

# Informing Strategic Development within the USFS Research and Development Deputy Area

*Michelle Greiner and Courtney Schultz*

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## ***About the Authors***

**Michelle Greiner** is a Research Associate with the Public Lands Policy Group, Colorado State University.

**Courtney Schultz** is the Director of the Colorado State University Public Lands Policy Group and Associate Professor in the Department of Forest and Rangeland Stewardship, Colorado State University.

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### **For more information, please contact:**

Courtney Schultz  
Department of Forest and Rangeland Stewardship  
Colorado State University  
Fort Collins, CO 80523-1472  
970-491-6556  
[courtney.schultz@colostate.edu](mailto:courtney.schultz@colostate.edu)  
[sites.warnercnr.colostate.edu/courtneyschultz/](http://sites.warnercnr.colostate.edu/courtneyschultz/)



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## INFORMING STRATEGIC DEVELOPMENT WITHIN THE USFS RESEARCH AND DEVELOPMENT DEPUTY AREA

*Michelle Greiner and Courtney Schultz*

**We are investigating communication and partnership strategies of the US Forest Service (USFS) Research and Development (R&D) deputy area, with particular focus on the Rocky Mountain Research Station (RMRS). We conducted 58 interviews with USFS personnel and R&D partners to investigate perceptions around integrating R&D science into agency operations and improving R&D relationships within the Forest Service and with external partners and policy makers. The intent of this paper is to capture interviewees' perceptions and to identify differences in perceptions among actors. Herein we summarize our key findings and recommendations from this stage of our work.**

### **Key Findings**

**There was consensus among interviewees that the role of USFS R&D is to provide scientific expertise through the development of management tools, scientific support for land management and planning, inventory and analysis, science interpretation, and innovations.** Divergent perspectives were shared as to whether R&D appropriately balances applied, practitioner-oriented research and basic, exploratory research. Some said R&D's focus is to address USFS needs, while others mentioned how external partners within the US and globally are also part of R&D's purview. Some congressional staff members were unclear about how research is being used to inform USFS forest management. R&D staff members suggested that directing more research towards National Forest System (NFS) priorities would require clearer leadership direction, adequate resources, and incentives.

**Most interviewees said that R&D generally lacks a clear strategic direction. Within RMRS, there was a lack of clarity on national priorities and specific research directions associated with those priorities.** Most RMRS interviewees said they value the autonomy to set priorities but also were unclear about how national guidance connects to research at the station or project level. We also heard that research typically occurs over longer time frames than political and management cycles; therefore, interviewees said it is not easy or desirable to link R&D to shifting national priorities. RMRS interviewees desired more coordination with the Washington Office R&D staff to define high-priority research needs and to provide appropriate funding and incentives to meet those needs.

**National level interviewees explained that communication from research leaders about R&D's success and capacities was not effectively reaching congressional staff members.** RMRS scientists and program managers also agreed that actors in key political positions and R&D leadership are not fully aware of the station's success and capabilities. Interviewees suggested a need for more communication upward to the Washington Office and Congress.

**Other challenges include career incentives that affect R&D's capacity, trajectory, and reputation.** Some interviewees added that the current research evaluation system rewards scientific achievement, without clear incentives for internal agency partnerships. There were some discrepancies about this claim; for example, program managers said there is ample space within the evaluation system to report on partnership efforts. Alongside a decreasing budget, scientists are driven to seek funds from sources outside the agency, further causing a division between R&D and the other USFS deputy areas, interviewees explained. Challenges in part reflect internal dynamics within the agency, including tensions related to prioritizing funding among deputy areas. Some interviewees said it is problematic for R&D to operate as an independent research agency embedded within a land management organization, especially if the R&D mission is supposed to be broader than NFS. Some discussed possibly restructuring R&D as an independent research branch or the value of organizing by topical areas instead of by regions.

**Other USFS deputy areas (e.g., NFS) and partners external to the agency who interface with RMRS were generally positive about RMRS, focusing on R&D's standard of conducting independent and excellent science.** Partners internal and external to the USFS favored practitioner-oriented work but recognized scientists have little support and incentives to conduct applied research. Partners expressed that informal, ad-hoc interactions are the best practices for collaborating with RMRS. Most interviewees discussed the ongoing difficulty of limited in-person interactions following COVID-19. Success with former structured collaborative efforts (e.g., RMRS Regional Science Advisory Teams) was contingent on consistent leadership and funding for scientists.

**In general, USFS and external partners said they valued RMRS's continued investment in science communication efforts, management-oriented deliverables (e.g., Science You Can Use), dedicated RMRS involvement on student research committees and other co-developed projects, and the decision to co-locate some research scientists at Regional Offices.** To enhance relationships with RMRS, their partners encouraged: 1) Clearer direction from the agency about research priorities; 2) Informal networking opportunities, along with funding to attend professional conferences; 3) A system to help track practitioner needs and scientist capacity; 4) Recognition of the R&D mission to look beyond NFS needs; and 5) Suitable rewards or incentives for scientists to co-produce and disseminate research.

## **Recommendations**

Interviewees offered key recommendations that warrant attention going forward:

- Agency leaders should define a strategic plan to direct research priority areas and associated research needs, and clarify the scope and expectations of R&D.
- Diversify the range of R&D staff members who communicate with Congress (e.g., Station Directors, National Program Leads, Program Managers), identifying motivated communicators with strong advocacy and relationship-building skills.
- Invest in boundary-spanning or translator roles, such as science delivery specialists at the station level, who specialize in science communication with partners and can help agency leaders understand the scope and importance of research occurring in the field.
- Increase and maintain operational resources required to conduct science-based research along with appropriate incentives and recognition for scientists to address management priorities.
- Explore ways to create informal networks and connections (e.g., summits and conferences).

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## **More Information**

Find reports and other publications about this research at: <https://sites.warnercnr.colostate.edu/courtneyschultz/>  
For more information about this project, contact: Dr. Courtney Schultz; [courtney.schultz@colostate.edu](mailto:courtney.schultz@colostate.edu)  
Colorado State University; Fort Collins, CO 80521-1472

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## Introduction

The Research and Development (R&D) deputy area of the USDA Forest Service generates and disseminates scientific research to inform the sustainable management of the nation's forests and grasslands, including and beyond the National Forest System (NFS). Our task was to understand perceptions around more fully integrating science and R&D into agency operations and improving R&D relationships within the US Forest Service (USFS) and with external partners and policy makers. In this paper, we report on our findings from our 2020-2022 investigation of the strategy and communications of R&D, focusing on the Rocky Mountain Research Station (RMRS), which funded this research. The intent of this paper is to capture interviewees' perceptions and to identify differences in perceptions among actors. These were our central research objectives:

1. Characterize the current vision for and perceptions of the efficacy of USFS Research and Development.
2. Characterize the use of RMRS research and perceptions of collaboration with R&D among internal USFS partners and external stakeholders.
3. Understand how research station-level program leads and scientists set their research agenda and who they partner with.

The development of this project was informed by previous investigations of the R&D deputy area, including the National Academy of Public Administration (NAPA) Assessment (Dominguez et al., 2019), the US Endowment for Forestry and Communities (US Endowment) Blue Ribbon Commission Report (Jolley et al., 2017), and the United States Government Accountability Office (GAO, 2010) Report to the Majority Leader of the Senate. These existing reports reveal that R&D has taken steps to improve its ability to fulfill its mission but also indicated that challenges persist with science delivery, within organizational structure that affects alignment with the agency, and with available capacity, such as funding and personnel. [Table 4](#) at the end of the report summarizes the primary take-aways from these reports in comparison with our findings.

Our study further explored these themes, with a focus on RMRS, but with broader perspectives on R&D from our interviewees. The first stage of our work, which is detailed in this report, focused on qualitative interviews with diverse parties about R&D's mission, research activities, communication, perceived challenges, and past successes, with a focus on RMRS. In the second stage of our work, we will expand our study with quantitative surveys.

## Approach

We began interviews to address our primary research objectives in late 2020. We used a purposive sampling approach to interview several groups of people: 1) national-level actors who are involved in R&D decision-making, oversight, or are key partners; 2) RMRS-level individuals who work at the station in various capacities, typically as program managers or scientists; 3) key internal partners with the National Forest System and State and Private Forestry deputy areas, or with academia, other agencies, or other entities (e.g., with NGOs or industry groups) who work with the station either co-creating or utilizing research expertise at a regional, state, or local level. Interviews were voluntary and confidential. For national-level interviews, we targeted current and former Washington Office (WO) leadership and senior officials of the USDA and USFS knowledgeable about R&D strategy and operations. We focused within the office of the USDA Undersecretary for Natural Resources and Environment, the USFS Office of the Chief, and the R&D, National Forest System (NFS), State and Private Forestry (S&PF), and International Programs (IP) deputy areas. We also spoke to people in positions of political oversight in the legislative and executive branches of the US government and national-level NGO partners and representatives of state forestry agencies. Most people were identified through public websites; some were recommended by other interviewees.

For RMRS interviewees, we targeted the station's current and former program managers (PMs), scientists, and communications staff members. We interviewed RMRS leadership and program managers to gather a more programmatic view. We interviewed a subset of scientists to understand the nature of their connections and partnerships to inform our sampling and future stages of research. Contacts were identified through USFS websites and other publicly available information. We also asked interviewees to identify other potential interviewees. Because we were interested in understanding scientist-manager connections, our scientist interviews focused on those working in or with Regions 1 and 4 of the USFS. These places were recommended as the furthest along in the Regional Science Advisory Teams (RSATs) and the RMRS-Region 4 Science Partner program, which were both efforts established to support coordination between agency land managers and scientists (Clark et al., 2021).

For RMRS partner interviews, our target population included people who collaborate with or use RMRS science at the regional, state, or local level within the RMRS footprint. Contacts included a suite of state foresters, university leaders in units specializing in forestry, other federal land management agencies, representatives of external forestry-related groups and NGOs, private landowners, industry groups, tribal liaisons or representatives, and USFS NFS and S&PF regional office staff members. To identify these individuals, we began with groups working closely with the RMRS headquarters in Fort Collins, Colorado. Beyond the immediate footprint of RMRS headquarters, we expanded our selection of partners to a sample of people who could discuss what was happening in other places. These participants were identified through a referral approach from our RMRS staff interviewees and the other partners we talked to. These partner interviews focus on R&D's science delivery, communication, value of their mission, and perceived problems and successes.

Between late 2020 and early 2022 we conducted 58 semi-structured interviews; quotes from interviewees are included below and denoted with a unique number. [Table 1](#) summarizes the number of interviewees. [Table 2](#) summarizes the different categories of participants. Interviews were recorded, transcribed, and coded for analysis to explore themes in the interviews. We provide illustrative quotes from interviewees and distinguish speakers by confidential interviewee identification numbers.

One limitation of our study is that our RMRS-level interviewees, both RMRS personnel and their external and internal USFS partners, were confined to the station's geographical footprint. During our interviews we learned that the network of partners and stakeholders with whom RMRS staff members interface was more expansive than we initially realized. We were able to sample from multiple groups in this footprint, including university partners, state agencies, and industry representatives. However, there are partners, scientists, and nuances of relationships and details that we missed due to the geographic constraint on sampling. Even so, with regard to our research questions, we were no longer hearing new major themes or information, and we reached an appropriate level of thematic saturation for this stage of the work. Thus, these findings should be viewed as capturing predominant perspectives about RMRS but are not quantifiable or generalizable to particular populations of interviewees.



Table 1 Interviewee summary

National or RMRS-level	Number of interviews
National-level actors <sup>a</sup>	11
RMRS staff members <sup>b</sup>	20
RMRS partners (both internal to the USFS, such as NFS, and external partners) <sup>c</sup>	27
<b>TOTAL</b>	<b>58</b>

<sup>a</sup> Current and former WO leadership and senior officials of the USDA and USFS within the office of the USDA Undersecretary for Natural Resources and Environment, the USFS Office of the Chief, the NFS, R&D, S&PF deputy area, congressional staff members, the Office of Management and Budget, and national-level partners in DC.

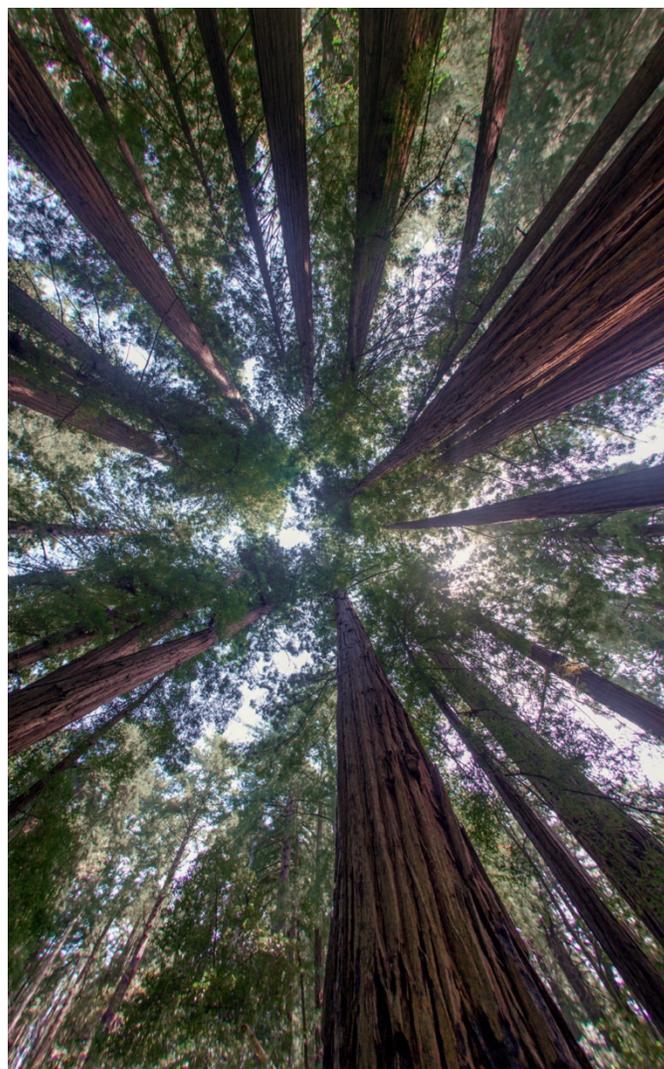
<sup>b</sup> Current and former Program Managers, station leadership and scientists within the RMRS.

<sup>c</sup> Internal to the USFS and external partners within the RMRS footprint; see Table 2 for more detail.

Table 2 Interviewee breakdown across all interviews

Category of interviewees <sup>a</sup>	Number of interviewees
R&D	24
NFS	7
S&PF	3
NGO	8
State and Other Federal Agency	6
University	3
Forest Products Industry Representative	2
Tribal Representative	2
Others in national-level government leadership/oversight positions	4
<b>TOTAL</b>	<b>58</b>

<sup>a</sup> Some interviewees had experience serving in or were liaisons for multiple categories. We designated interviewees in their primary role discussed during the interview.





## Findings

Here we present overall findings, generally organized by our research objectives. Interviewees also offered various recommendations and opportunities pertaining to strategic improvements for R&D. Key recommendations are synthesized in [Table 3](#) at the end of this report.

### *What were general perceptions of the efficacy of USFS Research and Development and underlying challenges?*

#### Mission and Scope

**Most interviewees said they were aware of a narrative that agency leadership, or key personnel in oversight positions, were not receiving what they expected from R&D.** We asked follow-up questions to understand the foundation of this narrative and investigate potential strategic improvements and opportunities going forward.

**There was consensus among interviewees that the role of USFS R&D is to provide scientific expertise through the development of management tools, scientific support for land management and planning, inventory and analysis, science interpretation and innovations; there was disagreement about the scope of R&D research and what it should focus on.** Interviewees disagreed about whether R&D appropriately balances practitioner-oriented research (applied) and exploratory research (basic), and the scope of the R&D mission.

**Almost all interviewees discussed that R&D conducts both applied research and basic research, which they said can be a central cause for misconceptions about R&D's expectations and performance.** As explained by some interviewees, applied research means conducting science to meet immediate land management needs, and basic research means conducting exploratory, forward-thinking primary science over the long term. R&D national-level actors and RMRS program managers discussed disjointed understandings about R&D's mission among some other actors at the national level and by other USFS deputy areas. These interviewees suggested that if conceptions about research were more universal, those outside of R&D may have more realistic expectations of the research enterprise. One interviewee explained:

*“There are two types of research. The basic, and [applied] . . . [With basic] research [it] is really hard to define when you've succeeded, you've developed a new technique, you find a new product or something like that, that's tough to put a timeline on. And in many cases, the research leads to nothing. And so, have you met your mission goal? I don't know. It's kind of tough, and it's long term. But those two dimensions are constraints, really, that are hard for us in research to sell and to define” (16).*

**There also was disagreement among individuals both external and internal to the USFS about the scope of R&D research.** Some interviewees said R&D's focus is to address USFS needs, while others mentioned how external US and global partners are also part of R&D's purview. Some congressional staff members said they were unclear about how research is being used to help forest management for the Forest Service, which they said should be R&D's primary focus. Interviewees in other deputy areas, like the National Forest System, also said R&D should be focused on addressing agency priorities, or they expressed confusion about R&D's mission. Partners external to the USFS thought that R&D's purpose was to provide directly applicable information to forestry practitioners both within and outside of the agency. We heard from interviewees, for example:

*"Maybe this is a mischaracterization on my part. I think there's some scientists that are doing work that's directly relevant to the management of our National Forests. And then sometimes it seems like their work is less relevant . . . I want them working for NFS because that's who I work for. And I want all their help focused on my needs . . . I don't actually know what their mission says. Is it broader than that?" (50).*

*"Research is not getting translated to on the ground management, on national lands, on National Forests, and that's what we want, right? It's all good but in the end, we want it to be focusing on the National Forest System. We don't want research to have to go out and get a lot of grants and projects from outside of the Forest Service because then they're not focused on those issues that the forest managers really need help with" (25).*

**R&D staff members expressed that research often requires a balance of addressing short-term land management needs, particularly those of NFS, and maintaining integrity as an independent research entity.** Some thought there was room to direct more research to address NFS priorities but were unclear if this was the expectation from agency leadership. Some R&D staff members suggested certain scientists could be appointed to focus on NFS, or that a portion of their time could be designated to address NFS priorities. They said directing more research towards NFS priorities would require clearer leadership direction, adequate resources, and appropriate incentives and rewards for focusing on NFS priorities.

### Leadership Direction

**Most interviewees said that R&D generally lacks a clear strategic direction (see Box 1 for quotations that represent some of the themes we heard).** Some pointed to the nature of research and R&D institutional and incentive structure, which we explore more below, as limiting the ability of national leaders to set research priorities. National-level interviewees also mentioned that research direction cannot change quickly and should not be politically driven; therefore, it is not easy or desirable to link R&D to shifting national priorities that may change with administrations.

#### Box 1: Examples of R&D direction and planning challenges

*"As a deputy area, I don't think we have a real clear vision of where we want to be and how we want to get there. Everybody has their ideas, but there's no consensus" (16).*

*"[The research deputy area] needs to know from the agency leadership, where are we going? What is it that is expected of us so that we can gear our work towards supporting the mission priorities or the questions that are facing us currently" (24)?*

*"There appears to be this inner struggle in R&D between the management of R&D and the scientists themselves about their purpose, function, and mission. That needs to be resolved because all it's doing right now is creating finger-pointing and tension. [R&D] needs to be like, this is who we are as an organization, and this is what we're doing" (5).*

*"Do they have breakout sessions when [the] Executive Leadership Team gets together to discuss coordination? Or does the Deputy Chief . . . have a strategic plan to execute with reduced or eliminated duplication or clear understanding of priorities and administration policy? Not clear" (27).*

**According to our interviewees, the R&D Deputy Chief sets the strategic direction for R&D, working with input from some members of the Executive Leadership Team (ELT)<sup>1</sup> and the National Leadership Council (NLC),<sup>2</sup> based on expectations from the USDA Undersecretary for Natural Resources and Environment and the USFS Office of the Chief.** Washington Office R&D Program Staff Directors work with the ELT and the NLC to communicate national priorities to the stations, which then use this guidance to inform how they will address localized needs within each program area.<sup>3</sup>

**Within RMRS, there was a lack of clarity on national priorities and specifically the research directions associated with those priorities; interviewees did not all agree about whether they wanted clearer direction.** There were common perceptions of ambiguous direction, and the lack of unity or consistency among leadership at the Washington Office and USFS R&D executives. Most RMRS interviewees said they value the localization and autonomy to set priorities but also were unclear about how national guidance connects to research at the station or project level. RMRS interviewees agreed that station priorities should not be a top-down directive, but they desired more coordination with the Washington Office R&D staff members to define high-priority research needs and provide appropriate funding, encouragement, and incentives to meet those needs. Some interviewees thought there could also be more cohesive priorities among stations and encouragement for intra-station collaboration (see [Table 3](#) for additional recommendations). One interviewee said, for example:

*“One of our big challenges is differences in station priorities, we get pulled in different directions . . . I have been concerned for a long time about lack of national focus and it doesn't need to be ‘here are the projects we are going to be working on’, but if they were [to say] here are the five priorities we really want to work on over the next decade, then each of us could rally around those priorities in terms of the focus in whatever program” (28).*

**We also heard that sometimes national topical priorities are identified.** Interviewees said, however, this does not necessarily translate into a clear set of research priorities. For instance, they identified a difference between climate adaptation being a priority and having an understanding of priority research needs to support climate adaptation within the agency.

## Communication Challenges

**National level interviewees explained that communication from research leaders about R&D's success and capacities was not effectively reaching congressional staff members.** There were a number of explanations for this, ranging from: 1) challenges associated with who in R&D and the USFS has direct access to communicate with congressional staff members to share this information; 2) challenges associated with leadership knowing and communicating what research scientists are doing; and 3) general communication strategies and their efficacy. For instance, some suggested more of a role for both the Deputy Chief and Station Directors in communicating with Congress about their activities. Others recommended that National Program Leads could serve in a translator role between stations and congressional staff members. Some said more station-level staff members could help translate up R&D's success and capacities. As a corollary, some said that leaders at the station and national level could do more to gain knowledge of scientist activities. Finally, when discussing congressional communication, interviewees said ultimately this depends on having the skills and freedom to build connections with those in key executive and legislative branch positions.

**RMRS scientists and program managers agreed that actors in key political positions and R&D leadership are not fully aware of the station's success and capabilities.** Most RMRS interviewees perceived that leadership was not boldly and meaningfully advocating to Congress or the other deputy areas of the research branch's contributions, resulting in less funding and support. Scientists theorized that people in leadership roles are unaware of R&D's value

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<sup>1</sup> The ELT is composed of the three USFS Deputy Chiefs, their associates, and the Office of the Chief.

<sup>2</sup> The NLC is composed of all Research Station Directors and Regional Foresters, ELT members, and some additional USFS Washington staff members, like legislative affairs and communications.

<sup>3</sup> Program areas include a number of disciplines within each of the seven FS R&D stations. For example, at RMRS there is a Fire, Fuel, and Smoke (FFS), a Forest and Woodland Ecosystems (FEW), and a Human Dimensions (HD) program area, amongst others.

and therefore cannot communicate about it, that budget shortfalls have forced prioritization of other deputy areas, or that leadership does not see as much relative value in funding R&D. Scientists suggested a role for more science delivery specialists and boundary spanners at the station-level to help connect with the WO. Some expressed concern over these factors decreasing scientist morale and their ability to generate novel, forward-thinking research. One person explained:

*“Messaging and delivery to the policymakers who influence the budget and the program direction. That really is so critical right now. . . . [T]here’s so many who are authorizing, or appropriating dollars [that] don’t know about what research is delivering. I think that’s just really critical to get in front of” (14).*

## Organizational and Institutional Factors

**Almost all interviewees discussed how career incentives affect R&D’s capacity, trajectory, and resulting reputation.** Interviewees explained that scientists are not incentivized and do not have the capacity to prioritize NFS needs. Interviewees said the Research Grade Evaluation Guide<sup>4</sup> (RGEG) informs how scientists are evaluated and incentivizes individual research interests and publishing academic papers more than addressing the short-term management needs of NFS. There were some discrepancies about this claim; for example, program managers said there is ample space within the evaluation system to report on partnership efforts. Several scientists did not see a need for the RGEG to change expectations for publications, emphasizing the importance of peer-reviewed publications in establishing credibility as scientists. Rather, scientists suggested that there could be greater recognition and support for informal collaborations and for conducting applied science. Many said they continue to partner with managers in spite of the lack of incentives to do so in the RGEG; they speculated that early-career scientists may feel a stronger pressure to produce publications to pursue promotion. Box 2 provides quotations from interviewees about the challenges they face with the incentive structure.

### Box 2: Examples of problematic incentives from interviewees

“The research system functions in a way that . . . disincentivizes prioritization and incentivizes individual interests. . . . One of the tradeoffs is that we have a fair number of people who pursue interests that may not be the highest priority of the agency. Then they become institutionalized and there’s very little ability to shift and change them because . . . the system that they are rewarded in is not the same as a GS employee. It’s neither right nor wrong, per se, it’s just that’s the tradeoff that we get. We’re able to attract really high-quality researchers and we have to reward them within the system of rewards that is meaningful to them, which is publishing and giving grants, et cetera. But as a result, it’s difficult to shift and change and be nimble” (7).

“The research station as an independent deputy area has relished its independence . . . but there’s also a new reality around the need for research to be applied, and there’s concurrent stressors around making your research relevant and obtaining external funds to get the operating costs to do your work and the institutional incentives and structure of the research organization . . . this new reality has not been reflected in the incentive structure . . . That’s the inherent tension. I think that has not been well addressed” (2).

**R&D interviewees explained that alongside a decreasing budget, research staff members are driven to seek funds from sources outside the agency, further causing a division between R&D and the other USFS deputy areas.** Most scientists agreed they lack an operating budget and need to seek external funding to pursue their work, which they said often directs time and attention to problems that are not agency specific. Some scientists said they co-develop research priorities with or receive input from other USFS deputy areas and external collaborators, with attendant

<sup>4</sup> The Office of Personnel Management (OPM)’s Research Grade Evaluation Guide (RGEG) informs the performance evaluation system for federal government scientific research positions. It provides criteria for evaluating the grade level of a research position and the position description. The 2019 NAPA report found the Forest Service R&D RGEG process can make it difficult to identify metrics that reflect outcomes or the impacts of a scientist’s contributions relative to the agency’s mission. The report suggests that a cultural shift is needed to address bias towards publications in the review process (Dominguez et al., 2019).

funding agreements, and, as such, their work is often directly related to management needs. Other scientists are less focused on applied research and their direction is oriented towards exploratory, longer-term research questions.

**Scientists and program managers agreed that declines in funding and competition for budgets, along with a lack of workforce capacity within R&D, continues to place stress on scientists' ability to address immediate land management needs for a variety of reasons.** For example, unfilled positions have led scientists to take on extra administrative tasks. Travel restrictions constrict scientists' ability to attend conferences and field visits, which they said are necessary to create meaningful connections with managers. Some said the lack of capacity caused competition for funding among stations, other deputy areas, and with external agencies. Some mentioned how the RMRS footprint contains the majority of NFS lands, saying it is unrealistic for scientists to be wholly responsive to that user base. Budget modernization, according to multiple interviewees, was making it more complicated to form partnerships with external entities and to enter into agreements with NFS.

**Finally, some interviewees thought R&D's autonomy and organizational structure is a source of disconnect between research and the other deputy areas.** Interviewees said R&D has a culture of independence, based on its establishment as a separate arm of the USFS. We heard this culture contributes to the distancing of R&D within the USFS. Some thought R&D's decentralized structure also was a factor making it challenging to set clear priorities and integrate with the other deputy areas. Most RMRS interviewees discussed that actors outside of research have disparate understandings of the timeline and adequate resources required to conduct science, which, according to interviewees, contributes to misunderstandings about expectations and capacity needs. Some interviewees thought setting dedicated time to share comprehensive updates from each deputy area during ELT meetings could help build interagency awareness.

**Some national level interviewees and RMRS program managers said it is problematic for R&D to operate as an independent research agency embedded within a land management organization, especially if the R&D mission is supposed to be broader than NFS.** Interviewees within R&D conjectured that the current structure perpetuates the idea that R&D exists to serve NFS and the resulting narrative that R&D is not responsive to NFS management needs. Some theorized it could be effective to restructure R&D to organize by primary research objectives or topics rather than by regional research stations. A few thought R&D could be organized as a separate institute or a national lab, or a separate agency under the USDA Research, Education, and Economics mission area like other research agencies (e.g., Agricultural Research Service). All the interviewees who discussed these organizational aspects recognized that any such changes would require a major institutional overhaul and thought it was largely unproductive to focus on shifting R&D structure, recommending that improvements be made elsewhere, such as with clearer strategic planning and direction from USFS leadership.

### *What are internal USFS staff members and external partner perceptions of collaboration with RMRS?*

**Interviews revealed there are many partners both internal and external to the USFS with whom scientists interface at varying levels.** We heard about a variety of examples where agreements are in place with RMRS, including internal NFS and S&PF collaborators at the Regional Offices and National Forests, and with academia, industry, private landowners, other Federal agencies, and NGOs spanning the country and internationally. Engagement is relative to project scope, and interviewees said it is mostly dependent upon established relationships and individual personalities. Most interviewees discussed the ongoing difficulty of limited in-person interactions following COVID-19.

**Partners both internal and external to the USFS discussed many ways people get connected with RMRS scientists and maintain their relationship with the station.** Mostly we heard partners, both internal to and outside of the agency, got to know their RMRS contacts from pre-existing relationships with individuals they attended graduate school with, through field visits, and by attending conferences. Some partners considered themselves to be more users of science, discussing that at the time of the interview they did not have a formal project agreement or memorandum of

understanding (MOU) with RMRS; but they mentioned past agreements or future agreements being developed. Other partners said their interactions with the station are informal but frequent.

**Both internal and external partner perspectives on the value of R&D and RMRS were generally positive, focusing on R&D's inherent standard to conduct independent, expert science.** We heard a variety of ways people collaborate directly with RMRS to co-produce science and the ways various actors use science. External and internal agency partners often mentioned, for example, RMRS Science You Can Use (see Box 3), General Technical Reports, monitoring information and data synthesis, focusing on the value of practitioner-oriented information and tools. Partner interviewees commonly highlighted RMRS products focused on climate change, adaptation, and fire management as examples of relevant and useful research. Most RMRS interviewees shared positive outlooks about the station's science delivery and communication initiatives saying they have made important strides in the program and continue to evolve in a promising direction. Some partners said they valued the station's dedicated involvement on student research committees and other co-developed projects. We heard there is limited support for scientists to conduct, analyze, and publish data in addition to working on products for the science-management interface. Scientists suggested a role for more science delivery specialists and boundary spanners at the station.

**Box 3: Science You Can Use**

Science You Can Use (SYCU) are RMRS products intended to synthesize scientific information for priority management needs (<https://www.fs.usda.gov/rmrs/science-you-can-use>).

**USDA Forest Service**  
U.S. DEPARTMENT OF AGRICULTURE

**Rocky Mountain Research Station**  
**Science You Can Use (in 5 minutes)**

FEBRUARY 2022

**Is This Flight Necessary? A New Framework for Fire Aviation Decision Support That Improves Efficiency Through Analytics**

Aircraft play vital roles in managing wildfire, but their use is both costly and inherently risky. On average, USDA Forest Service aviation costs represent 30 percent of annual firefighting expenditures. And despite improvements in airworthiness and safety in the last decade, aviation-related accidents represented the highest category of federal firefighter fatalities. To improve strategic risk management of firefighting aircraft, Rocky Mountain Research Station (RMRS) ecologist Crystal Stonesifer and colleagues have recently developed and published a decision support system called the Aviation Use Summary (AUS). The AUS provides a shared understanding for firefighters, fire managers, and fire leadership through near real-time automated mapping of aircraft actions (such as retardant drops) and a structured, repeatable check-in and planning process.

In aviation, a fundamental risk management practice is to ask, "Is this flight necessary?" This question may be straightforward during initial attack with a clear objective of containing the fire. It becomes more complicated when managing a large, long-duration fire with multiple, possibly competing, objectives. Alignment of management decisions is further challenged because responsibility for large wildfire management is often shared by multiple agencies and across several administrative levels. A key goal of the AUS is to help ensure consistency between tactical and strategic objectives so that risk-informed decision-making can be common practice. This work builds on over 10 years of RMRS research characterizing use and efficiency of aircraft in fire suppression to help understand operational effectiveness, improve wildfire response, and minimize unnecessary firefighter exposure.

The AUS has been applied since 2017 on over 70 different fires, forests, and regions throughout the Western United States. The tool utilizes aircraft tracking data, existing geospatial datasets, and

*Aircraft play a vital role in fighting wildfire, but their use is both expensive and inherently risky. The Aviation Use Summary (AUS) is a new decision tool that utilizes aircraft tracking data, existing geospatial datasets, and emerging analytics to guide decision makers through a strategic risk management process. USDA Forest Service photo of 2017 Ventura Fire by Karl Owen.*

**USDA Forest Service Rocky Mountain Research Station**

**USDA**  
United States Department of Agriculture

**Rocky Mountain Research Station**  
**Science You Can Use Bulletin**

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**How a Forest Disappears: Conversion of Forest to Nonforest Vegetation Following Wildfire**

If you take a road trip through valleys and mountains in the western United States, you're bound to see the transition between the lower tree line and the vegetation below it, predominantly shrubs or grasses. Under a warming climate, these lower elevation forests are considered "trailing edge" forests because the boundary between forest and nonforest is expected to move upslope and northward.

"That boundary between forest and nonforest you see is a climate signal. Below that transition, the climate conditions are generally unsuitable for trees," says Sean Parks, a research ecologist with the Rocky Mountain Research Station (RMRS) in Missoula, Montana.

It's here, along lower elevation trailing edges, where conditions are becoming increasingly warmer and drier and where a forest's range is likely to shrink. Parks has been tracking the trailing edge of forests because this is where the risk of conversion from forest to nonforest is most likely.

"Most of our forests, especially trailing edge forests, are susceptible to fire," he says. "They're dry and there's a lot of fuel. So if we can identify where there's an elevated likelihood of stand-replacing fire, it gives us an idea of where we can do

The 2020 Castle Fire killed 100% of the trees, including giant sequoias, on this site in the Sierra Nevada, California. USDA Forest Service photo by Curtis Kvamme.

**USDA Forest Service Rocky Mountain Research Station**

**NFS staff members at Regional Offices discussed Regional Science Advisory Teams (RSATs) as a primary effort aimed to connect science and management (see Box 4 for detail on RSATs).** RSAT success in Region 4 of the USFS and the Region 4-RMRS Science Partner Program were particularly highlighted as programs where structured collaboration has been useful for cultivating relationships. NFS interviewees familiar with these Region 4 efforts attributed success to the dedicated and consistent leadership facilitating the effort, and to scientist funding from NFS, which incentivized co-production of research projects and products, they said. We heard turnover of personnel in leadership and effects from COVID-19 have led to the disbanding of RSAT efforts across all the regions, although interviewees noted that personal relationships formed through RSATs endure. RMRS and NFS interviewees were

divided on whether to reinstate RSATs. Some expressed an interest in reinstating RSATs to provide structure to regional and station connections. Others expressed caution about reinstating the RSATs, recalling that there were too many meetings with limited action. During our interviews with RMRS scientists we heard about the same successes and challenges with RSATs that the NFS staff members at Regional Offices revealed.

#### *Box 4: Regional Science Advisory Teams and the Region 4-RMRS Science Partner Program*

- ❖ **RSATs** were established in 2018 across the RMRS footprint (Regions 1-4), with the intent of facilitating regular and strategic interaction between scientists and managers at the regional level. Teams were composed of 8-10 scientists and 8-10 regional staff members, each coordinated by a regional office and RMRS facilitator.
- ❖ The **Region 4-RMRS Science Partner Program** launched in 2016, prior to the RSATs, was meant to enhance co-production opportunities between RMRS scientists and Region 4 NFS managers at the project level. Managers were matched with scientists to address specific management needs. The competitive BeSMART microgrant program provided funding to co-designed projects (Clark et al., 2021).

**All partner interviewees discussed primary barriers they have experienced when communicating and collaborating with RMRS.** Partners both internal and external to the USFS consistently told us they sensed a lack of strategic direction from R&D leadership guiding the deputy area's priorities, which can make it difficult to know how to collaborate with RMRS. Almost all partners thought the R&D incentive structure was problematic for collaboration. Partners shared that a primary value from research is their science dissemination products and co-produced projects, but said they were aware scientists are not rewarded for such efforts. Some suggested that there could be a system to help track practitioner needs and scientist capacity. Several partners wanted RMRS to reach out directly to discuss key management needs, requests, and feedback. Partners external to the agency said the Forest Service's emphasis on NFS creates a silo for R&D, constraining the station's ability to meaningfully partner with other land managers outside of the USFS. Several NFS and S&PF staff members at Regional Offices expressed concern that scientists are lacking morale because R&D is not highly valued within the Forest Service.

**Partner interviewees both internal and external to the USFS expressed that informal, ad-hoc interactions are the best practices for collaborating with RMRS.** We heard consistently that the strongest relationships are formed organically and are often maintained based on an individual's personality and willingness to connect. External and internal USFS partners agreed field visits, being in proximity to a lab or station headquarters, or scheduled meetings were necessary for establishing and sustaining communication with the station. For example, some expressed an interest in tours of the Missoula Fire Lab. As another example, interviewees representing the forest product industry said it is meaningful when RMRS scientists can physically visit lumber mills and have the support from the agency to do so. There was also excitement about co-locating RMRS scientists at Regional Offices for establishing more consistent interaction with managers.



## Summary and Recommendations

**Key recommendations from our interviewees are summarized in [Table 3](#), below. Comparisons between our findings and those of previous assessments are summarized in [Table 4](#). We reiterate that although some interviewees had a more national-level perspective, the majority of our interviewees worked at or with RMRS.**

**Our findings suggest there is a need for clearer strategic planning and incentives to direct research and to clarify the scope, purpose, and value of R&D.** Interviewees at all levels, from congressional staff members to Washington Office leadership, RMRS program managers and scientists, and partners, said they would benefit from clarity about the strategic priorities of R&D and better incentives to pursue these. While individual scientists wanted the freedom to direct their own research programs, they also understood that some strategic priorities could guide their work and be helpful for the overall reputation of R&D.

**Interviewees said R&D's value as a deputy area can be better distinguished and elevated to Congress, key partners, and within the agency.** Although interviewees had various ideas of who should communicate with Congress, they said there is room to diversify the actors in this space and to invest in boundary-spanning or translator roles. Interviewees said motivated communicators with strong relationship-building skills are critical in leadership positions. They also felt more could be done by those in leadership positions to understand the range of activities being undertaken by scientists.

**We also heard there are some fundamental challenges that may exacerbate perceptions that R&D is underperforming.** Interviewees said research occurs on a relatively longer timeframe than management and political cycles, and often can and should not be responsive to shorter-term political priorities. Limited career incentives and support to conduct applied research together drive scientists to pursue external funding sources, which often directs focus to problems that are not agency specific. Some possible solutions include funding, incentives, and recognition for researchers to address management priorities. Researchers also said they need support and opportunities to connect with other scientists and managers to build their programs. A primary challenge for R&D is how to incentivize and provide adequate resources to co-produce applied research with external partners and the National Forest System, while maintaining independence and autonomy in research direction.

**We found that some of the challenges about the role of research reflect, in part, internal dynamics within the Forest Service in terms of which deputy areas are higher priorities for funding.** In light of this, and some of the long-term dynamics of the research enterprise, interviewees said that R&D needs strong advocates that can explain and defend its role. Some interviewees raised the question of whether R&D should be housed within the Forest Service or as an independent research branch. Others thought that R&D should be structured not regionally, but based on key challenges or areas of research, to allow for targeted investments and improved strategic thinking about research priorities in specific topical areas.

**In line with previous reports that have investigated the USFS R&D branch, we found similar factors that complicate the ability of R&D to meet its mission but also identified some more suggestions for R&D broadly and specific to RMRS.** Other reports also have noted unclear research priorities, organizational challenges, unclear expectations for research scope, and mismatched incentive structures (see [Table 4](#)). Declines in workforce capacity and funding availability were persistent challenges found in our work and previous efforts. Previous reports recommend restructuring R&D and which actors report to Congress. Our interviewees added specific suggestions in this arena. While our interviewees suggested restructuring might be valuable, they were clear this would be a major organizational overhaul and recommended efforts focus on strategic planning and strengthening individual skills in communication. Our work also identified some specific recommendations for RMRS to improve relationships within its footprint (see [Table 4](#)).

For the next phase of this work, we will be conducting this study with a survey to encompass a wider range of R&D partners and stakeholders, be able to characterize partnerships more fully, and be able to generalize perceptions captured in this research.

Table 3 Interviewee recommendations to improve R&D

Area with opportunity for improvement	Interviewee Recommendations
Leadership	Define a strategic plan to direct research priority areas and associated research needs, and provide clarity about scope and expectations of R&D
	Build awareness and visibility to distinguish R&D's value as a deputy area
	Articulate the success, capacities, accomplishments of R&D and demonstrate this value to Congress and policymakers
	During ELT meetings, preserve committed space for formal updates from each deputy area to help build interagency awareness and empowerment to partner across deputy areas
	Diversify who communicates with Congress, for example Station Directors Program Managers, and/or senior scientists
	Improve interface between congressional staff members and WO R&D. Possibly elevate the National Program Lead (NPL) or Program Manager roles to be involved in congressional visits and boundary spanning efforts
Organizational and Institutional	Sustain the funding and workforce capacities needed to conduct science-based management. Increase and maintain travel and operational funding
	Incentivize and provide clear rewards for practitioner-oriented work
	Track outcomes, relationships, and build recognition of informal collaborations
	Support greater flexibility and understanding within the agency for the time required to create and share science communication materials
	Designate a portion of R&D time or select staff members to address rapid response scenarios for NFS
	A few said R&D could organize by complex research problems instead of by stations
Communication and co-production	Invest in liaisons or translator role(s) to help with congressional visits and to communicate with other deputy areas
	Invest in science delivery specialists at the station program level, and regional boundary spanners to connect with the WO
	Invest in science delivery specialists at the station program level, and regional boundary spanners to connect with the WO
	Leverage partners external to the USFS to help communicate the success of R&D
	Continue to co-develop products with the end-users (e.g., managers), and explore mechanisms for practitioner requests/feedback
	Encourage collaboration between stations and the regional offices in addition to intra-station efforts

Table 4 Synthesis of key findings from investigations on the R&D deputy area

<p><b>Commonalities among our findings and previous investigations<sup>5</sup></b></p>	<p><b>What is new from our findings?</b></p>
<ul style="list-style-type: none"> <li>❖ Research priorities and direction are unclear</li> <li>❖ The organizational structure of R&amp;D as an independent research organization within a land management agency makes it difficult to maintain research autonomy while being responsive to short-term needs of the agency</li> <li>❖ There are uncertainties regarding whether R&amp;D appropriately balances practitioner-oriented research (applied) and exploratory research (basic)</li> <li>❖ Research performance evaluations can disincentivize engagement with managers and science delivery efforts</li> <li>❖ There is room for realignment of career incentives, particularly to incentivize applied research targeting management</li> <li>❖ More attention in research could be directed towards applied science or science delivery with a focus on the end-user, recognizing that this science is more short-term in nature</li> <li>❖ Declines in workforce capacity and funding perpetuate the aforementioned challenges</li> </ul>	<ul style="list-style-type: none"> <li>❖ There are ongoing questions about the role of R&amp;D overall, of staff positions, and station organization</li> <li>❖ There is a need to establish a stronger strategic plan and vision for R&amp;D with clarity on expectations</li> <li>❖ Interviewees speculated about the utility of restructuring research stations and diversifying who reports to Congress. However, they say reorganization would be a major institutional commitment, and it is likely more productive to focus on creating a unified vision and ensuring personnel in leadership positions are empowered to communicate and skilled at doing so</li> <li>❖ Stations should be connected with regional foresters but in a way that maintains research independence. There are concerns about the longevity of R&amp;D if the expectation of research is to be primarily responsive to the needs of NFS</li> <li>❖ RMRS context:                         <ul style="list-style-type: none"> <li>▪ Interviewees said the station has made valuable investments in science delivery; there was interest and desire for continued efforts in this area</li> <li>▪ The utility of RSATs depends on reliable funding and long-term embedded leadership. Informal networks were seen as more valuable than structured connections</li> <li>▪ There is some lack of clarity about why the value of RMRS as perceived by partners does not translate up to leadership and policy makers</li> <li>▪ Interviewees expressed concerns over possible declines in scientist empowerment and the risks of devaluing R&amp;D’s role in the agency</li> </ul> </li> </ul>

<sup>5</sup> Dominguez et al., 2019; Jolley et al., 2017; US Government Accountability Office, 2010.

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