

- Ensures consistency and compatibility among the plans.
- Contributes to standardizing the formats of land management plans.
- Realizes efficiencies if phases of the process are streamlined and expected timelines are met.

Cons

- Presents internal coordination challenges across 19 responsible officials and their staff.
- Changes on one national forest or grassland might impact all 19 national forests and grasslands.
- Would be challenging to conduct meaningful public engagement.

Incremental Plan Revision

Pros

- Focuses on national forests and grasslands with the most urgent needs.
- Supports ability to learn as we go; increases efficiencies.
- Provides lower per year and more sustainable budget and staff.

Cons

- Extends budgeting and staffing needs across a long period.
- Requires at least 12 years to complete revision on all 19 national forests and grasslands.
- Maintains the outdated condition of many plans for a longer time.
- Necessitates close coordination between planning teams as one group of plans is finalized and the next group starts.

Amendment(s)

Pros

- Focuses on the most immediate needs within the BioA area.
- Develops streamlined direction compatible with ecosystems and conditions.
- Provides public engagement focused on specific areas and issues.

Cons

- Doesn't address problems associated with overlapping management direction.
- Would not be a comprehensive modernization of all plans.

Individual Plan Revision

Pros

- Historically, most national forests and grasslands have individually revised or amended their land management plans.

Cons

- Extends budgeting and staffing needs across a long period.
- Requires about 80 years to complete revision on all 19 national forests and grasslands.
- Restricts the ability to accomplish timely work on the ground.
- Delays comprehensive modernization of most plans.

Incremental Plan Revision and Amendment

Pros

- Allows for a broad-scale modernization of plan components.
- Contributes to consistent management of similar issues across the landscape and management compatibility with varied ecosystems.
- Allows for more robust public involvement related to the specific issues.

Cons

- Delays comprehensive modernization of most plans.
- Amending rather than revising would result in overlapping layers of management direction.

Simultaneous Plan Revision—All 19 forests and grasslands in the BioA area would complete plan revision at the same time. This approach, like the landscape-level approach used during the NWFP, would ensure consistency and compatibility among the plans and would contribute to standardizing the formats of land management plans to help develop a common understanding of management direction. Completing simultaneous plan modernization presents significant capacity and coordination challenges across 19 responsible officials and their staff; however, efficiencies might be realized if phases of the process are streamlined and expected timelines are met. If, during simultaneous plan updating, the required analyses are integrated and conditions change significantly on one national forest or grassland requiring different or additional analysis, all 19 units would likely be impacted. Finally, this strategy might present a challenge to meaningful engagement with the public in the planning process because of the amount and complexity of information and the breadth of the geographic scope.

Incremental Plan Revision—We would revise three to six land management plans at the same time based upon similar challenges and geography. As an example, we could start with five units in the southwestern BioA area based on growing departure in desired ecological conditions, vulnerability to fire cost and behavior, and dependency of local communities on benefits from national forests and grasslands. The planning effort on the next group of units would begin approximately 1 year before the process is complete on the first group, and so on until revisions for all 19 units are complete. This option would allow the Forest Service to focus on the units with the most urgent needs for modernization first and would support our ability to learn as we go, which will help us continually improve land management planning efficiencies. Budgeting and staffing needs would be extended across a longer period than under the simultaneous plan revision option but would be lower per year and therefore, potentially more sustainable. Under this approach it would take at least 12 years to complete revision on all 19 units and would maintain the outdated condition of many plans for a longer time. Ensuring consistency and compatibility between plans that are in different groups would require close coordination between planning teams as one group of plans is finalized and updating is started on the next group.

Amendment(s)—Under this option, we would complete a range-wide amendment of all or a subset the land management plans to address one or more of the topic areas identified as needing change in the BioA. For instance, this option could be used to develop up-front, standardized agreements on range-wide management for listed species such as the northern spotted owl. This method could specifically address issues like northern spotted owl habitat connectivity throughout its range and facilitate Engendered Species Act consultation on future plan revisions. Amendments could also be used to better align late-successional reserve boundaries with late-successional habitat. An amendment process, even at a large scale, would be shorter than full plan revisions, and might take only 2 years to complete. This approach would allow the Forest Service to focus on the most immediate needs within the BioA area and might be a more streamlined option for creating direction that is compatible with the various ecosystems and conditions. Opportunities for public engagement would be more focused on specific areas and issues, which might allow for more robust public involvement. A drawback to this approach is that it would not completely address the problems associated with overlapping management direction. In addition, while this approach would focus on the most urgent issues within the BioA area, it would not be a comprehensive modernization of all plans; plans would remain outdated and many important updates would not be completed.

Individual Forest Plan Revision—Historically, land management plans are revised or amended by individual national forests or grasslands. However, many of the ecological and socioeconomic conditions in the BioA area span many forests and grasslands and are therefore, best addressed at a landscape scale. Completing individual land management plan modernizations wouldn't meet the agency's goal of reducing the time and cost to produce efficient, effective, and high-quality land management plans to accomplish more work on the ground and be more responsive to our public.

Incremental Plan Revision and Amendment—We would begin modernization on a prioritized group of units, as in the incremental plan revision option, and simultaneously complete amendments on other units that are facing some of the same urgent issues. For instance, as a group of plans are updated to include refined and improved direction associated with the natural role of fire in frequent-fire dependent ecosystems, all other plans on units with similar ecosystems could be amended to incorporate the same language. This approach would allow for a broad-scale modernization of plan components to meet immediate needs without the complexity of updating many plans at the same time. The approach would contribute to consistent management of similar issues across the landscape as well as management that is compatible with the varied ecosystems. Potentially, this approach would contribute to more robust public involvement related to the specific issues on which amendments were focused. However, comprehensive modernization of most plans would still be delayed and amending plans rather than revising them would still result in overlapping layers of management direction.

Combination approach—An Example

Relevant direction from the US Fish and Wildlife's Conservation Strategy for Grizzly Bear in the Northern Continental Divide Ecosystem 2019 [63] has been incorporated as amendments to the landmanagement plans for the Helena, Kootenai, Lewis and Clark, and Lolo National Forests. The Flathead National Forest incorporated the relevant direction into its land management plan revision.

This combination of revision and amendments ensures that habitat for this wide-ranging species is managed consistently and appropriately across all affected national forests.

Many of the identified opportunities for modernizing the land management plans in the BioA area cross multiple national forest and grassland boundaries. Some management opportunities on some national forests and grasslands are more urgent than others, while other challenges experienced across several national forests and grasslands would benefit from a consistent approach. Some forests have a more urgent need for restoration activities to improve the resiliency of the landscape than others (figure 2-6). The need for management consistency arises when multiple national forests and grasslands face the same management challenge; an example is managing habitat to facilitate the recovery of the northern spotted owl across that species' range (figure 2-7). We gain efficiencies by combining modernization efforts around similar management needs.

[63] NCDE Subcommittee, 2019.

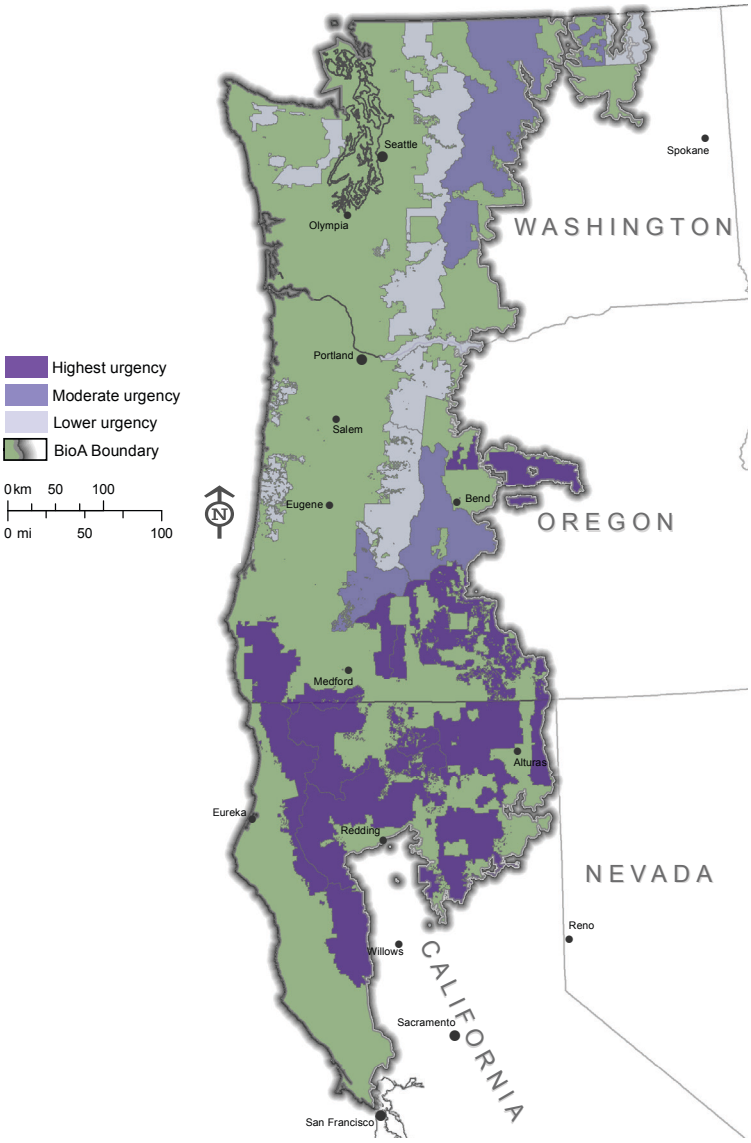


Figure 2-6—National forests and grasslands within the BioA area rated by urgency to address lack of resiliency. High urgency includes the Fremont-Winema, Rogue River-Siskiyou, Six Rivers, Klamath, Modoc, Lassen, Shasta-Trinity, Mendocino, and Ochoco National Forests and Crooked River National Grassland. Moderate urgency includes the Okanogan-Wenatchee, Umpqua and Deschutes National Forests. Map shows logical groupings of national forests and grasslands for incremental plan revision.

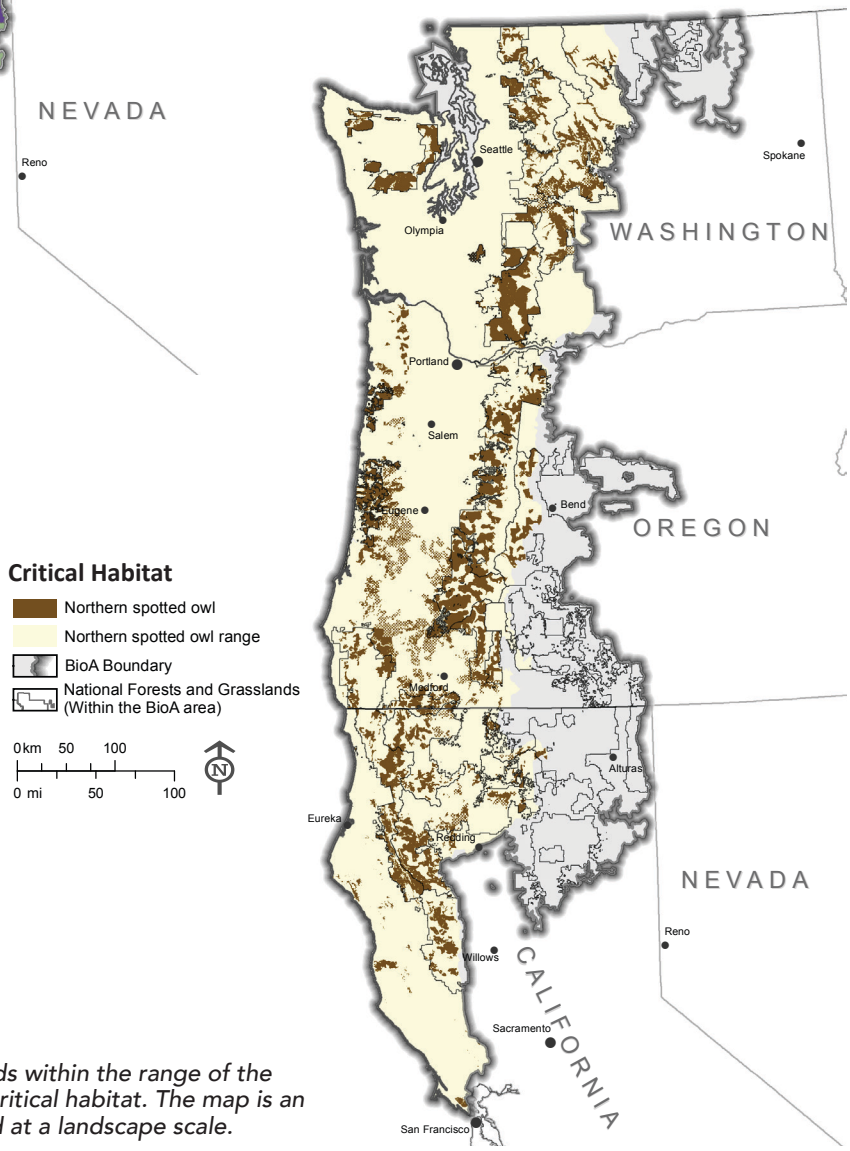


Figure 2-7—National forests and grasslands within the range of the northern spotted owl and its designated critical habitat. The map is an example of an issue that is best addressed at a landscape scale.

Conclusion

In this chapter, we presented key management recommendations aimed at addressing the complex social, economic, and ecological challenges that national forests and grasslands in the BioA area are facing. We recognized the interdependent relationships of these challenges and identified how updates to land management plans could improve the ability of national forests and grasslands to continue to deliver benefits to communities and increase the ability to manage for improved ecological sustainability across the landscape. We presented this information by organizing recommendations under five categories of resource management changes needed across the landscape: (1) ecological integrity, (2) fire and fuels management, (3) sustainable timber, (4) habitat management, and (5) sustainable recreation; these categories continue through the remainder of the BioA. Chapter 3 presents what's working well in the existing land management plans and identifies what should be retained or modified in future planning updates to reflect current knowledge and learning from past experiences.