Chapter 5

Geographic Considerations

The NWFP, PACFISH, INFISH and Sierra Nevada Framework all address challenges at the landscape scale by providing consistent management direction across multiple national forests and grasslands. As the BioA shows, we've learned that we need to refine and better align management direction so that it's compatible with unique ecosystems, while still being consistent at the appropriate scale. Chapter 5, like chapters 3 and 4, provides context to the 10 key recommendations highlighted in chapter 2.

Across the 19 national forests and grasslands in the BioA area, there are ecological and social similarities as well as differences and many unique opportunities to modernize the existing land management plans. We've learned that some land management plans are working better in some locations than in others, and some areas have a more critical need for modernization than others.

In chapter 5, we geographically illustrate patterns and trends across the BioA landscape. Some of the patterns and trends have a shared urgency, while others have a need for consistent management. The patterns and trends vary in scale, but they are all larger than one or two national forests or grasslands.

Table 5-1 is a snapshot—an innovative look and an attempt to be as transparent as possible right from the get-go—of broad-scale generalizations about management challenges and opportunities across each of the 19 national forests and grasslands in the BioA area. Keep in mind that the table is not an in-depth quantitative analysis; such analysis will come during future planning phases. Instead, table 5-1 is a qualitative appraisal that reveals some interesting patterns and trends, which we discuss in more detail in the chapter. We hope that table 5-1 will open a door and provide a starting place for future engagement with our communities and stakeholders as we move toward modernization of the land management plans in the BioA area.

Snapshot of Urgent Management Challenges and Opportunities

"Urgent," as used in this table and chapter, means that the issue might be critical on a particular forest or grassland and there might be a risk of loss if action is not taken in a timely manner.

1. National forests that depend on frequent fire have a greater need for **disturbance restoration** (such as mechanical and fire treatments) because fire has been excluded for much longer than what they historically experienced. These forests are overly dense and lack resiliency (pages 69-70).

2. Due to decades of fire exclusion and ongoing climate change, national forests and grasslands that rarely experienced **large, high severity fires** in the past might now have large fires on a regular basis, which could negatively impact late-successional habitat (pages 71-72 and 76 and figure 5-8).

3. **Climate change** will impact all national forests and grasslands in the BioA area but those with greater extremes and drier climates will likely experience greater effects (pages 70-71).

4. Some national forests in the BioA area have more potential to retain stored carbon because of their climate, vegetation, and fire frequency and intensity. Forests and grasslands with wetter year-around climates that infrequently experience fire have more potential to keep **stored carbon.** Seasonally dry areas that depend on frequent fires lose carbon more often (page 47, 70).

5. The land management plans signed in the 1980s and amended by the NWFP, PACFISH, INFISH, and Sierra Nevada Framework include projected **timber volume** outputs. Some national forests have met the projected outputs while others haven't. Although these volume projections are now more than 25 years old, its important to show the gap between projected and actual outputs (pages 73-74).

6. On some national forests the need for restoration is greater due to the type of vegetation, fire frequency and intensity, past disturbances, and past management actions. When there's also **less access to sawmills** to produce the product and markets to buy the product, these forests experience additional challenges to meeting their restoration needs (page 73).

7. Recreation is common on national forests and grasslands in the BioA area. Areas close to population centers generally experience high levels of **recreation use** and visitation and have more associated management challenges that will need to be addressed in the land management plans (page 77).

Table 5-1—A snapshot of broad-scale generalizations about critical management challenges and opportunities to change planning direction on the 19 national forests and grasslands in the BioA area. The table indicates where an issue has less, mid, or more urgency on a specific national forest or grassland and, in doing so, the table displays multi-unit landscape patterns that require management attention in a timely manner.

Ecological Integrity

Frequent-fire dependent ecosystems—those that are farthest from resilient conditions—occur throughout the BioA area but are most prevalent on east Cascades slopes and foothills and in the Klamath Mountains/California High North Coast Range ecoregions.[122] We determined the areas of less resilient conditions by comparing current forest structure with what was found historically[123] (figure 4-1). And, we identified two broad groups of restoration types that would be beneficial throughout the BioA area: disturbance restoration, such as mechanical and fire treatments (figure 4-1A), and succession restoration, such as enhanced tree growth and snag development (figure 4-1B). Both types of restoration are needed (figure 5-1). The Okanogan-Wenatchee, Shasta-Trinity, and Fremont-Winema National Forests are examples of where this complex restoration is more urgently needed.

There is a heightened risk of loss in forests needing disturbance restoration in comparison to those needing primarily succession restoration; therefore, disturbance restoration is an urgent need. Forests that need mechanical and fire treatments tend to be overly dense and are places where past fire exclusion deprived these systems of multiple important disturbance cycles (figure 2-5). If these forests are not restored, the next fire, or some other disturbance event, might move the ecosystem toward an undesirable, and potentially unstable condition (figure 2-1). Disturbance restoration is evenly needed throughout the NWFP land use allocations (figure 4-9), yet the urgency of the need varies by national forest or grassland (table 5-1 and figure 5-1) and limiting the overall carbon emissions through fire resiliency treatments in frequent-fire dependent and fire diverse (mixed-severity) ecosystem.[124]

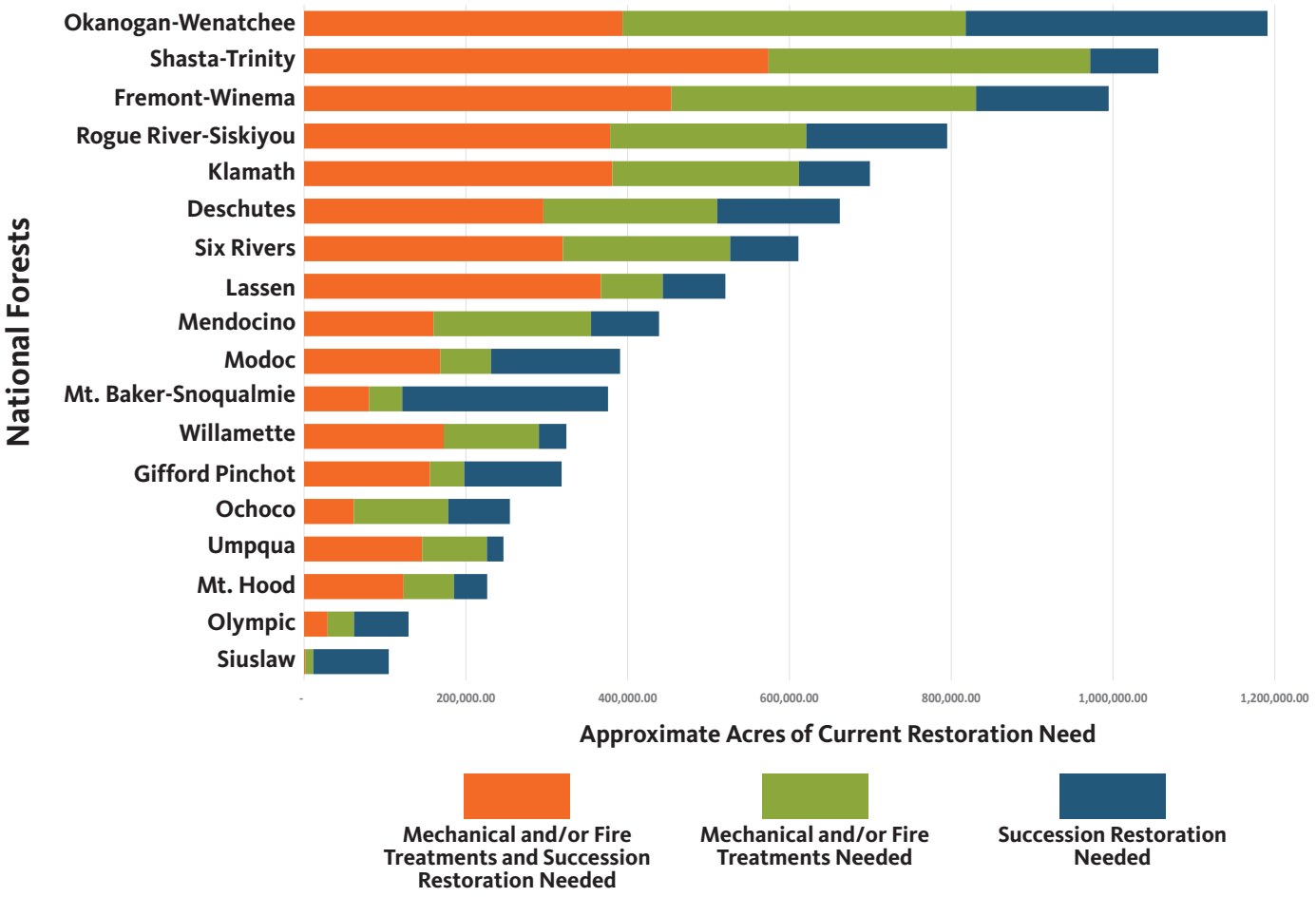

Figure 5-1—Total acres of restoration need by national forest.[125] All land designations including congressionally reserved areas, late-successional reserves, riparian reserves, matrix, and lands outside the NWFP area. Forests that depend on frequent fire have more restoration need.

[122] Level III ecoregions of the continental United States: https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states.
[123] Ringo and others, 2019.
[124] Spies and others, 2018.
[125] Ringo and others, 2019.

Late-successional reserves need management that is compatible with the diverse landscapes across the BioA area (chapter 2, Recommendation 1), while also being managed consistently for planning efficiency and implementation effectiveness. One of the key components of diverse landscapes is fire ecology.[126] Using the fire ecology groups—frequent-fire dependent, fire diverse (mixed severity), and fire infrequent—described in chapter 4 would provide a consistent management approach for future late-successional reserve (figure 5-2).

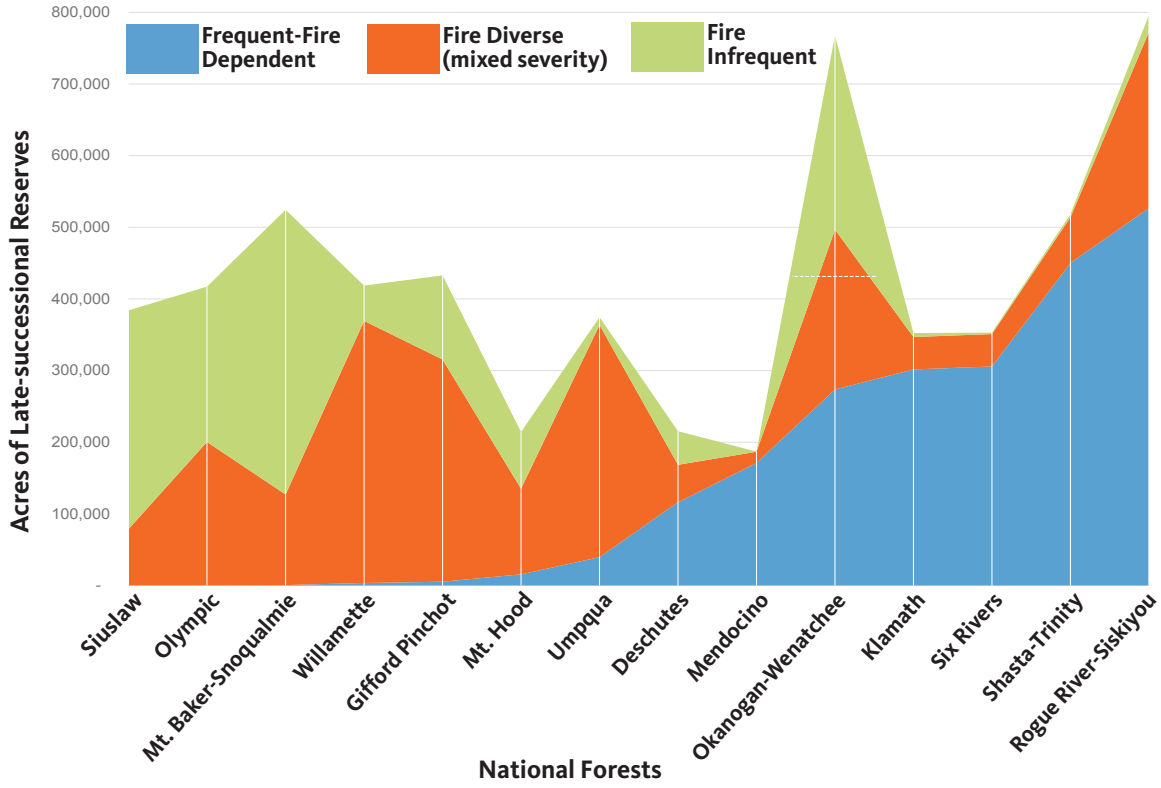

Figure 5-2—Acres of late-successional reserve in each fire ecology group (frequent-fire dependent, fire diverse (mixed severity), and fire infrequent) by national forests in the BioA area. Only forests with more than 100,000 acres of late-successional reserves are displayed. Consistent management of late-successional reserves is needed in forests with similar fire ecology. The Rogue River-Siskiyou, Shasta-Trinity, Six Rivers, Klamath, Okanogan-Wenatchee, Mendocino, and Deschutes National Forests all have more than 100,000 acres of late-successional reserves in the frequent-fire dependent ecosystem group. Source: Morelli and others (2016). After Spies and others 2018.

Carbon storage is an ecosystem service provided by healthy forests. The potential for carbon sequestration in the BioA area is greatest in coast-range forests, such as the Siuslaw, Mt. Baker-Snoqualmie, and Olympic National Forests, due to their high productivity and low fire frequency. The greatest potential for mitigating emissions and limiting the overall losses through fire resiliency treatments is in frequent-fire dependent and fire diverse (mixed-severity) ecosystems (figure 5-2).

The effects of climate change, such as increased temperatures, drier summers, and wetter winter storms, will likely be most pronounced in the southern portion of the BioA area (northern California and southern Oregon) and in the drier forested and non-forested types (eastern Cascades) (figure 5-3).[127] Climate change effects will also be pronounced in high-elevation forests where effects, such as loss of snow pack and warming, can change ecosystems.

[126] Spies and others, 2018.
[127] Reilly and others, 2018.

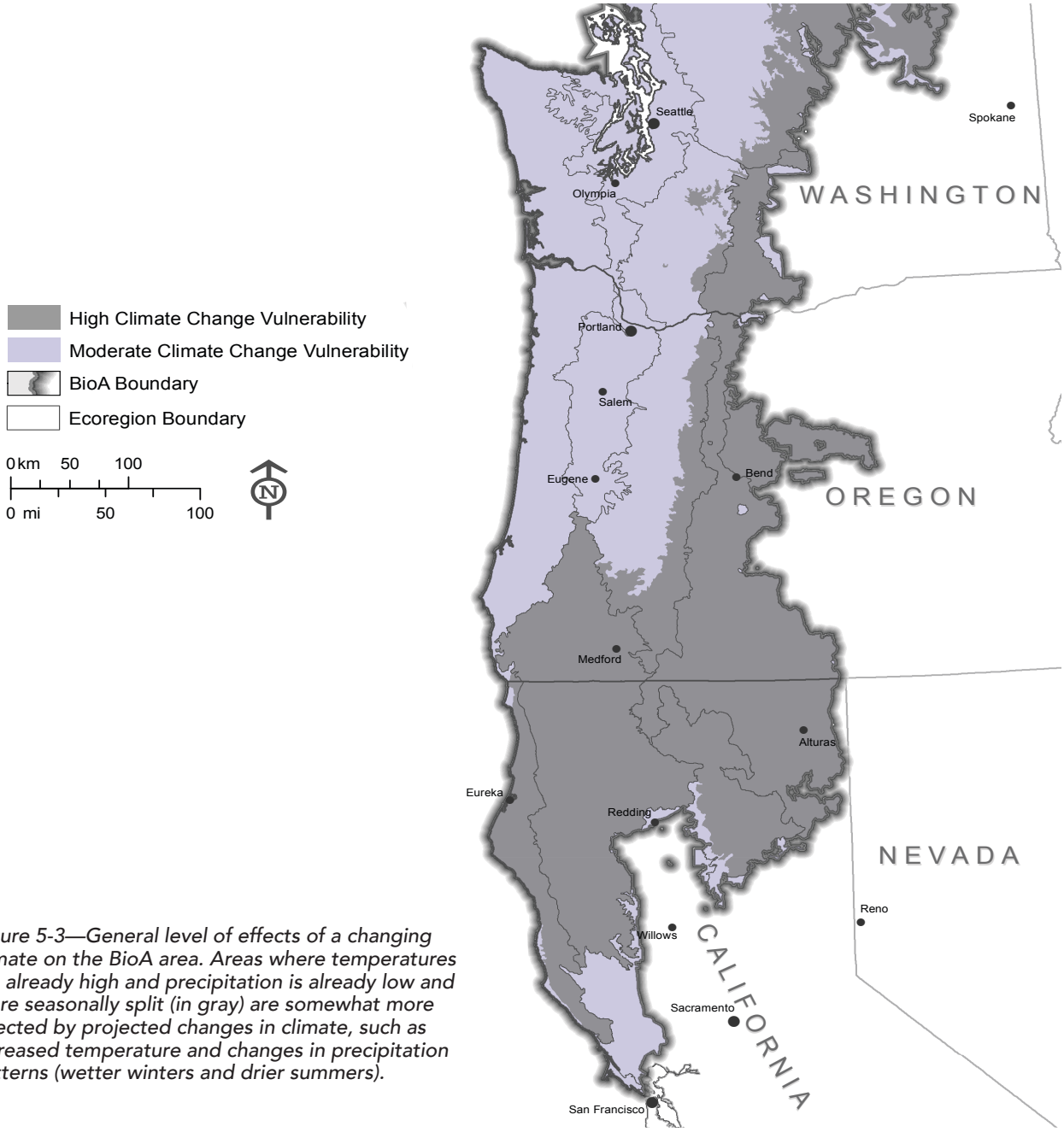

Figure 5-3—General level of effects of a changing climate on the BioA area. Areas where temperatures are already high and precipitation is already low and more seasonally split (in gray) are somewhat more affected by projected changes in climate, such as increased temperature and changes in precipitation patterns (wetter winters and drier summers).

Fire and Fuels

There is an urgency to address ecological conditions in frequent-fire dependent ecosystems that are outside of what would be expected for such an ecosystem. Identification of fire ecology groups provides a framework where consistent management approaches would be most effective for national forests and grasslands in the BioA area. The drier forest types (frequent-fire dependent) of northern California, southern Oregon, and the eastern Cascades[128] (figures 2-4 and 4-4) have the greatest increases in burn area; this trend is expected to continue. Most studies project little increase in fire activity in the moist maritime forests (fire infrequent); for example, Sitka spruce, redwood, and western hemlock forests[129] (figure 2-4).

Forests with many frequent-fire dependent ecosystems would benefit the most from adjustment to prescribed fire and wildfire management direction. All forests would benefit, to some degree, from direction to address the lack of fire on the landscape.

There is a lack of fire on the landscape even with current prescribed fire management activities (figure 2-5). Forests with the greatest gap have the greatest lack of fire and are most in need of updated land management plan direction to better enable fuel treatments for landscape ecological restoration.

[128] Reilly and others, 2018.
[129] Reilly and others, 2018.

Using quantitative wildfire-risk assessments (figure 5-4) addresses fire-risk management around communities and helps focus on the areas of greatest urgency. Assessments, when complete for California, can be used to evaluate overall priorities and urgency to focus management direction on community risk.[130]

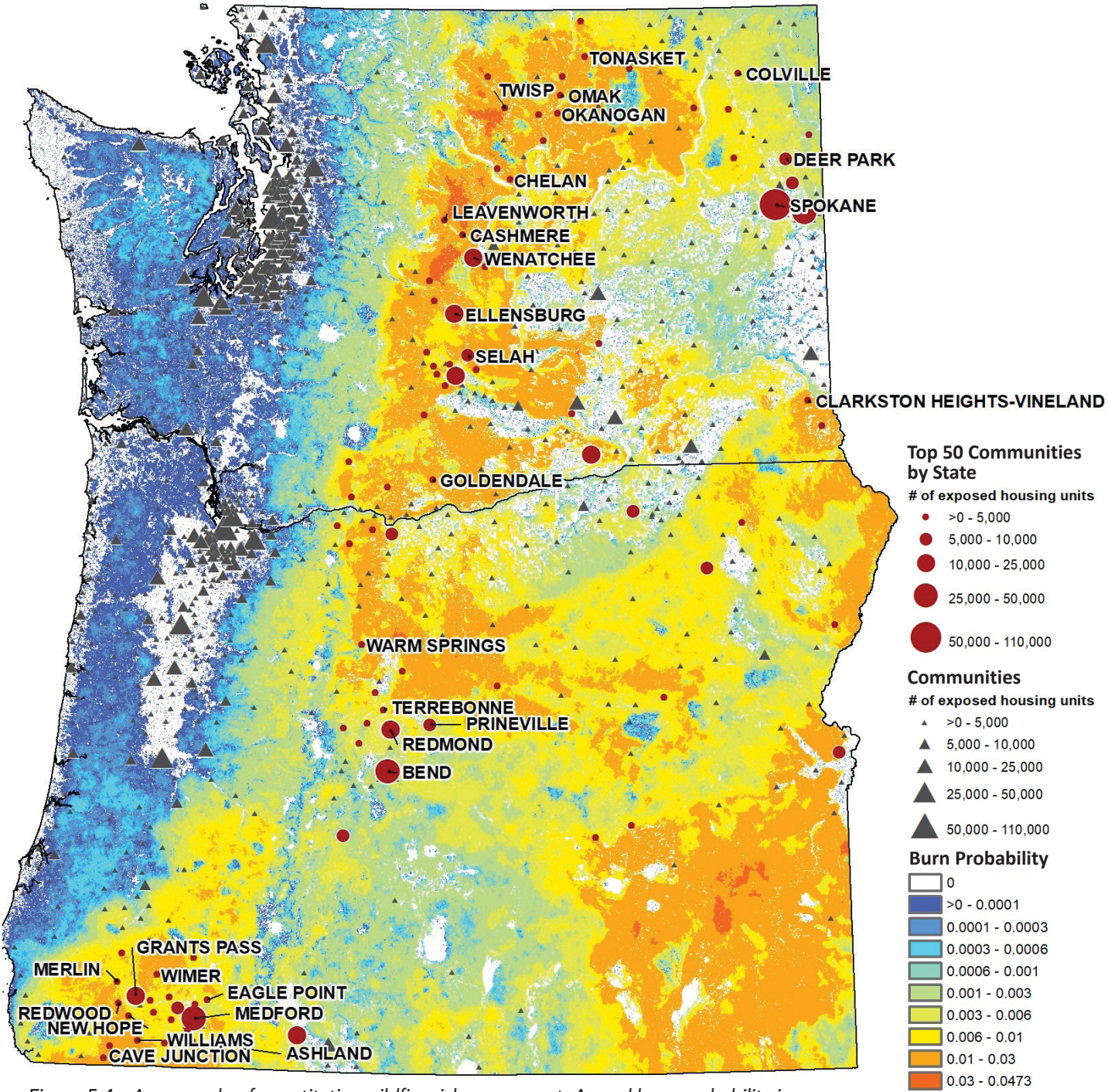

Figure 5-4—An example of quantitative wildfire-risk assessment. Annual burn probability in Washington and Oregon and exposed human communities in each state. The 50 most exposed communities in Oregon and Washington, based on annual burn probability, are in dark red.[131] A similar assessment is being drafted for California and will display similar data to highlight risks to communities and to conduct large-scale risk assessments. Source: Scott and others 2018

[130] Gilbertson-Day and others, 2018.
[131] Gilbertson-Day and others, 2018.

Sustainable Timber

Providing a predictable and sustainable timber supply is a core component of the Forest Service mission. Today, much of our timber volume is a product of restoration and resiliency projects, which are urgently needed (figure 4-1). Most of the current restoration need is in forests dominated by frequent-fire dependent ecosystems (figure 5-1, figure 4-4).

How timber is harvested and where it comes from today is very different from how and where is was projected to come from when the NWFP was signed. The land management plans on the Gifford Pinchot, Mt. Hood, Willamette, and Umpqua National Forests projected the highest timber outputs under the NWFP. Today, these forests have the biggest gap between timber actually produced and what was projected in the NWFP. The actual timber output doesn't accurately reflect potential productivity because we know that these are highly productive timber forests.

The number of local timber processing facilities has decreased in Washington, Oregon, and northern California. Although total processing capacity has increased in Washington and remains constant in Oregon,[132] the cost of transporting harvested timber to mills has increased in areas with limited remaining infrastructure.[133] This is particularly true east of the Cascade Range and in the southern Coast range (figure 5-5) where restoration needs in frequent-fire dependent ecosystems are critical.

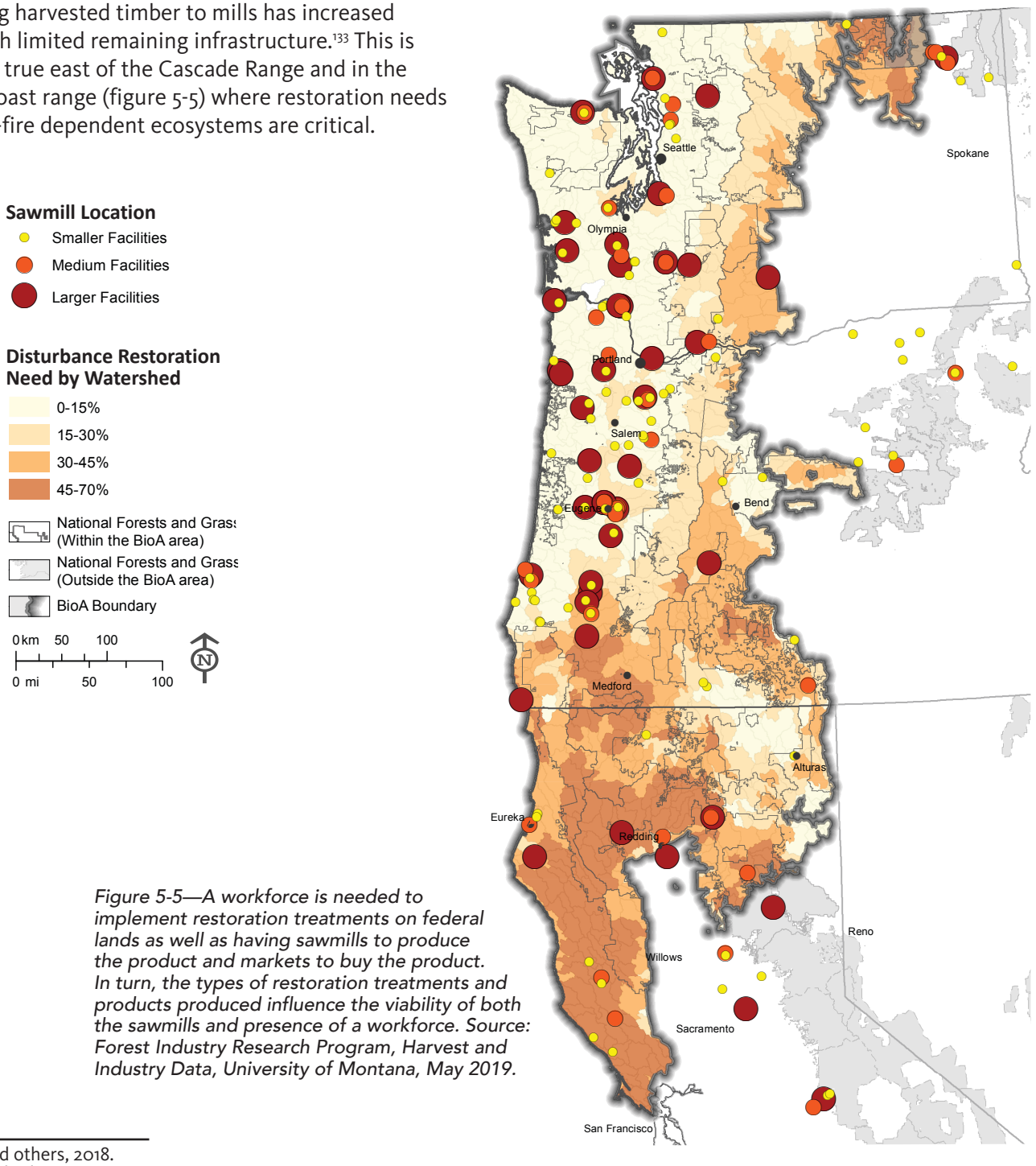

Figure 5-5—A workforce is needed to implement restoration treatments on federal lands as well as having sawmills to produce the product and markets to buy the product. In turn, the types of restoration treatments and products produced influence the viability of both the sawmills and presence of a workforce. Source: Forest Industry Research Program, Harvest and Industry Data, University of Montana, May 2019.

[132] Charnley and others, 2018.
[133] Charnley and others, 2018.

Conflicting management direction related to northern spotted owl designated critical habitat affects anticipated timber harvest. The overlap of critical habitat designation (chapter 4, Sustainable Timber) is least aligned with late-successional reserves on the Mt. Hood, Umpqua, Six Rivers, Willamette, Klamath, Okanogan-Wenatchee, Shasta-Trinity, Gifford Pinchot, and Rogue River-Siskiyou National Forests (figure 5-6). These forests have the greatest urgency to modernize land management plan direction to better align designated critical habitat with late-successional reserves. Better realignment of the late-successional reserve network with critical habitat could adjust the matrix lands available for ecological treatments, which might provide additional timber outputs.

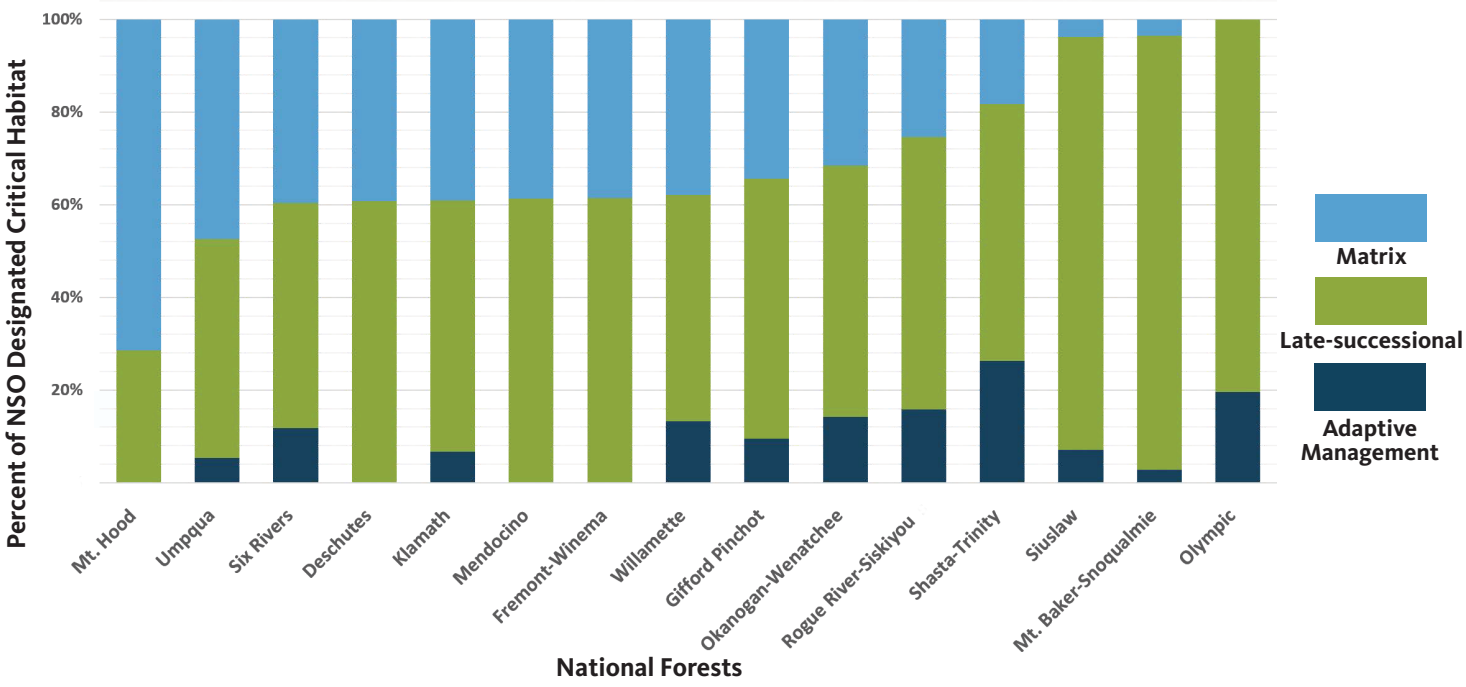

Figure 5-6—Northern spotted owl designated critical habitat overlaps with plan management direction differently on each national forest. On some forests there is a more urgent need to align critical habitat with late-successional reserves. Consistency in critical habitat management is needed between adjacent forests, especially when fire ecology is similar. Critical habitat designations are least aligned with late-successional reserves on the Mt. Hood, Umpqua, Six Rivers, Willamette, Klamath, Okanogan-Wenatchee, Shasta-Trinity, Gifford Pinchot, and Rouge River-Siskiyou National Forests, where there is less than 60 percent alignment for critical habitat in non-Wilderness reserves.

Habitat Management

Addressing old-forest habitat management for the northern spotted owl across the BioA area requires considering different ecological conditions, while working toward a level of consistency to help ensure planning effectiveness and implementation efficiency. Consistency would relate to the fire ecology of the landscape. For example, drier frequent-fire dependent ecosystems would benefit from habitat direction different from fire diverse (mixed severity) and fire infrequent ecosystems. However, planning efficiencies would still be gained through consistent direction within each fire ecology group (figures 4-4 and 5-7). Consistent habitat direction, appropriate for the ecosystem, could help national forests and grasslands meet the recovery actions highlighted in the northern spotted owl and marbled murrelet recovery plans (for example, northern spotted owl recovery action 10 and 32).[134] Similarly, consistent management direction for aquatic and riparian conservation is recommended across the BioA area to meet the needs of broad ranging aquatic species and to increase planning efficiency and implementation effectiveness.

[134] US Fish and Wildlife Service, 2011a.

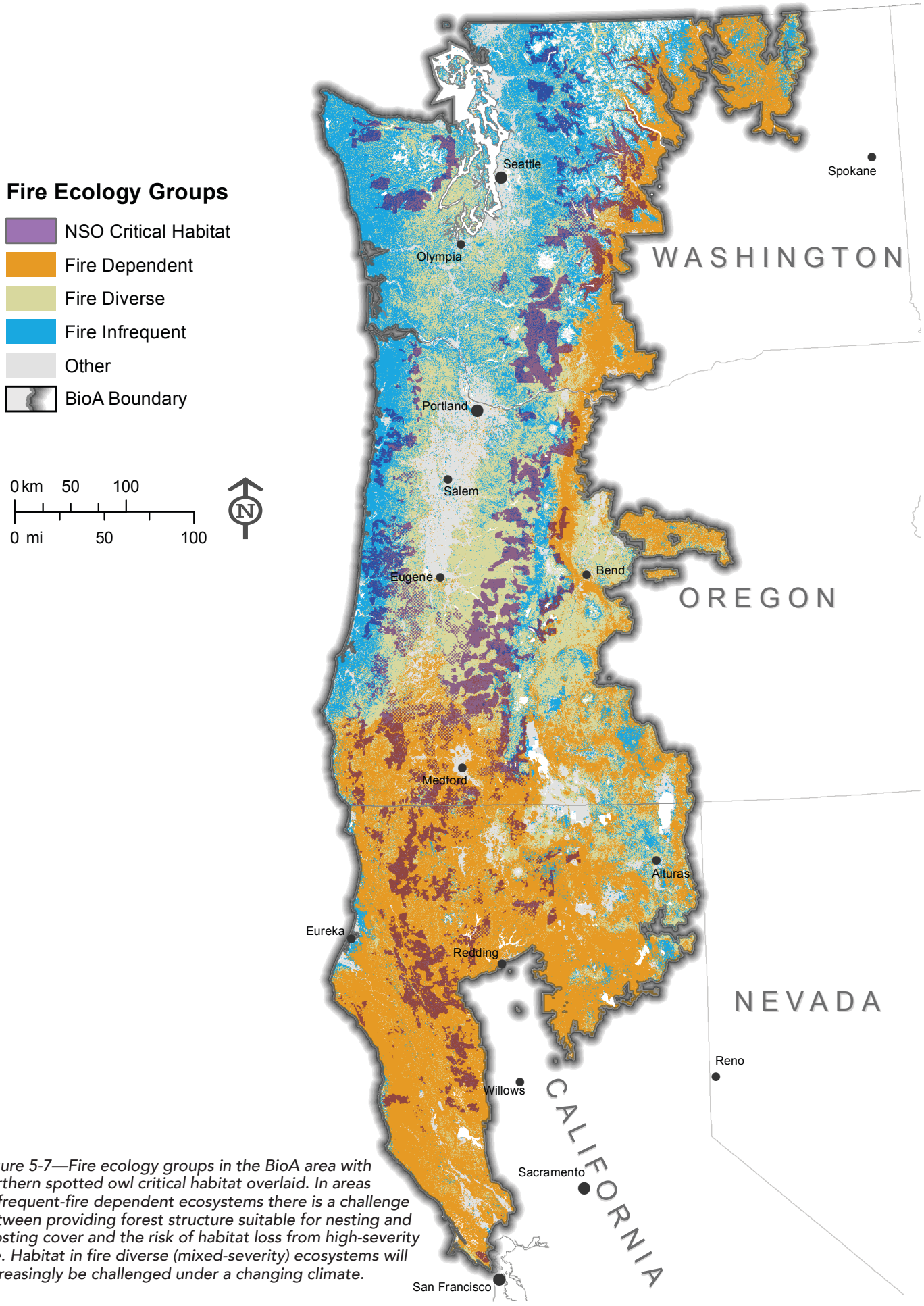

Figure 5-7—Fire ecology groups in the BioA area with northern spotted owl critical habitat overlaid. In areas of frequent-fire dependent ecosystems there is a challenge between providing forest structure suitable for nesting and roosting cover and the risk of habitat loss from high-severity fire. Habitat in fire diverse (mixed-severity) ecosystems will increasingly be challenged under a changing climate.

Active management is urgently needed to manage ecological integrity and wildlife habitat, as highlighted by the large fire potential in late-successional reserves and congressionally reserved land allocations (chapter 5, Fire and Fuels, figure 5-8). Some areas in northern California and eastern Oregon experience wildfires that are uncharacteristically large. It is projected that more fire diverse (mixed severity) areas will experience large fires in the future, which could have negative impacts on late-successional habitat (figure 5-8).

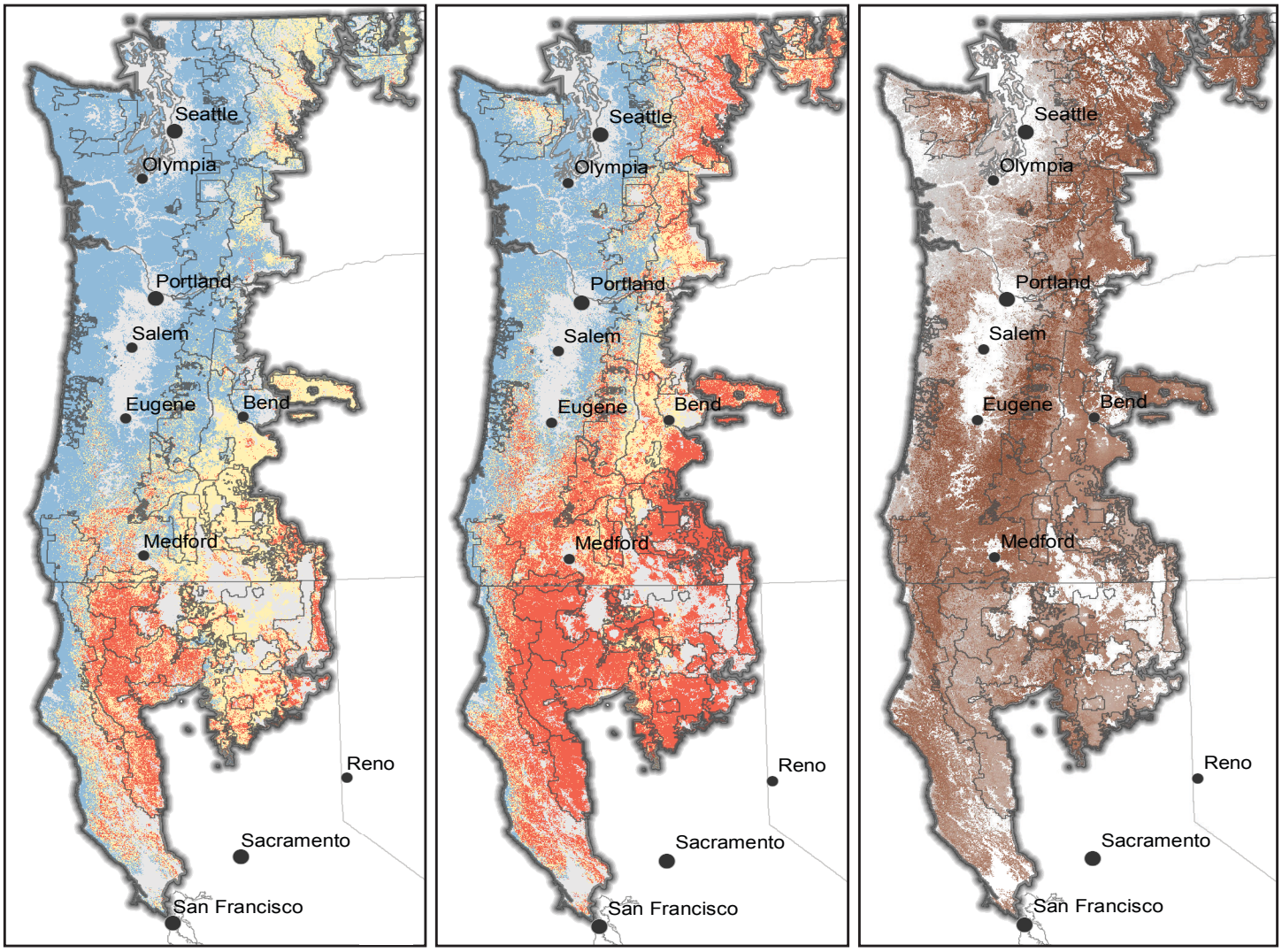

Figure 5-8—With a changing climate some forests will become increasingly prone to large fires. This shift will put reserve areas and associated habitat at risk of large stand-replacing fire. Developing vegetation management direction and desired conditions that are informed by climate change to sustain higher levels of ecological function, reduce risk, and create options for resilient ecological pathways will be important for these forests.[135]

[135] Adapted from Davis and others, 2017.

Sustainable Recreation

Providing consistent land management plan direction for recreation will help avoid confusion and frustration related to conflicting direction. The amount and type of visitor use varies across the BioA area, with high levels around metropolitan areas (figure 5-9). Additional assessment of how people use the national forests and grasslands will help to highlight where there is a need for consistency in land management plan direction. The data can be used to develop land management plan direction and monitoring strategies that consider the need for consistency, where appropriate, as well as the unique characteristics of recreation landscapes across the BioA area.

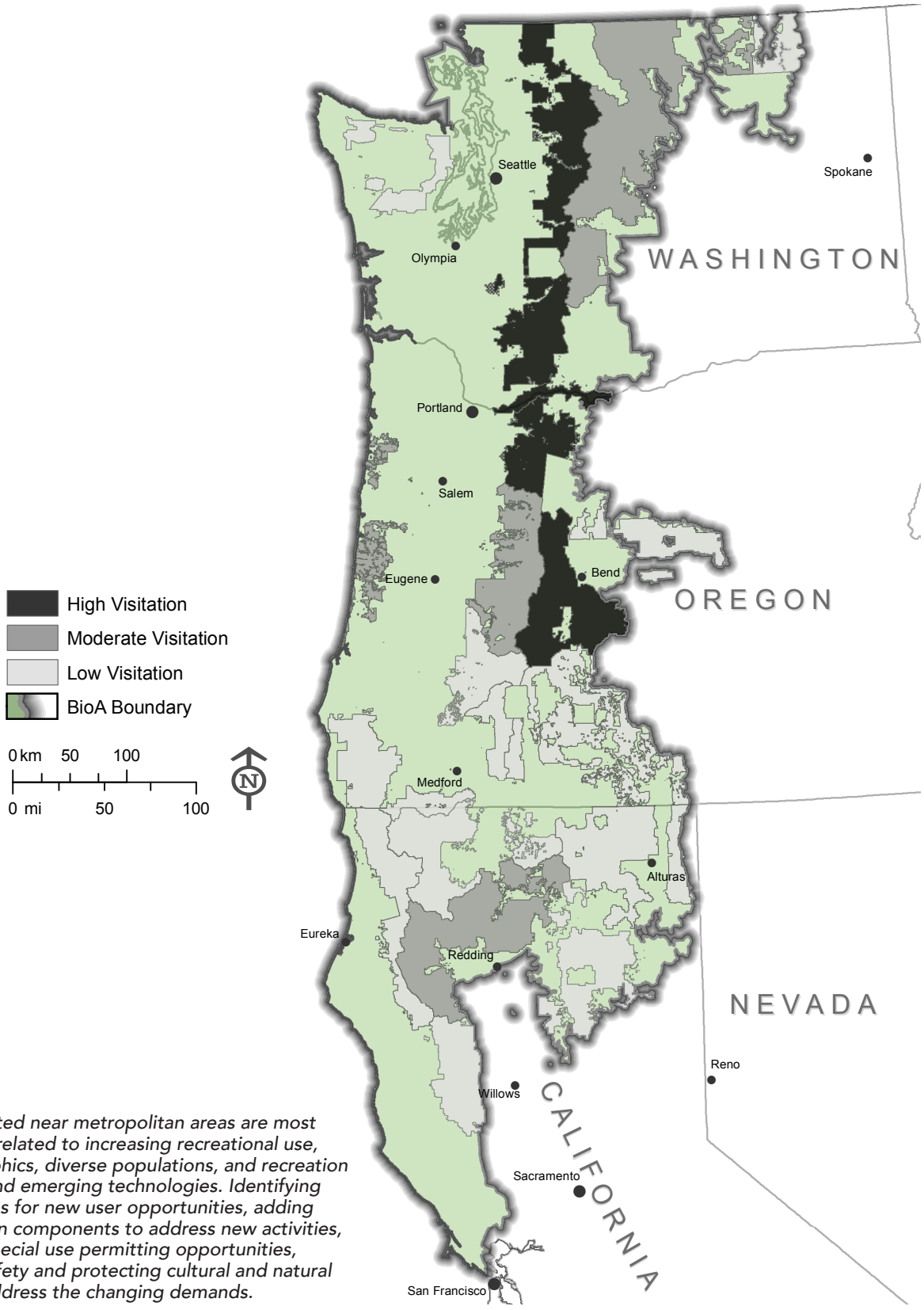

Figure 5-9—Forests located near metropolitan areas are most likely to face challenges related to increasing recreational use, changing user demographics, diverse populations, and recreation activity related to new and emerging technologies. Identifying recreation emphasis areas for new user opportunities, adding consistent recreation plan components to address new activities, and adding recreation special use permitting opportunities, while addressing user safety and protecting cultural and natural resources, can help to address the changing demands.

Roads and trails across national forests and grasslands are an important aspect of recreation and provide the Forest Service with access to conduct work on the ground, including fire and fuels management. The National Forest Road System varies by national forest and grassland (figure 5-10), as does its impacts on ecological integrity and terrestrial and aquatic wildlife and plants. Because existing Forest Service direction adequately addresses most road-related concerns, road management is not a primary driver in the need to modernize land management direction. However, when a road crosses from one national forest or grassland to another, consistent management direction is needed to efficiently serve communities and conduct management.

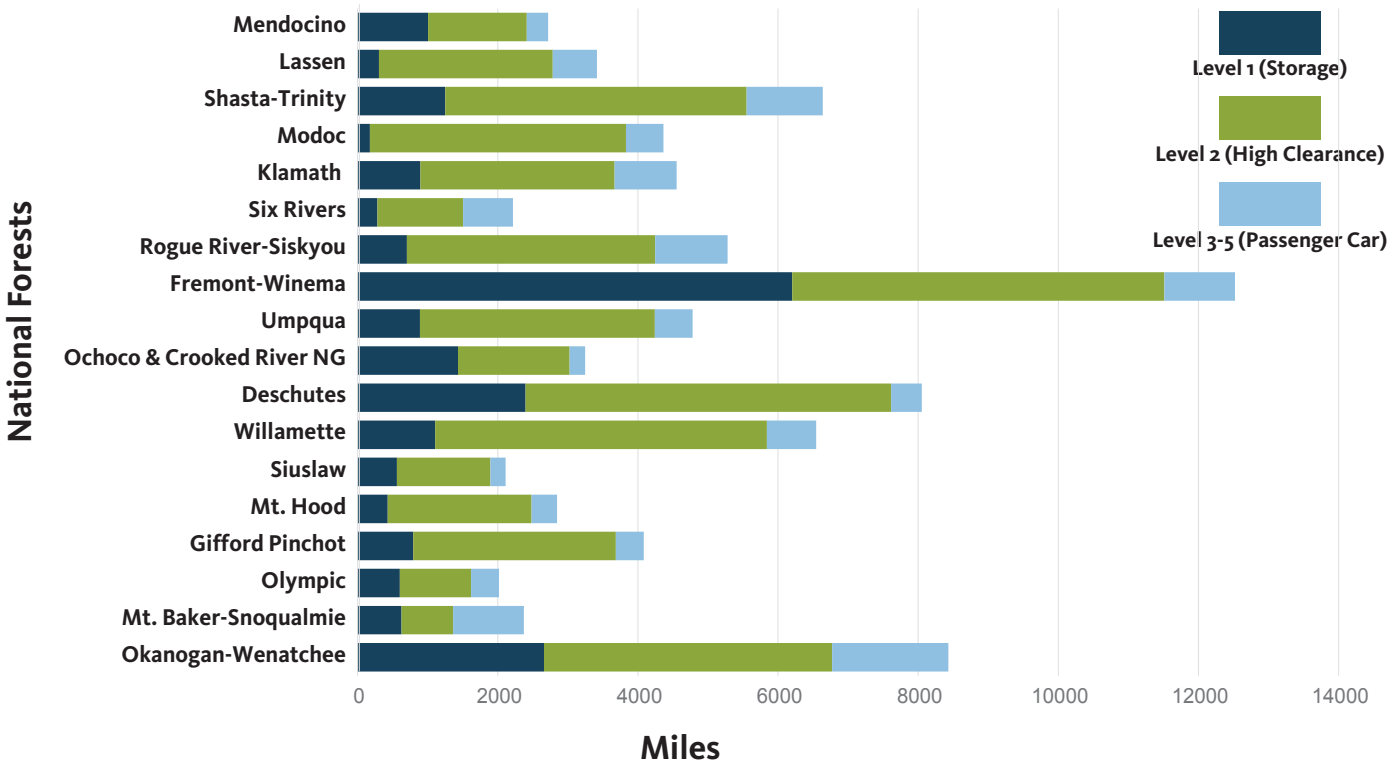

Figure 5-10—Road density and maintenance levels vary widely and, while not directly correlated, provide an indication of the maintenance backlog and needs along with access to a given area. Stored roads are not open to the public and receive no regular maintenance; high-clearance roads are open yet receive minimal maintenance, typically only to address road failures and resource concerns (for example, drainage and erosion control); and passenger car roads are open, can be gravel to pavement, and are intended to receive regular scheduled maintenance.

The impacts of climate change on recreation and Forest Service roads and trails exist across the entire BioA area, from increased flooding in more northern areas and to tree fall from increased wildfires in northern California, southwest Oregon, and the eastern Cascades (figure 5-3). Climate change has impacted and will continue to impact the delivery of abundant and safe recreational opportunities on national forests and grasslands in the BioA area.

Conclusion

In this chapter, we weighed the geographic urgency of various management challenges and opportunities for change and discussed the value of management consistency across the BioA area. We identified some management issues that would benefit from consistent direction across the BioA area and some management challenges and opportunities for change that aren't equal in geographic scope or urgency. To best address and improve how we meet the needs of the socially, economically, and ecologically diverse BioA landscape, the Forest Service will consider the full spectrum of policy and regulatory options available to make management decisions as we engage with Tribes, states, local governments, stakeholders, and the public. Next, you'll read about how your participation will help guide the Forest Service to develop land management plans that improve how we meet public needs while maintaining ecological sustainability on our national forests and grasslands in the BioA area.