

Land Manager Experiences with Resilience in National Forest Planning and Management

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SUMMER 2020



ECOSYSTEM WORKFORCE PROGRAM WORKING PAPER NUMBER 101



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About the Ecosystem Workforce Program:

The Ecosystem Workforce Program is a bi-institutional program of University of Oregon's Institute for a Sustainable Environment and the College of Forestry at Oregon State University. We conduct applied social science research and extension services at the interface of people and natural resources. Our publications aim to inform policy makers and practitioners, and contribute to scholarly and practical discourse.

More information: <http://ewp.uoregon.edu/about/intro>.



Acknowledgements

This project was funded by the Joint Fire Science Program (grant #16-3-01-10). We sincerely thank the survey respondents for their insights, and thank our colleagues on this project for their contributions.

Photos courtesy of Michelle Greiner (cover, pages 8 and 13, back cover) Jesse Abrams (page 1), and Thomas Timberlake (page 12). Document layout and design by Autumn Ellison, University of Oregon Ecosystem Workforce Program.

For more information and publications on this project: <http://ewp.uoregon.edu/ForestResilience>

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In recent years the concept of resilience has increased in importance as a guiding principle in land management objectives. Key policies such as the National Cohesive Wildland Fire Management Strategy (2014), the USDA Forest Service (Forest Service) 2012 regulations for the National Forest Management Act, and the USDA Strategic Framework (2008) include objectives based on restoring or maintaining the resilience of public forest lands to threats such as climate change and altered wildfire regimes.¹ While these and other recent policies collectively promote resilient landscape outcomes, it is less clear if or how the concept is operationalized in forest planning efforts.

Through a Joint Fire Science-funded research project, we investigated the concept of resilience as a means of constructively living with disturbances such as fire and insect outbreaks on national forest lands, including what resilience means, what it takes to plan for resilient outcomes, and the factors that complicate and encourage these outcomes. Previous reports from this research document how agency policy mandates, approaches, and resources encourage the use of resilience in planning (Timberlake et al., 2017) and compare three recently completed national forest plan revisions

in terms of how they incorporated resilience concepts (Abrams et al., 2020).² This report focuses on how resilience is incorporated in project planning on national forests and how well it aligns with planning processes and frameworks on a broader scale. We draw upon data from a national survey of Forest Service planners conducted in 2020. The specific objectives of the survey were to:

1. Understand land manager experiences with resilience as a concept and as an element of national forest policy;
2. Recognize how agency policies and practices can influence the ability of units to manage for resilience;
3. Identify how land managers perceive the relative importance of different agency objectives at forest, regional, and national levels.

The results of the survey illustrate how national forest planners and managers across the nation reconcile the concept and objectives of resilience in the work they do. The results also illuminate obstacles to achieving resilience as well as factors that can encourage more effective management for resilient outcomes. These findings have implications for forest managers and key stakeholders planning for resilience-based management.

¹ For a list of Key US Department of Agriculture policies and directives featuring resilience and related concepts, and the language they use related to resilience, see Timberlake et al., 2017.

² All publications are available on the project page: <http://ewp.uoregon.edu/ForestResilience>.

Approach

Survey population

To obtain a contact list of Forest Service planners, we manually collected the names of individuals from all Environmental Impact Statements (EIS) from national forests across all regions (for a map of regions, see Figure 1, page 3) from the years 2013 through January 2020. We downloaded over 1,200 PDFs of EIS documents from Forest Service and US Environmental Protection Agency archives, searched for “Responsible Officials” and “ID Team” members and manually entered associated names into a database, removing duplicate names. We then retrieved the USDA email address of each identified individual through the Forest Service Employee Search webpage.³ Some names were not found in the employee search webpage as they were not longer affiliated with the Forest Service, presumably as a result of retirement or career changes. This process resulted in a list of 2,213 email address contacts of individuals still employed within the Forest Service, all of whom were contacted and asked to complete the survey.

Survey design and administration

Concepts for the survey were drawn from literature on forest resilience and informed by case studies of Forest Service use of resilience in forest planning processes and frameworks for forest management (Abrams et al., 2020). The survey consisted of four main sections:

1. **Definitions of resilience:** To account for difference in perspectives on resilience within the Forest Service, we drew on four distinct definitions of resilience (see Table 1, below):
2. **Influence of disturbance agents:** We asked respondents for their views on the potential influence of 11 different disturbance agents on the resilience of forests within their management units.
3. **Influence of policies and practices within the Forest Service:** We asked respondents about the extent to which 10 different policies and 13 practices either enable or constrain their ability to manage for resilience on their respective management units.
4. **Leadership priorities and agency objectives:** We asked respondents to tell us how much of a priority they felt different objectives were to the leadership at the forest, region, and Washington Office level of the agency. Objectives included:
 - Incorporating climate science into analysis and planning
 - Managing for resilient landscapes
 - Meeting flagship targets (e.g., board feet sold and acres treated for hazardous fuels)
 - Crafting simple and efficient NEPA documents.

Table 1 The conceptualizations of resilience presented in the survey⁴

Resilience conceptualization	Definition
Resistance	The ability to resist or withstand external disturbances.
Engineering resilience	The ability to quickly return to a pre-disturbance state following disturbances.
Adaptive resilience	The ability to adapt to disturbances while retaining core system components.
Transformative resilience	The ability to undergo complete system changes in response to disturbances.

³ <https://www.fs.usda.gov/about-agency/contact-us/employee-search>

⁴ These definitions for “resilience” are based on Bone et al., 2016 and Higuera et al., 2019

We used Qualtrics software to design a web-based survey form. We used email to distribute an anonymous link to the survey to our identified population of 2,213 Forest Service planners in January, 2020. We followed up with two reminders to complete the survey and left the survey open for approximately 10 weeks. We received 608 responses, but 180 of those respondents did not complete the entire survey. Ultimately, we received 428 completed survey responses, for a response rate of just over 19 percent. Descriptive statistics and response frequencies were tabulated using quantitative analysis software SPSS 26. In the following sections we present key survey results.

Results

Respondent characteristics

Survey respondents were based in all nine Forest Service regions and at the Washington Office level, with between 15 (Region 9) and 77 (Region 6) respondents per region (see Figure 1, below). Respondents reported between 1 and 52 years of experience working for the Forest Service, with the majority (58%) reporting 11-20 years, 20% reporting 10 or fewer years, 26% reporting 21-30 years, and 16% reporting over 30 years of experience (see Figure 2a, page 4). Respondents also worked

Figure 1 Forest Service regions and the number of survey respondents from each region

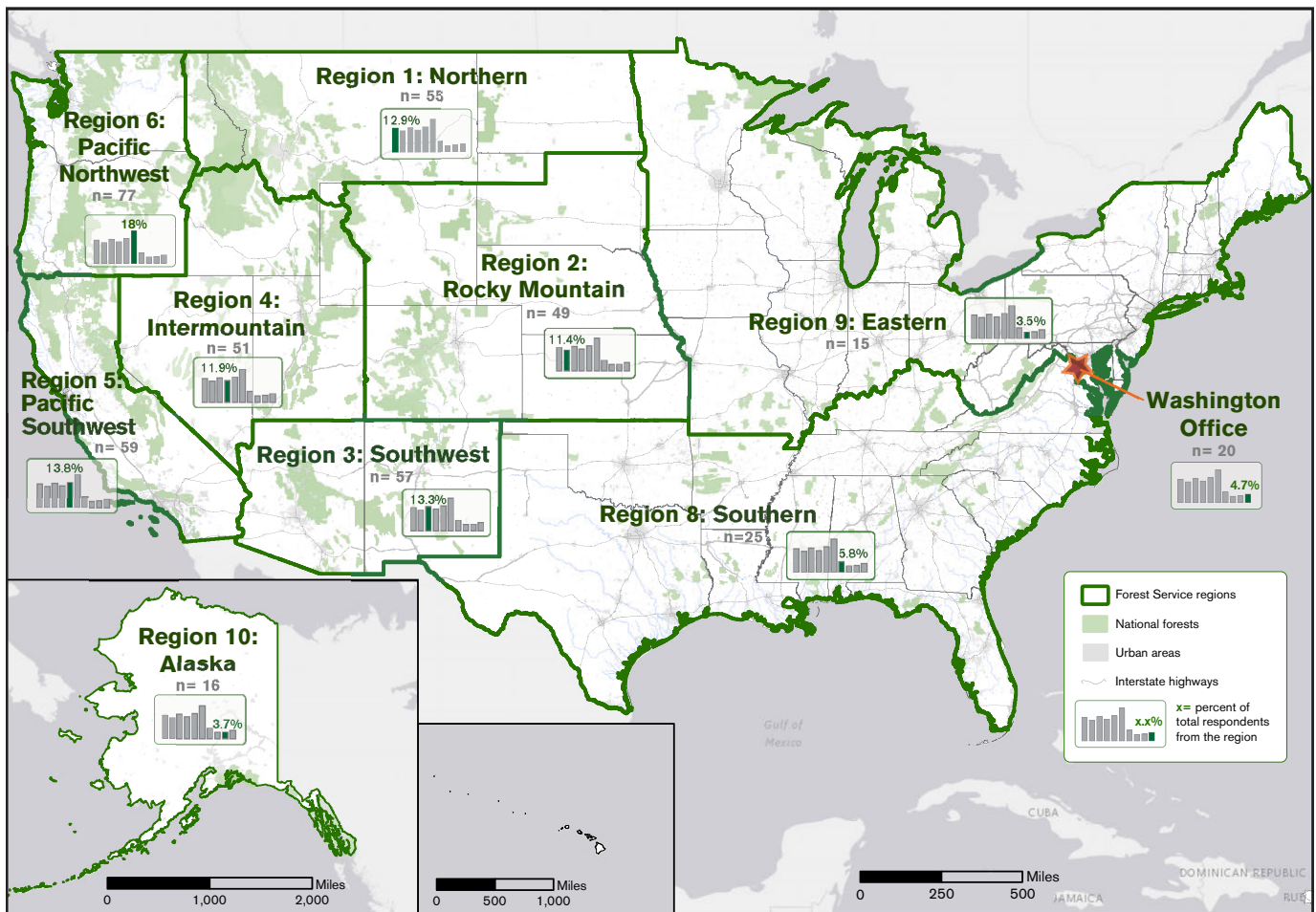
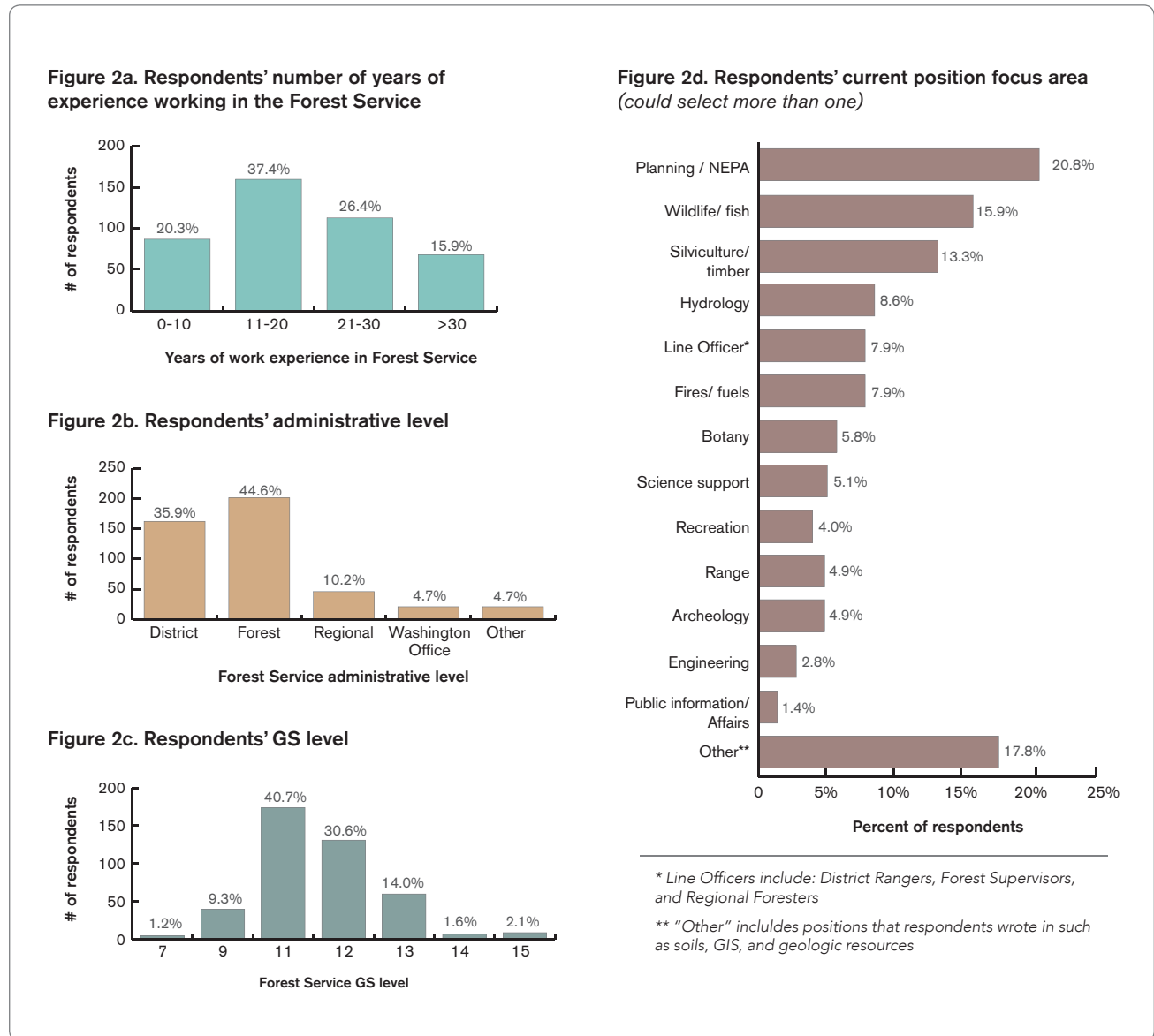


Figure 2 Survey respondents' Forest Service experience, administrative level, GS level, and position focuses



at every level of the agency. Most commonly, they worked at the forest level (45%) followed by district (36%), regional (10%) and national Washington Office (5%) levels (Figure 2b). Nearly all respondents (93%) worked in the National Forest System deputy area, and the rest worked in business operations, research and development, state and private forestry, or the Office of the Chief. Respondents reported GS levels between 7 and 15, with GS levels 11 and 12 accounting for more than 70% of total respondents

(Figure 2c). Finally, respondents indicated that the positions they were currently working in had a wide range of focus areas (Figure 2d). The most commonly selected focus, by 21% of respondents, was planning and NEPA, followed by wildlife and fish (16%) and silviculture/timber (13%). Each of the 13 focus areas that we asked about was selected by a minimum of 6 respondents, and 18% wrote in an additional focus areas for their positions such as soils, GIS, or geologic resources.

Definitions of resilience

Our results suggest that there is a lack of consensus around use of the term “resilience” within the context of national forest management, as well as a lack of clarity in how the term is defined within the agency (see Figure 3, below). When asked about the clarity of the scientific meaning of “resilience,” over 55% of respondents (n=237/428) agreed the definition was clear while 30% of respondents did not believe that it was clear. However, when asked about the clarity of the definition of resilience within national forest policy only about 26% of respondents agreed that the term was clear while the majority

(51%, n= 218/428) felt it was unclear. At the same time, nearly all (94%) respondents believed it was important for the Forest Service to have a clear definition of resilience, with 76% noting it was very to extremely important (see Figure 4, below).

There was more consensus around the scientific definition than the agency definition. When prompted to select the best scientific definition for resilience, the majority (>64%, n=275/428) selected “adaptive resilience,” i.e., the ability to adapt to disturbances while retaining core system components (see Figure 5, page 6). An even greater percentage of respondents also selected the “adaptive resilience”

Figure 3 Respondent perspectives on the clarity of the term “resilience” within science and national forest policy

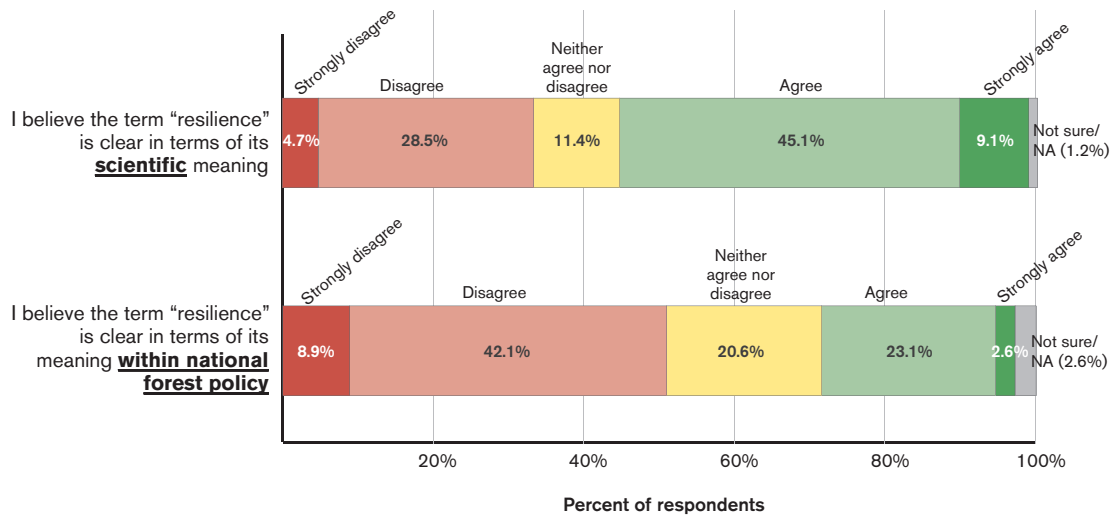
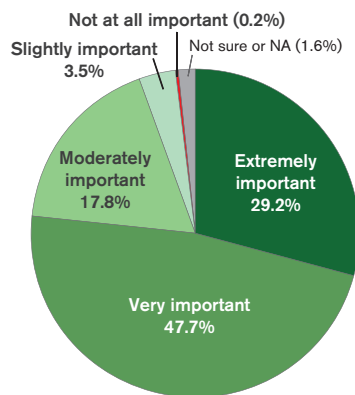


Figure 4 Respondent perspectives on the importance of the Forest Service having a clear agency definition for “resilience”

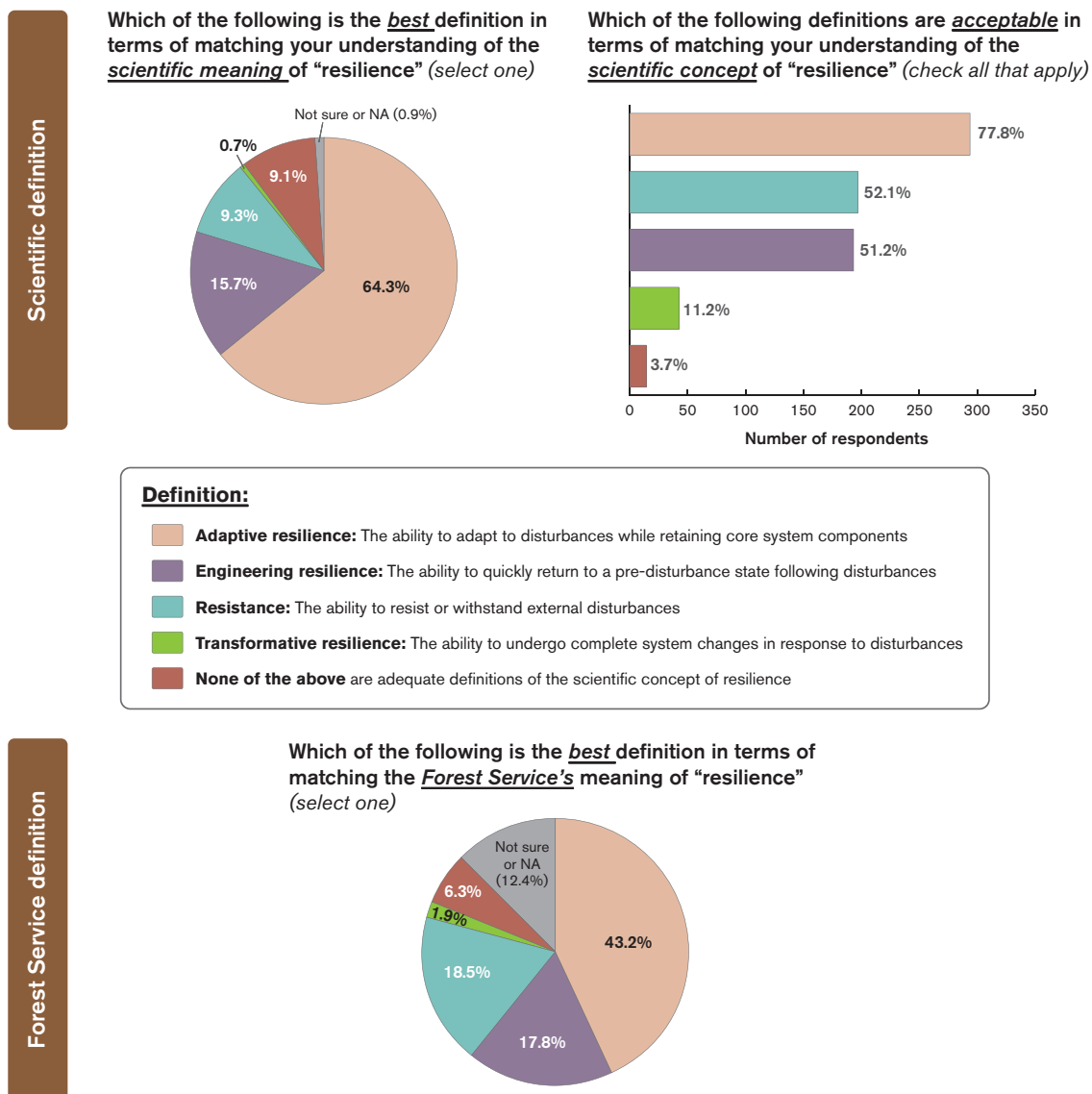


definition as acceptable in matching their own scientific understanding of resilience. About half of respondents also noted two other acceptable definitions: the “resistance” definition, i.e. the ability to resist or withstand external disturbances and/or the “engineering resilience” definition, i.e. the ability to quickly return to a pre-disturbance state following disturbances.

When asked to identify the best definition matching the Forest Service’s meaning of resilience, the

“adaptive resilience” definition was again most often selected by respondents. Notability, however, there was a greater diversity of responses to Forest Service’s definition of resilience than to the scientific definition. This suggests a higher diversity of definitions for resilience exists within the agency, and less consensus on the best definition. The percent of respondents who were unsure about which definition was best for the agency meaning was also greater than for the scientific meaning (12.4% versus less than 1% for the scientific meaning).

Figure 5 Respondent perspectives on the best and acceptable definitions for resilience



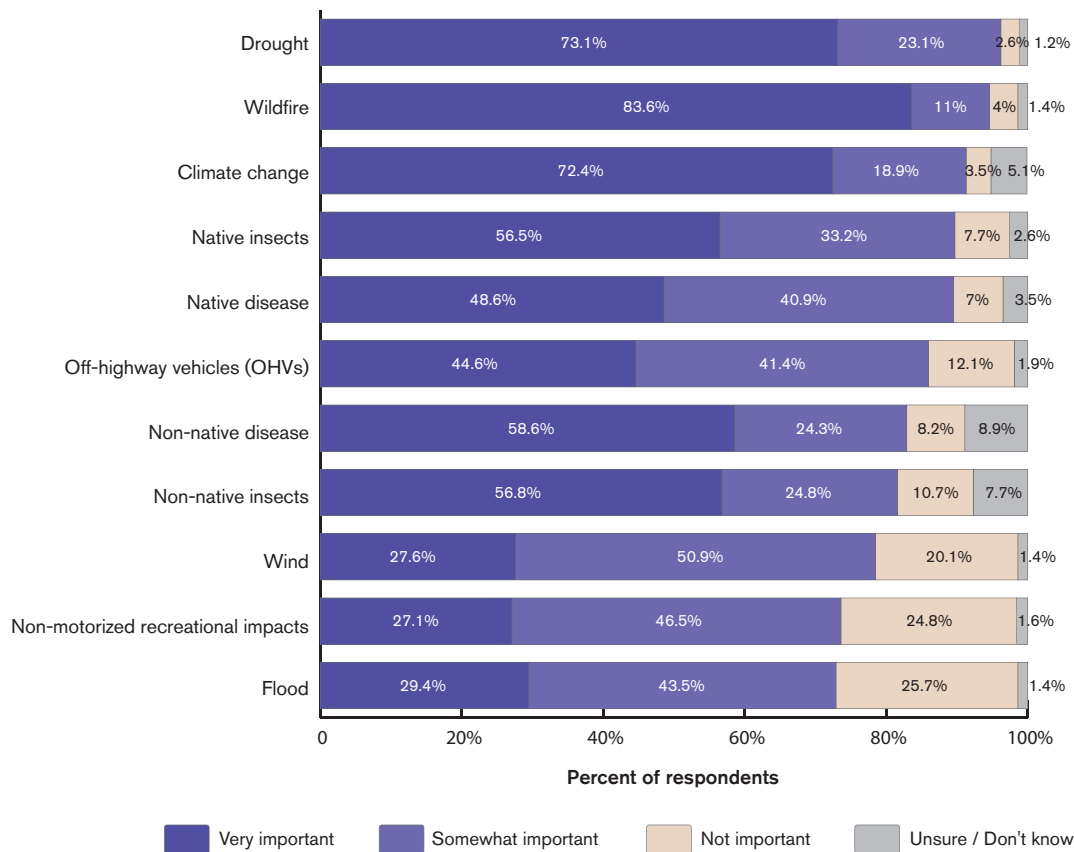
Influence of disturbance agents

Respondents indicated that all of the disturbance agents listed in the survey had an influence on the resilience of their individual management units. However, responses were not unanimous and did vary across the different disturbances and regions. The percent of respondents selecting “somewhat important” to “very important” ranged from 73% for flood to 96% for drought (see Figure 6, below) with an overall average of approximately 85%. However, with the exception of drought (at 96%), wildfire (at 95%), and climate change (at 91%), at least 10% of respondents thought that for their

management unit, specific disturbances were either not important or they were unsure.

To understand some of the variability in responses, we examined the rated importance of these disturbance agents by Forest Service region that respondents currently worked in (see Figure 7 with region summaries, page 9). Respondents at the Washington Office (n=20) most consistently indicated that wildfire, climate change, non-native diseases, and non-native insects were important (95% of respondents each); wind was rated as least important by Washington Office respondents (75%).

Figure 6 Respondent evaluation of the importance of disturbance agents on resilience within their management unit



Region 1. Respondents from Region 1 (n=55) most frequently identified wildfire, native diseases, and drought as important disturbance agents influencing landscape resilience in their management unit. The fewest individuals from Region 1 identified floods and non-motorized recreation impacts as important.

Region 2. Respondents from Region 2 (n=49) most frequently identified drought, wildfire, and native insects as the important disturbance agents influencing landscape resilience. Floods, non-motorized recreation impacts, and non-native insects were the least frequently selected.

Region 3. Respondents from Region 3 (n=57) most frequently selected wildfire, drought, and non-native diseases as the important disturbance agents influencing landscape resilience. Least frequently selected disturbances were wind and non-motorized recreation impacts.

Region 4. Respondents from Region 4 (n=51) most frequently selected drought, wildfire, and native diseases as the important disturbance agents influencing landscape resilience. Wind, floods, and non-motorized recreation impacts were the least frequently selected.

Region 5. Respondents from Region 5 (n=59) most frequently selected wildfire, drought and climate change as the important disturbance agents influen-

cing landscape resilience. Least frequently selected disturbances were floods, non-motorized recreation impacts, and wind.

Region 6. Respondents from Region 6 (n=77) most frequently selected drought, wildfire, and climate change as the important disturbance agents influencing landscape resilience. Non-motorized recreation impacts, floods, and OHVs were least frequently selected.

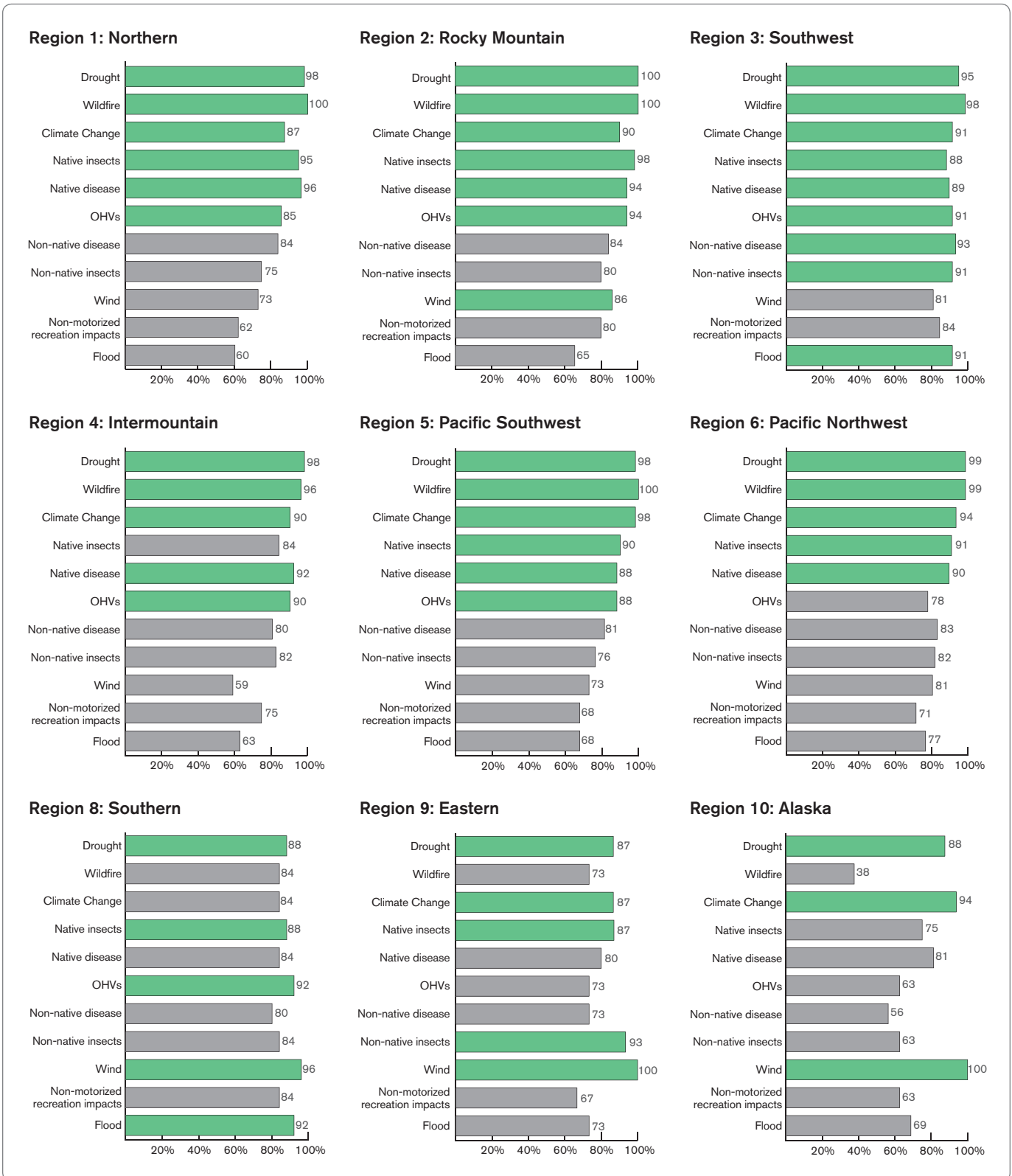
Region 8. Respondents from Region 8 (n=25) most frequently selected wind, floods, and OHVs as the important disturbance agents influencing landscape resilience. Least frequently selected disturbances were non-native diseases, followed by non-motorized recreation impacts, non-native insects, native disease, climate change, and wildfire.

Region 9. Respondents from Region 9 (n=15) most frequently selected wind and non-native insects as the important disturbance agents influencing landscape resilience. Non-motorized impacts, non-native disease, OHVs, and wildfire were the least frequently selected.

Region 10. Respondents from Region 10 (n=16) most frequently selected wind and climate change as the important disturbance agents influencing landscape resilience. Wildfire, non-native insects, and non-motorized recreation impacts were the least frequently selected.



Figure 7 Percent of respondents from each region that rated disturbance agents as important influences on resilience in their management units⁵



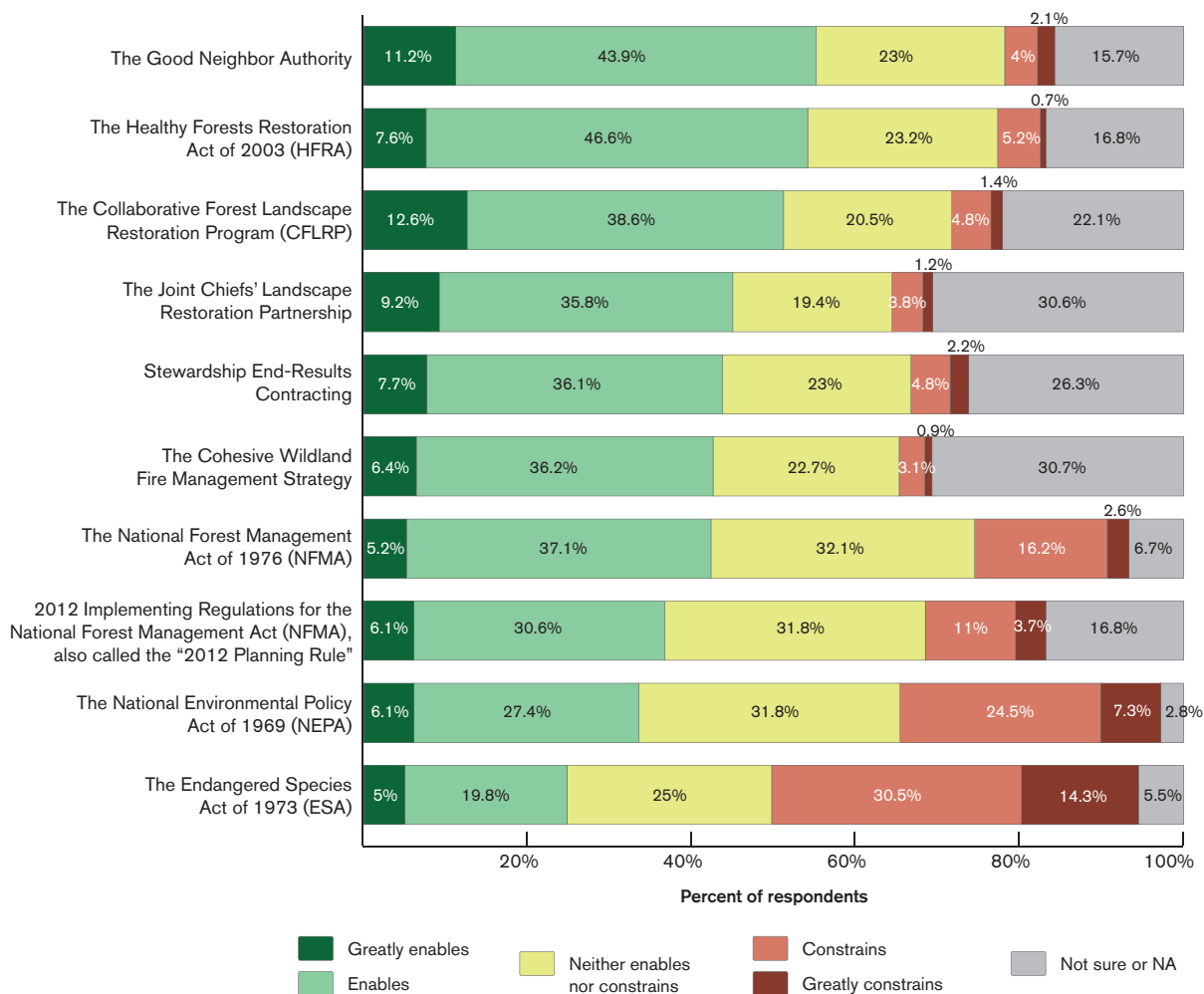
⁵ Green bars indicate disturbance agents influencing landscape resilience that were selected as important by more than 85% of respondents from that region (i.e. higher than the overall average of 85%) and grey bars indicate disturbance agents influencing landscape resilience that were selected as important by fewer than 85% of respondents.

Influence of policy and practices within the Forest Service

We asked respondents about the extent to which various policies and practices either enable or constrain their ability to manage for resilience on their respective management units. Most respondents reported that the listed policies either enabled or had no influence on their management unit’s ability to manage for resilience (see Figure 8, below). In particular, they identified the following policies as most enabling their ability to manage for resilience: the Good Neighbor Authority (55.1%), the 2003 Healthy Forest Restoration Act (54.1%), and the Collaborative Landscape Restoration Program (51.2%). Respondents noted that the Endangered Species Act and the National Environmental

Policy Act (NEPA) constrained their unit’s ability to manage for resilience more than the other policies (45% and 31% of respondents, respectively); the Endangered Species Act was the only policy rated as more constraining than enabling. The number of respondents who were unsure or who felt that the policy was not applicable varied greatly between policies. Very few respondents lacked a clear opinion on how enabling or constraining NEPA and the Endangered Species Act were, while other policies had many more respondents that selected Not Sure or NA (e.g., more than 30% of respondents for Joint Chiefs’ and the Cohesive Wildland Fire Management Strategy). Not Sure and NA responses could reflect respondents’ lack of familiarity or experience working with a particular policy (e.g., if they had not had a Joint Chiefs’ project on their unit).

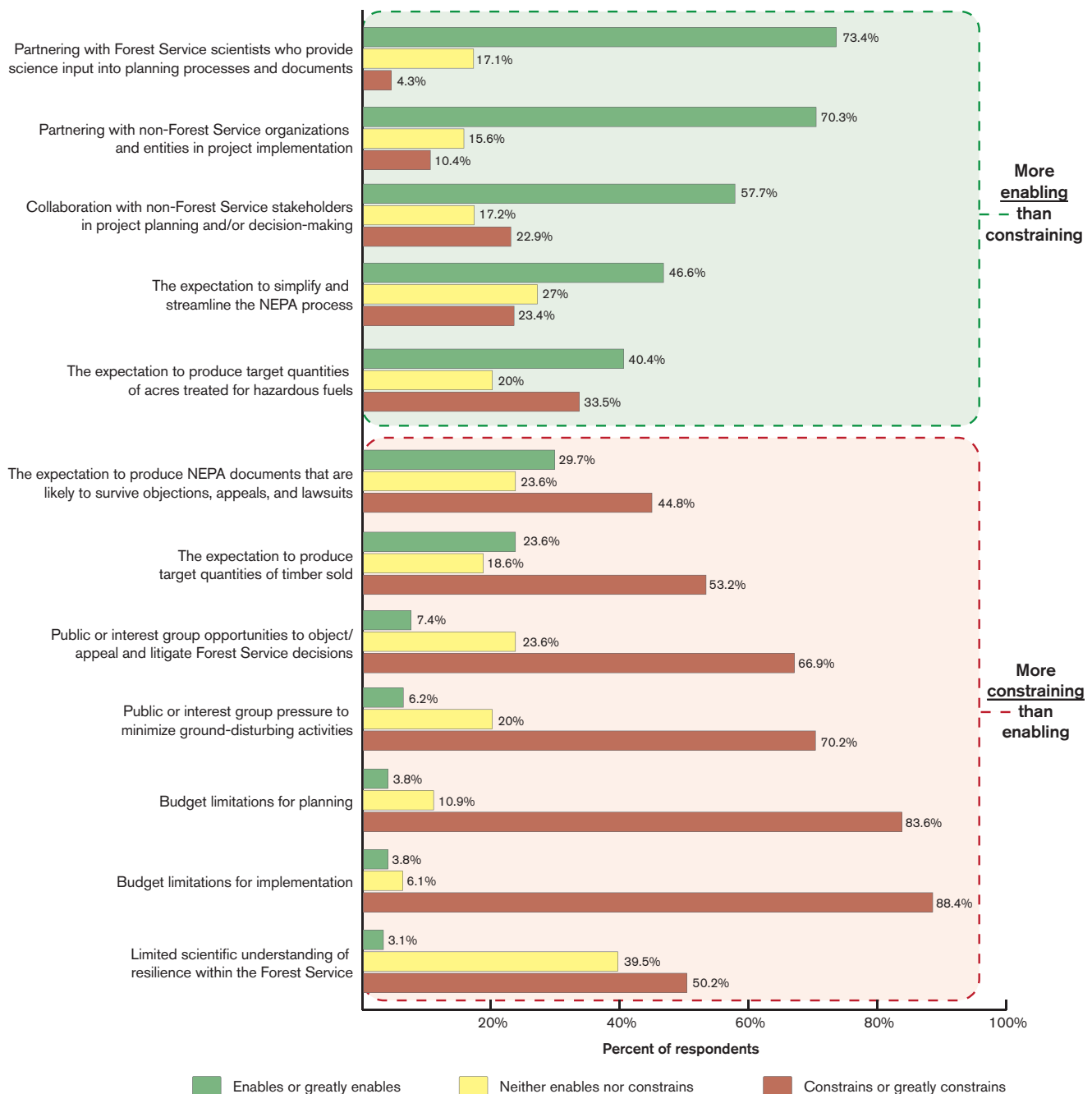
Figure 8 Respondent perspectives on the extent to which different policies enable or constrain their unit’s ability to manage for resilient outcomes



Unlike the response to policies, most respondents indicated that a host of common practices either constrained or greatly constrained the ability to manage for resilient outcomes on their management units (see Figure 9, below). Budget limitations for implementation and planning were the most frequently implicated constraints, with between 80-

90% of respondents indicating that they constrained or greatly constrained management for resilient outcomes. Approximately 70% of respondents thought that public pressure to minimize disturbance and the threat of appeals, objections, and lawsuits challenging Forest Service decisions either constrained or greatly constrained unit-level resilient outcomes.

Figure 9 Respondent perspectives on the extent to which different practices and factors enable or constrain their unit’s ability to manage for resilient outcomes⁵



⁵ Relatively few respondents (between 2-7% for each option) selected Not Sure or NA for the different practices and factors compared to policy options; these responses are not included in Figure 9.

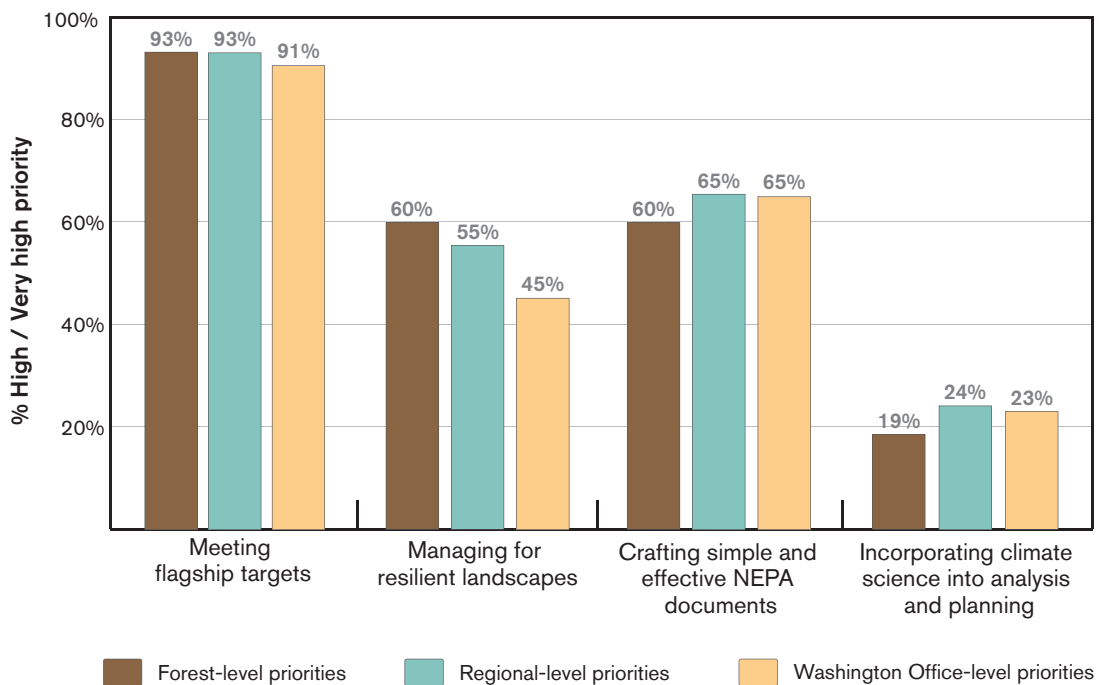


Leadership priorities and agency objectives

When we asked respondents to tell us how much of a priority they felt different objectives were to leadership at the different levels of the agency, responses were fairly uniform across forest, region, and Washington Office levels of the Forest Service. Nearly all respondents (over 90%) thought that meeting flagship targets (board feet sold and acres treated for hazardous fuels) was a high or very high priority at each level. Approximately 65% thought

crafting simple and effective NEPA documents was a high priority among agency leadership. More respondents identified managing for resilient landscapes as a high priority for forest-level leadership, with fewer identifying it as a priority for the larger region or Washington Office scales (65%, 55% and 45%, respectively). When asked about incorporating climate science into analysis and planning documents, most respondents did not feel that it was a high priority at any of the three levels (proportions varied from 19% at the forest level to 24% at the regional level).

Figure 10 Respondent perceptions of Forest Service priorities at forest, regional, and national levels



Discussion and conclusions

Overall, our results suggest that Forest Service planners share broad agreement on resilience concepts, factors influencing resiliency on landscapes, factors either enabling or constraining resilience-based management, and the priorities of Forest Service leadership within the context of resilience. On the whole, Forest Service planners felt that there was greater clarity on the scientific meaning of resilience than on its meaning within national forest policy, with notions of “resistance” and “engineering resilience” more frequently selected as the predominant approach within the agency. Combined with other results from the survey, this suggests that there is some uncertainty within the agency about what resilience means in practice and whether it represents a break from the steady-state ideas that drove national forest management for most of the twentieth century.

Influence of disturbance agents

At the aggregate level, a majority of survey respondents indicated that a variety of disturbances have important influences on forest resilience within their management units. Drought, wildfire, and climate change were particularly important across geographies. However, our breakdown of these results across regions illustrates the variation that exists among different forest ecosystems. National forest managers are clearly confronting challenges to resilience stemming from numerous social and ecological drivers; future research could uncover the tensions and tradeoffs related to managing resilience to multiple stressors simultaneously.

Influence of policy and practices within the Forest Service

Resilience is relatively new as a concept guiding national forest management, and it has at least the potential to conflict with the concepts that guided the design of older forest policies such as NEPA and the Endangered Species Act. Survey respondents did see the Endangered Species Act as a constraint on managing for resilient landscape outcomes, though they were more equivocal when assessing NEPA. Budget constraints and public perceptions and pressures were more widely seen as constraining

the ability to manage for resilience. Taken together, this suggests that declining agency capacity may serve as a limitation on the ability to achieve resilient landscape outcomes, despite the existence of recent policy tools that more clearly support resilience-informed management.

Leadership priorities and agency objectives

Respondents indicated sharp discrepancies between the priority given to resilient outcomes and the priority given to meeting flagship targets (board feet sold and acres treated) within agency leadership. Further, respondents felt that the importance given to resilience declined from forest to region to Washington levels. Although flagship targets may not always be in direct conflict with resilience-oriented management (respondents felt that timber targets hindered the achievement of resilience-oriented outcomes more than did acres treated targets), it appears that any conflicts that do exist will often be resolved in favor of meeting short-term targets. A careful consideration of the tradeoffs between achieving short-term performance metrics and longer-term forest resilience will be an important task to inform future forest policy reforms.



Literature cited

Abrams, Jesse, Michelle Greiner, Thomas Timberlake, Courtney Schultz, Alexander Evans, and Heidi Huber-Stearns. 2020. "Planning and Managing for Resilience: Lessons from National Forest Plan Revisions." Working Paper 100. Eugene, OR: Ecosystem Workforce Program, Institute for a Sustainable Environment. http://ewp.uoregon.edu/sites/ewp.uoregon.edu/files/WP_100.pdf.

Bone, Christopher, Cassandra Moseley, Kirsten Vinyeta, and R. Patrick Bixler. 2016. Employing resilience in the United States Forest Service. *Land Use Policy* 52:430-438.

Higuera, Philip E., Alexander L. Metcalf, Carol Miller, Brian Buma, David B. McWethy, Elizabeth C. Metcalf, Zak Ratajczak, Cara R. Nelson, Brian C. Chaffin, Richard C. Stedman, Sarah McCaffrey, Tania Schoennagel, Brian J. Harvey, Sharon M. Hood, Courtney A. Schultz, Anne E. Black, David Campbell, Julia H. Haggerty, Robert E. Keane, Meg A. Krawchuk, Judith C. Kulig, Rebekah Rafferty, and Arika Virapongse. 2019. Integrating subjective and objective dimensions of resilience in fire-prone landscapes. *BioScience* 69(5):379-388.

Timberlake, Thomas, Courtney Schultz, and Jesse Abrams. 2017. "Resilience in Land Management Planning: Policy Mandates, Approaches, and Resources." Working Paper 77. Eugene, OR: Ecosystem Workforce Program, Institute for a Sustainable Environment. http://ewp.uoregon.edu/sites/ewp.uoregon.edu/files/WP_77.pdf.

